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RESPONSE

'Raksha Anirveda' editorial team looks forward to receiving comments and views from the readers on the content of the magazine.

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Editorial

INDIA MATTERS IN THE EMERGING WORLD ORDER

Asia dominated the global stage in the third quarter of 2021. The unexpected return of Taliban in Afghanistan, the changed dynamics of geo-political landscape in the Af-Pak region, the ongoing tense border situation between India and China, AUKUS, the first in-person Quad summit and China's burgeoning threat on Taiwan and the ongoing Sino-US confrontation have kept both the media and experts busy with interpretative acrobatics.

For India, the last three months have been challenging but rife with opportunities to accelerate its economic growth. It has seen India emerge as a reliable hub of manufacturing as well as a geography that offers resolution of global supply chain woes. India has now to act with precision and move in the right direction, for the world knows—India matters in the emerging world order.

Celebrating *Azadi ka Amrit Mahostav*, the future roadmap for India's vibrant story should focus on ways and means to strengthen its strategic autonomy and enhance military capabilities through indigenous efforts, and set in motion technology-driven economic progress to achieve self-reliance.

The start has been made. With right intent, focus and out-of-the-box thinking, efforts are on track to revive the sluggish pandemic-hit economy, uplift the confidence of industry and ensure that the ongoing reforms in military affairs continue and the domestic defence industry thrives.

The recent C-295 Airbus-Tata contract, a slew of defence orders to start-ups, SMEs and MSMEs and their hand-holding by the armed forces to further improvise their tech innovations skills and R&D have been encouraging. The government should now further strive to realise the power of collaborative economics ably supported by the competitive and consensual political landscape as these are imperative issues for the domination by Brand India.

Looking into the future, India will have to be on high alert, well prepared to confront security threats as China remains its biggest challenge regionally and globally. The yawning gap between India and global powers in technology, economic and military power should be addressed with prioritised urgency.

With the Indo-Pacific region continuing to be at the forefront of the great power rivalry, India finds itself positioned in the centre and drawn into the new competitive dynamics as an emerging power. As the first steps, India needs to have in place a National Security Doctrine, a revamped foreign policy, and an ambitious yet pragmatic space policy.

Witnessing the immense flux in the world order, without doubt, it is now a high stakes game as India finds itself seated at the high table. The challenge is to play it well.

Team ***Raksha Anirveda*** too was intensely engaged during this quarter, its effort saw realisation of two web features in August and September. Hope that the forthcoming October-December edition, with its colourful blend of content and special focus on Indian Air Force (IAF) will find wider acceptance among readers, policy makers, armed forces and industry.

Raksha Anirveda congratulates Indian Air Force on its 89th Foundation Day and extends its best wishes to IAF fraternity – *keep your spirits of bounce high and continue to touch the skies with glory*.

Jai Hind!!

Ajit Kumar Thakur
Editor & Business Director

Contents

RAKSHA ANIRVEDA VOLUME 4 | ISSUE 15 | OCTOBER - DECEMBER 2021

04 LEAD STORY

TATA-AIRBUS C-295 DEAL: A NEW CHAPTER IN DEFENCE MANUFACTURING

With the Govt clearing the mega deal to manufacture military transport aircraft in the private sector, expediting the induction of new fighter aircraft into the IAF is important

06 Sea-power and India's Maritime Options

Adopting a maritime strategic policy integrated into India's larger diplomatic and security strategy is required to make Indian Navy a potent force

12 'Effects' Thinking: Integrating High Value Capabilities to Win

The art of modern warfare hinges on the vision of a well-designed end state, perfectly integrated into the military and political efforts

26 In Conversation: Neil Hunter, Global Head - Biz Dev, Schiebel

Hunter explains the company's global footprint and its futuristic "Make in India" plan for expansion in India

58 Collins Aerospace: India is a Very Important and Strategic Market

Sunil Raina, MD - Customer & Account Management, gives a detailed account of the company's footprint, future plans and the pivotal role it has been playing to empower India

75 Pratt & Whitney: "We are Proud to Have Been India's Engine Power"

Ashmita Sethi, President and Country Head, explains the company's strategy for India and the role it has been playing as a partner to advance India's aerospace ecosystem

LEAD STORY

TATA-AIRBUS C-295 DEAL OPENS NEW

Now that the domestic manufacture of a military transport aircraft in the private sector has been approved by the government, it also needs to expedite the induction of new fighter aircraft into the IAF

By **G MOHAN KUMAR**

Airbus C-295 aircraft

The recent approval by the Cabinet Committee on Security of the Tata-Airbus project for the acquisition of the C-295 light transport aircraft for the Indian Air Force (IAF) opens a new era in defence manufacturing. For the first time ever a military aircraft will be fully manufactured in India in the private sector. Tata Advanced Systems Ltd (TASL) will have the unique distinction of undertaking this $3 billion project in collaboration with Airbus Defence and Space (Spain).

The IAF had been planning for a long time to replace the vintage Avros (HS-748) and the AN-32 but the delay in the Ministry of Defence (MoD) finalising the procurement has kept them waiting for years. In 2014 the Defence Acquisition Council of the MoD decided to invite offers from Indian vendors under the 'Buy and Make (Indian)' category to procure 16 medium transport aircraft in fly-away condition and manufacture another 40 in India in collaboration with an original equipment manufacturer (OEM). The emphasis was on finding an Indian vendor who would be able to manufacture the aircraft in India in pursuance of the Make in India initiative.

It was the first attempt to involve the private sector in the full-fledged integration of a military aircraft in India, a tall order considering the fact that there was hardly any Indian firm having such a track record except the defence public sector undertaking (DPSU) Hindustan Aeronautics Ltd (HAL). For many years private sector firms had been involved in offsets relating to aerospace but these firms have been engaged in low-end products that do not involve high technology.

The RFP however got stuck because of the fact that the Tata-Airbus proposal was the only offer received. Single vendor proposals are not favoured in the MoD as it implies imperfect price discovery, a situation that calls for onerous negotiation rounds and acceptance of accountability for any overpricing. The result was protracted negotiations for nearly five years before the MoD finally decided to go ahead with the deal. The fact that the proposal was made under a competitive bidding could have been sufficient reason for the acceptance of the proposal. This wisdom seems to have dawned on the MoD after the passage of several years. The delay must definitely have led to partial obsolescence of the originally chosen model of the aircraft but it is better to be late than never. The fleet of the vintage Avros had to be replaced at the earliest.

Under the 'Buy and Make (Indian)' category of the defence acquisition procedure, the overall indigenous content for the domestically manufactured portion of the contract has to be not less than 50% in cost terms and the transfer of technology between the OEM and the Indian partner will have to conform to this requirement. Considering India's past record of technology assimilation this looks unrealistic. One only has to look at the outcome of our defence offsets administration to understand the myth of technology transfer. The working of offsets contracts, even if they are done by leading Indian

CHAPTER IN DEFENCE MANUFACTURING

The Indian Ministy of Defence and Airbus Defence and Space, Spain, signed a contract for procurement of 56 C-295 aircraft for the Indian Air Force

companies like the TASL, has resulted in the manufacture of low-end products like nose cones and helicopter frames.

Many of India's much touted technical collaborations, including those with Russia, have not made any dent in transfer of technology. When the US government talks about transfer of technology it could mean only the transfer of the right to use their weapons, which in turn implies that India will buy their weapons without having any illusions about acquisition of key technologies. Many collaborators treat the 'built to print' mode of working with Indian firms as technology transfer where the Indian collaborator only has to produce a product according to the drawings provided by the OEM. Therefore it is only to be expected that the manufacture of the C-295 will result only in marginal transfer of technology through the 'built to print' mode with very little transfer of the 'know why'. So we have to be realistic about technology transfer and the TASL will have to work hard with the tech ecosystem of small and medium firms to eventually indigenise the technologies and initiate further R&D to improve upon the products.

These limitations notwithstanding, the fact that the new military aircraft is being assembled by an Indian private sector company is significant in itself. It will expand the current aerospace ecosystem and lead to huge efforts at innovation, enabling several small companies to integrate with the global value chain, making them capable of catering to the export market. Many of them can also aspire to be future suppliers of Airbus not only in the military space but also in the civil domain. Manufacturing the C-295 aircraft for export to other countries could also open new pathways for innovation. By assembling the aircraft, TASL will have the unique opportunity to graduate to the level of an integrator capable of handling other products of similar nature or even fighter aircraft.

Now that the domestic manufacture of a military aircraft in the private sector has been approved by the government, it also needs to expedite the induction of new fighter aircraft into the IAF. The fast depletion of the IAF fighter squadrons and the need to replace them expeditiously are irrefutable facts that have to be faced. On the lines of the LCA manufacture programme, which recently got a boost under the government's 'Atmanirbhar' mission, the MoD needs to take up the manufacture of a new line of fighter aircraft under the strategic partnership programme. There is every reason to pursue the IAF's proposal for acquiring a new set of 112 aircraft for which an RFI had been floated earlier. If this is done it will lead to a buzz of activity in the aerospace domain leading to huge capacity development, which will come in handy when the development of the Advanced Multi-Role Combat Aircraft (AMCA) is undertaken. Rather than leave it to the DRDO, the MoD needs to forge a public-private partnership to make this mission successful.

–The writer is a former Defence Secretary. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

ON THE LINES OF THE LCA MANUFACTURE PROGRAMME, WHICH RECENTLY GOT A BOOST UNDER THE GOVERNMENT'S 'ATMANIRBHAR' MISSION, THE MOD NEEDS TO TAKE UP THE MANUFACTURE OF A NEW LINE OF FIGHTER AIRCRAFT UNDER THE STRATEGIC PARTNERSHIP PROGRAMME

STRAIGHT DRIVE

Cochin Shipyard

SEA-POWER AND INDIA'S MARITIME OPTIONS

Adopting a 'whole of government' approach, a maritime strategic policy integrated into India's larger diplomatic and security strategy is what is required to realise the full potential of the Indian peninsula's geographical advantage and to make the Indian Navy a potent force

By **ADMIRAL ARUN PRAKASH**

It is ironic that it took the Sino-Indian confrontation in the Himalayan heights, more than 2,000 km from the sea, to bring sharp focus on India's neglected maritime domain. The Chinese were obviously surprised by India's military response, backed by firm political resolve, and this, probably, influenced their decision to commence disengagement in March this year. But even in the unlikely event that the status-quo ante is restored along the LAC, China's territorial transgressions have imposed heavy costs on India, which cannot be ignored.

While the political consequences of these intrusions may be manageable, it is the price being paid, in terms of far-reaching economic and security penalties, which is cause for concern.

To compound an already complex security matrix in South Asia, we have seen the precipitate withdrawal of US and NATO forces from Afghanistan, and the virtual abandonment of the country to a barbaric Taliban regime.

Given the huge stakes that Pakistan, China, Russia and Iran have in Afghanistan, the emerging power-play is bound to have a deep impact on India's security. This calls for a well-thought-out strategy by our diplomats and contingency-planning by the military.

In the context of our own security, we must face the stark reality, that given the huge asymmetry—economic, military and technological—between the two Asian giants, and the active China-Pakistan nexus, the best that India can hope for, is stalemate on its northern and western land borders. So, are there any options in the maritime domain that can help checkmate China?

While the Indian Navy (IN) has clarity about its roles and capabilities, in the Indian Ocean as well as the larger Indo-Pacific, one is not sure how well maritime affairs and the employment of sea-power are understood in Raisina Hill.

There is, however, a vague, emerging view, that India's sea-power, perhaps on its own, but certainly in partnership with others, can exert significant leverage vis-à-vis China, and prevent it from undertaking actions inimical to India's interests.

MARITIME COERCION?

British historian, Prof. Geoffrey Till has suggested that, since "The costs and uncertainties of war are so, potentially horrendous, that the use of coercive force to influence behavior of others and to get them to do what you want them to by means, well short of war…" is worth exploring." Naval coercion was the instrument used by European powers, from the 15th century onwards, to colonise the East, and Indians must never forget it.

The practitioners of sea-power, as well as our political masters would be well advised to study the historic use of maritime power in depth, and while doing so, they should pay heed to what another historian, Julian Corbett, had to say:

"Since men live upon land and not upon the sea, great issues between nations at war, have always been decided, either by what your army can do against your enemy's territory and national life, or else by the fear of what the fleet enables your army to do."

For many years, under the influence of Admiral Mahan's writings, we had imagined that the raison d'etre of navies was only to engage the enemy in a big battle at sea, and plans were shaped accordingly. However, the lessons that emerged over time, clearly conveyed that navies, like ours, cannot achieve any decisive results by conducting maritime operations in isolation. Our doctrines, now acknowledge that, unless the navy's actions at sea have a strong linkage, with events on land, its potential would be wasted.

A bigger struggle that India's naval leadership had to wage for many years, was in trying to persuade our land-oriented decision-makers that India's security as well as destiny was heavily dependent on the oceans surrounding this peninsular nation. Many factors have contributed to bring about the change in attitudes, but we still have a long way to go before maritime power receives its due in India.

THE DOCTRINAL VOID

That India should have a navy, has never been a matter of contention, and yet, no serious debate ever took place about its size, shape and roles; thus, leaving us in a doctrinal void. Even after 71 years as a sovereign republic we lack a clearly articulated statement of national interests, aims and objectives. This strategic vacuum had tended to deny the IN a contextual frame of reference, and that is why we did not produce a maritime doctrine for many years.

History shows that there is little point in accumulating military power, unless there is clarity about doctrine and strategy to guide its employment. There are many past examples of countries like Indonesia, Egypt, Syria, Iraq, (and now Afghanistan) which were amply endowed with foreign weaponry, but failed, in conflicts, because their planning and operations lacked doctrinal underpinning and forces lacked motivation.

For many years, India, too, has suffered from a lack of doctrinal clarity; not only at the highest political level where Grand Strategy is to be formulated, but also amongst the Service HQs and war-fighters. In order to address this vacuum, the IN, during the first decade of this century, took up the challenge of drawing up a roadmap to synergise its maritime endeavours.

In October 2005, Naval HQ issued a Maritime Strategy, which became the companion volume to the Maritime Doctrine which had been issued in 2004.

The Strategy and Doctrine were logically followed by a blueprint for naval force development titled, 'Maritime Capabilities Perspective Plan; 2005-2022,' which set out the capabilities and hardware required.

While figures ranging from 190

ONE IS NOT SURE HOW WELL MARITIME AFFAIRS AND THE EMPLOYMENT OF SEA-POWER ARE UNDERSTOOD IN RAISINA HILL

INS Vikrant

STRAIGHT DRIVE

INS Karanj, the 3rd Kalvari Class Submarine, Commissioned at the Naval Dockyard in Mumbai

to 300 ships had been mentioned from time to time, NHQ decided to be as realistic as possible, by using conservative figures for GDP growth rate, defence budget and the navy's share, and sought a stabilized strength of about 150-170 ships and submarines, and 350-400 aircraft, helicopters and unmanned aerial vehicles. All these documents have been revised and updated during the past decade.

UTILIZING SEA POWER

The end of the Cold War brought winds of change in foreign policy and saw India responding to US overtures, which eagerly sought military to military cooperation with India. The IN took a lead by initiating the first ever Indo-US naval exercises, named 'Malabar,' which became a precursor for bilateral exercises with at least a dozen other navies.

India's growing dependence on seaborne trade and energy supplies, coupled with its demonstrated naval capabilities saw growing acceptance of its role as a regional maritime power.

Despite the absence of any joint contingency planning, the conflict arising from Pakistan's 1999 incursion into Kargil saw the IN undertaking the mobilization and concentration of both Western and Eastern fleets in the Arabian Sea. This overt display of maritime muscle sent the appropriate message to Pakistan. Fearing the imposition of a blockade or 'maritime exclusion zone,' the Pakistan Navy ordered its units to stay in harbour.

The 2004 tsunami marked a defining moment which established the IN as a credible regional force of substance. The navy's ships, aircraft and helicopters sped, to render humanitarian aid and disaster relief (HADR), not just to India's own stricken citizens but also to its Sri Lankan, Maldivian and Indonesian neighbours in distress.

IN operations, now, extended far and wide across the larger Indian Ocean and even beyond. While mounting sustained anti-piracy patrols off the Horn of Africa, it reacted, with alacrity, to many HADR situations in our extended neighbourhood.

Closer home, the Mumbai terrorist strikes of November 2008 provided a grim reminder that the maritime domain constituted a huge liability which India could neglect only at great peril.

Of the numerous, sea-power-related issues that bear review or scrutiny, I take up just two, that have most relevance to the topic under discussion: foreign cooperation and warship building.

NAVAL COERCION WAS THE INSTRUMENT USED BY EUROPEAN POWERS, FROM THE 15TH CENTURY ONWARDS, TO COLONISE THE EAST, AND INDIANS MUST NEVER FORGET IT

FOREIGN COOPERATION

For many years, China's, so-called, 'string of pearls' and, the more recent, 'maritime silk route' strategy has been causing concern in New Delhi. The obvious answer, was for India, to craft a long-term counter-strategy, based on economics, geo-politics and hard, as well as soft-power.

The Navy had an important role to play, in this, because after its sterling performance during the 2004 tsunami, and in many subsequent episodes of natural disasters and civilian evacuations from the Middle-East and Africa, India's neighbours expected prompt assistance from the IN in times of need.

Our smaller neighbours sought maritime security; either through direct naval presence, or through requests for material aid, training assistance and advice. Our response to such requests was not always prompt due to lack of coordination and synergy between Naval HQ, MEA & MoD. Lengthy delays were seen, by our smaller neighbours, as lack of urgency, or even as indifference, and they often chose other alternatives.

After futile attempts to create a 'whole of government' approach to this issue, NHQ decided to invest its 'naval diplomacy' with a degree of limited autonomy. This was done by: (a) creating a new organization which would deal exclusively with the navy's foreign cooperation programmes, and (b) by rendering material assistance from within NHQ resources, keeping MoD and MEA informed.

Thus, in the first year, we pulled out surplus hardware, including an offshore patrol vessel, two patrol boats and three light reconnaissance aircraft and gifted

them to neighbouring navies garnering much goodwill.

Thus, foreign cooperation, as a vital component of the IN strategy, has not only to enabled it to create friends and partnerships, but also to familiarize itself with the future battle-space.

WARSHIP BUILDING

There was a time, when the IN appeared to be one of the world's fastest growing maritime forces. But even then the picture was not entirely rosy for two reasons. Firstly, the public-sector shipyards, with one exception, did not rise to the occasion and their slow production rates have been inadequate to sustain the desired force-levels. Secondly, the Russian military-industrial complex on which India's warship building industry remains heavily dependent, for machinery, weapons and sensors, suffers from problems of quality-control and lack of response.

A closely related aspect and a second area of concern is the low level of home-grown technological inputs into 'indigenous' warships. Despite the Navy's determined support to indigenous industry, all types of engines, most weapons, sensors and other systems installed on-board are still imported. This external reliance has created a dangerous security paradigm in which every new weapon system acquired from abroad creates dependency for the life-time of the system.

Persuading the defence R&D establishment to develop, reverse-engineer or buy/import weapon and sensor technologies for Indian-built warships will constitute a major challenge for future growth of the IN.

The recent ban, by the government, on import of certain items of defence hardware, under the Atmanirbharta campaign, may be well-intentioned, but requires modification. A ban on import of a destroyer, fighter or submarine may sound fine, but what about the engines, radars, weapons and other systems that still have to be imported? This ban will be productive, only if we, simultaneously, push an integrated programme for indigenous development of key technologies.

Against this backdrop, let us, now, discuss the options that sea-power has to offer in the domain of national security.

INDIA'S MARITIME OPTIONS

In the current scenario, given Chinese intransigence and our misreading of their expansionist intent, Sino-Indian tensions are likely to persist. If India is not to cede ground physically or diplomatically, it must muster all elements of its 'comprehensive national power', including sea-power, and create a strong negotiating position.

This seems all the more reason for India to try shifting the confrontation to 'sea-level', where its geographic advantages, tilt the asymmetry in its favour. In a longer-term perspective, two readily available options that need serious examination by India are 'naval coercion' and 'naval diplomacy' or coalition-building.

Naval coercion comprises two closely related dimensions; deterrence and compellence. Acts of deterrence are aimed at preventing a particular act, by showing the adversary that the costs will outweigh the benefits. It is based on potential, rather than actual use of force, and since it is a psychological phenomenon, its effectiveness is based on the clarity of aim, as well as resolve, demonstrated by the political leadership.

The other requirement for effective deterrence is to create a sufficiency of maritime power to include air-power—ship-based as well as land-based—and missile-armed warships and submarines. The IN, in spite of fiscal constraints, has emerged as a compact but professional and competent force, and India's fortuitous maritime geography will enable it to dominate the Bay of Bengal and the Arabian Sea.

India's favourable maritime geography enables the peninsula to dominate both the Bay of Bengal and the Arabian Sea. This geographical disposition highlights the advantages of its 'interior lines of communication' as compared to 8,000-10,000 km long 'exterior lines' that separate Chinese naval bases from Indian Ocean locations. We must, however, bear in mind that the PLA Navy is underpinned by a powerful economy and supported by an efficient and prolific shipbuilding industry.

Apart from boosting the navy's capabilities, fortification of the A&N Island chain, located astride the mouth of the Malacca Strait, will add, significantly, to naval deterrence. By maintaining surveillance, over the exits from the South China Sea, India can create a 'forward maritime defensive line.'

This brings us to the other aspect of naval coercion, 'compellence', which by threat of force, obliges an adversary to do something or behave in a certain way. During wartime, trade warfare and 'commerce raiding' are feasible strategies and belligerents may declare an 'exclusion zone' or naval 'blockade'; denying entry and exit to all merchant shipping from the latter's ports. In peacetime, however, a different set of rules apply.

HISTORY SHOWS THAT THERE IS LITTLE POINT IN ACCUMULATING MILITARY POWER, UNLESS THERE IS CLARITY ABOUT DOCTRINE AND STRATEGY TO GUIDE ITS EMPLOYMENT

STRAIGHT DRIVE

Naval vessels sail in formation while conducting RASAPs as part of the Malabar Exercises

THE RECENT BAN BY THE GOVERNMENT ON IMPORT OF CERTAIN ITEMS OF DEFENCE HARDWARE, UNDER THE ATMANIR-BHARTA CAMPAIGN, MAY BE WELL-INTENTIONED, BUT REQUIRES MODIFICATION

Given that China is the world's largest trading nation, its seaborne trade and energy imports constitute a vulnerable 'jugular vein,' and regardless of buffer stocks, any disruption or delay of shipping traffic could upset China's economy, with consequent effects on industry and morale of population. Therefore, launching 'maritime interception operations' which involve stopping and boarding or diverting Chinese merchant shipping, especially oil and gas tankers, could constitute a useful option for compellence.

Coming finally, to collaborative naval diplomacy and coalition-building to secure foreign policy objectives. In this context, two templates are available to India: 'Malabar' and the Quadrilateral Security Dialogue or 'Quad.'

'Exercise Malabar' goes back to 1992, when India and the US first established military-to-military relations. With a brief interregnum, in the aftermath of our 1998 nuclear tests, Malabar has been ongoing for nearly three decades. It has evolved from a bilateral event involving just the Indian and US navies, to a tri-lateral that embraced Japan, in 2015, and now to a four-cornered naval drill that also includes, Australia. Year 2021 saw the 26th edition of Malabar being conducted in the Philippine Sea, with all four navies participating and US playing host.

The Quadrilateral or 'Quad,' on the other hand, traces its origins to the great Asian tsunami of December 2004, when the IN was joined, by navies of the US, Australia and Japan to form a Joint Task Force, and a 'core group' of senior diplomats representing the four powers was formed to coordinate relief efforts. This Quadrilateral Security Dialogue became the 'Quad.'

China's extreme concern about Malabar as well as the Quad arises from the suspicion that they are precursors to a US-initiated strategy of 'containment.' So far, China has succeeded in intimidating most of the Quad members, who have remained extremely reluctant to take a firm stand vis-à-vis China's aggressive conduct.

While Quad and Malabar have served a useful purpose, a reappraisal of both concepts is overdue. For India, which faces a massive Chinese military mobilization on its borders, accompanied by blatant territorial claims, the time for ambivalence is over. While preparing to fight its own battles, it is time for India to seek external balancing, via the maritime domain. Using the Quad and Malabar templates, it needs to give concrete shape to these alliances and partnerships, so that China gets the right message.

CONCLUSION

History shows that neither appeasement, nor empty rhetoric has deterred hegemonic powers. India has, with considerable exertion and at substantial expense, stabilized the military situation in Eastern Ladakh for the time being.

But we face an adversary who is ruthless, ambitious and unpredictable. Today, real-politik demands that India takes necessary steps to ensure a favourable regional balance-of-power through cooperation and partnerships; striking short-term alliances if necessary.

Sea-power is a potent and flexible instrument that can be used to convey messages and influence events through the use of a broad spectrum of naval actions, ranging from coercion at one end, to naval diplomacy or coalition-building at the other end. But for this to happen, navies, bureaucracies, diplomats and statesmen need to evolve a strategic approach to maritime power and integrate it with the country's diplomacy and larger security strategy. The navy has done its bit in the fields of doctrine and strategy, it is, now, up to our security decision-makers to evolve a 'whole of government' approach.

–The author is a retired Navy Chief. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

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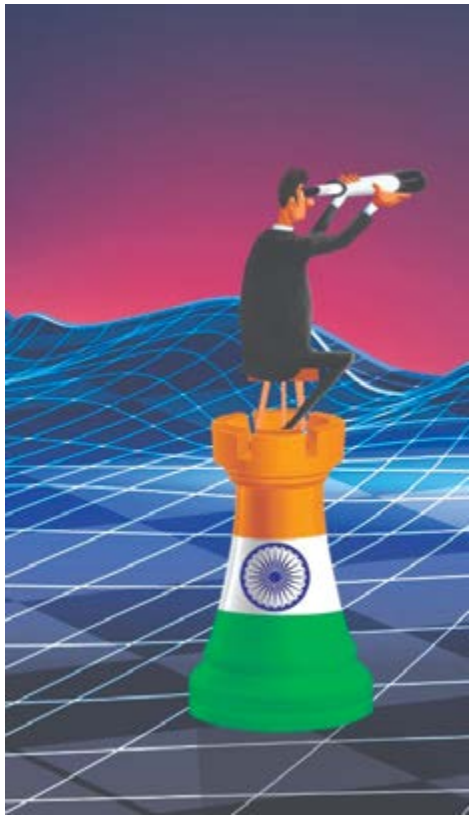
ANALYSIS

INTEGRATING HIGH VALUE CAPABILITIES TO WIN:

The top-down approach in the art of modern warfare hinges on the vision of a well-designed endstate that is perfectly integrated into the military and political efforts that focus on achieving specific effects

By **NATALIA FREYTON**



As any other country with its strategic interests and international standing at heart would, India is thinking about the future of its defence system. Facing adversaries such as Pakistan, and China to an even greater extent, it is wisely considering the potential confrontation of high-tech capacities, in confined inter-services areas which require real-time and global monitoring, if they are to allow operations to be properly commanded.

This requires systems to manage information, to exchange and integrate data, and to communicate.

While we yield to experts on these technical and operational subjects, we choose to draw the reader's attention towards the fact that mastering these developments may be a necessity, but is entirely insufficient, in the art of warfare, to reach success.

It is indeed useless, if it is not part of a broader and more sustainable approach, which links these developments to a global understanding of strategy and operations, and ensures a seamless continuity between the accurate, relevant and articulated control of the ends, on the one hand, and the synchronised implementation of means, on the other.

The keyword, in this art, is integration. And, more to our point, "effect integration".

In lieu of introduction only, as complete command of the subject is the object of entire curricula in Western war colleges, and the daily work of command centres of all kinds, we shall present in this article a few key-ideas around the notion of effect thinking.

Before we do so, let's put an end, once and for all, to the simplistic objection which states that, given the moderate success of Western military engagements over the past couple of decades, the pitiful departure from Afghanistan being the sad epitome, the manner in which these campaigns were designed and executed makes a poor case, and should be abandoned.

This is a mistake: the method is not the problem, it is even the synthesis of what the West has done best, over the past century (the West being taken in its broader sense, including Soviet Russia), the ingredients within are the problem.

And, first and foremost, the political intentions and objectives, which translate into the relevance of results. A poorly-designed political intent, or an unrealistic one, or one designed regardless of geopolitical and strategic realities, are all it takes to skew the entire reasoning.

We will therefore be examining "effect integration", and two steps in the reasoning method. The former involves defining the "what" which is to be obtained, otherwise known as designing the effects. The latter will be the "how", or the planning of actions intended to achieve this effect.

Let's take them one by one.

WHAT DO WE WANT TO ACHIEVE?

The "what": the name of the game, here, is to define what we want to achieve with the campaigns (be they military or other, but more on that later on) at hand.

Effects are defined as the change which occurs in the physical state of a system (aerial defence, energy production, banking or road infrastructure...) or in the physical or psychological state of a human agent (which can be individual, like a head of State, or collective, like a reserve army) after an action or a series of actions, or even the absence of actions. This question,

A BRIEF INTRODUCTION TO 'EFFECTS' THINKING

ILLUSTRATION BY: BUDHA CHANDRA SINGH

as suggested above, must even be asked at the political level: what does the political decision-maker want, on the political and strategic level?

The military level has a key-role in leading its political chief to ask himself the right questions, and to answer them. Moreover, military leaders can and must help their political chiefs, in terms of methods of thinking. They must even, should the need be, not hesitate to oppose biased reasonings. On this, hinge the efficiency of future actions, overall success, and the life or death of the men and women deployed on active battlefields, and many other factors. The courage of great military leaders also lies here.

The question of change focuses on the parameters of a given situation. Which changes do we want to achieve within an initially unsatisfactory situation, or which absence of change do we wish to guarantee on satisfactory parameters? Starting with what NATO calls the endstate, of political essence, we will focus on all the sub-parameters which lead to it: diplomatic, economic, social, legal, financial, cultural, informational and, naturally, military.

What is their current state, are we satisfied with it, and in what future state should these parameters be in order to contribute to the endstate. How does each one break down in particular items, and how are they linked to one another (we then speak of a systemic study)?

Based on this, which alterations should be operated on all or part of these parameters at the N-1 level, in order to achieve the desired change on the N-level parameters. These questions address parameters which can be more or less granular, according to the level of focus (political, military, operational or tactical): the higher up we consider things, the larger and more global these parameters are. The lower we go, the more precise and potentially selective these parameters will be.

Thus, the national defence agencies of a power such as India will consider all factors, at the global level, or at least at the Indo-Pacific level, whereas the lower commander of an Indian Land Component will only consider what is part of his future area of action: local players, air-land military power balance, characteristics of the geophysical environment within his reach...

As a result of this study, we have a tree structure of all intermediate effects, on the parameters of the situation, which enable shifting from the initial state to the endstate.

In other terms, what we are talking about is the design and definition of means, articulated amongst one another within space and time. This tree structure can be organised by dominants, which NATO refers to as "lines of operations".

In the work of a military staff, everything revolves around interdisciplinarity, information exchange, shared understanding, and breathing between the contributions of experts on the one hand, and the construction of a global vision on the other. This is a necessity in the staff's work, and ideally for the reasons

A POORLY-DESIGNED POLITICAL INTENT, OR AN UNREALISTIC ONE, OR ONE DESIGNED REGARDLESS OF GEOPOLITICAL AND STRATEGIC REALITIES, ARE ALL IT TAKES TO SKEW THE ENTIRE REASONING

ANALYSIS

EFFECTS ARE DEFINED AS THE CHANGE THAT OCCURS IN THE PHYSICAL STATE OF A SYSTEM OR IN THE PHYSICAL OR PSYCHOLOGICAL STATE OF A HUMAN AGENT AFTER AN ACTION OR A SERIES OF ACTIONS, OR EVEN THE ABSENCE OF ACTIONS

stated above, it is theoretically even more vital in the interdepartmental work which should rule upon the definition of political ends.

Alas, only a handful of countries have understood this and integrate this into their decision-making processes, beyond partisan squabbles, ego confrontations, and actions only led by particular interests, may they stem from individuals or organisations.

HOW DO WE CHOOSE TO ACHIEVE WHAT WE WANT?

The "how": Once the objectives have been sequenced and validated by the appropriate-level authority, and the authority of the level above, the staff's work is to elaborate the "how", which are the options to reach the effects previously defined. This phase, which gradually brings us towards action, requires us to elaborate the modes of action, the combinations in time and space of the resources at hand, according to each one's ability to achieve all or part of the desired effects.

This task, which calls upon the particular expertise of each capacity which can be mobilized (hence their representation in, for example, joint HQs as specialized cells: land, sea, air and cyber), must be carried out not only for friendly forces, but for the enemy as well (insofar as we understand its doctrines and capacities).

Furthermore, and this is a key element of the modern-day development of these methods, it must be performed with regard to all of the players we will be interacting with, and whose actions can interfere with ours, and those of the enemy.

To remain stuck in a dual representation of operational engagements, when at an operative or strategic level, amounts to keeping a subordinate mindset, suitable to a company or battalion commander, and leads to overlooking the operational realities from above, necessary to operations leadership.

At the end of this collective and interdisciplinary endeavour, the leader will choose amongst various action hypotheses. Once the choice is made, it is clearly laid out in an OPLAN, which links the desired effects with the actions which are planned to achieve them.

NO ACHIEVEMENT WITHOUT CLEAR AND REALISTIC VISION

Once the political greenlight has been given, the time has come for operational engagement, and the shift from operational design, which comes from abstraction from reality and designed to give bearings to an entire system, to actual confrontation to reality.

As previously noted, if the representation of reality was flawed and biased during the design phase, by ideological misconceptions, centrifugal interests or a lack of courage on the staff officers' part to correct their superior, or even from the highest ranking officer's part to correct the political decision-maker if they think are being misled, there is a high chance that the plan will not survive the first musket-shot.

Should this occur, having the most advanced equipment, the strongest-willed men, and the most advanced real time command-and-control information systems, the most one can hope for is a handful of tactical victories. The path will then be set, from half-victories to actual defeats, in the hope to achieve an ill-designed endstate, on the basis of flawed reasoning.

This will be all the more the case, if the players, both military and political, collectively remain in a purely-military perspective, despite claiming otherwise and stating that they aim for a global resolution of crises. This would amount to simply forgetting about the existence of half of their arsenal, with all of the power tools of "*Unrestricted Warfare*", which Chinese officers brilliantly theorized 20 years ago. We will perhaps have a future opportunity to look deeper into this.

– The writer is a defence and security industry consultant having varied experience working with medium and large companies majorly in European market. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

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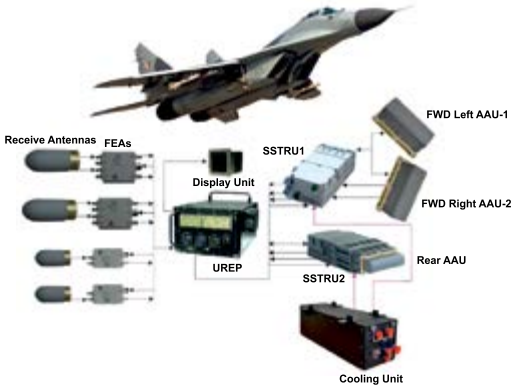

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COVER STORY

REALITY CHECK ON QUAD AND AUKUS: INDIA'S PERCEPTIONS AND OPTIONS

Two developments, the first in-person Quad Summit and the formation of AUKUS, have redefined India's regional geopolitics. For India, it's time to recognise the opportunity and take calibrated pro-active actions to redress the asymmetry it faces

By **AMB. MAHESH SACHDEV**

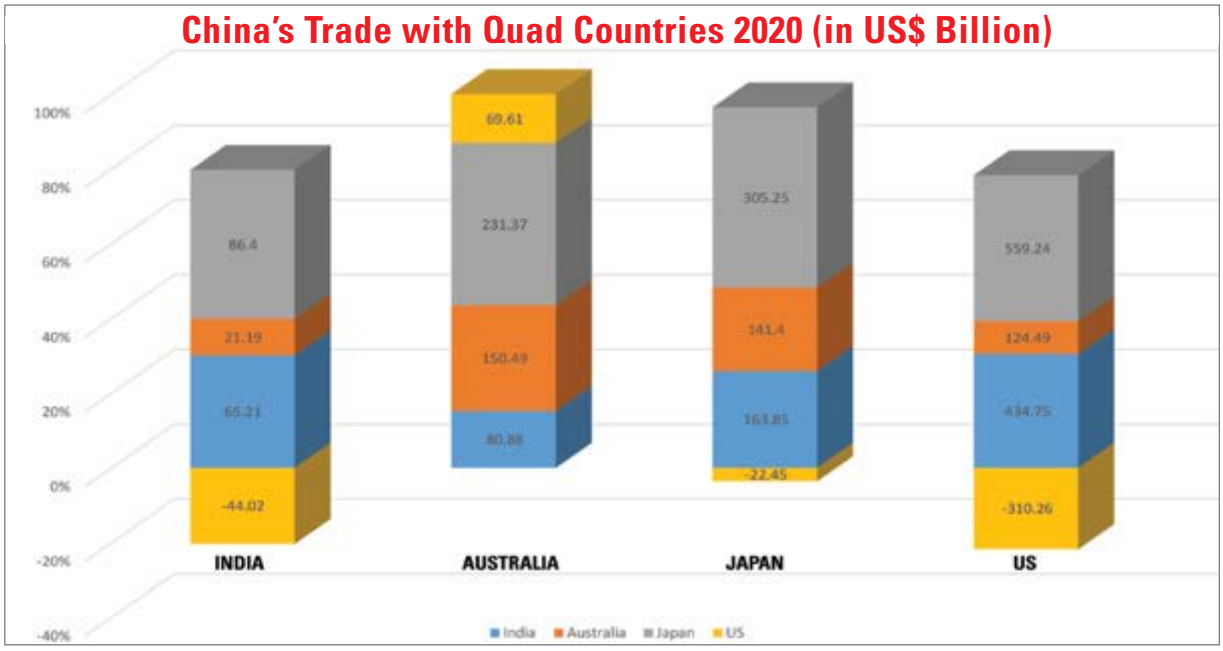
Now that the Quad's Washington Summit is over and AUKUS has joined the political lexicon, we can perhaps stop plumbing the media equivalent of the Mariana Trench in Indo-Pacific and let the thought nuclear submarine come to the surface. Once its crew has decompressed, the view is bound to be more prosaic and less Prozac-induced. Indeed, several deep-dived observations would then appear flawed. The following facts need to be kept in mind:

CHINA'S TRADE WITH QUAD COUNTRIES 2020 (IN US$ BILLION)

	India	Australia	Japan	US	Total
Imports from China	65.21	80.88	163.85	434.75	744.69
Exports to China	21.19	150.49	141.40	124.49	437.57
Total Trade	86.40	231.37	305.25	559.24	1182.26
Trade Balance	-44.02	+69.61	-22.45	-310.26	-307.12

For one, the pack of 8 nuclear submarines, the supposed game-changing opening salvo of AUKUS, is unlikely to be operational before 2030.

Secondly, the economies of the Quad countries are significantly intertwined with China, making a mutual decoupling between such frenemies is not only going to be difficult but also time-consuming and costly. The table below shows, the total trade between China and the Quad countries is well over 1.18 trillion dollars, with China perhaps being the top trading partner of all the four countries. In addition, the cumulative investments in China by the US, Japan and Australia, three



of the Quad countries, stood at (in USD billion) 123.9, 130.3 and 64 respectively. Finally, although most of the 50 million Chinese overseas diaspora is in ASEAN countries, it also has a substantive presence in Quad countries: the US (5.1 million), Australia (1.2 million) and Japan (0.9 million). These People-to-people contacts cannot be ignored.

Thirdly, China has tied up most of its neighbours (notably Russia to ASEAN, Pakistan and Iran) to its apron strings through such devices as BRI, various bilateral and multilateral trade and investment pacts, so isolating it may be impractical.

On other hand, US history is replete with attempts to contain its detractors by universal but unilateral action, from the Monroe Doctrine of 1823 to the ongoing sanctions against Iran. After a protracted Cold War, the dismemberment of the Soviet Union in the early 1990s was seen as the success of its containment policy. However, in this existential pursuit, Washington cosied up to Beijing since 1971 and indulged the latter – from abandoning Taiwan to the UN Security Council's permanent seat. Beijing's open and privileged access to the American capital, technology and markets for nearly half a century played no small part in creating a supersized China. This lavishing of China continued for nearly three decades after the Berlin Wall came down. West's current demonisation of China is blowback on half a century of their fascination with Beijing, often at India's expense.

A finer point in the US containment strategy is its duality: militarily, a coalition of willing is created, often in tandem with an overlapping regional politico-economic structure to shore up the dominoes. Thus, NATO and the European Community were created almost simultaneously to contain the USSR and Warsaw Pact. Similarly, the Vietnam War led to the ASEAN complementing the ANZUS. Therefore, it is hardly surprising that AUKUS and Quad are the latest Avatars of this well-worn strategy to contain China.

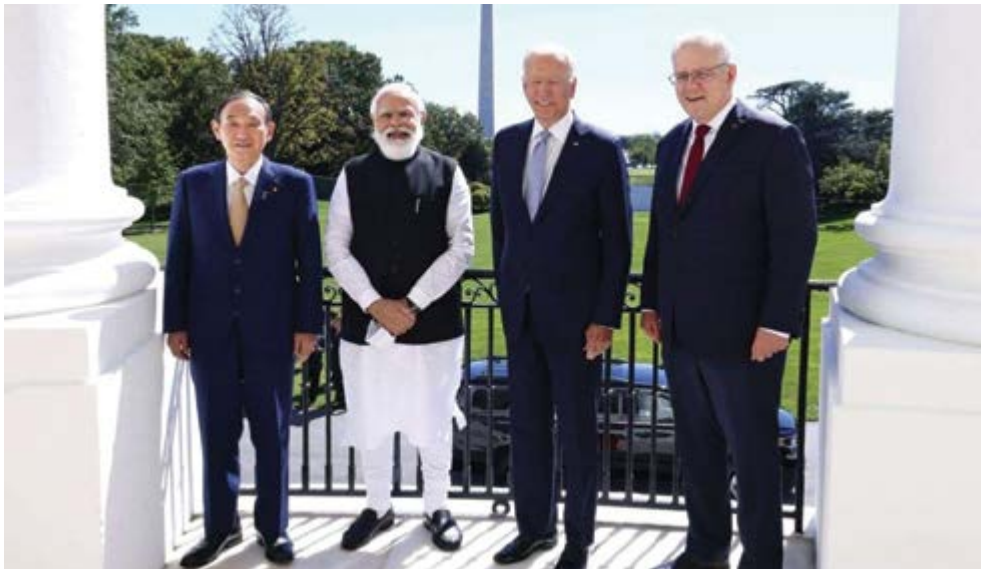
Under AUKUS, Australia will get a new class of nuclear submarines

Representational Map showing Quad Countries

However, there are likely to be several systemic complications this time: At the peak of the Cold War, the USSR's nominal GDP was one-seventh of the US. This time China's nominal GDP is nearly 60% of the US and China is said to have already overtaken the US GDP in PPP terms. Moreover, the Chinese seem to be preparing for some time for this "mother of all battles" with the US-led coalition. With some conjecture, it is possible to interpret the recent string of geostrategic events – from the Wuhan pandemic to South China Sea territorial grab and from Himalayan scruffle with India last year to the end of term limits for President Xi at the last Party Congress – as pre-emptive actions taken by the Chinese leadership to seize the offensive.

Nevertheless, a new all-out Cold War is not inevitable and the two main protagonists have taken some steps to diffuse the tensions. On September 9, less than a week before AUKUS formation, Biden and Xi talked to each other

COVER STORY



PM Narendra Modi with Quad members - US President Joe Biden, Japanese PM Yoshihide Suga and Australian PM Scott Morrison

for the first time. Similarly, on the day of the Quad Washington Summit, the US authorised the release of Huawei Technologies owner's daughter Meng Wanzhou from house arrest in Canada. Moreover, the two sides have also eschewed fire-eating rhetoric at the UN General Assembly's annual session, even as Chinese leadership has leveraged the growing friction domestically to add a twisted "Wolf-Warrior" narrative to the ongoing centenary celebrations of the Chinese Communist Party.

Semantics apart, a strategic rivalry between China and the US seem to be taking shape, even as its contours are still to emerge. However, in the era of Mutually-Assured Destruction, Supply Chain imperatives and globalisation, it is likely to be differently nuanced. It would be waged less at any killing fields, more at the board rooms, start-ups, trading floors and technical standard-setting sessions. Both sides are prone to miscalculations. The US presumption of technical superiority is as questionable as the Chinese leadership's overconfidence in their better governance and their belief in the West's terminal decline.

WHERE DOES THIS ESCALATING DRUMBEAT LEAVE INDIA? WE ARE THE ONLY QUAD COUNTRY THAT SHARES A LAND BORDER - OVER 3,000 KM LONG, NON-DEMARCATED AND PERIODICALLY CONTESTED - WITH CHINA

Where does this escalating drumbeat leave India? We are the only Quad country that shares a land border - over 3000 kms long, non-demarcated and periodically contested - with China. This quasi-adversarial relationship situation is further exacerbated by Beijing's barely-concealed geopolitical hostility for India, from keeping India away from membership of relevant international organisations to active encouragement to our South Asian neighbours – notably Pakistan, Nepal, Myanmar and Sri Lanka – to move away from us. Lastly, despite recent attempts at correction, our short-to-mid term dependence on China for critical inputs such as APIs, electronics and bulk chemicals, rare earths, etc. weakens our strategic autonomy against that country. All these factors compel us to be more careful as a Quad member.

India faces two specific challenges from China. Firstly, in the military domain, we need to restore greater symmetry to resist Chinese expansionism more effectively. Secondly, our economic growth rate not only needs to catch up with China but overtake it, so as to ensure greater economic convergence with China. While building up our strength, we need to avoid any counterproductive distractions.

The dualism between Quad and AUKUS helps us to meet our previously described geo-economic and military challenges. We could leverage our membership of Quad to foster greater eco-technological synergy with the other three members and influence their decision making on other Indo-Pacific issues relevant to us, such as Afghanistan. Cynically speaking, staunching the West's gravy train to China – and its redirection to us – could make Beijing more reasonable and buy us more time to redress the asymmetry. AUKUS, on the other hand, indicates a growing US resolve to activate its "Pivot to East Asia" strategy. While this is unlikely to be of any direct assistance to us in the Himalayan stand-off with China – it would, nevertheless, raise the cost of military adventurism for Beijing and isolate it regionally. As a "frontline" country, it could also facilitate for India a better access to Western defence technology and intelligence. Moreover, our calibrated pro-activism would also persuade other fence-sitters, such as ASEANs to be more receptive to "a free and open Indo-Pacific, which is also inclusive and resilient."

The past few weeks witnessed the first Quad Summit and the formation of AUKUS, two developments which have redefined India's region geopolitics. As we dip our toe in the new Indo-Pacific waters, we better bear in mind two ancient prescripts: Chankya's Mandala Theory and a Chinese saying: "In a crisis, be aware of the danger -- but recognize the opportunity."

–The author is a retired Indian diplomat. He is the President of Eco-Diplomacy and Strategies (www.eco-diplomacy.com), a Delhi-based Consultancy. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

Xpeller: Protection from Dangerous High Flyers - The Threat from the Air

The growth of the drone market continues to accelerate, with demand for commercial and recreational use ever increasing. Insider Intelligence estimates that annual global sales will reach US$ 2.4 million in 2023. As legislative frameworks struggle to keep up with the advance of unmanned aerial technologies, threats associated with increased drone use also arise.

Small drones, often commercially available for just a few hundred dollars, can be converted into flying explosive devices, delivery systems or filming devices with little effort. Effective boundary management for new and existing airspace users is being increasingly challenged. Countering such threats needs a smarter solution.

Xpeller – The drone expeller with modular counter UAV solutions

The name Xpeller is derived from the idea of expelling an intruder. HENSOLDT has developed a modular and flexible counter UAV system by adding variety of sensors to detect and countermeasures to effectively neutralise the threat. The Sensors includes RF based director finders, radars and high resolution cameras. Countermeasure or Effectors includes Jammers and/or Drone Catcher. The System is modular and flexible enough to integrate 3rd Party Hard Kill solution. Overall, Xpeller is integrated, highly customizable and easy to operate system.

HENSOLDT has vast experience with a broad portfolio of sensors, effectors and sensor fusion that make up a complete Counter UAV system solution, deployed to support different requirements. In May last year, the Netherlands National Police used Xpeller C-UAV to secure

Remembrance Day celebrations in Amsterdam against malicious un-authorised UAVs. In France, Xpeller was deployed for surveillance and security for a heads of government meeting. The applications for improved safety and surveillance are many, with solutions including both mobile and permanent deployment for law enforcement, military surveillance, border security, protection of critical infrastructure (such as dams and hydroelectric schemes), event security, site protection (such as oil rigs and government buildings), airport security, site situational awareness and even polar bear detection in Greenland!

High-resolution cameras and 360 degree awareness make it easier to determine whether there is a serious threat, ensuring early detection for decision making. The threat can then be addressed by choosing an appropriate countermeasure, reducing risks and costs with managing interference in surrounding air space.

INSIDER INTELLIGENCE ESTIMATES THAT ANNUAL GLOBAL SALES WILL REACH US $ 2.4 MILLION IN 2023. AS LEGISLATIVE FRAMEWORKS STRUGGLE TO KEEP UP WITH THE ADVANCE OF UNMANNED AERIAL TECHNOLOGIES, THREATS ASSOCIATED WITH INCREASED DRONE USE ALSO ARISE

Working together across all boundaries

When it comes to preparing a security concept, HENSOLDT provides advice and recommendations, based on a comprehensive vulnerability analysis of the site, event or situation.

This allows a tailor-made system to be configured alongside the customer, optimally taking individual needs and the operational environment circumstances into context.

At HENSOLDT's India Office in Bengaluru, we are also cognizant about India's uncompromising focus on Military self- Reliance through "Make in India" policy. Our proposed approach is to offer complete Xpeller solution framework to Indian customers. Through a joint development we could realize an Indigenous Counter UAV solution in the most practical and incremental way, for example in supporting Indian capabilities like Sensors or 3rd Party Hard Kill effectors with selected Xpeller modules

Currently, HENSOLDT is demonstrating its Xpeller system to various potential India customers. Several trials have been conducted remotely and now preparations are on to field the system physically in India very soon. So far we have demonstrated Jamming range of upto 10.4 Km for small drones.

GUEST COLUMN

TATA-AIRBUS C-295 CONTRACT: A CAUSE FOR CELEBRATION

AMIT COWSHISH

The C-295 deal proves that India matters, irrespective of its regulatory flaws and sluggish decision making process. The unique contract breaks many a myth, creates a new and simpler paradigm for future deals, and provides invaluable lessons for the Indian aerospace sector to embark on an upward trajectory and position itself as an important manufacturing hub, well integrated with the global supply chain

After a decade of dithering, the ministry of defence (MoD) signed the contract with Airbus Defence and Space S.A., Spain on September 25 for acquisition of 56 C-295MW medium transport aircraft. This over Rs 21,000 contract will enable the Indian Air Force (IAF) to replace its aged 'Avro' fleet of Hawker Siddeley 748 transport aircraft it has been operating for the past six decades.

The contract requires Airbus to supply 16 C-295MW aircraft in a fly-away condition within four years and manufacturing another 40 aircraft in India within ten years. These aircraft will be manufactured in India in collaboration with the Tata Consortium. There are indications that more aircraft may be acquired for the Coast Guard later.

Besides plugging an operational void, this deal will generate direct and indirect employment -around 25,000 by some estimates- and give a fillip to the private sector in India. The latter spin-off is significant, considering that aircraft manufacturing has so far been the monopoly of the state-owned Hindustan Aeronautics Limited (HAL).

Designed in 1990s, the C-295 aircraft can carry up to 9 tonnes of payload, 71 personnel, or 50 paratroopers and operate from short or unprepared surfaces, making it possible for the IAF to reach the locations which cannot be accessed by the heavier transport aircraft it presently operates. The aircraft can also be used for logistic and tactical missions, cargo drops, medical evacuation, maritime patrol, and civil aviation.

The deal is a befitting reward for the Airbus's remarkable perseverance since 2013 when the Request for Proposal (RfP) was issued for acquisition of medium transport aircraft. It is also a big boost for the Tata Advanced Systems Limited (TASL) which will emerge in due course as the only private sector company in India to have assembled an aircraft of any denomination. The experience gained by TASL will hopefully equip it to undertake more ambitious aircraft manufacturing projects in future.

The time it has taken for the contract to be inked is mortifying but, considering the circumstances in which this project was conceived and the headwinds it faced on several occasions, it is no mean achievement that the deal has eventually seen the light of the day. This unique contract breaks many a myth, creates a new and simpler paradigm for future deals, and provides invaluable lessons.

First, it breaks the myth that the MoD is comfortable dealing only with the public sector companies which prevents the private companies from performing to its full potential in the defence production sector. In the present case, the Hindustan Aeronautics Limited (HAL), which would have been the first, and perhaps the only, choice for building the aircraft in India, was consciously kept out of the project by the MoD. Subsequent objections by a cabinet minister regarding HAL's exclusion and several other internal hurdles were boldly overruled by the MoD, albeit after much dawdling.

It also breaks the myth that the MoD is uncomfortable with the single-vendor situations. This perception has

IT ALSO BREAKS THE MYTH THAT THE MOD IS UNCOMFORTABLE WITH THE SINGLE-VENDOR SITUATIONS. THIS PERCEPTION HAS PERSISTED DESPITE THERE BEING NO ABSOLUTE BAR ON SINGLE-SOURCE PROCUREMENT IN THE SUCCESSIVE PROCUREMENT MANUALS

persisted despite there being no absolute bar on single-source procurement in the successive procurement manuals. In the present case, there was only one response to the RfP from Airbus which initially did cause some hesitation, but to the MoD's credit, all misgivings on this count were later overcome.

Second, it demonstrates that a make-in-India project does not become infeasible only because the number of platforms or equipment to be manufactured locally is small. The IAF had this very apprehension which is why initially it proposed outright purchase of 56 aircraft under the Buy (Global) category. Everyone sort of assumed that it would be commercially unviable to seek transfer of technology for manufacturing just 40 aircraft in India.

During subsequent discussions, however, it was realised that besides the possibility of the MoD's requirement going up beyond 56, the local and foreign civil aviation markets also offered good prospects for such an aircraft. Consequently, the procurement category was changed to 'Buy and Make', which entails outright purchase of a limited number of platforms from a foreign manufacturer, followed by local manufacturing of the remaining numbers by a MoD-nominated Indian Production Partner (IPP).

Both local industry and the foreign manufacturers evinced great interest in the project when a sub-committee formed by the MoD interacted with them while the proposal was being processed for approval. It, therefore, came as a surprise when only Airbus responded to the RfP issued by the MoD.

THE DECISION TO PERMIT THE FOREIGN VENDORS TO TIE UP WITH THE INDIAN PRIVATE SECTOR COMPANIES OF THEIR OWN CHOICE TO MANUFACTURE THE AIRCRAFT IN INDIA WAS THE RESULT OF COLLECTIVE OUT-OF-BOX THINKING BY THE MOD AND IAF

Some contemporaneous media reports also pooh-poohed the project as being commercially unviable but, as mentioned earlier, Airbus did not dither and has now been rewarded for its perseverance.

It demonstrates that even if the MoD's requirement is insubstantial, the foreign equipment manufacturers may still be interested in setting up a manufacturing base in India-on their own or in collaboration with the Indian industry-if the project entails good commercial prospects in the military and civil markets in India and abroad.

Third, the trust reposed by Airbus in TASL as the IPP should inspire confidence among other foreign manufacturers, some of which continue to harbour reservations about the capacity of the local private sector to absorb technology and undertake complex manufacturing. It is also often argued that control over the management of the local production agency is essential for a foreign manufacturer to deliver quality products. The collaboration between Airbus and the Tata Advanced Systems Limited (TASL) proves that there is no basis for such apprehensions and that it is possible to work out a mutually acceptable arrangement.

Fourth, the decision to permit the foreign vendors to tie up with the Indian private sector companies of their own choice to manufacture the aircraft in India was the result of collective out-of-box thinking by the MoD and IAF. This bold decision helped, as the MoD had no internal guidelines to select and nominate an IPP from the private sector, which is what the prevalent procedure required it to do.

The inevitable conclusion is simple and straightforward. While every procurement project throws up unique challenges, it is possible to overcome them by out-of-box thinking and boldness in decision-making, which are sine qua non for ensuring that every project fructifies within the prescribed timeframe, provided sufficient funds are available for procurement.

– The author is Ex-Financial Advisor (Acquisition), Ministry of Defence

MARITIME EDGE

STRATEGIC CHOICES OPEN TO INDIA NOW

The AUKUS alliance could confine the Quad's security cooperation to just the Malabar exercise and make India go in for SSNs as per the requirement of RMA

By **CMDE RANJIT B RAI**

The need for security cooperation between Washington, New Delhi, Tokyo and Canberra was first mooted by former Japanese PM Shinzo Abe in 2007 after India had signed the civil nuclear deal and the 123-Agreement with the US in July 2005. Abe's grouping got dubbed as the four-nation 'Quadrilateral' (QUAD) for its togetherness. QUAD remained a consultative grouping at the official and foreign ministers' level till two years ago. During this period, India-US cooperation grew and India signed three foundational agreements namely the Logistics Exchange Memorandum of Agreement (LEMOA), COMCASA for secure communications and Basic Exchange Co-operation Agreement (BECA) for exchange of geospatial intelligence.

Quad meeting in USA

Since 1992 the Indian Navy has been seamlessly exercising with the US Navy in 26 high-pitched Malabar exercises employing Pentagon's internet Combined Enterprise Regional Information Exchange System (CENTRIX) for the duration of the exercise with US Navy Sea Riders embarked on Indian Navy ships.

India became US's preferred defence partner and procured $ 22 billion worth of military equipment, which has increased India's ability to exercise with NATO forces with interoperability, as seen in the advanced Malabar, Konkan with the Royal Navy, and Garuda with the French Navy exercises.

On September 25 this year, a QUAD summit was scheduled by President Biden for the Prime Ministers of India Narendra Modi, Yoshide Suga of Japan and Scott Morrison of Australia in Washington. The outcome was looked forward to, as QUAD was ranged against China's aggressiveness in the maritime domain.

India's maritime geography and its small but potent Navy lends strategic advantage to the QUAD in the Indian Ocean Region (IOR), especially if India allows QUAD basing of ships, as PLA (Navy) has developed basing facilities at Djibouti, and has plans for basing at Gwadar in Pakistan, and Ormara where it is building Pakistan's submarine base.

However, in a surprise move on September 15, ten days before the QUAD Summit, a tri-lateral security alliance comprising Australia, UK and USA with the acronym AUKUS was announced from Washington jointly by President Biden in a virtual ceremony.

AUKUS included a statement to provide nuclear technology to Australia by US and UK to acquire eight nuclear propelled

SSN submarines which surprised most nations and made waves beyond the Indo-Pacific. China which had called the QUAD 'a foam that will dissipate', called AUKUS a 'ganging up' against it.

The Australia-US-UK pact means other countries' will be free to pursue other areas of cooperation without worrying about the larger looming regional security challenge. Australia announced it would not be buying the eight French conventional submarines from Naval Group and cancelled the ongoing preparations by paying damages, as it had opted to get nuclear-powered submarines SSNs from the US and UK.

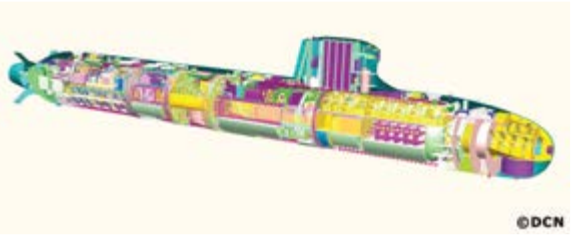
SSNs are quieter, stealthy submarines and do not need to surface, and can operate longer under water as long as provisions and human endurance lasts. France recalled its Ambassador from Washington in protest but later reconciled.

AUKUS has had an effect on nations to think of nuclear armament and proliferation as SSNs are game-changers. This is in adherence to the Theory of Revolution in Military Affairs (RMA), a well-accepted theory that was first articulated in the Soviet military in the 1970s by Marshal Nikolai Ogarkov who stated that the potential and possibility of invention of new weapons (aka SSNs) was rapidly increasing, and that revolution leads to the development of new doctrines of security that militaries must adapt to.

Nuclear-powered submarine technology is currently only held by five NPT nations though the Soviet Union loaned a Charlie class SSN INS Chakra (S71) to India for three years in 1987 and simultaneously transferred SSN-building technology to India's Project Advanced Technology Vehicle (ATV) now called 'Akashanka' (Hope).

USS Nimitz and INS Vikramaditya during the Malabar 2020 naval exercise

SSN Barracuda Nuclear Powered Attack Submarine



©DCN

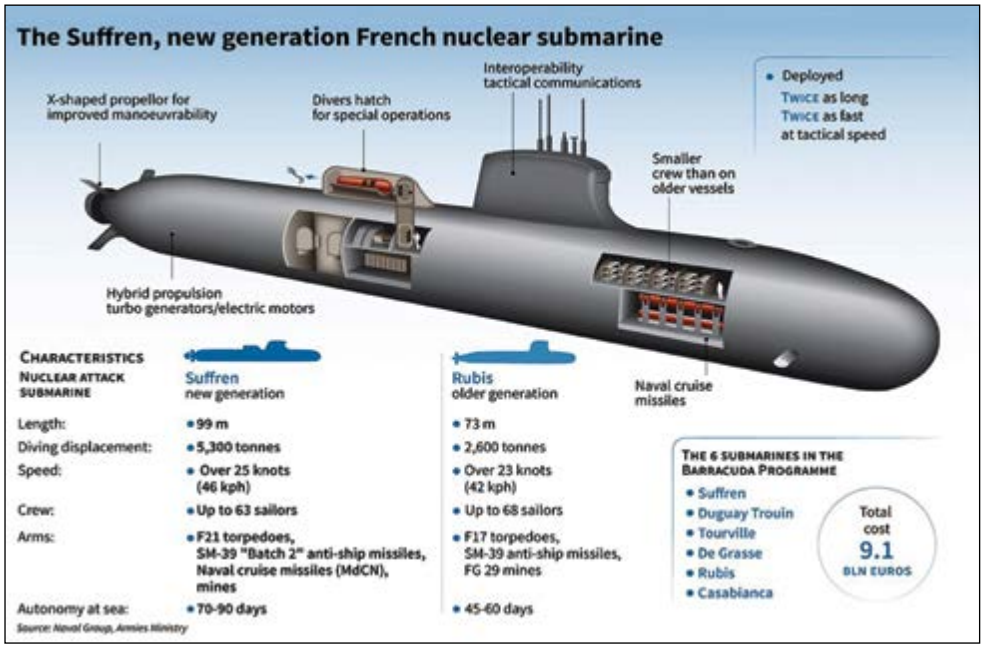
The Indian Navy and DRDO tweaked the SSN technology and design to build the 6,500-ton 89mw SSBNs christened INS Arihant and Arighat—which is on trials—and armed them with 750 km vertical launch nuclear missiles (K-15/BO-5).

The AUKUS agreement legally leverages the same loophole in the 1968 Non Proliferation Treaty (NPT) and the IAEA Statute, that India used as it permits Nuclear states to divert fissile material away from the IAEA inspection if it is used for 'peaceful pursuits', including submarine propulsion.

INDIA'S MARITIME GEOGRAPHY AND ITS SMALL BUT POTENT NAVY LENDS STRATEGIC ADVANTAGE TO THE QUAD IN THE INDIAN OCEAN REGION (IOR), ESPECIALLY IF INDIA ALLOWS QUAD BASING OF SHIPS

It was no surprise the QUAD summit that followed was held in a subdued atmosphere and a long joint statement was issued more on areas of cooperation in COVID, climate change and

MARITIME EDGE



THIS HAS HAD AN EFFECT ON NATIONS TO THINK OF NUCLEAR ARMAMENT AND PROLIFERATION AS SSNS ARE GAME-CHANGERS. THIS IS IN ADHERENCE TO THE THEORY OF REVOLUTION IN MILITARY AFFAIRS (RMA)

scholarships for students in QUAD, and only in the last paragraph QUAD pressed for freedom of navigation.

China was not specifically mentioned though it is China that has denied freedom of navigation as permitted by UNCLOS 1982 in the Taiwan Straits, and in the waters the Dragon has taken over in the Nine-Dash Line by converting rocks in the Parcels and Spratlys in the South Sea into artificial islands for larger EEZ and then armed military bases.

INDIA MUST THINK SSNS IN NAVY'S ORBAT

AUKUS is evidently the result of America and China locking horns in what is being dubbed the Cold War 2.0, and possibly because India and Japan had reservations to convert QUAD into a US-led military alliance. The trilateral security AUKUS pact will goad countries to boost their own nuclear and nuclear submarine capabilities on the premise that if Australia can be equipped with more nuclear materials, can India be left far behind?

Such escalation by India could force China to similarly alter its 'no-first-use nuclear weapons' declaration. Analysts say only nuclear submarines with long ranges from Australia can deter China, not conventional submarines that drove the idea of AUKUS.

The AUKUS puts Japan and India in a quandary on their future role in the QUAD and India and US naval maritime cooperation that began in 1992 that may remain confined to bi-lateral Malabar exercises as Japan joined in 2015 and Australia in 2020.

India had hopes the QUAD could deter Chinese naval ambitions in the Indian Ocean Region (IOR), but will have to think of SSNs for its maritime security, dictated by RMA.

India's Defence Acquisition Council (DAC) has sanctioned six SSNs to be acquired by the Indian Navy under Project 78A and this needs traction in preference to the RFP issued for six conventional submarines with Air Independent Propulsion (AIP) as the AUKUS which is termed a trilateral maritime security pact realigns the Indo-Pacific's strategic security landscape and impacts South Asia's conventional balance of power between India and Pakistan. Both are nuclear states. It will compel India to reassess its maritime nuclear doctrine as China has signed to supply Pakistan Navy SSN submarines in the coming decade and Pakistan is attempting to arm its submarines with nuclear missiles.

Pakistan Navy in a long term plan is modernising its naval warfare capabilities by acquiring Yuan Class Air Independent Propulsion (conventional) submarines which are under construction and China's two Jiangwei-II F-22P and two Type 054A/P multi-purpose frigates, and Fast Attack Craft with C-602 Anti-Ship and FN-16 SHORADS surface-to-air missiles besides Z-9 helicopters.

India's options for a SSN programme are three-fold. India could try to convert its Arihant programme into a 'Atamnirbhar' homemade one with underwater-launched Brahmos missiles that DRDO has tested and was Dr APJ Kalam's dream, or seek an American offer of nuclear propulsion technology with highly enriched uranium (HEU), such as the one to be provided to Australia, though that would carry the conditions of an alliance or India could look to the offer from France's Naval

Group to build Baracuda class SSNs in India.

Media reported France's President Emmanuel Macron dialed India's PM Narendra Modi on September 21 to talk about strengthening cooperation in the Indo-Pacific and also boost, as Macron's office said in a statement, India's strategic autonomy.

Macron assured Modi of France's continued "commitment to the strengthening of India's strategic autonomy, including its industry and technology base, as part of a close relationship based on trust and mutual respect".

It is speculated this could lead to a decision to cooperate in both military-technical and military-industrial matters related to Project-78A to procure six indigenously-built nuclear-powered attack submarines with France's Direction Générale de L'Armement (DGA) with supply of the enriched uranium fuel for the India-built pressurised water reactors (of Russian design) for the entire service-lives of the six SSNs.

On the Indian side, the prime industrial beneficiary will be Larsen & Toubro (L&T), as it has built the Arihant and could be a win-win 'Atamnirbhar' project. The French Navy's Barracuda-class 4,800-ton SSNs have a hybrid propulsion system that provides electric propulsion for economical cruise speeds and turbo-mechanical propulsion for higher speeds.

INDIA'S DEFENCE ACQUISITION COUNCIL (DAC) HAS SANCTIONED SIX SSNS TO BE ACQUIRED BY THE INDIAN NAVY UNDER PROJECT 78A

In addition, each of the SSNs are likely to incorporate a pump jet propulsion that combines a shrouded rotor and a stator within a duct to significantly reduce the level of radiated noise and avoid cavitation. The strategic choices are open to India.

–The writer is former DNO and DNI in the Indian Navy and runs a Maritime Museum and library at C-443, Defence Colony, New Delhi and writes on naval affairs. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

IN CONVERSATION

"THE RANGE AND ENDURANCE OF THE CAMCOPTER® S-100 PROVIDES A DEDICATED 'EYE IN THE SKY' FOR MEETING THE NEEDS OF INDIAN ARMED FORCES"

The Schiebel Group, based in Vienna focuses on the development and production of high-tech VTOL Unmanned Air Systems. Schiebel's CAMCOPTER S-100 is a market leader in its class.

In an exclusive interview with ***Ajit Kumar Thakur - Editor, Raksha Anirveda, Neil Hunter, Global Head of Business Development at Schiebel*** *spoke at length about the company's global footprint and its futuristic "Make in India" plan of expansion in India. An excerpt:*

Schiebel CAMCOPTER® S-100 has customers across the continents. Tell us about the story behind the evolution and development of CAMCOPTER® S-100 platform.

NH Schiebel was founded in 1951 in Vienna, Austria, and we have come a long way since then. The now globally operating Schiebel Group focuses on the development, design and production of the CAMCOPTER® S-100 Unmanned Air System (UAS). We have built an international reputation for producing high-tech military, commercial and humanitarian products over the years.

We have customers on five of the world's continents; a mixture of military, governmental, NGO and commercial customers. Notably, over the last 3 years, Schiebel has won multiple contracts with the European Maritime Safety Agency (EMSA). In the execution of these contracts the S-100 provides simultaneous maritime surveillance services to several EU Member States and its coast guards, e.g. in Spain, Finland, Romania and Estonia.

In July 2021, the Royal Australian Navy (RAN) awarded Schiebel with a 3-year extension contract for the sustainment of its CAMCOPTER® S-100. The

CAMCOPTER® S-100

NOTABLY, OVER THE LAST 3 YEARS, SCHIEBEL HAS WON MULTIPLE CONTRACTS WITH THE EUROPEAN MARITIME SAFETY AGENCY (EMSA). IN THE EXECUTION OF THESE CONTRACTS THE S-100 PROVIDES SIMULTANEOUS MARITIME SURVEILLANCE SERVICES TO SEVERAL EU MEMBER STATES AND ITS COAST GUARDS, E.G. IN SPAIN, FINLAND, ROMANIA AND ESTONIA

extension allows the RAN to continue to experiment and develop knowledge of the employment of UAS in the maritime domain, using the S-100.

Other current clients include the UK Coast Guard, Royal Thai Navy, French Navy and the Indonesian Navy. Building on its vast experience, Schiebel also demonstrated the S-100 to the Hellenic Navy and the US Navy this summer.

To remain ahead in competition, UAV technology demands continuous R&D, investment and testing. What proportion of its revenue earnings Schiebel reinvests for future development of S-100?

NH Schiebel invests 20 per cent of its annual revenue into Research and Development. The CAMCOPTER® S-100 is continuously being developed using state-of-the-art materials and technology. As part of the investment, the company acquired a titanium 3D printer back in 2020 to enable valuable weight savings and design freedom. The needs of our customers are our number one priority. Their experiences and their feedback are the basis of our development process.

What features, role play and functions of the CAMCOPTER S-100 differentiates it from others? Please elaborate.

NH The UAS has gained extensive experience around the world over the last 15 years and has amassed several hundred thousand flight hours, with thousands of maritime flight hours under its belt. It is being operated by 14 navies worldwide.

The S-100 is a multi-role, multi-domain UAS, which caters to the specialised needs of navies, armies and air forces alike. The payload-agnostic unmanned aircraft allows customers to add a robust and value for money "eye in the sky" to their existing capabilities, allowing for the provision of Intelligence, Surveillance and Intelligence (ISR), search and rescue, environmental protection, vessel detection and cargo delivery – just to name a few.

The major differentiator compared to fixed wing systems, which use catapult launch systems, is that the S-100 can operate from any ship with a small helicopter landing deck or suitable space, even in challenging weather. Catapult launch systems are very cumbersome for usage at sea, whereas VTOL UAS are ideally suited due to their small footprint.

Schiebel is developing a larger and heavier rotary-wing UAV S-300 in its Camcopter range. How is the S-300 development work progressing and when do you expect it to come into service?

NH We have been working on the development of the S-100's bigger brother, the S-300. Figures are yet to be completely finalised, but we estimate it will come up at 600-750 kg Maximum Take-Off Weight, which will give a maximum payload capacity of around 250 kg. Maximum endurance should reach about 20 hours with a light payload. There are still some technical milestones, which need to be overcome, before being able to announce when exactly the S-300 will become available to the market.

Recently, conducted the world's first unmanned cargo delivery to an active oil

IN CONVERSATION

THE EXHIBITION PROVIDED US WITH A HOLISTIC PICTURE OF THE UNMANNED LANDSCAPE IN INDIA AND HOW IT IS SET TO GROW IN THE NEXT DECADE. WE WANT TO BE PART OF THIS GROWTH STORY AND HAVE A LONG-TERM RELATIONSHIP WITH VEM TECHNOLOGIES, WHO ARE SUPPORTING US IN OUR ENDEAVOUR

and gas platform in Norway. Do you think in context of the ongoing debate between the Manned Versus Unmanned, the later has an edge both for defence and civilian use? What's your take in support for unmanned solutions?

NH India has more than 7000 km of coast line dotted with various oil and gas platforms and other sea borne assets. Both the military and civil domain has accepted and is using unmanned systems and the new set of drone rules and regulations has provided the basis framework, leading to a huge amount of interest in unmanned systems.

Remote areas, such as oil and gas platforms or hilly terrain are perfectly suited for the S-100. The recent cargo delivery in Norway has resulted in major interest from the oil and gas industry. The most important factor, when operating UAS is that no human life is in danger, compared to flying with a manned helicopter, which is only one reason why the interest keeps growing.

How was the experience at Aero India 2021? What are Schiebel Group expectations from the Indian market? Tell us in detail about your partnership with VEM Technologies and business strategy to tap Indian market – in particular defence sector and participate in government's make in India initiative.

NH Given our increased focus on the Indian market due to the large number of developing requirements for Unmanned Air Systems (UAS), exhibiting at Aero India 2021 was a logical step. At the event, we were able to generate a lot of interest among potential military customers, including Chief of Defence Staff (CDS), Chief of Naval Staff (CNS), Chief of Air Staff (CAS) and various heads of directorates dealing with unmanned systems in the Army, Navy and Air Force. The exhibition provided us with a holistic picture of the unmanned landscape in India and how it is set to grow in the next decade. We want to be part of this growth story and have a long-term relationship with VEM Technologies, who are supporting us in our endeavour. Currently, we are bidding for the Indian Navy's Naval Ship-borne Unmanned Aerial System (NSUAS) Fast Track Programme that will deliver Intelligence, Surveillance and Reconnaissance (ISR) capability at sea.

CAMCOPTER® S-100 is considered to be an extremely flexible, multi-role, multi-domain asset. How it fits into the unique requirements of Indian Armed Forces? What futuristic capabilities can Schiebel offer to them?

NH The unique requirements of the Indian Armed Forces are defined by the types of terrain and the kind of weather, which the military has to face at high seas and its borders. The S-100 provides the best option to the Indian Navy, where the weather is unpredictable and an autonomous VTOL UAS is the ideal solution to meet the tactical ISR requirements. The range and endurance of the CAMCOPTER® S-100 provides a dedicated "eye in the sky" for meeting the needs of the Army, Navy, Air Force and the Coast Guard. In addition, the Manned Unmanned-Teaming (MUM-T) opens a plethora of usage options for both the tactical ISR as well as Search and Rescue.

Are you participating in the mega defence event DEFEXPO 2022? If yes, kindly provide insights into your plan to showcase your product offerings.

NH Yes, as part of our growth strategy in India, we will definitely exhibit at DEFEXPO 2022 and we're looking forward to further strengthening our network and to showcase the unrivalled capabilities of our S-100. We are also in the process of setting up a local office and company in India to focus on long-term business in the region. We want to support and grow with the Indian industry by creating jobs and developing technology and offering the best Vertical Takeoff and Landing (VTOL) UAS available in the global market.

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FOR DEFENCE VENDORS

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- Development as well as Certification Tests on all Electrical & Electronic products
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IAF @89 SPECIAL

THE IAF IS A MAJOR 'COMPONENT OF NATIONAL POWER'

Over the years the IAF has grown from a tactical force to one with transoceanic reach. The rapid economic growth of the country dictates the need to protect the country's security interests extending from the Persian Gulf to the Straits of Malacca. Thus, emphasis on acquiring best of technology through acquisitions or upgradation, be it aircraft, systems, precision missiles or net centricity is a must..

Indian Air Force's Rafale fighter aircraft

By **SRI KRISHNA**

As Indian Air Force completes 89 years on October 8, it has ambitious plans for growth considering the prevailing scenario in the neighbourhood and the developments in Afghanistan. With high-tech wars of high intensity likely to be the scenario and threats on the northern and western borders, aerospace power would have a distinct advantage. Since its official establishment on October 8, 1932, as an auxiliary air force of the British Empire with the prefix Royal, it has now come a long way having in its arsenal some of the latest weapon platforms and continuing to strengthen its air arm in the wake of the increasing threats on two fronts - Pakistan and China.

With the country facing the full "spectrum of threats" from nuclear confrontation through conventional war to conflicts limited in area, scope or objectives, as former Air Chief Fali H. Major said "from a tactical force, IAF has today become a strategic force - powerful, professional and proven." Aerospace power is empowering and futuristic and easily lends its strengths and capabilities to other disciplines and with the move to have theatre commands in the country under the Chief of Defence Staff, air power would play a significant role in this scenario.

It is modern aerospace capabilities that have as much, or perhaps greater impact than what maritime power did for colonising nations in the past. In the Indian context, all forms of military power are necessary and important, though strategic aerospace power offers newer options. The role of the IAF whose complement of personnel and aircraft assets ranks fourth largest among the air forces of the world can be described as Deterrence, Punishment, Protection, Projection and Peace time roles.

With the government's focus on self-reliance (Make in India and Atmanirbhar Bharat initiatives), indigenisation and self-reliance has remained a Key Result Area (KRA) of IAF. Indigenisation

is typically attempted at three distinct levels of complexity viz. system level, subsystem level and MRO spares.

From Counter-Insurgency in its early years, to Army cooperation in WW-II, the IAF was a tactical force. Today, it is a strategic force – powerful, professional and proven. Though the transition to strategic capability has been slow in coming, the process must be sustained, if India is to effectively influence events within its strategic boundaries.

The IAF has proved itself time and again its capability and resolve and played key roles in all the conflicts that the nation has been involved in as also during the time of humanitarian crisis and natural disasters like the Kedarnath tragedy or the floods in Kerala. The IAF is also a sought-after contributor to UNPKO and that its uniqueness lies in its rich all-terrain experience and its diverse inventory. Its capability and reach have enhanced significantly in the last decade.

The IAF must be a strong 'deterrent', in a tough neighbourhood. Implicit in the deterrence is the ability for swift, calibrated, but effective 'punishment'. This deterrence currently includes the nuclear dimension. The IAF's primary and traditional role is 'protection' or Air Defence, the scope of which will expand as do the country's interests and reach.

A benign presence, or assistance to friendly nations in distress, is a 'projection' of interests that IAF would be expected to execute. This requires long-range presence, persistence, 'forward-basing arrangements' etc. Perhaps the most visible demonstration and utility are 'Peace-time' applications – both internal and external. They range from airlift and surveillance, to possible offensive action. Military diplomacy is yet another aspect that has increased in recent years yielding handsome friendship dividends. Indeed, IAF today is adequately suited and structured to execute these roles, should the need arise.

HAL HTT-40 basic trainer aircraft

IAF Mi-17V-5 helicopter

Though IAF is a fairly balanced force – but it also has shortages, reducing force-levels and gaps in its inventory, which are being addressed with all urgency and governmental support. IAF's modernisation plan, aims to sustain and enhance its operational potential and consolidate the specified force levels through judicious and cost-effective replacements and upgradation of existing resources. It is a gradual, but transformational modernisation. The approach is three-pronged – preserve, upgrade and acquire. All fleets, including transport and helicopters, with residual life, are being upgraded to contemporary standards; so also is operational and maintenance infrastructure

FROM COUNTER-INSURGENCY IN ITS EARLY YEARS, TO ARMY COOPERATION IN WW-II, THE IAF WAS A TACTICAL FORCE. TODAY, IT IS A STRATEGIC FORCE – POWERFUL, PROFESSIONAL AND PROVEN. THOUGH THE TRANSITION TO STRATEGIC CAPABILITY HAS BEEN SLOW IN COMING, THE PROCESS MUST BE SUSTAINED, IF INDIA IS TO EFFECTIVELY INFLUENCE EVENTS WITHIN ITS STRATEGIC BOUNDARIES

IAF @89 SPECIAL

BAE SYSTEMS CONGRATULATES IAF

"We offer our congratulations to the Indian Air Force on the 89th Air Force Day. For decades we have been proud to "co-create for a self-reliant India" and to have contributed to the modernisation of the Indian Air Force (IAF). From being the core contributor to the establishment of the Air Force Technical College in 1949, to providing advanced training to the IAF pilots through our Hawk MK 132 India programme – strengthening the expertise of Indian Armed Forces has been central to our vision and mission. The world-class manufacturing facility we have established for the Hawk programme in partnership with Hindustan Aeronautics Limited (HAL) demonstrates the success of Make in India in defence manufacturing. Building on the success of the Hawk Mk132, which has exceeded 100,000 flying hours with the Indian Air Force and the Indian Navy, we continue to stand by for a potential repeat order to fulfil the Indian Air Force's requirement for its prestigious aerobatic team, the Surya Kiran.

We recognise India's aspirations and fully support the Government's vision for Atmanirbhar Bharat and Make in India. We are proud of our in-country presence and robust partnership that we have created with the local industry which includes HAL, Mahindra Defence Systems Ltd as well as several SMEs and MSMEs. We stand focused to support the Indian Armed Forces in their modernisation journey through our local collaborations and investment".

Ravi Nirgudkar, Managing Director – India, Sri Lanka and Bangladesh, BAE Systems

and logistic tools. The planned acquisitions are across-the-board and include platforms, weapons, sensors and equipment; spread over the next 10-15 years.

Today, the IAF is in throes of a most comprehensive modernisation which can also be described as transformational, for it will change everything dramatically. Being based on long-term perspective plans, most of it has already crystallised. Yet, a lot remains to be determined; many new capabilities are still short of the decision stage.

Since IAF requires a comprehensive capability, its future in the long-term, will largely mirror the future of aerospace power itself. Though this path is invariably influenced by leading nations, India and countries like it, must be selective and seek creative variations, both in terms of hardware and doctrine.

A strong and professional IAF can contribute to national options and to peace and stability, not only within the country but also within the region. It is a considered opinion that the IAF, with its current capability and plans has the potential to make a very significant impact on the postures India adopt in the future. IAF must therefore grow in step with nation.

As the Chief of Air Staff, Air Chief Marshal R.K.S. Bhadauria said recently that the IAF is planning to acquire 450 fighter aircraft for deployment on the northern and western frontiers of the country. The list of aircraft planned to be inducted by the Air Force include 36 Rafales, 114 Multirole Fighter Aircraft, 100 Advanced Medium Combat Aircraft (AMCA) and over 200 variants of the Light Combat Aircraft.

"In the next 15 years, 83 LCAs are our primary focus, after that LCA Mark 2 will come in and we are looking at close to 100 of those, that makes it near 200 of LCA class," he said. "AMCA, we are looking at six squadrons, so that puts it close to 100 (aircraft). So, in the indigenous domain areas which are already frozen in terms of our requirement, in terms of our understanding with Defence Research and Development Organisation in the fighter (segment)".

He said the induction of these fighters would take place over a period of the next 35 years as the inductions have to be planned to keep in mind the future requirements.

"In the trainer aircraft segment, we are looking at 70 HTT-40 as a support aircraft to the Pilatus fleet. So, we are looking at 370 odd indigenous aircraft," he said. "Currently it's the best time from

THE IAF'S MODERNISATION PLAN AIMS TO SUSTAIN AND ENHANCE ITS OPERATIONAL POTENTIAL AND CONSOLIDATE THE SPECIFIED FORCE LEVELS THROUGH JUDICIOUS AND COST-EFFECTIVE REPLACEMENTS AND UPGRADATION OF EXISTING RESOURCES. IT IS A GRADUAL, BUT TRANSFORMATIONAL MODERNISATION. THE APPROACH IS THREE-PRONGED – PRESERVE, UPGRADE AND ACQUIRE

the point of view for indigenous production. It is now the perfect time for industries to respond and come up with solutions which are rapidly put in place and come up to the challenge of delivering these aircraft."

On plans to acquire 114 multirole fighter aircraft, he said, "this project is in the middle-weight and is in the Rafale class, in this issue, we will deal with it in the Make in India region, with an increase in FDI, with support to the private sector. I think in future this will bring in technology which is required to support the aviation sector. I think it is important to have another generation of aircraft in terms of capability, technology as we go along".

Keeping pace with the demands of contemporary advancements, the IAF continues to modernise in a phased manner and today it stands as a credible air power counted amongst the foremost professional services in the world.

The primacy of Air Power will be a decisive factor in shaping the outcome of future conflicts. In line with this dictum, the Indian Air Force (IAF) has developed into a major 'Component of National Power', which can be applied quickly and decisively. The IAF has reoriented itself to a multi-role capability of platforms and equipment, along with multi-skill capability of personnel. The rapid economic growth of the country dictates the need to protect the country's security interests extending from the Persian Gulf to the Straits of Malacca.

Over the years the IAF has grown from a tactical force to one with transoceanic reach. The strategic reach emerges from induction of Force Multipliers like Flight Refuelling Aircraft (FRA), Remotely Piloted Aircraft (RPA) and credible strategic lift capabilities. There is emphasis on acquiring best of technology through acquisitions or upgradation, be it aircraft, systems, precision missiles or net centricity.

Sukhoi Su-30 MKI fighter aircraft

IAF has started upgrading its combat aircraft fleet since the last few years in order to enhance its operational capability and maintain its aircraft as modern weapon platforms, capable of meeting the present challenges posed by the security scenario in the region. Of the available fleet, MiG-21, MiG-27 and Jaguar aircraft have already been upgraded and Mirage-2000 and MiG-29 aircraft are planned for upgradation. The Indian Air Force is considering upgrade of its medium lift helicopters comprising Mi-8, Mi-17 and Mi-17-IVs, as also the AN - 32 transport aircraft, with the aim of improving their overall capability.

The IAF today is in the process of a most comprehensive modernisation plan. Over the next few years, the force would induct more Su-30 MKI aircraft, the Light Combat Aircraft (LCA) and the Medium Multi Role Combat Aircraft (MMRCA). There are plans to augment the helicopter and transport fleets too. The IAF is also in the process of acquiring radars in various categories to meet the Air Defence requirements, accurate and advanced weapons, Network Centric Warfare systems, etc., to meet its assigned tasks.

THE IAF TODAY IS IN THE PROCESS OF A MOST COMPREHENSIVE MODERNISATION PLAN. OVER THE NEXT FEW YEARS, THE FORCE WOULD INDUCT MORE SU-30 MKI AIRCRAFT, THE LIGHT COMBAT AIRCRAFT (LCA) AND THE MEDIUM MULTI ROLE COMBAT AIRCRAFT (MMRCA). THERE ARE PLANS TO AUGMENT THE HELICOPTER AND TRANSPORT FLEETS TOO

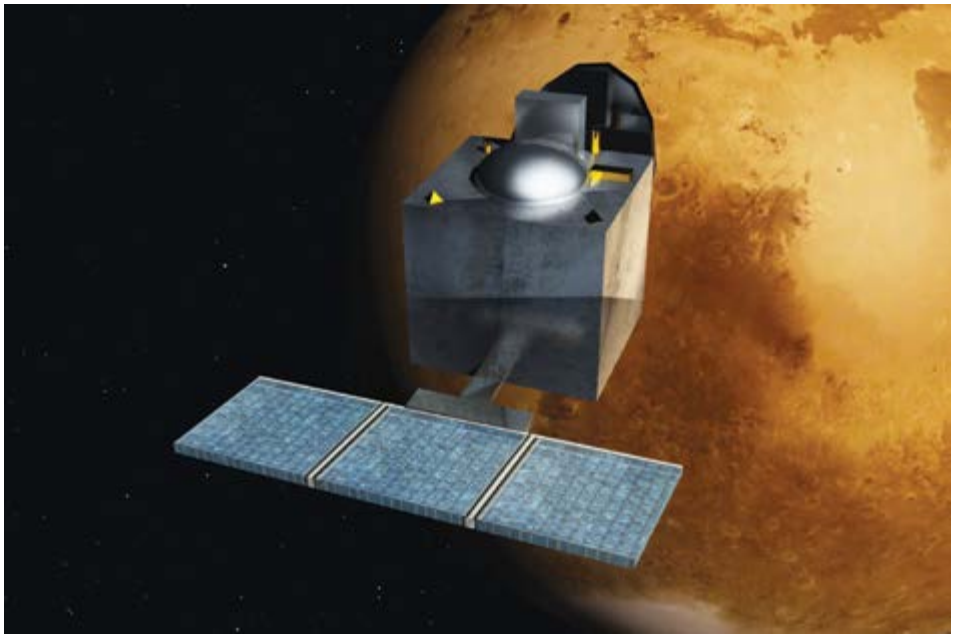
Some of the other technologies which IAF requires in the next ten years include (a) Development of AESA Radar technology for Air to Air or Air to Ground. (b) Active and Passive {Radio Frequency (RF) and Imaging Infra –red (IIR)} Seeker and Sensor Technology for missiles (c) Electro Optical (EO)/ Infra-red (IR) payload for Intelligence, Surveillance and Reconnaissance (ISR) (d) Smart materials (e) On board prognostic and real time health monitoring technologies (f) Low Observable Technology.

- The writer is a senior journalist and media consultant. The views expressed are of the writer and do not necessarily reflect the views of ***Raksha Anirveda***

IAF@89 SPECIAL

IAF AT THE CROSSROADS

The Indian Air Force's ninth decade begins amid big force structure challenges and the effort to set up Theatre Commands even as the world's fourth biggest air force is concomitantly undertaking modernisation and multi-dimensional capability development



By **AIR MARSHAL M MATHESWARAN**

As the Indian Air Force and the country celebrated the 89th Air Force Day on October 8, 2021, the IAF enters its ninth decade with its sights set on significant modernisation and multi-dimensional capability development into an all-encompassing strategic force by 2032—its centenary year. This should involve not just a force structure in terms of numbers but a more qualitative transformation. It aims to rebuild its fighter strength back to the authorised 42 squadrons, almost entirely 4.5 generation and 5th generation aircraft, precision strike and net-centric warfare capability, cyber and space warfighting capabilities, and backed by strong expeditionary, force-multiplier, and C4ISR capabilities.

This is an enormous task, given the current state of declining force structure and ever inadequate budgetary support.

Currently, the IAF is down to 30 combat squadrons as against its authorised 42 squadrons, and this will continue to reduce over the next decade unless drastic measures are taken to arrest the decline.

The new Chief of Air Staff, having taken over on September 30, has an unenviable task of putting on track an aggressive modernisation and rebuilding strategy. He has gone on record stating that at best the IAF's fighter strength would rebuild to 35 squadrons in the next decade and a half. But there are more complex challenges that the IAF should overcome. These are in the domains of organisational structure, operational philosophy, and national security strategy.

For many years the government has been looking at ways and means of restructuring the military forces by cutting down the flab, remove duplications, and enhance combat capability through organisational restructuring and better optimisation. This is rightly so if viewed from a purely financial perspective but that would be too simplistic.

Military capability assessment is a complex affair and is not simple arithmetic of numbers and financial calculations. The CDS stirred a hornet's nest with his ill-considered statement in July that the IAF is a supporting arm much like the Engineers and the Artillery.

More seriously, his statement betrayed the deep flaws in the current operational philosophy and the consequent approach to restructuring. On this Air Force Day, it would be very pertinent to examine some of these issues as they impact the centrality of aerospace power for national security and future wars.

AIRPOWER AND FUTURE WARS

Since World War II it is well established that airpower plays the critical role in the conduct of war. Further technological developments such as precision weapons, communications and datalink, real-time situational awareness, C4ISR, net-centric warfare, space-based services, global expeditionary capabilities, and cyber warfare have demonstrated the centrality of airpower to modern warfare and national security.

Airpower is central to the very survival and effective operations of surface forces, be it on land or the

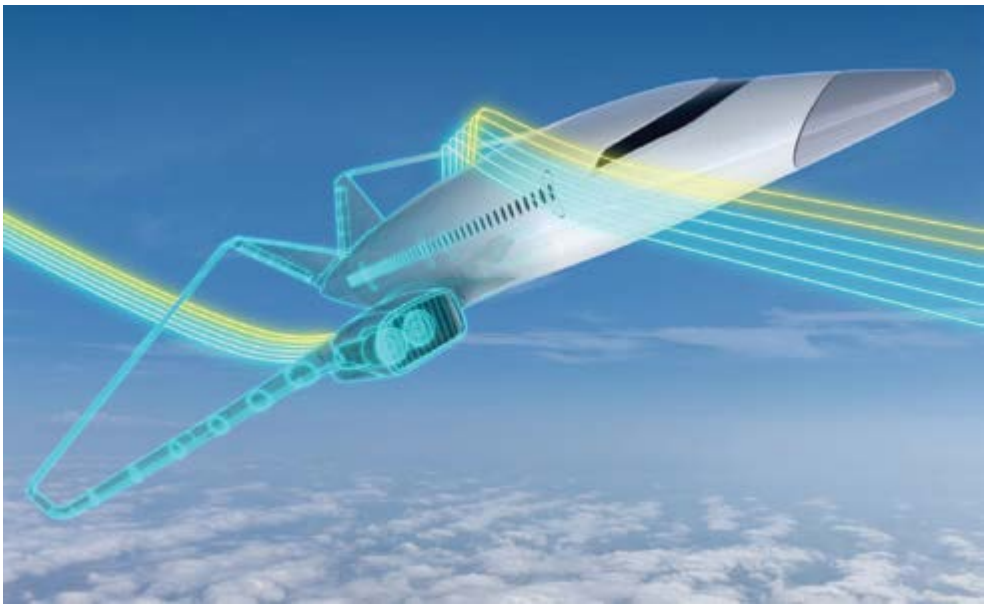
sea. However, when one calls air power as a supporting arm for surface forces it is easy to term it as flawed but there is more to it in terms of individual turf sensitivities and the continued prevalence of traditional continental mindset that afflicts the Indian military leadership, more particularly the army, and much of the government.

The reason is not hard to see; India's vast territorial borders to be defended, coupled with its long-standing territorial and boundary disputes and the wars with Pakistan and China, and the continuing involvement in battling insurgencies, low-intensity conflict, and terrorism have given prominence to the ground forces. As a result, it has led to the Army's complete domination of the military's strategic thought process and effectively India's defence policy.

Even though Pakistan and China pose significant threats, India's approach has been defensive and land-centric rather than use air power at the centre of its military strategy to deter and dissuade the adversaries.

The old fear or misperception that the use of airpower is escalatory continues to influence and constrain India's military strategy. This is evident in the way we continue to handle even recent provocations from both China and Pakistan, where airpower is rarely considered as the first option for strong response.

It suits Pakistan to pursue the LIC strategy against India, while China will continue to push India with its aggressive approach, using its salami-slicing strategy in Ladakh but remaining below the threshold of a full-fledged conventional war. A major war will be deeply damaging to all three countries. This pattern of future wars will become more technology-intensive with the increasing use of drones, swarming, and artificial intelligence.



India's operational strategy, therefore, must become airpower-intensive to not only to deter the adversaries but more towards enforcing its position on the LOC and LAC. War in the Himalayas must be led by air power to not only deter the PLA but help to rephrase the boundary dispute on India's terms rather than react to China's actions.

Technically such a strategy would place the Army in the supporting role to the air strategy. But that is really not the point. What is more important is to realise that the nation fights the war for which the Army, Navy, and Air force are its instruments of war. Each will need to support the other.

More importantly, if future wars are going to be largely in the domain of limited wars and the sub-conventional, India may do well to use airpower as its most preferred instrument of force application. Such a strategy will have major ramifications for force structures and organisational restructuring such as the integrated theatre commands.

IAF AND THE INTEGRATED THEATRE COMMANDS

The recent controversy on Theatre commands has had one fortunate outcome. Despite strong reservations on the modalities of the proposed theatre commands, the CDS appeared to be pushing

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INDIA'S OPERATIONAL STRATEGY, THEREFORE, MUST BECOME AIRPOWER-INTENSIVE TO NOT ONLY TO DETER THE ADVERSARIES BUT MORE TOWARDS ENFORCING ITS POSITION ON THE LOC AND LAC

aggressively for implementing the first three integrated theatre commands. The controversy brought into the open the fact that this organisational structuring is far more complex than envisaged, needs extensive deliberations, and cannot be rushed through.

Fortunately, the government has opted to examine it more deeply. The main argument that modern warfare needs an integrated approach and hence, the necessity of theatre commands is a weak one. Joint warfare and coordination between two or more services have been successfully done through the COSC in the past wars. The 1971 war is an excellent example.

However, what is more important is the issue of unity of command, thus giving rise to the need for unified command plans and the need for a unified command structure.

Its origin goes back to the experiences from the Second World War. An integrated or unified command involves two or more services under a single commander from one of the services. He is assisted by the individual component commanders whose forces would be provided by the individual services and employed as per the operational doctrines of each service.

Hence, the starting point for an integrated command is to put in place the mechanism for joint planning and the operational philosophy, particularly in the context of the multi-role capability and flexibility of airpower as well as the limited resources.

The essence of integrated theatre command is more about reducing duplication of commands in a defined geography. This is vital and necessary. The challenge is to bring in effective integration of various service-specific geographical commands into individual theatre commands.

This is where the unified command logic is integrated into the theatre command process, but this needs considerable thought and work. It is not a simple matter of just redrawing geographical boundaries and responsibilities.

The complexity of integrating air power without compromising its advantages of flexibility, precision, swiftness of application is the biggest challenge. More importantly, without the guidance of an officially articulated National Security Strategy, theatre commands may be hampered by constraining and limiting the most valuable asset of airpower.

On the other hand, it makes eminent sense to perfect the functional or specified integrated commands in a building block approach. We already have established the Strategic Forces Command (SFC) and the Andaman Nicobar Command (ANC). These need to be strengthened and refined further, in particular the ANC.

In addition, three integrated agencies; Defence Space Agency, Defence Cyber Agency, and Armed Forces Special Operations Division have been established. These must be developed rapidly into full-fledged commands—Space Command, Cyber Command, and Special Operations Command.

IMPORTANCE OF OFFICIALLY ARTICULATED NATIONAL SECURITY STRATEGY

India is a rising great power that aspires to be one of the poles in the 21st century's emerging multi-polar world order. Inexplicably, India's political leadership has shied away from articulating its national security strategy (NSS) publicly. This has its ramifications on the military strategy and force structures, more so when major restructuring like the integrated and theatre commands are being undertaken.

India is the only major power in the world that has significant portions of its territory occupied by Pakistan and China. Current military deployments and the

land-centric strategy reflect a defensive approach of maintaining the status quo rather than signal any serious intent to recover the lost territories. The NSS must define India's resolve to not only recover its territories but deter any major war and punish adversaries when they violate India's articulated security redlines, and project power in its areas of interest.

Such an articulation will put the right emphasis on the primacy of airpower and its force structure. This is vital to establish the right foundations of integrated theatre commands. Quite clearly, such a process needs to be driven by parliamentary oversight and a parliamentary committee.

This raises more important questions about the chain of command and the structure. Should a theatre commander be a four-star General/Admiral/ Air Chief Marshal, with erstwhile C-in-Cs becoming Component Commanders? Logic demands that it be so. This would be the most complicated challenge as in the current system the Chiefs are also the operational heads.

The chain of command will be to the RM, facilitated by the CDS, and not to the CDS. In the Indian environment where the RM and the PM are generally political figures without any military experience, and an over-sensitive bureaucracy that wants to retain its dominance, the theatre command restructuring is fraught with complex challenges.

The first step to address these issues is for the government to bring out a defence white paper that signals to the rest of the world India's security interests and strategy. India's will to pursue its National Security Strategy will be reflected in its force structures and organisational restructuring.

IAF AT 89 AND THE ROAD TO ITS CENTENARY

In the press conference a few days ago, the CAS Air Chief Marshal V R Chaudhari eloquently put across the reality of the challenges faced by the IAF. Its force structure will only reach 35 combat squadrons by 2035, still short of the minimum required 42 squadrons.

This is further complicated by the pace and production efficiency of the indigenous programmes and the need to balance operational capability with the objectives of the 'Atmanirbhar' policy.

Nevertheless, there are many silver linings. IAF's expeditionary capability is significant and continues to improve. IAF's leadership, through the Defence Space Agency, in the development of space security capabilities is significant. The IAF is leading the way in NCW and C4ISR capabilities. However, in terms of power projection and deterrence, the IAF needs to seriously consider the development of a strategic bomber force. IAF'S support to indigenous developments in missiles, trainer aircraft, and system developments are showing encouraging results.

The government must increase the funding for defence modernisation and rapid recovery of the necessary force structures. Nowhere is it more urgent than for the IAF. It is important to recognise that rebuilding force structure through the right balance of indigenous development and international collaborations will better address India's security and the objectives of self-reliance or 'Atmanirbhar Bharat'.

–The writer is a former Deputy Chief of Integrated Staff at IDS. He is now the President of The Peninsula Foundation at Chennai. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

THE NSS MUST DEFINE INDIA'S RESOLVE TO NOT ONLY RECOVER ITS TERRITORIES BUT DETER ANY MAJOR WAR AND PUNISH ADVERSARIES WHEN THEY VIOLATE INDIA'S ARTICULATED SECURITY REDLINES

SPOTLIGHT

TWO DECADES OF THE BRAHMOS' STELLAR TRAJECTORY

The BrahMos missile programme is undoubtedly one of the brightest stars on the Indian Defence firmament

The over two decade-long journey of BrahMos Aerospace – a joint venture between India's Defence Research and Development Organisation (DRDO) and the Russian Federation's NPO Mashinostroyeniya – has been a great success story of defence cooperation. The name BrahMos is a portmanteau formed from the names of two rivers, the Brahmaputra of India and the Moskva of Russia.

The BrahMos joint venture (JV) is the finest testimony of India-Russia strategic partnership, showcasing the uninterrupted flow of energy and brilliant synergy between both the nations. The JV has been a "technology sharing" programme and through mutual learning and understanding, it has further widened the scope to work together on newer, more advanced BRAHMOS missile versions and achieve new technological breakthroughs.

BRAHMOS, the flagship product of the Indo-Russian JV is the fastest supersonic cruise missile in the world. With a range of 290 km and multiple variants, it can hit land and ship targets from sea, sub-sea, land, and air.

The BRAHMOS has become the most trusted weapon in the Indian military's armoury. It has validated its immense destructive potential by being capable of destroying a target as large as a frigate. It is the world's fastest anti-ship cruise missile in operation and its land, ship, and air-launched versions are already in service.

From its end, the DRDO has already test-fired the Hypersonic Technology Demonstrator Vehicle (HSTDV), a precursor to the development of a hypersonic cruise missile system. BrahMos Aerospace hopes to come out with a new version of BRAHMOS designed for coastal security. It is a shore-based weapon system and will be deployed by the Indian Navy to safeguard India's vast coastlines. The BRAHMOS is reinventing itself almost every year by coming out with different versions to meet the requirements of the Indian armed forces.

As a trailblazer, BrahMos Aerospace has successfully synergised the capabilities of Indian aircraft designers, developers, and manufacturers along with certifying agencies for an indigenous solution. They redesigned and modified the structure of the Su-30 and have developed several new materials and metal joining technologies. It has also successfully set up a consortium of defence industries from India and Russia for producing various systems and sub-systems for the world-class BRAHMOS weapon complex. It has brought together a number

of competent defence industries, both public and private, and various R&D laboratories from the partnering countries in developing and producing different sub-systems for the universal missile system, which has endowed the Indian Armed Forces with a unique strength.

BrahMos Aerospace is the first engineering company to have successfully developed a launcher – one of the most complicated, reliable, and the largest missile launchers with a length of approximately six metres and designed to carry 4.5 tons load.

In a first, BrahMos Aerospace has created a knowledge base in the area of air-launched missiles and become the first company in the world to integrate such a missile to a fighter aircraft. It has also achieved a major development milestone, as the BRAHMOS air version gives the option of air-to-ship and air-to-land targets. Considered to be the deadliest supersonic cruise missile for its precision strike capability, the BRAHMOS can be integrated on almost all platforms and is capable of operating from across the spectrum of war.

The successful induction of BRAHMOS missile platforms has given India's armed forces an invincible tactical advantage over potential adversaries. The BRAHMOS has added teeth to India's air and maritime dominance in the Indian Ocean Region (IOR) with the IAF inducting the Su-30MKI equipped with the supersonic cruise missile into its No. 222 Squadron ('The Tigersharks') in southern India. With its "stand-off" attack capability, the BRAHMOS can strike targets 300 km away with accuracy of less than five meters.

Bolstering India's defence

THE AIR VERSION OF THE BRAHMOS GIVES THE OPTION OF AIR-TO-SHIP AND AIR-TO-LAND TARGETS. CONSIDERED TO BE THE DEADLIEST SUPERSONIC CRUISE MISSILE FOR ITS PRECISION STRIKE CAPABILITY, THE BRAHMOS CAN BE INTEGRATED ON ALMOST ALL PLATFORMS AND IS CAPABLE OF OPERATING FROM ACROSS THE SPECTRUM OF WAR

indigenisation and the government's flagship "Make in India" programme, the indigenous content in the formidable BRAHMOS missiles has reached a high value. Be it the Mobile Autonomous Launcher, or the Command Post, or the Ancillary Vehicles and Communications Systems – all are made in India. DRDO and BrahMos Aerospace have successfully indigenised major sub-systems such as booster, nose cap, canister, fuel management system, Airframe

and other major non-metallic airframe components, taking the Indian contribution to more than 70%. All launcher systems for the missiles are also being manufactured domestically by Indian industries.

As a high technology defence product, the BRAHMOS has great potential to become India's major weapon of export in the coming decades, and with the government's proactive support to facilitate defence exports, the target is achievable in the near future.

FUTURE-PROOFING THE FLANKER: WHY AN UPGRADE IS CRITICAL FOR THE SUKHOI SU-30

There are not many fighters in the world that can track and destroy an incoming air-to-air missile. The right approach would be to arm the Flanker with the most powerful weapons systems the IAF can afford. Suboptimal systems would only lead to an aerial Mexican stand-off with the adversary. That's not what the Sukhoi was built for

By **RAKESH KRISHNAN SIMHA**

The formidable Sukhoi Su-30 MKI has been in service with the Indian Air Force (IAF) for nearly 20 years and needs a major upgrade to remain relevant to future air warfare. Codenamed Flanker by NATO when it was first introduced as the Su-27 in Russia in 1985, the warplane entered service with the IAF in 2002. Currently, India has nearly 260 Sukhois – an impressive number for such a high-end and expensive weapons platform. With its induction, the IAF has not only made a huge technological transition from a MiG-21 dominated fleet, its war fighting doctrine has also changed, focusing on long-range and strategic missions. It also shows a keen sense of judgement by the IAF, which realises that 100% fleet utilisation is impossible – it is around 60% – and having a large number of air superiority aircraft around is the key to getting the job done.

IAF's fighter aircraft Sukhoi Su-30

However, as the mainstay of the IAF's fighter fleet, the Su-30 needs a major makeover to keep in step with changes in air combat. For the past decade, India and Russia have been circling around a $8-billion deal to upgrade its Sukhoi fleet to near fifth-generation level. The upgraded version would be renamed Super Sukhoi, which will have improved radar, avionics, weapons and an electronic warfare (EW) suite. However, modernising such a large aircraft with multiple offensive and defensive systems would cost nearly as much as a new fighter. In this backdrop, the IAF has decided to proceed in phases, and the most urgent upgrades would be taken up in the first phase.

IMPETUS FOR THE UPGRADE

In 2002, the same year that India acquired the Su-30, British fighter pilot John Farlight saw Victor Pugachev turn his Flanker 360 degrees in 10 seconds at the Paris Air Show. In an interview to Russia's Nauka I Zhisn (Science & Life) magazine he said: "What the Russians have achieved has astonished us to the bottom of our souls."

Developed to counter the American F-15 Eagle, the Sukhoi achieved much more, becoming a dogfight duke that ran the competition into the ground. With its un-refuelled range of 3,200 km, ability to fly 2.35 times the speed of sound, and astounding agility – despite its 30 ton weight – the Flanker wowed the world's aviation experts. Said Farlight: "When you see there are no limits for a Su-27 or that the aircraft can go vertical, stop, slide down and then resume normal flight and perform this not once, not twice but time after time, you realise this

Indian Air Force MiG-21

is not an exception, not a trick, but a standard."

However, no aircraft can continue to rule the skies forever and the Flanker is no exception. The IAF's inability to upgrade the aircraft has clearly impacted its effectiveness as was clearly demonstrated during the aerial combat that took place the day after India's Mirage-2000 fighter-bombers raided Balakot, deep in Pakistan's Khyber-Pakhtunkhwa.

To save face and avoid complete humiliation, Pakistan responded with "Operation Swift Retort" the following day. The PAF offensive comprised nearly 24 aircraft, including F-16 and JF-17 fighters armed with beyond visual range air to air missiles (BVRAAMs). However, despite their numerical superiority and the longer-range missiles, the Pakistani raiders were neutralised by a handful of IAF Su-30MKIs, Mirage-2000s and MiG-21 interceptors. India also shot down an F-16 while losing a single MiG-21 in the dogfight. The Sukhois were at the centre of this air battle, neutralising the powerful American made AMRAAM missiles fired by the F-16s at the Indian fighters.

But despite the powerful Sukhois providing combat air patrol, the outcome of the dogfight was not entirely satisfactory. Group Captain (Retd) Anurag Sharma, former Director Operations (Air Defence) explains in a report for the Manohar Parrikar Institute for Defence Studies and Analyses: "Had the Su-30MKIs that engaged in combat with the PAF's American-made F-16s and the Chinese made JF-17s been equipped with a superior BVRAAM and an upgraded EW suite, the kill ratios may have been even more favourable. In such a case, the IAF could have caused higher attrition on the raiders. Furthermore, instead of seeing a courageous pilot paraded as a prisoner of war, India may have held the bargaining chips at the negotiating table. It was not so much because of delayed induction of the Rafale, but perhaps a consequence of delayed upgradation of the existing fighter fleets, principally the Su-30MKI."


Mirage-2000 fighter jet

According to Sharma, the upgrade programme for the Sukhoi fleet was initiated about a decade ago and it was to be timed with the first overhaul stage of the aircraft. "However, many aircraft have already been overhauled but there has been little progress on the upgrade programme thus far. The responsibility can perhaps be deflected between the Russian original equipment manufacturer

"HAD THE SU-30MKIS THAT ENGAGED IN COMBAT WITH THE PAF'S AMERICAN-MADE F-16S AND THE CHINESE-MADE JF-17S BEEN EQUIPPED WITH A SUPERIOR BVRAAM AND AN UPGRADED EW SUITE… THE IAF COULD HAVE CAUSED HIGHER ATTRITION ON THE RAIDERS…"

IAF@89 SPECIAL: ABSOLUTE POWER

THE SUKHOI IS AN EXTREMELY LARGE AIRCRAFT (ALMOST TWICE AS MASSIVE AS THE F-16 OR RAFALE) MAKING IT A VERSATILE PLATFORM FOR ADDING ALL SORTS OF AVIONICS, RADARS, WEAPONS AND DEFENSIVE SYSTEMS. THIS HAS ALLOWED HAL TO INCORPORATE INDIGENOUS AVIONICS AND THE BRAHMOS MISSILE ALONGSIDE FRENCH AND ISRAELI SUB-SYSTEMS AND WEAPONRY

for demanding exorbitant prices and withholding technology, HAL (the Indian manufacturer) and DRDO for delayed projects, the ministry concerned for inordinate delays in clearing projects, and the IAF itself for not aggressively pursuing these issues. The bottom line is that the equipment/capability that directly dictates operational readiness cannot be compromised and it is the IAF that has to draw the line."

URGENT UPGRADE AREAS

The Sukhoi is an extremely large aircraft (almost twice as massive as the F-16 or Rafale) making it a versatile platform for adding all sorts of avionics, radars, weapons and defensive systems. This has allowed HAL to incorporate indigenous avionics and the BRAHMOS missile alongside French and Israeli sub-systems and weaponry. Currently, the most important areas requiring upgrades are:

ENGINE: According to a 2014 CAG report, the Su-30MKI had an operational availability of just 55%. This means 45% of the IAF's Flanker fleet is in maintenance, repair and overhaul (MRO). Maintenance is the easy part and usually means inspecting the aircraft after each flight; repair means fixing any damaged parts; and overhaul could involve taking out the engine for major maintenance. The Su-30 MKI's Achilles Heel is its AL-31 engine that needs to be overhauled more often than any comparative Western engine. The IAF's aim is to achieve 75% operational availability. This could mean upgrading to the more advanced AL-41 engine, but the Russians are going to demand a king's ransom for this power plant.

Saturn AL-31 FN turbofan engine

RADAR: The Sukhoi has the passive electronically scanned array (PESA) radar while most current warplanes are equipped with active electronically scanned array (AESA) radars. The major difference between the two is the number of transmitters. A PESA system relies on one large transmitter while AESA systems have multiple transmitters. This allows for greater reliability, smaller size and weight and a lower threat of being detected due to the use of multiple frequencies. In order for the Sukhoi to be able to track modern missiles while the Flanker itself remains undetected, the existing Russian-made BARS PESA radar needs to be replaced. The Uttam AESA radar being developed for the Tejas fighter is being pitched as a replacement. However, the Uttam is comparatively less powerful and meant for small and medium fighters. Whether it can be upscaled for the Sukhoi's massive radome is to be seen. The other alternatives are the Irbis-E PESA radar (which is twice as powerful as the BARS) or the Zhuk AESA.

IRST: The Infrared Search & Track uses infrared search and track technology to detect and track heat coming off the engines of enemy aircraft. What makes it unique is its passive nature – meaning it can act without emitting any radiation of its own. The system offers a fighter both an extra set of medium-range eyes and a stealthy air-to-air combat weapon. The Defence Acquisition Council has accorded approval for undertaking design and development of Long Range Dual Band IRST for SU-30 MKI aircraft under the Make II sub-category. The system, which is being developed by Bharat Electronics, will be able to operate in day and night

Lockheed Martin F-35 Lightning II

conditions and help the Sukhoi detect stealth aircraft like the Lockheed F-35 and Chengdu J-20, which are made up of radar-absorbing materials.

AIR TO AIR MISSILES: In the 1999 Kargil War, it was the MiG-29's 30-km range air-to-air missiles that kept the Pakistan Air Force's F-16s away from the battle zone while the Indian Army pounded the Pakistani troop concentrations in Kargil and Skardu. However, Balakot showed that the IAF had ceded the advantage to the F-16. With that in mind, the IAF is acquiring the 110-km range Astra Mark 1 beyond visual range missile that will replace the Sukhoi's R-77 and R-27 missiles. India is currently testing the Astra Mark 2, which will be capable of taking down enemy aircraft from a range of 160 km. Also planned is the 350-km range Mark 3.

DIGITAL FLIGHT CONTROL COMPUTER: HAL will be replacing the mission computer with a more powerful Digital Flight Control Computer.

END GAME

The IAF's gameplan for the Sukhoi seems to be an incremental rather than a full-on upgrade. While funds are a significant factor, there is also the belief that the incremental approach offers space and time for indigenisation. Developing Indian systems is no doubt a better policy because even if they are a notch below Russian analogues, there is the assurance of hassle-free supplies. Moscow's after-sales unreliability is a key reason why the Indian armed forces have been gradually moving away from Russian weapons.

However, while going for indigenous weapons, India's defence brass must not lose sight of the fact that the Sukhoi's versatility – owing to its extended range, speed, firepower and legendary super-manoeuvrability – has given the IAF considerable leeway in deploying the aircraft in multiple missions. The primary lesson from Balakot and the dogfight that followed is that air superiority is a precious advantage that should not be frittered away. The Sukhoi performs best in the air dominance role, providing combat air patrol for other fighters to attack the enemy with impunity. There are not many fighters in the world that can track and destroy an incoming air-to-air missile. The right approach would be to arm the Flanker with the most powerful weapons systems the IAF can afford. Suboptimal or outdated systems would only lead to the aerial equivalent of a Mexican stand-off with the adversary. That's not what the Sukhoi was built for.

THE PRIMARY LESSON FROM BALAKOT AND THE DOGFIGHT THAT FOLLOWED IS THAT AIR SUPERIORITY IS A PRECIOUS ADVANTAGE THAT SHOULD NOT BE FRITTERED AWAY. THE SUKHOI PERFORMS BEST IN THE AIR DOMINANCE ROLE, PROVIDING COMBAT AIR PATROL FOR OTHER FIGHTERS TO ATTACK THE ENEMY WITH IMPUNITY

–The writer is a globally cited defence analyst. His work has been published by leading think tanks, and quoted extensively in books on diplomacy, counter terrorism, warfare and economic development. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

IAF@89 SPECIAL

GOING THE INDIGENOUS WAY IN MILITARY AVIATION PRODUCTION

India's indigenous capacity in the military aviation sector of defence production is steadily enhancing. The imperative need is to harness it well and in good time

By **AIR MARSHAL ANIL CHOPRA**

India's defence aviation industry is at times accused of not having significantly met the indigenous production needs of the air arms of the Indian armed forces despite being in existence for nearly seven decades. Hindustan Aeronautics Ltd (HAL), for long had mastered the art of license production. After a partial success with the HF-24 'Marut', and now with Light Combat Aircraft (LCA) 'Tejas' and Advanced Light Helicopter (ALH), it seems to have come of age.

Similarly, the Defence Research and Development Organization (DRDO) set up early after independence, today has 52 research laboratories. The first Ordnance Factories (OF) in India were set up by the British in 1787. Today there are 41 OFs with product range in the areas of air, land, and sea systems.

There is huge infrastructure but physical inductions into the armed forces could have been many more. The recent "Atmanirbharta" (indigenisation) initiatives of the government are in the right direction and should bear fruit soon.

IAF DEPLETING NUMBERS AND SOURCING OPTIONS

The Indian Air Force's (IAF) fighter squadron strength is down to 32 from the authorized 42. Numbers could go down further if immediate acquisitions are not initiated. The IAF also needs many other platforms and systems. The Indian military aviation market continues to be huge. Immediately in the pipeline beyond the two LCA Mk1 squadrons are 83 LCA Mk1A, 12 additional Su-30 MKI and 21 MiG 29s. Also there are reports that some old Mirage 2000 aircraft may be bought for sourcing spares.

The earliest first flight for Mk II may take place in 2025 and the actual induction around 2030. The IAF proposes to buy 200 LCA Mk II.

LCA production should be ramped up to around 16-20 aircraft per year to stem depletion of the IAF numbers.

The Request for Proposal (RFP) for IAF's 114 more MRCA has still to be issued. Will IAF settle for more Rafale or wait for LCA Mk II is being contemplated.

The IAF fully supports DRDO's fifth-generation stealth Advanced Medium Combat Aircraft (AMCA). This is a work still in the initial progress and the DRDO says that the aircraft will fly around 2025 and induction around 2028. More realistic figures could be 2028 and 2035 respectively.

The almost three-decade-old fleet of nearly 100 An-32s, despite upgrades, will one day need replacement/augmentation. The replacement of 56 HS-148

Indian Air Force C-130 Hercules transits through Grand Forks AFB

'Avro' aircraft with the Airbus C295W military transport aircraft (9-ton payload) has finally been cleared. 40 of these will be built in India through a JV between Tata Advanced Systems Ltd (TASL) and the Airbus Defence and Space. If successful, it could one day also replace the An-32.

The IAF also desperately needs additional Flight Refueller Aircraft (FRA) and AEW&C aircraft. DRDO is being transferred Air India's Airbus A-321 to develop a larger indigenous AWACS.

With the success of ALH variants, including of LUH and LCH, it should be possible to meet IAF's helicopter requirements indigenously. A medium variant is also planned by HAL.

IAF has already given the RFP to HAL for 70 HTT-40 basic trainers with an option for 38 more. Similarly, IAF awaits successful completion of developmental testing of IJT. Later the LCA trainer could evolve into a Lead-in Fighter Trainer (LIFT).

The midsized, 80-90 seat Indian Regional Jet (IRJ) has still to take off. Similarly, the Saras small transport (20 seats) is still struggling. There is a great requirement for international class simulators for all our platforms.

GROUND BASED RADARS

The DRDO has been successful in developing the INDRA series of radars, the Rajendra fire-control radar for the Akash missile system, and the Central Acquisition Radar (CAR). The Long Range Tracking Radar (LRTR) has been developed with the assistance of ELTA of Israel. There are many others in the pipeline for all the three services. The LRTR, with a 3D AESA, was developed by DRDO with ELTA's assistance.

The 3D Multi-Function Control Radar (MFCR) was developed as part of the Indian ABM programme in cooperation with Thales of France. After the induction of 19 Israeli ELTA 2284 Medium Powered Radars (MPR), IAF awaits DRDO's 'Anudhra' MPR. The 4D, Low-Level Transportable Radar (LLTR), 'Ashwini' is also under trial. Bharat Electronics Ltd (BEL) and Bharat Dynamics Limited (BDL) are great contributors to the indigenous effort.

WEAPON SYSTEMS

The well-beyond their extended-life S-125 Pechora and OSA-AK SAM-8 surface-to-air missiles are being replaced by indigenous Akash medium-range system, and the Israeli SPYDER (Surface-to-air Python and DERby) mobile air defence missiles systems. There is also a plan to upgrade Pechora.

IAF FIGHTER SQUADRON STRENGTH IS DOWN TO 32 FROM THE AUTHORIZED 42. NUMBERS COULD GO DOWN FURTHER IF IMMEDIATE ACQUISITIONS ARE NOT INITIATED


Airbus C-295W

The HTT 40 rolls for take off at Aero India

HAL HF-24, Marut

IAF@89 SPECIAL

ASTRA BVR AIR-TO-AIR MISSILE IS A SUCCESS STORY AND UNDER INDUCTION. ULTIMATELY WE NEED TO BE ABLE TO INDIGENOUSLY DEVELOP METEOR CLASS OF AERIAL MISSILES

LR and MR SAM are also being developed in collaboration with Israel. DRDO is in talks with MBDA to develop Maitri LLQRM (Low-Level Quick Reaction Missile) for all three services. Ultimately India needs to develop long range AD systems of the S-400 class.

Astra BVR air-to-air missile is a success story and under induction. Ultimately we need to be able to indigenously develop Meteor class of aerial missiles.

Work is on to develop laser kits for bombs, and also to develop glide bombs. This needs accelerating. BrahMos is a success and now deployed by all the three services. BrahMos II would have much greater ability. Nirbhay cruise missiles would also augment precision-strike capability.

UNMANNED AERIAL SYSTEMS

All the three services have been dependent for their larger UAVs on Israel and there is a likelihood of signing a contract with General Atomics, USA, for purchase of Predator MQ-9 drone variants for all the three services.

Many Indian private sector companies are now in the small UAV sector. Major orders have been placed for small UAVs. Adani-Elbit has a joint-venture for the Hermes class of UAVs. Bangalore based Alpha Design in a joint-venture with Elbit is working on cost effective loitering munitions.

Meanwhile, DRDO has the Rustom/Tapas variants of Combat UAVs evolving. DRDO's "Ghatak" UCAV is being planned to be a self-defending high-speed reconnaissance UAV with weapon firing capability. HAL is also working on a Manned Unmanned Teaming systems. Unmanned is where the future is and India must endeavour to become self-reliant.

INDIAN NAVY AND ARMY AVIATION REQUIREMENTS

The Indian Army and Navy require helicopter variants in large numbers. They also need air defence radars and missiles. They require UAVs.

Navy requires a variety of aircraft for maritime and carrier-based roles, including fighters. Army requires anti-tank and other surface weapons. The Tactical Battle Support Helicopter or Indian Multi-Role Helicopter (IMRH) is a tri-services project. Clearly India has huge defence requirements to support indigenous production. There is great export potential in Asia and Africa for tapping.

PRIVATE SECTOR

Big private industrial houses have come into defence manufacturing in a serious way. We have great success in ship-building both through public and private sector shipyards. Tata Power and Larsen & Toubro manufacture the Pinaka multi-barrel rocket launchers. L&T was involved in developing the hull for a nuclear submarine for the Indian Navy.

And Tata Power is handling the modernization of airfield infrastructure for IAF. Tata Aerospace and Defence (Tata A&D) have been making the AH-64 Apache combat helicopter fuselage. They are also making aero-structures for Boeing's CH-47 Chinook helicopters.

All C-130Js delivered to customers around the world have major aero-structure components from India producing 24 C-130 empennages annually. Sikorsky—a Lockheed Martin company—also relies on TASL in Hyderabad, India, as the manufacturing base for its global supply of cabin for the S-92 helicopter. Tata Power SED also makes Akash launchers.

GE has a huge India presence. Tata group is working with GE to manufacture CFM International LEAP engine components in India. Lockheed Martin selected TASL to produce F-16 wings in India. EADS unit Cassidian plans to make India a hub for a large number of defence products. BAE's US arm plans to shift the Howitzer assembly to India. There is also a large MRO market that can create an R&D base for engineering services.

The Centum Group, a Bangalore-based defence electronics company has been supplying to French defence solutions provider Thales. Mahindra Group makes large aero-

AH-64 Apache

components and a variety of metallic components for several Airbus aircraft. Bharat Forge is becoming a major player in the artillery and specialized vehicles segment. Several small companies—such as Dynamatic Technologies, Avasarala Technologies, DefSys, Ravilla, and Taneja Aerospace—have of late acquired advanced technological capabilities.

Dynamatic Technologies makes assemblies of vertical fins for Sukhoi 30 MKI fighters. Samtel electronics makes SU-30 Head-Up Displays and other electronics. Ananth Technologies is a leading Aerospace and Defence manufacturer in India with over 1,200 employees across five locations, supplying to ISRO and HAL. Bangalore-based Alpha Design Technologies specializes in defence electronics, avionics and space satellites systems. Godrej & Boyce are into high precision spacecraft components made of exotic alloys for ISRO. Vem technologies are into various systems from the nose to the tail for all major categories of Missiles. Thirty percent of LCA is outsourced to the local industry.

The CII has appreciated the opening of small and medium enterprises (SMEs) and it is bound to spur more design development activities within the country.

Many of the licensing needs have been dispensed with and export clearances are virtually online. The Indian industry, especially MSMEs and start-ups in defence production, need hand-holding. Over the next 7-8 years, India's defence modernisation plan is projected at $130 billion and nearly half of these contracts are expected to be placed with domestic manufacturers.

CRITICAL TECHNOLOGIES INDIA MUST ACQUIRE

High speed, agile, stealthy platforms with low maintenance and high turnaround are required. Other critical technologies include lighter and yet stronger aero-structures, mouldable layered composites materials, higher levels of stealth, hypersonic platforms and weapons, optionally manned systems, stealthy rotary wings and heavy platforms, engines with super-cruise and reduced IR (infrared) signature, and greater levels of thrust vectoring, AESA radars, unmanned airlift, AESA radars, advanced IR technologies, Artificial intelligence (AI) and Robots, Directed Energy weapons (DEW), and EW hardware... India must also push to make a commuter aircraft to step to the Heavy transport next.

And lastly, the need for greater R&D funding.

Sukhoi 30 MKI

WAY AHEAD FOR INDIA

Investment in R&D is the crucial first step to become independent in defence production. India needs to get out of the socialistic workforce ethos with low productivity culture. Technocrat business trained managers and not generalist bureaucracy must control defence production.

The government's move to reorganise and disinvest in ordnance factories is a good move. Privatisation will bring better business practises and accountability. Defence procurement has to be made more Indian private sector-friendly.

The government's thrust to increase the share of all manufacturing from the current level of 15 per cent of Gross Domestic Product (GDP) to 25 per cent is a welcome one as defence will be a significant area.

The negative list of items for defence imports of 209 items include helicopters, towed artillery guns, short-range surface-to-air missiles, cruise missiles, offshore patrol vessels, electronic warfare systems, next-generation missile vessels, floating dock and anti-submarine rocket launchers, next-generation corvettes, airborne early warning systems, tank engines and radars, among others.

Indian industry's strengths need harnessing. Time to act is now lest India misses the bus again.

–The writer is a IAF veteran and Director-General Centre for Air Power Studies (CAPS). The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

OVER THE NEXT 7-8 YEARS, INDIA'S DEFENCE MODERNI-SATION PLAN IS PROJECTED AT $130 BILLION AND NEARLY HALF OF THESE CONTRACTS ARE EXPECTED TO BE PLACED WITH DOMESTIC MANUFAC-TURERS

BUSINESS INITIATIVE

Mrs Anandi Ramalingam, CMD, BEL

BEL SHARES SPECIAL SYNERGY WITH IAF

On the occasion of the 89th Anniversary of the Indian Air Force, Navratna Defence PSU Bharat Electronics Limited (BEL) is looking forward to continue extending its full support to the IAF. BEL and the Indian Air Force have over the years shared a special synergy on the professional front. The Defence major and the IAF have worked together with seamless co-ordination in successfully executing various projects of national importance.

The Bengaluru-headquartered DPSU has been supplying a range of products, systems and services for the Indian Air Force, including Electronic Warfare Systems, Avionics, Weapon Systems, Radar and Fire Control Systems, Communication systems, C4I Systems, Homeland Security, EO Payloads for Helicopters, Counter Drone Systems, etc. BEL's airborne EW products include Radar Warning Receivers for aircraft and helicopters (MiG 29, Jaguar and LCA), new generation Integrated EW Suites for fighter aircraft and Self-protection Suites for helicopters with light-weight RWR, laser and missile warning capabilities, state-of-the-art Jammers, etc.

BEL is the Lead Integrator for the prestigious Akash Missile System for the Indian Air Force and has supplied several squadrons. BEL is currently executing the next phase of commissioning Akash Missile System for the Indian Air Force. BEL is also actively participating in the MRSAM weapon system programme of the Air Force, which is a joint development programme between DRDO and IAI, Israel.

BEL has been actively associated with the prestigious Light Combat Aircraft (Tejas) programme since 1994. BEL has been partnering for many years with various DRDO labs like ADE, ADA and DARE in the development and manufacturing of various avionics grade systems for the LCA. BEL's avionics products for Tejas include flight-critical equipment like the Digital Flight Control Computer, Flight Control Panel, Air Data Computer, Mission Critical Line-Replaceable Units (LRU) like Pylon Interface Box and Stores Interface Box, Head Up Displays, Cockpit Modules and Data Link equipment.

BEL has also been supplying Radars for the Indian Air Force since many decades. BEL radars supplied to the IAF include Air Defence Radars such as INDRA, a series of 2D mobile surveillance radars for low level target detection, 3-D Central Acquisition Radar (CAR), as part of the Akash Missile System, Low Level Light Weight Radar, SRE Surveillance Radar for Air Traffic Management, etc.

In the area of Communication, BEL has developed the Software Defined Radio (Airborne) version. BEL is also engaged in projects such as TROPO upgrade, Mobile Radio Relay (DMRR) upgrade, and Communication terminals for Advanced Landing Ground (ALG), etc, for the IAF.

In order to strengthen the security infrastructure of critical assets, BEL is executing the Integrated Perimeter Security System for IAF. Similarly in the Unmanned Systems domain, BEL is engaged in the design, development, manufacturing and supply of Payloads and Ground Control Stations for UAVs.

BEL has developed various C4I or Network Centric Systems for the Indian armed forces to network and provide a Digital Battle Space for geologically dispersed forces. C4I systems developed by BEL for the Indian Air Force include Integrated Air Command and Control System (IACCS), Operational Data Link and Airborne Early Warning and Control System.

BEL has active collaborations with top Defence and Aerospace firms. In some niche technology areas, BEL does look for collaboration with foreign firms to meet the requirement of Indian customers. Similarly for various programmes of foreign OEMs, BEL is the preferred supply chain partner.

BEL is at present executing an order from ELOP, Israel, for EOIR Payloads (CoMPASS) and other airborne systems. The Company is involved in the manufacturing and supply of systems/subsystems required for missile systems for IAI, Israel. BEL is also working on the development of software for a C4I solution for Rafael, Israel.

CV 200 Ventilator System

BEL is supplying RF Super Components to Thales through a JV between BEL and Thales (BTSL), for Rafale aircraft. BEL is also working with several OEMs in USA and Russia for various products and systems such as Data Link II, IFFI (Identify Friend or Foe Interrogator), etc. Apart from these, the Company is actively interacting with many other OEMs such as Elisra (Israel), Telephonics (USA), and Saab (Sweden), to explore aerospace related business opportunities.

The Defence PSU achieved a record turnover of Rs. 13,818 Crores in FY 2020-21, registering a growth of 9.6% over the previous year turnover of Rs. 12,608 Crores. BEL's overall order book also looks good at about Rs.54, 400 Crores as on July 1, 2021. The major projects executed in FY 2020-21 were LRSAM, IACCS, Akash Missile System, CDR TI for BMP & T72, Land-based EW System Upgrade, AFNET, SHAKTI PH III, Ventilators, Homeland Security, Smart City projects, HUMSA, Coastal Surveillance System, K-FON, ACCS P17A, SDR (NC), EOIR, CCTV, Avionics for Light Combat Aircraft, Electronic Fuzes, NAISS and Low Level Transportable Radar.

BEL has acquired orders worth about Rs. 15,200 Crores in FY 2020-21. Major Orders received include AFNET Performance & Security Enhancement and SATCOM Network, Ventilators (including service), Naval Fire Control System, Software Defined Radio, Advance Torpedo Defence Systems, Digital Mobile Radio Relay, etc.

Some of the major projects planned for execution during 2021-22 are Long Range Surface to Air Missile System (LRSAM), Integrated Air Command & Control System (IACCS), Coastal Surveillance System (CSS)-Phase II, Kerala Fibre Optic Network (K-FON), Weapon Locating Radar (WLR), Integrated Perimeter Security System (IPSS), Samyukta EW Upgrade System, SAGAR III Systems, ACCS, HUMSA UG Systems, Lynx U1 Mod, Shakti Phase-III, Electronic Voting Machines (EVM), etc.

BUSINESS INITIATIVE

CoMPASS System

Akash Weapon System

BEL ACHIEVED AN EXPORT SALE OF $ 51.93 MILLION DURING FY 2020-21. SOME OF THE COUNTRIES, WHERE BEL'S PRODUCTS WERE EXPORTED WERE USA, FRANCE, ISRAEL, GERMANY, SWITZERLAND, SWEDEN, CHINA, REPUBLIC OF ARMENIA, MALDIVES, INDONESIA, SRI LANKA, TURKEY, BHUTAN AND A FEW SPECIFIC SEZS

Defence, being the mainstay of BEL, has traditionally been contributing to around 80% of the Company's annual sales revenue. BEL, however, has been continuously exploring opportunities in allied non-defence areas. Some of the areas BEL is focussing on in non-defence include solutions for Civil Aviation sector including Air Traffic Controller Radars, Anti Drone systems, Space / Satellite Electronics, Space Launch Vehicles, Satellite Communication Services, Spacegrade Solar Cells, Unmanned Systems, Satellite Assembly & Integration, Solar Business, Railway and Metro solutions, Software as a Service, Network & Cyber Security, Energy Storage products for Electric Vehicles (Li-ion & Fuel Cells, Charging Stations, etc), Homeland Security & Smart City businesses, Smart Meters, a range of Medical Electronic and health care solutions (ICU Ventilators, Dialysis Machines, Patient Monitoring System, UV Sanitiser, Telemedicine, Medical Simulators, Portable CT Scan, Medical Displays, X-ray C Arm, Ultra Sound, MRI, etc), Artificial Intelligence, Communication Radios & Networks, Composite Shelters & Masts, etc. This wide bouquet of businesses in non-defence would play a key role in driving BEL's growth in the coming years.

BEL achieved an export sale of 51.93 Million USD during FY 2020-21. Some of the countries, where BEL's products were exported were USA, France, Israel, Germany, Switzerland, Sweden, China, Republic of Armenia, Maldives, Indonesia, Sri Lanka, Turkey, Bhutan and few specific SEZs. The Export order book, as on 1st April 2021, stands at US $125.93 Million including Offset orders of US $46.35 Million. BEL is fast expanding its global presence, putting its best foot forward to give a thrust to exports worldwide. All-out efforts are being made to tap new markets across the globe. In a bid to develop new markets in the Indian Ocean Region (IOR) and friendly foreign countries (FFCs), BEL has operationalised overseas marketing offices in Oman, Vietnam, Sri Lanka and Myanmar. BEL has also expanded its Singapore and New York Regional Offices to handle marketing activities.

Be it the efforts that the Company has been putting in to engage in collaborative R&D in addition to augmenting its own R&D set up — its recent attempts to outsource work to Indian private industries and MSMEs, or the path breaking decision to go in for Public-Private partnerships to execute turnkey projects, BEL is leaving no stone unturned to ensure that it is in sync with the Government's larger goal of achieving an Atmanirbhar Bharat.

HELD UNDER THE PATRONAGE OF HIS EXCELLENCY, PRESIDENT ABDEL FATTAH EL-SISI
THE PRESIDENT OF THE ARAB REPUBLIC OF EGYPT, THE SUPREME COMMANDER OF THE EGYPTIAN ARMED FORCES

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BY INVITATION

THALES IN INDIA: BUILDING A TRUSTWORTHY AND SECURE TOMORROW

As a steadfast partner of India for close to seven decades, Thales through a diverse mix of high-technology solutions, services and collaborations, has brought its global expertise in defence, digital identity and security, aerospace, space, and transportation to India. It remains committed to India's growth story

By **ASHISH SARAF**

Research and innovation are now at the economic centre of India's growth story. There have been collective efforts from the government, armed forces, industries, and academia to stimulate the advancement of technological innovation in the country. The government's allocation of Rs. 500 crore to push research and innovation in aerospace and defence by supporting 300 start-ups is one of the latest examples of these efforts. As rightly said by Rajnath Singh, the honourable Defence Minister, India can become an economic superpower if it achieves advancement in enabling technology.

Keeping innovation at the helm of its operations, Thales has been a steadfast partner of India for close to seven decades now. Through a diverse mix of high-technology solutions, services and collaborations, the organisation has brought its global expertise in defence, digital identity and security, aerospace, space, and transportation to India. With 1,800 employees working with Thales and its joint ventures in India, the organisation is looking to strengthen its presence in the country and has plans to hire at least 300 more this year for high technology roles.

'AATMANIRBHAR BHARAT ABHIYAAN': AN OPPORTUNITY FOR GROWTH

The vision of Aatmanirbhar Bharat has marked a series of initiatives which aim to achieve more indigenisation and self-reliance in India. The progressive steps to provide priority to indigenously designed and developed defence products mark a shift towards self-reliance in true essence of building an "Aatmanirbhar Bharat".

THALES, STANDING TOGETHER WITH INDIA AT EVERY STEP OF THE WAY

Thales has contributed in providing teeth to Rafale's game-changing weapons through a range of solutions such as the AESA RBE2 radar, the SPECTRA electronic warfare suite for 360° detection and action modes, advanced man-machine interface with displays in cockpit, missile electronics, the front-sector optronic with infrared search and track systems FSO-IRST, the CNI suite (communication, navigation, identification) as well as power generation systems and a logistics support component.

Thales is also proud of the upgradation of the Mirage 2000 fleet of the Indian Air Force. Apart from this, the company also offers a host of systems for India's armed forces ranging from night vision devices and carbines to unguided rockets for attack helicopters.

Nurturing local industrial and supplier partnerships to support India's defence and aerospace needs, Thales has more than 50 offset partners and more than 75 supply chain partners. Exemplifying the spirit of "Make in India", Thales has also formed joint ventures in India - formed a JV with Reliance Aerostructures in 2017 and

with Bharat Electronics Ltd. (BEL) in 2014, among others. Through these JVs, Thales has built comprehensive skillsets in India to contribute towards sustainable manufacturing in India for India as well as in India for the world focused on exports.

THE FUTURE IS DIGITAL AND UNMANNED SYSTEMS

With the future seen belonging to digital technologies, UAV and CUAV solutions, Thales identified the trends early and invested more than 7 billion euros globally in technologies such as connectivity, big data, artificial intelligence, cybersecurity and quantum computing amongst others. Research and Development (R&D) and innovation are crucial to Thales for its success. Discovering new ways to step up to the challenges of modern society, Thales brings to the table a unique combination of technologies and talent that make Thales a key player in keeping the public safe and secure, guarding vital infrastructure and protecting the national security interests of countries around the globe and in India. Progressing in this direction, Thales' Engineering Competence Centres (ECC) in the National Capital Region and Bengaluru have been fostering R&D, and serving its projects and customers in India and abroad across different markets.

As an expert in civil / military aerospace with over 40 years of experience, we develop and implement integrated end-to-end solutions to command, control and coordinate air operations and to ensure flight safety, sovereignty and air superiority. Thales' solutions provide safety and security at all levels of the airspace both military and civil.


Spy'Ranger


Thales Watchkeeper WK450


Thales UAS 100

We make UAVs across the Group for the civilian and military markets (Spy'Ranger / Watchkeeper / UAS 100 etc). We provide unmanned traffic management (UTM) derived from our expertise in air traffic management (ATM) and also counter unmanned aerial vehicles (CUAV) measures derived from our Air Defence expertise and enhanced by partnerships with small companies.

Thales, can manage the entire drone ecosystem — UAV systems, UTM, surveillance, C-UAS, neutralisation to:

- Assist with the alignment of players / lead this ecosystem of civil and military organisations, regulatory bodies, major defence and aerospace companies as well as the many agile and innovative SMEs in the segment.
- Offer end-to-end solutions based on expertise in air supremacy at all levels of the airspace

Thales provides solutions allowing civil and military aviation authorities to detect - even without data transmission - and verify a drone's registration number, identify its pilot, and confirm its flight authorisation, all in a few seconds. By the same time, to cope with unexpected or non-registered drones, detection and classification are the first steps before engaging a graduated response.

For the drones that are not allowed, then a complete set of graduated neutralisation can be deployed, ranging from hijacking, jamming, drone interception, or even shooting down through directed high-energy weapon or ultimately air defence systems.

Thales will continue to help its customers master their decisive moments in an increasingly complex world. The organisation remains committed to India and helping its customers prepare for tomorrow, today. Thales congratulates the Indian Air Force and fellow Indians on the account of the 89th Indian Air Force Day.

–The writer is a Vice President & Country Director - India, Thales. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

NURTURING LOCAL INDUSTRIAL AND SUPPLIER PARTNERSHIPS TO SUPPORT INDIA'S DEFENCE AND AEROSPACE NEEDS, THALES HAS MORE THAN 50 OFFSET PARTNERS AND MORE THAN 75 SUPPLY CHAIN PARTNERS

MUSINGS FROM RUSSIA

TALIBAN RETURN TO KABUL REKINDLES INDIA'S SECURITY DIALOGUE WITH RUSSIA

The chaos in Afghanistan post US withdrawal and return of Taliban has rekindled India's high level security dialogue with Russia. Between India's vital interest in the Indo-Pacific and the growing importance of the Eurasian landmass as a strategic space, Russia remains India's main strategic partner

By **VINAY SHUKLA**

Return of Taliban in Kabul as the US-led NATO troops hurriedly withdrew after two decades of military campaign has rekindled India's high level security dialogue with Russia and Eurasian landmass acquired similar strategic dimension as the maritime Indo-Pacific. Although, India was critical of Russia's engagement with Pakistan in Afghan process within the framework of extended "Troika" comprising the US, Russia, China. Strangely, India which had invested huge sums for developmental projects in Afghanistan felt betrayed by old friend Russia and not by the new friend – the US.

However, the harsh reality uncovered the commonality of their vital interests in the unfolding scenario in the "Graveyard of Empires". No wonder, Prime Minister Narendra Modi was the first leader of the world whom the Russian President Vladimir Putin called to discuss the serious challenges posed by the Taliban 2.0 regime in Kabul. The two leaders who are concerned at spill-over of Taliban terrorism into Central Asia and Jammu & Kashmir instructed senior security officials to launch bilateral communication channel on Afghanistan. Shortly after this, Deputy National Security Advisor Pankaj Saran flew to Moscow to prepare for the visit of top Kremlin security tsar-Nikolai Patrushev, Secretary of powerful National Security Council. Patrushev, a close Putin aide and former chief of Federal Security Service (FSB) flew to New Delhi for consultations with NSA Ajit Doval.

Director of Moscow-based Centre for Studies of Contemporary Afghanistan, Andrei Serenko believes that the US had handed over the endgame

in Kabul to Pakistan's ISI, which is now full master of the country. He was speaking at the session of pro-Putin hardline Izborsk Club. Many speakers, who are veterans of Soviet Afghanistan campaign with security establishment

background criticised the government for lack of clear-cut policy on Afghanistan and towing China's line which has virtually pushed out Russia from former Soviet Central Asian republics.

Both India and the US seem to be engaging with Russia, which has capabilities to project hard power in the region through its military bases in Tajikistan and Kyrgyzstan. On his first foreign visit, India's Chief of Defence Staff General Bipin Rawat visited Russia to attend the meeting of the Chiefs of General Staff of the Shanghai Cooperation Organisation (SCO) at the Russian base in Orenburg region on geographical border of Europe and Asia where anti-terror exercise Peace Mission 2021 were held with participation of armed forces of the SCO member countries including China and Pakistan. India had sent 200 strong contingent for the drills spread over several days. On the sidelines of the drills General Rawat had a bilateral meeting with his Russian counterpart Army General Valery Gerasimov who flew direct from Helsinki after his talks with US counterpart General Mark Milley, Chairman of the Joint Chiefs of Staff near the Finnish capital.

General Rawat and General Gerasimov discussed the defence cooperation between India and Russia and situation in Afghanistan challenging for both strategic partners. It is believed that Moscow has refused to assist the US in securing bases

MUSINGS FROM RUSSIA

FRIENDS MAY CHANGE OVER THE PASSAGE OF TIME BUT BROTHERS STILL REMAIN BROTHERS, ALBEIT WITH THEIR INDIVIDUAL INTERESTS, WHICH AT TIMES MAY CONFLICT UNDER CHANGING CIRCUMSTANCES

in Central Asian republics tied with Collective Security Treaty Organisation (CSTO) of former Soviet republics. A move, which is likely to be welcomed by China and Pakistan. Russia sent a large military delegation headed by Deputy Defence Minister Alexander Fomin to Pakistan to discuss evolving situation in Taliban -controlled Afghanistan and possible military cooperation to mitigate threats for the countries of region.

Meanwhile, India seems to be balancing its Indo-Pacific maritime tilt with greater military interaction with old friend Russia in Eurasia where also many countries are beginning to feel the breath of Chinese dragon.

After hiatus of 2020 due to COVID-19 scare, India reinvigorated joint drills and visits organised by Russia. In July Russian built Talwar class stealth frigate INS Tabar took part in the naval parade to mark the 325th anniversary of Russian Navy in St. Petersburg in the presence of President Putin. Naval Chief Admiral Karambir Singh was among the special invitees.

After the parade the 12th edition of exercise INDRA NAVY, a biennial bilateral maritime exercise between Indian Navy and Russian Navy was held in the Baltic Sea from July 28 to 29, 2021 with the participation of INS Tabar and the Russian Navy's Baltic Fleet Corvettes RFS Zelyony Dol and RFS Odintsovo.

Similarly, 12th Edition of Indo-Russia joint military Exercise INDRA 2021 was held at Volgograd (former Stalingrad) from August 1 to 13, 2021. It involved counter terror operations under the United Nations mandate by a joint force against international terror groups, 250 personnel from both the nations took part in the exercise.

Another milestone in joint exercises was Indian participation in Zapad-2012 strategic war games. Held in Nizhny Novgorod region, 200 strong Indian contingent drawn from Naga regiment, mechanised infantry, and IAF commandos honed their skills in multi-theatre war games with Russia and other CSTO member servicemen.

Interestingly, China and Pakistan were invited as observers only in the war games to enhanced preparedness for countering possible NATO aggression. Zapad in Russian means West. The Russian Defence Ministry released several videos showing Indian contingent actively participating in combat drills holding tricolour high.

Summer of 2021 showed the growing importance of Eurasian landmass as a strategic space, vital for India's long-term interests and in the vacuum caused with the withdrawal of US from Afghanistan, Russia remains its main strategic partner.

- The writer is a Moscow-based independent analyst. Views are personal.

MAKE IN INDIA

WORKING TOWARDS ATMANIRBHARATA

ISO 9001-2015 , DSIR Approved R&D House, DGQA Approved , Space Approved

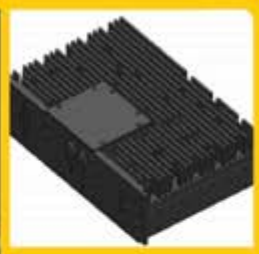
SEAMLESS INTEGRATION OF IT,MACHINES & HUMANS WITH RELAIBLY INOVATIIVE SOLUTION

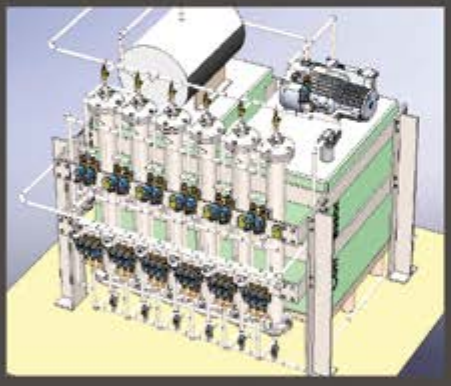
INDIGENIZATION









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IN CONVERSATION

"INDIA IS A VERY IMPORTANT AND STRATEGIC MARKET FOR COLLINS AEROSPACE, AND WE REMAIN COMMITTED TO SUPPORTING OUR CUSTOMERS HERE NO MATTER WHAT CHALLENGES THE FUTURE BRINGS"

With more than two decades of its presence in India, Collins Aerospace – a Raytheon Technologies company, is one of the nation's largest exporters of aerospace products and also offers breadth and depth in aviation products and capabilities. It considers India as an important market for future growth and is expanding its presence with investment in people and infrastructure.

In a freewheeling conversation with ***Editor, Raksha Anirveda, Collins Aerospace's Managing Director - Customer & Account Management, Sunil Raina*** *provided a detailed account of the company's footprint, experience in India, future plans and the pivotal role it has been playing to empower India....*

What are the major advantages that AI offers in military decision-making? Would you call application of AI in the military domain a revolutionary step forward? Can it change the nature of warfare?

SR Artificial Intelligence is impacting nearly every industry sector, driving emerging technologies like big data, robotics and IoT.

According to a McKinsey Global Institute report, AI and ML (machine learning) will create trillions in value for verticals like marketing and sales, manufacturing, and supply chain planning.

These technologies can be a boon to modernize the defence industry. As the future heads towards unmanned systems, AI can play a role across military applications, from tactical, operational, to strategic-level planning and execution. India has a leadership position in IT and we should leverage that expertise to reshape our economy and our defence.

AI can go through massive amounts of data in seconds and it can be used to prepare early warning algorithms that will pick up conflict signals much faster than humans. Using AI and ML technologies our military forces can efficiently coordinate movement, flows, and supplies as well make informed decisions. These systems can also be used to navigate un-

manned aerial systems (drones) and ground vehicles (UAVs).

India's Ministry of Defence has prepared a road map to promote AI in national security, and the development of 25 defence specific AI products by 2024. In DefExpo 2018 Prime Minister Modi had stressed on the transformative power of emerging technologies like AI and robotics and said that these technologies would perhaps be key to the defensive and offensive capabilities of any defence force of the future.

What is the direction that new communication systems are taking in the military domain? What factors are being kept in mind while developing cutting-edge communication systems?

SR In the modern battlespace, one of the critical success factors is to keep defence forces connected, even in complex and rapidly changing environments. It is also important that communication systems span the entire operational spectrum and integrate seamlessly with existing platforms cost effectively.

Our modernized military communication systems and sophisticated software-defined radio technologies provide advanced effectiveness within and between domains. And not only do our solutions span the entire operational spectrum, they integrate seamlessly with existing platforms at very low operating costs.

For example, Collins Aerospace's TruNetTM – the most advanced, integrated software-defined communications solution available – gives ground, airborne and mobile forces the power to network and share critical data, image, voice and video, securely and in real time.

Our TruNet™ AR-1500 networked communications airborne radio delivers software-defined capabilities for country-specific customization. It's designed to stay advanced as needs and missions change. This powerful radio is in broad use today, providing secure and highly adaptable communications worldwide. A powerful feature of the radio is its customizability to host-country needs. From sovereign waveforms to multinational interoperability and advanced encryption security, the AR-1500 offers tailorable functionality in a form factor that also makes it easier, faster and more cost-effective to integrate

In the domain of cyber solutions, platforms and components are become increasingly connected. But it is being felt that the issue of cyber security is not being adequately addressed and may remain to be the 'Achilles Heel'. What do you feel?

SR With the ever-increasing number and complexity of threats to information networks at critical infrastructure facilities worldwide, proactive cybersecurity solutions that support continuity of operations are more critical than ever. Collins Aerospace ARINC cybersecurity solutions encompasses system assessment, design and build. Our fully managed Cybersecurity Operations Center (CSOC) is located in Annapolis, Maryland and the latest services and solutions offered include:

INCIDENT RESPONSE: We have extensive experience protecting mission-critical systems on the local, state and federal levels. We use mature cyber playbooks and courses of action to detect, respond to and contain threats. Our recovery process determines the ingress path of threat, closes it off and returns the critical system to operation.

COTS TECHNOLOGY: Our comprehensive solutions leverage mature, proven commercial off-the-shelf (COTS) technologies featuring endpoint protection, next-generation firewalls, IDS/IPS, SIEM, whitelisting and trusted hardening techniques to mitigate identified threats and risks in the most effective way possible.

SECURITY PERFORMANCE AND COMPLIANCE TESTING: We use real-world test scenarios and dynamic requirements traceability tools to validate our solutions against the threats and regulatory guidelines of the system.

TRAINING AND ON-SITE SERVICES: From general awareness to policy and procedure training, to administrator and maintenance training for specific components, our field staff will equip you with the skills and knowledge to make the most effective use of our cybersecurity solutions.

VULNERABILITY MANAGEMENT SERVICES: Our experience and proven processes in mitigating hundreds of vulnerabilities in critical systems and preventing them from being exposed enables us to consistently

INDIA'S MINISTRY OF DEFENCE HAS PREPARED A ROAD MAP TO PROMOTE AI IN NATIONAL SECURITY, AND THE DEVELOPMENT OF 25 DEFENCE SPECIFIC AI PRODUCTS BY 2024. IN DEFEXPO 2018 PRIME MINISTER MODI HAD STRESSED ON THE TRANSFORMATIVE POWER OF EMERGING TECHNOLOGIES LIKE AI AND ROBOTICS AND SAID THAT THESE TECHNOLOGIES WOULD PERHAPS BE KEY TO THE DEFENSIVE AND OFFENSIVE CAPABILITIES OF ANY DEFENCE FORCE OF THE FUTURE

IN CONVERSATION

Cyber Security

validate and deliver patches and updates without affecting system performance.

Our extensive experience providing security solutions to nuclear power plants, railroads, the DoD and other critical infrastructures gives us the strategic perspective to leverage best practices across industries and build industry-specific solutions based on our customers' specific needs.

How soon do you see products and platforms that will provide seamless integration of military platforms and systems in all domains, in other words, platforms for multi-domain warfare? Is the military industrial complex working on this line?

SR The solutions are already available today, and our unique ability to leverage technologies across our commercial and military market segments provides increased flexibility as well as reduced total lifecycle and acquisition costs through open systems and commercial off-the-shelf technology solutions. We are also backed by a global network of service and support to promote mission readiness.

Collins Aerospace creates and deploys targeting and C2 solutions that provide the awareness and connectivity needed to quicken the pace of battle and to dominate the battlespace. Integrating advance technologies provides a new level of battlefield integration. From precision joint targeting solutions to countrywide command and control, Collins provide solutions for modern warfare.

Apart from command and control solutions, we also continue to pursue opportunities in other areas such as interior systems, displays and mechanical systems (e.g. wheels and brakes, landing systems and actuators)

India remains a strategic and important market for Collins Aerospace. We will continue to bring advanced solutions and value-add to support the Atmanirbhar Bharat initiative and are looking for opportunities to increase our local partnerships to provide seamless integration of military platforms and systems in all domains.

Collins Aerospace recently demonstrated advanced communication, mission computing and sensor technologies to support Joint All Domain Command and Control and Advanced Battle Management System initiatives on a KC-135 Stratotanker. Tell us more about it. Do you have any plan to showcase it with IAF in near future?

SR In collaboration with 151st Air Refueling Wing, our demonstration showed how integrated technologies and joint connectivity can provide warfighters with the actionable data and increased situational awareness they need to make informed, split-second decisions in evolving threat conditions against cyber-sophisticated adversaries.

The demonstration took place on a Block 45 retrofitted

KC-135 featuring Collins' real-time information in the cockpit (RTIC) system and included live-fly elements that simulated a forward deployed element as the primary information gathering source and an airborne relay element. Once the forward deployed element identified and processed key target information, it transmitted collected data over the Collins Tactical Targeting Networking Technology (TTNT) mesh network directly to the flight deck.

Collins' Rosetta message processing software and Multiple Level Security (MLS) system captured this data and encrypted the incoming messages to ensure they retained their respective security levels. Then the software seamlessly sent the messages to those leading and/or executing the mission in the moment.

The ability to distribute secure data to those in different security areas is a key differentiator of the Collins MLS system and solves a major challenge in maintaining secure dataflow communication across the congested battlespace.

We are not able to reveal details of any local pursuits on this due to confidentiality reasons.

How has been Collins Aerospace's experience in India? Does Collins Aerospace India play a significant role in the overall global entity? How has been the India design centre and global engineering centre performance? Kindly elaborate on Collins contribution in India's aerospace and defense capabilities.

SR Collins Aerospace has about 5,000 employees in India and has had an established presence in the country since 1997. We are building an end-to-end global manufacturing, engineering and avionics supply chain, including the India Design Center in Hyderabad and the Global Engineering Center in Bengaluru. Collins is one of the nation's largest exporters of aerospace products and also offers breadth and depth in aviation products and capabilities.

Collins Aerospace supports local Indian and international governments, aerospace original equipment manufacturers and defence contractors in avionics, communications, navigation and electronic solutions:

- Assembles and tests commercial aircraft interiors including evacuation systems, water solutions, lighting and seating
- Mechanical systems including cargo and actuation, and avionics including sensors, cockpit displays and smoke detectors
- Mission systems including wire harnesses and testing of various functions including vibration and power door operating systems
- Manufacture and assembly of electronic components including box builds and wiring harnesses
- Mechanical component assembly such as gluing, riveting and bonding
- Cutting, sewing, joining, finishing and bonding of special fabric and silicone heaters, and special processes such as chemical processing and digital radiography
- Engineering services that include avionics, aerostructures, power and controls, mechanical systems, mission systems and interiors

We've also received the following accolades from the industry:

- The Airbus SQIP award for lighting, named Best U.S. Company in the Manufacturing Sector by IACC, won an Excellence in Innovation Award for engineering from NASSCOM and was awarded by ET and Frost & Sullivan for its manufacturing and supply chain excellence.
- As a safe and equal opportunity employer, Collins Aerospace earned the Golden Peacock Occupational Health & Safety Award; National Safety Award, Unnatha Suraksha Puraskara, 2019; Best Employer Brand Award in 2017, 2018 and 2019; and was named one of the Top 100 Companies in India for Working Women.

Kindly provide insights into your future plans for the Indian market along with your thoughts regarding government policies for the sector.

SR India is a very important and strategic market for Collins Aerospace, and we remain committed to supporting our customers here no matter what challenges the future brings.

We are also looking to invest in people and infrastructure in order to create disruptive solutions for the aerospace, defense and space sectors.

The Indian aviation industry

INDIA REMAINS A STRATEGIC AND IMPORTANT MARKET FOR COLLINS AEROSPACE. WE WILL CONTINUE TO BRING ADVANCED SOLUTIONS AND VALUE-ADD TO SUPPORT THE ATMANIRBHAR BHARAT INITIATIVE AND ARE LOOKING FOR OPPORTUNITIES TO INCREASE OUR LOCAL PARTNERSHIPS TO PROVIDE SEAMLESS INTEGRATION OF MILITARY PLATFORMS AND SYSTEMS IN ALL DOMAINS

IN CONVERSATION

Digital Terminal Control Systems

was impacted much like every country around the world due to the pandemic. Despite that, today there are multiple initiatives being undertaken to bring the sector back to speed. We understand that the government is focused on the development of aviation infrastructure and we look forward to contributing to the growth of the sector in areas such as the connected aviation ecosystem for India's aviation infrastructure requirements.

WE UNDERSTAND THAT THE GOVERNMENT IS FOCUSED ON THE DEVELOPMENT OF AVIATION INFRASTRUCTURE AND WE LOOK FORWARD TO CONTRIBUTING TO THE GROWTH OF THE SECTOR IN AREAS SUCH AS THE CONNECTED AVIATION ECOSYSTEM FOR INDIA'S AVIATION INFRASTRUCTURE REQUIREMENTS

We are also trusted by multiple government and military missions to provide flight support services every day irrespective of where they are flying to and we will continue to be a trusted partner for our clients and government in India.

In addition, we have a sizable portion of our attention and revenues that go towards building a better more empowered India and to that end we will continue our extensive CSR activations in the country.

Over the last couple of months, we have conducted various initiatives to help the underprivileged and those most impacted by the pandemic. Collins Aerospace will continue to contribute to the health and safety of the community in our fight against the COVID in both Urban and Rural areas as we move forward.

Our efforts are part of Raytheon Technologies' larger response to India's COVID-19 crisis (Collins Aerospace is a unit of Raytheon Technologies Corp.) To date, the company has donated four mobile oxygen trucks, 1.2 million pieces of personal protective equipment, along with funding for 1,000 oxygen concentrators and assistance to local relief organizations.

We are also matching employee donations to numerous nonprofits supporting COVID-19 relief efforts. Recently, Collins Aerospace joined hands with AerCap, Pratt & Whitney, and SMBC Aviation Capital in a group effort to support equitable access to COVID-19 vaccinations in low-income countries via a collective $400,000 USD contribution to the Gavi COVAX Advanced Market commitment (COVAX AMC), the multilateral mechanism, that provides access to donor-funded vaccine doses to 92 lower-income nations.

MULTI-MILLION POUND TEMPEST FUNDING SET TO ADVANCE THE UK'S FUTURE COMBAT AIR CAPABILITY

New Delhi. (India). The Ministry of Defence (MoD) has awarded a contract worth approximately £250m to progress the design and development of Tempest, the UK's Future Combat Air System (FCAS). The contract, signed by BAE Systems, officially marks the start of the programme's concept and assessment phase.

Continued funding of Tempest underlines the UK Government's confidence in the progress and maturity of the programme, which is set to deliver the military, industrial and economic requirements of the national combat air strategy.

The programme is being delivered by Team Tempest – combining the expertise of the UK MOD, BAE Systems, Leonardo UK, MBDA UK and Rolls-Royce. Working with international partners, the team is leading progress towards a UK-led internationally collaborative Future Combat Air System which will ensure the Royal Air Force and its allies retain world-leading, independent military capability. The concept and assessment phase contract will see the partners develop a range of digital concepts, embedding new tools and techniques to design, evaluate and shape the final design and capability requirements of Tempest.

DIGITAL DEVELOPMENT

Tempest will pioneer cutting-edge technologies, including those assisted by Artificial Intelligence, machine learning and autonomous systems to meet the capability requirements of future conflicts and be operational in the mid-2030s.

The Tempest next generation stealth fighter jet

The design and production of Tempest demands a radically different approach and the Team Tempest partners are working with companies in their supply chain to drive digital transformation, embedding a digital enterprise through the ecosystem; embracing an agile approach that will deliver a combination of advanced technologies, efficiency, speed of production and lower costs.

ECONOMIC CONTRIBUTION

Recent research conducted by PwC underlines how the Tempest programme is expected to deliver significant and wide ranging benefits to all regions of the UK, stimulating vital investment, productivity, skills and innovation. The programme will make an estimated £26.2bn contribution to the UK economy, create high productivity employment - 78% higher than the UK national average – and will support an average of 21,000 jobs a year.

The programme is able to stimulate R&D in regions most in need and generate wider economic benefits for these areas, with 70% of the programme's value to be generated in the North West, South West and East of England. This means the Tempest programme is well placed to support the UK Government's levelling up priorities and contribute to the UK's economic recovery and prosperity in the decades ahead.

CONVERGENCE OF INTERESTS: INDIA, AUSTRALIA CLOSENESS IMPARTS NEW

The fast paced geo-political environment change in the Indo-Pacific region have brought India and Australia together to infuse dynamism in their bilateral defence engagement under the Comprehensive Strategic Partnership. The first 2+2 ministerial dialogue, reflected their commitment to deal with the emerging challenges to regional security effectively, cooperate with each other and further strengthen the ongoing defence cooperation between the two countries….

By **SHANKAR KUMAR**

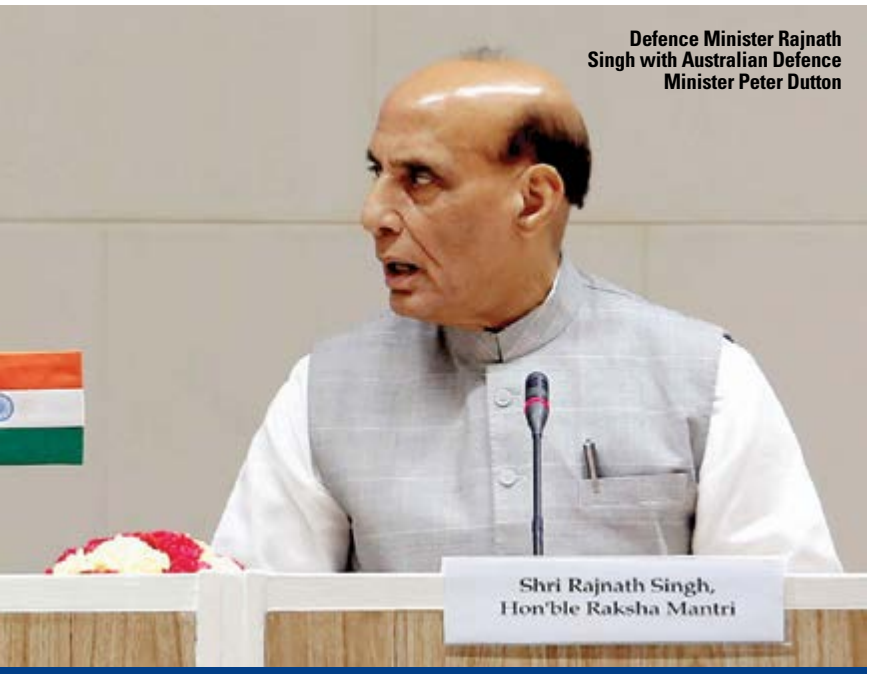
With the geo-political environment in the Indo-Pacific region changing very fast, India and Australia have come together to infuse dynamism in their bilateral defence engagement under the Comprehensive Strategic Partnership. Ongoing defence cooperation between the two countries received further boost when they recently held their first two-plus-two ministerial dialogue, reflecting their commitment to deal with the emerging challenges to regional security effectively and in cooperation with each other.

On September 10, when Rajnath Singh met his Australian counterpart Peter Dutton at his impressive and well maintained office at South Block in New Delhi, the Defence Minister's comment at the in-person meeting was assertive and emphatic.

He told the visiting Australian Defence Minister that India was looking forward to further strengthening defence ties with Canberra. The Australian Defence Minister sitting opposite his Indian counterpart nodded in agreement that both countries would have to walk hand-in-hand to realize the full potential of their Comprehensive Strategic Partnership.

The Australian Defence Minister, who along with Foreign Minister Marise Payne had visited India for the first two-plus-two ministerial dialogue, was hinting towards advancing defence cooperation between the two countries for their shared security challenges across the Indo-Pacific region.

It would be pertinent to note that defence relationship lies in



Defence Minister Rajnath Singh with Australian Defence Minister Peter Dutton

THRUST TO DEFENCE COOPERATION

the core of the India-Australia Comprehensive Strategic Partnership, upgraded by the two countries during the Leaders' virtual summit held in June 2020.

However, ball started rolling when New Delhi and Canberra signed a historic agreement, called 'Mutual Logistics Support Agreement' during the Leaders' summit in 2020. It envisages reciprocal access to military logistic facilities, joint military exercise and interoperability between armed forces of the two countries. It also envisages reciprocal access to military facilities in terms of logistics support which generally include food, water, fuel, spare parts and other components.

Driven by their common objective to take on challenges thrown by China, the two countries under the rubric of Comprehensive Strategic Partnership have also agreed to expand military engagements across the three services. Currently, their military level engagement is limited to biennial AUSINDEX, a naval exercise which the two countries have been undertaking since 2015. The 2019 event of AUSINDEX was held in the Bay of Bengal. It saw the first anti-submarine warfare exercise and also the first coordinated P-8 maritime patrol aircraft over the Bay of Bengal.

The fourth edition of this bilateral naval exercise between India and Australia was held between September 5 and 13 in northern Australia. It saw Indian Navy warships INS Shivalik and INS Kadmatt training alongside Royal Australian Navy frigate HMAS Warramunga. Both Indian and Australian ships were joined by an Australian submarine, P-8A maritime patrol aircraft, tactical fighter jets and helicopters from both the navies.

In fact, a framework for security cooperation that was established between India and Australia in November 2014, created the base for an enhanced bilateral defence engagement between the two countries. It allowed the two countries to conduct bilateral maritime exercise and explore defence research and development cooperation through visits by Indian and Australian defence delegations and by fostering joint industry links. For the first time, it paved the way for regular Defence Ministers' meeting, annual Defence Policy talks, service to service engagement including regular high-level visits, annual staff talks and joint training and regular exercises.

The re-establishment of the Quadrilateral Security Dialogue between India, Japan, the US and Australia in 2017 and its successive elevation from the official to the ministerial to finally, the leadership level and then Australia's participation in the Malabar naval exercise further infused dynamism in the defence cooperation of India and Australia. Invariably, spike in China's military activities in the Indo-Pacific region and escalation of Beijing's tension with India and Australia on different planes are factors behind such rapid developments in the defence engagement of the two countries.

Remember, in the Indo-Pacific region, China has increased its aggressive behaviour in the South China Sea. It claims all of the 1.3 million square mile of the Sea as its sovereign territory. It has already built military bases by developing artificial islands in the region, also claimed by the Philippines, Vietnam, Malaysia, Brunei and Taiwan. Lying in the Western Pacific Ocean region, the South China Sea has a multiple strategic importance from resources to location.

Significantly, in terms of resources, it has proven oil reserves of around 7.7 billion barrels, while natural gas reserves are estimated

IT WOULD BE PERTINENT TO NOTE THAT DEFENCE RELATIONSHIP LIES AT THE CORE OF THE INDIA-AUSTRALIA COMPREHENSIVE STRATEGIC PARTNERSHIP, UPGRADED BY THE TWO COUNTRIES DURING THE LEADERS' VIRTUAL SUMMIT HELD IN JUNE 2020

DEFENCE COOPERATION

Australian Prime Minister Scott Morrison (L) met Indian Prime Minister Narendra Modi (R) during the Quad Summit in US

to total around 266 trillion cubic feet. Then, one-third of the world's trade (over $3 trillion) passes through this sea route each year, making it one of key sea-lanes in the world. Any country that controls this sea route will have natural military advantages, thereby, making the region strategically very important when it comes to controlling the rest of Asia.

China, armed with nuclear submarines, warships, advanced aircraft, bombers and missile systems and physical control over critical islands in the South China Sea, has an upper hand in exerting its authority over the entire region. Already, by using its imaginary claim through the Nine-Dash-Line that stretches hundreds of miles South and East from southerly province of Hainan, China has made it clear to the world that the region belongs to it and it will not brook any challenge over such claim. And this is what worries the world the most.

In 2016, an international tribunal in The Hague found that China's Nine-Dash-Line claim lacked a legal basis. Four years later, in 2020, Australia and nine other countries, including the US, the UK, France, Germany, the European Union, the Philippines, Vietnam and Malaysia, issued statements rejecting China's expansionism.

India too has raised its voice against Beijing's imaginary claim over the South China Sea at several international forums, including the UNSC. Nearly $200 billion worth of India's trade passes through the South China Sea and thousands of its nationals work, study and invest in the ASEAN countries, Japan, South Korea and also China. India is concerned that if China establishes its un-challenged sway over the Sea, it would hugely impact the flow of trade and commerce, besides damaging its geo-political interests in the region.

Australia, with stakes in peace and security in the region came out with a Defence White Paper in 2016 which arguably drives Canberra's defence strategy towards the South China Sea. It calls for a secure, resilient Australia, with secure northern approaches and proximate sea lines of communication; a secure nearer region, encompassing maritime Southeast Asia and the South Pacific; and, a stable Indo-Pacific region and a rules-based global order.

In substance, rising China's militaristic activity in the region has pushed New Delhi and Canberra into a warm and deeper embrace of each other on the defence and strategic front. And, reflection of this bonhomie between the two countries can be unambiguously seen in their joint statement issued after the inaugural two-plus-two ministerial dialogue in New Delhi on September 11.

"India and Australia reiterated the importance of the defence relationship, a core pillar of the Comprehensive Strategic Partnership. India and Australia acknowledged the increased defence cooperation between both countries and discussed initiatives to enhance defence engagements. Both sides welcomed the success of the recently concluded Exercise Malabar Phase I," read the India-Australia Joint Statement.

Invariably, both India and Australia are keen to impart more vigor and strength to their partnership. Decision of the Indian military to participate in the forthcoming Talisman Sabre exercise, a major Australian and the US military training exercise focused on the planning and conduct of mid-intensity high-end war fighting is a case in point. Besides, in sync with its growing maritime relationship with Canberra, India has allowed the presence of a Liaison Officer from Australia at the Gurgaon-based Information Fusion Centre for Indian Ocean Region.

On the technology front, both countries have shown their keenness to work together in the areas of unmanned vehicles and other niche technologies. Obviously, such developments are not possible in the absence of trust, mutual understanding and common vision for a safe, secure and threat-free world.

IN SUBSTANCE, RISING CHINA'S MILITARISTIC ACTIVITY IN THE REGION HAS PUSHED NEW DELHI AND CANBERRA INTO A WARM AND DEEPER EMBRACE OF EACH OTHER ON THE DEFENCE AND STRATEGIC FRONT

–The writer is a senior journalist with wide experience in covering international affairs. The views expressed are of the writer and do not necessarily reflect the views of ***Raksha Anirveda***

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IN DEPTH ANALYSIS

DEFENCE & STRATEGIC AFFAIRS

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ANALYSIS

GRAND OPPORTUNITY FOR INDIA TO 'ACT WEST' IN THE MIDDLE EAST

The India-Israel-UAE relationship has the potential to be the fulcrum for India's 'Act West' policy with defence and security being among the key thrust areas where Israeli technology, UAE resources and Indian skilled workforce can come together

By **MD MUDDASSIR QUAMAR**

The signing of the Abraham Accords between Israel and four Arab countries—United Arab Emirates (UAE), Bahrain, Sudan and Morocco—was a historic development for a fractious Middle East. For the first time, a group of Arab countries not only recognised Israel as a sovereign country but also normalised relations with the Jewish state. That the Accords were signed under mediation from the United States was no surprise. What was remarkable was that the agreement came without any seemingly significant quid pro quovis-à-vis the Palestinian or Arab claims (except in the case of Morocco wherein the United States recognised the Moroccan sovereignty claims over Western Sahara).

Notably, unlike Egypt and Jordan that had recognised Israel and established diplomatic relationship with it in 1979 and 1993 respectively that created the 'Cold peace' between these states, the Abraham Accords are considered a harbinger of an active cooperation between the Arab countries and Israel.

Nearly a year from the breakthrough announcement by the Donald Trump Administration in August 2020, some patterns are now emerging.

With opening of embassies and exchange of diplomats, the Israel-UAE and Israel-Bahrain relations are developing robustly. Israel and Morocco have also begun the process of establishing diplomatic presence and exchanging emissaries. In terms of trade, business and cultural exchanges, the Israel-UAE relations are at the forefront. The two countries are openly embracing official, business and casual visitors from each other. Cooperation in healthcare amidst the Covid-19 pandemic has progressed vigorously.

A number of Israeli and Emirati higher education and research institutions have signed bilateral MoUs to collaborate in joint research and exchange researchers and experts. Participation in sports and cultural activities from both sides has increased.

Significantly, the UAE and Israel have also been developing a robust partnership in the military and security sector; although it is evident that the security establishment from the two countries had been meeting and exchanging views much earlier than the signing of the Accords.

Nonetheless, the Abraham Accords has led to open and public security engagement especially as both Israel and UAE have similar threat perceptions as far as the regional security situation is concerned.

For India, the Abraham Accords, especially the normalisation of relations between Israel and UAE offers newer opportunities for strengthening its 'Act West' policy. That the two—Israel and UAE—are the most important regional partners of India in the Middle East is an added advantage and should encourage both the public and private sectors to begin collaborations in achieving India's developmental needs and economic ambitions. Diplomatic and political opportunities notwithstanding there are four broad areas where India, UAE and Israel can look for cooperation.

Firstly, there are immense potential for scientific and technological collaborations. India faces a number of developmental challenges emanating from its massive size, large population, rapid urbanisation and its aspirational youth population.

Israel, which although is a tiny country with only about 9.5 million population, is one of the world's most advanced country in terms of scientific and technological

Prime Minister Narendra Modi with his Israeli counterpart Benjamin Netanyahu in 2018

innovations. The UAE, on the other hand, is a rich nation that faces some challenges emanating from the need for transformation of its economic base beyond oil. The Emirati leadership has, therefore, begun to invest earnestly in scientific and technological innovations to be able to meet the future developmental needs.

The complementarity in terms of the requirements, resources, expertise and political will between India, Israel and UAE makes its attractive for all three countries.

There are many areas in which the Israeli technology, UAE resources and Indian skilled workforce can come together to find innovative solutions for developmental problems. For example, the issues emanating from rapid urbanisation, such as waste management, water treatment and need for better urban planning, are serious issues that need innovative solutions.

Many Israeli companies have developed innovative solutions in these areas, while Emirati businesses are keen in investing in these sectors. Indian companies and start-ups can, therefore, find Israeli and Emirati collaborators to work on these issues in partnership with district and city administration.

Similarly, issues emanating from rising population in terms of environmental degradation and pollution can be another area for collaboration for Indian, Israeli and Emirati companies.

India has for long faced problems of river pollution for a variety of reasons. Mega river cleaning projects have failed to get the desired result and only partial success has been achieved in this regard. These require a more innovative and collaborative effort bringing a multi-dimensional approach in terms of the developmental needs of a growing society as well as the requirement for understanding the forces of nature in terms of climate change and global warming.

Many Indian institutions of higher learning have been conducting research in these areas and have also come up with innovative ideas but the scale of innovation is yet to match the pace of the growing requirement for finding a solution. A more focused and collaborative approach might be comparatively more

PM Modi meets Minister of Foreign Affairs and International Cooperation of UAE Sheikh Abdullah Bin Zayed Al Nahyan

effective and in this regard too, the possibilities for collaboration with Israeli and Emirati enterprises should be explored.

Issues related to food security, agriculture and irrigation where India and Israel already have a robust and growing partnership can be expanded to bring Emirati companies interested in these sectors. This is an attractive area because of the Gulf countries' dependence of imports for food security.

Similar collaboration opportunities can be explored in areas such as training and skill development, higher education

WHAT WAS REMARKABLE WAS THAT THE AGREEMENT CAME WITHOUT ANY SEEMINGLY SIGNIFICANT QUID PRO QUO VIS-À-VIS THE PALESTINIAN OR ARAB CLAIMS

ANALYSIS

Mohammed VI, King of Morocco, with Indian Prime Minister Narendra Modi

THE COMPLEMENTARITY IN TERMS OF THE REQUIREMENTS, RESOURCES, EXPERTISE AND POLITICAL WILL BETWEEN INDIA, ISRAEL AND UAE MAKES ITS ATTRACTIVE FOR ALL THREE COUNTRIES

and research, human resource management, healthcare as well as clean and renewable energy and space exploration.

Secondly, there are immense potentials for developing partnerships in business and investments in both conventional business sectors such as transportation, infrastructure, telecommunication, aviation and so on as well as non-conventional areas as underlined in previous paragraphs.

India has potentials not only as a huge market but also as it aspires to emerge as a global manufacturing hub. The strong political will notwithstanding, there are Indian corporations which have been focussed on grabbing new opportunities in these fields.

Collaboration with like-minded Emirati and Israeli corporations can help channelize the investment potentials, resources in terms of raw material and human resource and innovative ideas to develop business models that are not only capital incentive but also fulfil the developmental needs of the people without contributing the degradation of the land and environment.

Thirdly, there are immense potentials in terms of collaboration in defence manufacturing. Israel is among the leading global innovators in finding high-tech solutions for military needs. Israeli radar and communication systems are among the most advanced in the world.

India has traditionally had a robust defence partnership with Israel. However, with changing times and requirements, there is a greater emphasis in India now on developing an indigenous defence industry. Stakeholders including the government, the military and industries have shown interest in this sector.

The UAE has a similar emphasis of developing a domestic defence industry and several steps have been taken by Emirati leadership to achieve this goal over the past few years.

This is again an area where strong political and business relations among India, Israel and UAE can be harnessed to achieve the respective goals of the three countries. There are already immense ongoing collaborations between Indian and Israeli defence companies and some movement have taken place in collaborations between Indian and Emirati companies. This can be further channelized to look for collaboration among the three countries.

Finally, there are potentials for partnerships in the security domain. India, Israel and UAE have similarity of views and understanding on issues such as counter-terrorism, combating radicalism, preventing organised crimes, coastal and maritime security. These are important areas that are significant for security and stability in the three respective regions that is the Mediterranean, the Persian Gulf and the Arab Sea.

The three countries therefore can take initiatives to develop a trilateral dialogue to discuss strategic issues. While some degree of collaboration or discussion at the government level might be going on already, the need is to strengthen dialogue among think-tanks and research institutions working on these fields for finding solutions to problems faced by the three countries. The progress in relations between Israel and UAE in the year since the announcement of the Abraham Accords has been significant.

India is viewed as an important rising global power by both these countries and in terms of political, economic and cultural relations, India has strong relations with Israel as well as the UAE. In fact, it would not be wrong to terms India's relations with the UAE and Israel as two of India's most important strategic partnerships in the world.

The strong political will and focus on the need for finding innovative solutions for developmental challenges faced by the three countries can become the catalyst for transitioning of the bilateral relations into a robust trilateral partnership between India, Israel and the UAE after Abraham Accords.

– The author is Fellow, Manohar Parrikar Institute for Defence Studies and Analyses (MP-IDSA), New Delhi. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

TATA BOEING AEROSPACE DELIVERS 100TH FUSELAGE FOR THE AH-64 APACHE COMBAT HELICOPTER

Hyderabad. Tata Boeing Aerospace Limited (TBAL) delivered the 100th fuselage for the AH-64 Apache combat helicopter to Boeing from its state-of-the-art manufacturing facility in Hyderabad. The fuselage will be transported to Boeing's AH-64 Apache manufacturing facility in Mesa, AZ, for integration into the final assembly line. Mr KT Rama Rao, Minister for Municipal Administration & Urban Development, Industries & Commerce, and Information Technology of Telangana; and senior officials from Boeing and Tata Advanced Systems (TASL) were present to mark the delivery milestone.

Tata Boeing Aerospace, Boeing's first equity joint venture in India, is the result of a 2015 partnership agreement with TASL. Spread over 14,000 square meters, the state-of-the-art facility has been producing aero-structures for Boeing's AH-64 Apache helicopter, including fuselages, secondary structures and vertical spar boxes for customers worldwide. Recently, Boeing announced the addition of a new production line to manufacture complex vertical fin structures for the 737 family of airplanes. Customers globally operate more than 1,200 Boeing-made Apache helicopters. The helicopter has been fielded or selected for acquisition by the armed forces of 16 countries, including India.

SCHIEBEL CAMCOPTER® S-100 COMPLETES SUCCESSFUL TRIALS FOR THE HELLENIC NAVY

Vienna. Schiebel demonstrated the outstanding capabilities of its Unmanned Air System (UAS) CAMCOPTER® S-100 to the Hellenic Navy. Stationed on board of the Elli-Class Frigate Aigaion (F-460) in the Mediterranean Sea west of Crete, the S-100 showcased in a one-week trial its range, endurance and speed, as well as its maritime surveillance and detection capabilities, to the Hellenic Navy. For the demonstration flights, the CAMCOPTER® S-100 was equipped with a Trakka TC-300 EO/IR sensor and a Shine Micro Automatic Identification System (AIS) receiver.

The scenarios alternated day and night take-offs and landings. They included cooperation with other Hellenic Navy vessels, maritime traffic monitoring and coast observation.

Hans Georg Schiebel, Chairman of the Schiebel Group, said: "Our CAMCOPTER® S-100 is the only UAV of its class with extensive flight experience. It is operated by 14 navies worldwide and we are very proud that we had the chance to successfully showcase our system to the Hellenic Navy."

IN AUDIENCE

"WE SEE INDIA AS A MUTUAL PARTNER FOR SUCCESS AND ARE PROUD TO HAVE BEEN INDIA'S ENGINE POWER"

Pratt & Whitney, over the past seven decades has actively powered aerospace growth in India and strengthen its overall aerospace ecosystem. Considering India as a key strategic market and aligned to the government's vision with its customer centric approach, Pratt & Whitney's engagement with India is extensive with expanding footprint across R&D, sourcing, MRO and more.

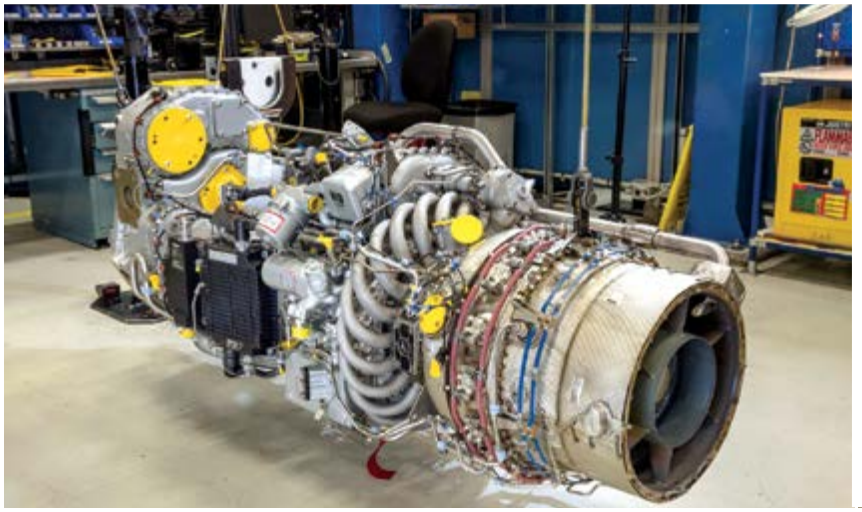
***Ashmita Sethi, President and Country Head, Pratt & Whitney** in an interview with **Ajit K Thakur, Editor, Raksha Anirveda**, explains about the company's strategy for India, its support to the Indian Armed Forces modernisation and the role it has been playing as a partner to advance India's aerospace ecosystem. Edited excerpts:*

What is Pratt & Whitney's strategy for India?

AS India is a key strategic market for Pratt & Whitney. Pratt & Whitney has actively powered aerospace growth in India and strengthen its overall aerospace ecosystem over the past seven decades. From the 'Parshuram' Douglas DC-3 aircraft that served the armed forces in 1947, and the JT9D on the 747s, to the V2500s on IndiGo's A320ceo fleet in mid 2000s that ushered in the new age of private aviation in India, and the revolutionary and fuel efficient GTF (geared turbofan) that are powering India's modern commercial fleet – we are proud to have been India's 'engine power' across commercial, defence, regional and general aviation.

As India advances its aerospace ecosystem through forward looking policies on MRO, Skilling, regional aviation and manufacturing – Pratt & Whitney is aligned to the government's vision. We established Air India Engineering Services Limited (AIESL) as a provider of maintenance services in support of GTF operators in India and the surrounding region. The Taj Air facility in Mumbai services PW308C engines for Dassault Falcon 2000 aircraft, as well, and is a great example of our commitment towards India.

Another example of our continued involvement in India's aerospace growth is our world-class India Customer Training Center (CTC) in Hyderabad. The center provides advanced training for airline customers, MRO operators, as well as industry and university skill development programs, to spur the growth of the aviation sector in India. The India CTC has imparted 11,500 student days



of training to over 39 operators representing over 27 nationalities since its launch.

India has significant market access, innovation capabilities, talent pool and cost competitiveness to offer – and we see India as a mutual partner for success. That's why we continue to expand our footprint across R&D, sourcing, MRO and more – and we share further updates soon.

How is Pratt & Whitney supporting the modernisation of Indian Armed Forces with its large portfolio of businesses across commercial and military aviation?

AS At Pratt & Whitney, we have the expertise and experience of powering a wide range of aircraft which are optimized for diverse missions. This includes regional and commercial airlines, firefighting, aerial surveillance, cargo transport, civil defence and humanitarian missions. In terms of our military expertise, we have been powering tactical, strategic, mobility and rotary aircraft for 34 armed forces and have more than 7000 military engines in service around the world.

We have a solid foundation and association with India which spans over seven decades. Pratt & Whitney offers a diverse portfolio of advanced propulsion solutions to the Indian Air Force (IAF) which includes the F117 engines on the IAF's 11 C-17 Globemasters, and the PT6A turboprop engine on its 75 PC-7 trainers. Our PT6A also powers India's indigenous NAL-Saras and serves as a great example of our partnership with local aircraft development programs.

At this juncture, we also look forward to powering the IAF's C-295 aircraft fleet with our versatile, dependable, and efficient PW127G family of engines. Additionally, as India selects its 114 fighters for MRFA, we are keen to power India's F-15EX with our advanced and reliable F100-PW-229 engines.

So, should India look forward to the F100-PW-229 powering the F-15EX for the IAF's 114-fighter requirement?

AS As makers of the world's first operational fifth-generation engine, the F119 for the F-22 and the world's most advanced fighter engine F135 for the F-35, Pratt

THE F100 ENGINE HAS BEEN ENTRUSTED BY THE US AIR FORCE TO POWER EVERY F-15 IN ITS OPERATIONAL FLEET SINCE THE AIRCRAFT'S FIRST FLIGHT IN 1972; AND ITS SAFETY, RELIABILITY, & PERFORMANCE RECORD WITH THE F-15 IS SECOND-TO-NONE

IN AUDIENCE

WE ARE PROUD TO BE THE ENGINE POWER FOR C295 WITH OUR PW127G ENGINE, WHICH ARE KNOWN TO DELIVER INDUSTRY LEADING LOW FUEL CONSUMPTION AND CARBON EMISSION

& Whitney's history and expertise with advanced propulsion systems is unmatched. Therefore, as India selects its 114 fighters for the MRFA, we definitely want to power India's F-15EX with our F100-PW-229 engines.

The F100 engine has been entrusted by the U.S. Air Force to power every F-15 in its operational fleet since the aircraft's first flight in 1972; and its safety, reliability, and performance record with the F-15 is second-to-none. The F100-PW-229 is technologically fully capable of powering the most challenging missions against any adversary – now and in the future. The engine's fully modular architecture ensures ease of maintenance and incorporates leading edge technologies in materials, cooling, and health management including some advanced 5th generation technology. The latest upgraded F100-PW-229 is also fully capable of integrating with the F-15EX's fly-by-wire flight control system.

These superior features, along with quality and value over the entire lifecycle, make the F100-PW-229 a superior propulsion system for this critical aircraft and for the Indian Air Force's missions, now and into the future. The F100-PW-229 will be the engine of choice for India's future mission needs and developing its next-gen ambitions.

The Government has recently approved the procurement of 56 C295 military transport aircraft which are powered by the PW127 engine. Would you like to elaborate on this latest development?

AS The procurement of 56 C295 transport aircraft is a major leap forward for not only IAF's modernization but also for the Indian Government's vision of self-reliant India. As some of the C295s are made in country, the program will also benefit India's private aerospace sector, a win-win situation for every stakeholder.

We are proud to be the engine power for C295 with our PW127G engine, which are known to deliver industry leading low fuel consumption and carbon emission. With this advantage of low fuel burn during cruise, the PW127G engine provides the C295 aircraft with exceptional range and endurance for time-critical missions. The PW127G engines are part of Pratt & Whitney's PW100/150 engine family, which powers several aircraft families around the world, performing a variety of missions in diverse climates and flying conditions.

Pratt & Whitney has been providing these engines to Airbus Defence and Space (ADS) since the C295 took its first flight in 1998 and since then we have shipped across more than 400 PW127G engines to ADS.

What are your views on the indigenous AMCA program?

AS Advanced Medium Combat Aircraft (AMCA) represents India's desire to develop its own 5th Gen platform – and this ambitious defence program will be a great leap forward in strengthening India's defence and industrial capabilities. As the leading engine-maker in the world, Pratt & Whitney commands both experience and expertise in delivering the most advanced propulsion systems to the world, and that's why we truly understand that engine performance and development is a critical component in advancing any new warfighter platforms. At Pratt & Whitney, we are happy to engage with India and look forward to working with our customers on any opportunity that they see fit for us in the long run.

EMI /EMC TESTING AS PER MIL-STD-461

MIL-STD-461 specifies the requirements for the control of electromagnetic interference characteristics (emissions and susceptibility) of electronic, electrical, and electromechanical equipment/system/ subsystems (Rack mount/Wall mount/ Floor standing) designed for various agencies of the Department of Defence (DoD). MIL-STD-461 has been an active document since 1967 and has undergone several revisions over the years due to changes in Electromagnetic Environment (EME) caused by the rapidly increasing use of electronics and advancements in technology.

ERDA has vast EMIEMC testing experience of different electrical and electronics products made for defence application like control panels for Missile launcher , Missile controller, Radar System, Flood detection for Navy application & Motors for Naval application.

ERDA is fully equipped, capable and accredited as per ISO/IEC 17025: 2017 to perform testing as per E&F revisions of MIL-STD-461. ERDA is equipped with 10 meter Semi Anechoic chamber having 3 ton weight bearing capacity to accommodate big & bulky equipment. In-house testing of equipment, in excess of 20 feet in length and weighing up to 3 tons is already performed.

Tests undertaken at ERDA as per MIL-STD-461 Revision E & F

TEST NAME	TEST DESCRIPTION
CE 101	Conducted Emissions, Power Leads, 30 Hz to 10 kHz
CE102	Conducted Emissions, Power Leads,10 kHz to 10 MHz
CS101	Conducted Susceptibility, Power Leads, 30 Hz to 150 kHz
CS114	Conducted Susceptibility, Bulk Cable Injection, 10 kHz to 200 MHz
CS115	Conducted Susceptibility, Bulk Cable Injection, Impulse Excitation
CS116	Conducted Susceptibility, Damped Sinusoidal Transients, Cables and Power Leads,10 kHz to 100 MHz
RE101	Radiated Emissions, Magnetic Field, 30 Hz to 100 kHz
RE102	Radiated Emissions, Electric Field, 10 kHz to 18 GHz
RS101	Radiated Susceptibility, Magnetic Field, 30 Hz to 100 kHz
RS103	Radiated Susceptibility, Electric Field,2 MHz to 18 GHz (up to 50V/M)

ISRAEL DIARY

ISRAEL'S CARMEL PROGRAM TO ENTER SECOND PHASE SOON

Aimed at allowing a ground combat vehicle to perform a long and complicated list of combat missions with only a two-man crew, Israel's Carmel program will soon be entering the second phase. The outcome will shape the way the IDF uses its combat vehicles in future combat

By **ARIE EGOZI**

The Israeli ministry of defence will soon begin the second phase of its Carmel program, aimed at allowing a ground combat vehicle to perform a long and complicated list of combat missions with only a two man crew. The Israeli ministry of defence three years ago initiated a competition between the three Israeli major defence industries. The competition is dubbed Carmel, and will shape the way Israel Defence Forces (IDF) will use its combat vehicles in future combat.

The competition unleashed an effort that is based on all the technologies developed in recent years by these industries. The entries of the three competitors point to the desired concept shaped by the IDF's ground forces command.

This concept can be summed up in one sentence - give our combat vehicles capabilities that serve the new concept of fast moving ground forces equipped with multi sensors, multi weapon systems to achieve control of the battle ground quickly and decisively. The development of the systems that will turn each combat vehicle into a real "war machine", has reached a stage where all the components have been developed and now the integration will be made on different types of combat vehicles. The operational integrations will include the "cockpit" systems that have been developed and additional weapon systems like the Rafael "Spike" anti-tank missiles and the company's automatic weapon stations.

The Directorate of Defense Research and Development (DDR&D), in the Israel Ministry of Defense, and the Office of the Head of the Armored Corps in the IDF, completed a demo event to reveal the platforms developed within the framework of the Carmel Program. The Israeli defence ministry is trying to bring the US and Indian Army to become partners on the program.

The prototypes that were unveiled last year are based on the lessons of the Second Lebanon War and carry a large chunk of very advanced systems. The main idea is to enable the two men crew to operate along the battle from inside the vehicle, to protect themselves in urban warfare especially from snipers and anti-tank missiles. The operation will

The inside of Elbit's prototype packed with displays, the pilots can be seen wearing IronVision helmets

Rafael Carmel

be based on the array of sensors that the vehicle will carry. An optional third team member will be capable of operating robotic ground vehicles in areas with very high degree of danger even to armoured vehicles.

The plan of the developers is to come out with a Hybrid vehicle, equipped with diesel and electric motors at the same time. Electric propulsion will allow for quieter short-distance travel, but is essential as a new source of power for a new weapon that may be integrated into the project: high-intensity laser. "We have been investing in the last few years, and especially in the past year, to develop a powerful laser for a variety of uses, and it may be integrated into Carmel," said Brigadier General Yaniv Rotem, head of R&D at the ministry of defence.

The prototypes presented by the industries differ slightly in the nature of their operation. Each industry was asked to develop its own technological concept that would transform and upgrade the interior part of the IDF's combat vehicles to an advanced cockpit, like the ones used in fighter aircraft. The challenge: proving the feasibility of two soldiers conducting closed hatch operations and integrating technological capabilities that would enhance mission efficiency for the IDF's manoeuvering forces.

The proposed suits made by the three companies have been installed on M-113 APC's that are used for demonstration. The advanced cockpit integrates autonomous capabilities (maneuvering, detecting targets,

THE DIRECTORATE OF DEFENSE RESEARCH AND DEVELOPMENT (DDR&D), IN THE ISRAEL MINISTRY OF DEFENSE, AND THE OFFICE OF THE HEAD OF THE ARMORED CORPS IN THE IDF, COMPLETED A DEMO EVENT TO REVEAL THE PLATFORMS DEVELOPED WITHIN THE FRAMEWORK OF THE CARMEL PROGRAM. THE ISRAELI DEFENCE MINISTRY IS TRYING TO GET THE US AND INDIAN ARMY TO BECOME PARTNERS IN THE PROGRAM

defense, etc). In addition, the combat soldier enjoys multi-sensor fusion and 360-degree surround vision, high connectivity, and situational awareness. Ultimately, the soldiers are only required to make decisions that the mechanism cannot (yet) make by itself.

The industries took the challenge head on, employing experts in the field and introducing advanced technological infrastructure in the process. Each industry tested its solution throughout a period of a week, within a series of complex operational scenarios. A team of experts from the ministry of defence and the IDF evaluated the three concepts in accordance with predetermined criteria. The technological platforms proposed for the future AFV, employ a combination of advanced sensors, VR and AR mechanisms, AI technology to process information, and more.

Elbit says that its technology is a dramatic change in the operational capability of combat vehicles. This, the company says is achieved by applying autonomous capabilities and Artificial Intelligence (AI) to accelerate decision making and facilitate target engagement with dramatically increased rapidity and accuracy. The company system uses a Helmet Mounted

ISRAEL DIARY

Israel Aerospace Industries' prototype of the Carmel autonomous armoured vehicle, powered by artificial-intelligence technology

THE PROPOSED SUITS MADE BY THE THREE COMPANIES HAVE BEEN INSTALLED ON M-113 APCS THAT ARE USED FOR DEMONSTRATION. THE ADVANCED COCKPIT INTEGRATES AUTONOMOUS CAPABILITIES (MANOEUVERING, DETECTING TARGETS, DEFENSE, ETC). IN ADDITION, THE COMBAT SOLDIER ENJOYS MULTI-SENSOR FUSION AND 360-DEGREE SURROUND VISION, HIGH CONNECTIVITY, AND SITUATIONAL AWARENESS

Display (HMD) used by a crew of two warriors operating the combat vehicle under closed hatches.

Elbit says that its system demonstrated its capacity to function as an independent high fire-power strike cell, as a networked station for multi-spectral sensing and information fusion, as well as a base platform for operating additional unmanned systems.

RAFAEL's solution for the future combat fighting vehicle enables two crew members to perform their mission, in a fully protected closed hatch vehicle, with a breakthrough transparent cockpit design, enabling 360 degree situational awareness, using augmented reality for real-time battlefield information and data. This includes targets, Blue Forces, and other Points of Interest (POI's), as well as an autonomous mission support system, for autonomous mission planning, driving, and simultaneous operation of all vehicle weapon systems, all based on combat artificial intelligence capabilities.

According to the company, the basis of the company's concept is that it will be applicable to a manned or autonomous vehicle. "We enable the two men crew to function manually or with the help of the third robotic team member. The commander decides how to operate the vehicle. For example, to drive the vehicle manually based on the situation awareness that the system provides and at the same time ordering the third robotic crew member searching for targets in the fighting zone," a company official said.

The Rafael official added that the technology can be used on any future combat vehicle that the IDF chooses to operate. "Some of the technologies are already being incorporated in the current fleet of combat vehicles."

IAI presented a platform based on the company's family of autonomous systems and robotic tools, which are currently in wide operational use in Israel and around the world. The Carmel platform proposed by IAI, combines a panoramic display, individual control screens, and a control stick similar to a gaming console or "Xbox Joystick".

The autonomous capabilities in the combat vehicle are operated by a central, autonomous system, which integrates the various components in the platform and assists the human operator in processing information, focusing on critical threats, and making effective real-time decisions. The platform is based on AI technology to detect threats, enabling effective target engagement and weapon system management as well as autonomous driving in various terrains.

According to IAI, the technologies package offered by the company is aimed mainly on supplying the two men crew with the best situational awareness. "And after that is achieved to choose the best weapon to kill it. You can see the commander of the ground vehicles as a safety button. The system can shoot automatically but for now the human in the vehicle will have to release the safety button," a company official said.

Thus, it would be interesting to see the outcome of project Carmel's second phase that will start soon with the MOD trying to consolidate capabilities for implementation in current and future combat vehicles.

–The writer is an Israel-based freelance journalist. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

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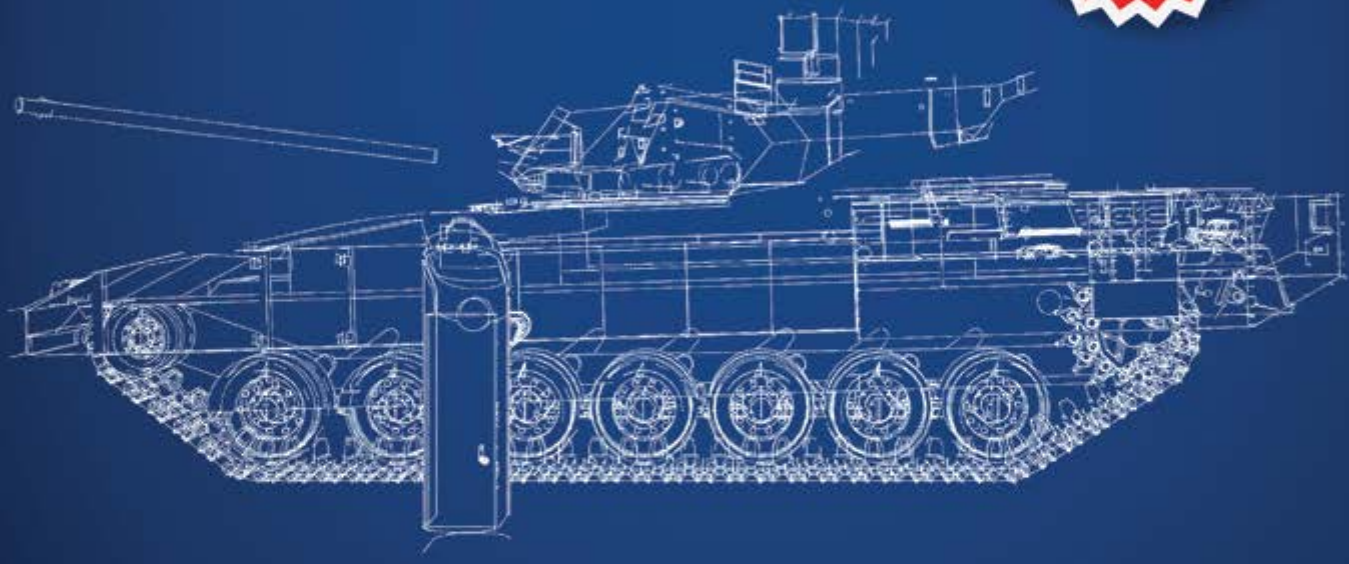

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ISRAEL DIARY

ADVANCED UNDERWATER SYSTEMS ADD MORE LETHALITY TO ISRAELI NAVY

Israeli navy is being equipped with advanced underwater systems to handle underwater threats of all types

By **ARIE EGOZI**

With new SAAR 6 corvettes and new Dolphin 2 submarines the Israeli navy is ready to handle all naval threats. In addition to the main platforms like the corvettes and submarines the Israeli navy is being equipped with advanced underwater systems. In recent years, the Israeli navy is a very capable competitor on chunks of the Israeli defence budget.

The submarines are believed to be capable of launching cruise missiles developed in Israel (according to various reports, these are Popeye missiles), which can be used with nuclear warheads with a range of 1,500 kms. But the new advanced submarines are only one tool in Israel's "box of tools" to defend against underwater threats of all types. Israeli company Rafael is the main source for special underwater systems. The company is focusing on three capabilities when it deals with the underwater fighting arena - communication between submarines and divers, protection against torpedo attacks and an undetectable sonar.

Rafael has invested huge sums in the development of systems for the underwater fighting arena. Some are made exclusively for the Israeli navy, others are offered for export. The Rafael official exposed some of the systems that are cleared for export.

When a submarine is submerged it has to communicate with its home base. "***FloatLink***" enables the submarine to stay in touch with the navy's headquarters while "Deep and Silent". This system enables the submarine to Communicate with HQ or other units, while deep and stealthy "It has other advantages - it does not disclose submarine position and has no manoeuvrability limitations".

The ***FloatLink*** is ejected from the submarine, using its torpedo launching tubes. It gets to the sea surface. A SATCOM antenna is then unfolded from the floating system and enables the two way communications.

Rafael has also developed systems aimed at protecting surface ships from torpedoes. Modern acoustic torpedoes, with advanced features that greatly enhance their capabilities, are a major threat to surface vessels. Defeating these threats, requires sophisticated, quick response, automated Countermeasures.

According to Rafael, ***Lescut*** is an intelligent, third generation reactive countermeasure, designed to identify the incoming threat and provide a customized response. The ***Lescut*** is launched from a surface ship and is

designed to respond simultaneously to multiple torpedoes of various types - active and passive, and programmed to defeat all types of modern torpedo logic, including range gates, Doppler shift, pulse discrimination, AGC/DVG, and more. ***Lescut*** requires no pre-launch input or tests, shortening the response time and eliminating errors due to incorrect settings or operator mistakes.

Countermeasure operation starts automatically after launch, with the ***Lescut*** suspended to its operating depth. ***Lescut*** analyses the environment and the torpedo and then selects from its threat library the appropriate deception signal for emission. As a result, acoustic torpedoes home in on ***Lescut*** as the legitimate target, attacking it repeatedly, enabling the ship to evade a torpedo hit. ***Lescut*** operates for ten minutes, then self-destructs and sinks.

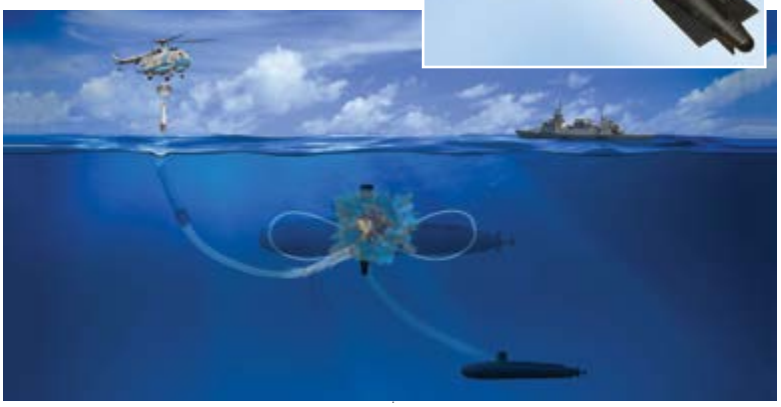
In modern maritime combat, submarines are exposed to torpedoes launched from ASW helicopters, ships, or other submarines. To counter that threat, Rafael has developed the Scutter. Defending from these threats requires quick response, automated Countermeasures.

Scutter is a self-propelled, third generation reactive, expendable torpedo Countermeasure, capable of protecting a submarine from passive and active acoustic homing torpedoes. Scutter has a threat library, based on intelligence programmed by the user, which is used to select the appropriate response. Designed to respond simultaneously to multiple torpedoes of various types - active and passive.

Scutter is launched immediately following a torpedo alert, moving automatically to operating depth. It identifies the torpedo, then generates and transmits customized deception signals. The torpedo attacks and re attacks the Scutter Countermeasure until the torpedo's end of run. Scutter self-destructs at the end of its mission.

Rafael has also developed what it claims is the first hard kill torpedo system that can work even in shallow waters. The Torbuster is a fourth generation torpedo countermeasure for submarines. It provides effective defence against all types of acoustic homing torpedoes by means of combined soft and hard kill.

The company says that upon detection of an incoming torpedo, the Torbuster will be launched from an external launcher. "The previous such systems played a seduction role diverting the torpedo from its target. Here we destroy the threat".



Torbuster will propel itself to a safe distance from the submarine and seduce the incoming torpedo by transmitting specific acoustic signals, using a technology based on the Scutter, reactive acoustic decoy. As the torpedo homes in on the decoy, the decoy will sense when it is at the closest point of approach and self-explode, inflicting sufficient damage to the torpedo to neutralize it.

Rafael is investing in the development of additional systems for the underwater combat zone, but these are highly classified.

Israeli company DSIT is also very active in developing systems for underwater security. The company's Swordfish is a passive or passive & active low frequency towed array sonar system.

The company says that it is capable of underwater search, detection tracking and classification in passive, active and parallel modes. It explains that each sonar system, includes machine learning technologies for automation of algorithms and reduction of operator workload.

Elbit Systems has developed the TRAPS low frequency variable-depth-sonars intended for detection, tracking and classification of submarines, midget submarines, surface vessels and torpedoes.

The underwater threats on Israeli civil assets - on shore and at sea - are many and imminent. This of course adds to the operational need to protect the Israeli navy's surface ships and submarines.

The aforementioned descriptions provides glimpse of a small segment of systems against underwater threats that have been developed in Israel. Others are operational but are highly classified.

–The writer is an Israel-based freelance journalist. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

MODERN ACOUSTIC TORPEDOES, WITH ADVANCED FEATURES THAT GREATLY ENHANCE THEIR CAPABILITIES, ARE A MAJOR THREAT TO SURFACE VESSELS. DEFEATING THESE THREATS, REQUIRES SOPHISTI-CATED, QUICK RESPONSE, AUTOMATED COUNTER-MEASURES

IAF @89 SPECIAL

F-15EX OFFERS A FUTURE-READY, MULTI-ROLE SOLUTION TO THE INDIAN AIR FORCE

Boeing's commitments to its Indian defence customers while positioning for new business opportunities is aligned in sync with the government initiatives. Boeing's 'For India, By India' aircraft sustainment strategy is gaining more traction.

***Surendra Ahuja, Managing Director of Boeing Defence India** (BDI) in an interview to Editor-Raksha Anirveda, talks at length about Boeing's role in making India a key hub for A&D manufacturing for the world, its wide range of engagement with Indian Armed Forces and Indian Aerospace and Defence Industry. **Edited excerpts**:*

What makes the F-15EX the right choice for the IAF?

SA In early 2021, Boeing received a marketing license approval from the US Government to offer the F-15EX to India. The F-15EX offers a future-ready, multi-role solution to the Indian Air Force that has superior deterrent and air supremacy capabilities relative to the competition.

The F-15EX is the latest and most advanced version of combat-proven, multi-role, all-weather day/night F-15 aircraft family. USAF recently signed an indefinite-delivery/indefinite-quantity contract with Boeing for 144 aircraft and the numbers could be even higher than 200. The $5B investment by USAF and international customers has made the iconic platform even more 'future-ready' by integrating leading edge technologies, networks, weapons and sensors to meet the adversaries of today and tomorrow. The F-15EX can carry large payload and offers unmatched performance in the form of range, speed and altitude. The F-15 is the only aircraft that has 104 kills to its name in air to air combat. The F-15EX can carry large payload and offers impressive performance in the form of range, speed and altitude. The F-15 is the only aircraft that has 104 kills to its name in air to air combat.

The C-17 has been in the limelight with its role in evacuation in Afghanistan – what makes the C-17 such a versatile heavy lifter and how is Boeing assisting the IAF in maintaining the serviceability of its fleet?

SA The C-17 fleet has been a vital part of the Indian Air Force's (IAF) strategic and combat airlift capability. The IAF C-17s have performed a wide range of operations in military missions, and provided peacekeeping support, humanitarian assistance, and disaster relief in India and internationally, since induction to the Sky Lords squadron in 2013.

Boeing is supporting the IAF C-17 fleet under the Globemaster Integrated Support Program (GISP) and has been maintaining the fleet through techno-logistics support and training for aircrew that operate the platform. The C-17 fleet has maintained high serviceability rates since its induction. Boeing is responsible for maintenance, field support services, modifications and upgrades, technical manual support and logistics engineering services. The IAF's C-17 fleet, since their induction in 2013, have logged more than 31,000 flight hours.

Boeing's C-17 simulator training centre provides training services to the IAF.

Boeing's C-17 training centre in India has completed thousands of training hours for aircrews and loadmasters for the IAF. Boeing's Global C-17 support program is a Performance-Based Logistics (PBL) contract designed to provide the United States Air Force (USAF) and international partners with maximum aircraft availability while optimizing affordability, and lowest sustainment risks for all C-17 support elements.

The C-17 is the world's premier heavy-lift aircraft and will continue to prove itself as a versatile strategic airlifter in future operations to come.

Please provide an update on the work being done at Boeing's India Engineering and Technology Center (BIETC) in Bengaluru

BOEING IS SUPPORTING THE IAF C-17 FLEET UNDER THE GLOBEMASTER INTEGRATED SUPPORT PROGRAM (GISP) AND HAS BEEN MAINTAINING THE FLEET THROUGH TECHNO-LOGISTICS SUPPORT AND TRAINING FOR AIRCREW THAT OPERATE THE PLATFORM

and Chennai? Please provide an update on Boeing's proposed wholly owned engineering and technology campus coming up at Bengaluru?

SA Boeing India Engineering & Technology Center (BIETC) in Bengaluru and Chennai is leveraging a talented pool of employees towards innovation in aerospace. Our engineers in India undertake high-quality, advanced aerospace work spanning engineering design of structures and systems, manufacturing support, developing systems to test our airplanes and providing digital solutions to our airline customers. Cutting-edge research and development work in traditional and emerging areas is also done at BIETC including next-generation Airplane Health Management (AHM), environment-friendly coatings, advanced networks and secure-communications where teams leverage new-age technologies to replace traditional approaches, enhancing safety and productivity.

Boeing engineering design teams collaborate with our R&D team to leverage Artificial Intelligence (AI) and Machine Learning (ML) methods and in the process, result in a significant reduction in time taken for tasks, and also enhancing quality. Digital aviation efforts are also helping airlines reduce fuel consumption through route optimization, and make effective utilization of their crew. Digital engineering is being used to enhance the manufacturing environment and provide value to customers. Digital threading is being used to create a digital twin before manufacturing aircraft systems, resulting in fewer manufacturing issues. This drives efficiency, optimizes product design, and enhances manufacturability, making the end-to-end supply chain more digital.

Boeing Research & Technology India has delivered commercially viable solutions for AHM and Air Traffic Management (ATM). Its ATM experts are currently working with the Airports Authority of India to develop a roadmap for air traffic management modernization in the country. Today, the research center is using AI and ML to improve the quality of wide-body airplanes that Boeing delivers. Using Internet-of-Things (IoT) technologies, its engineers are finding ways to improve passenger experience during air travel.

Boeing's wholly owned engineering and technology campus is coming up in Bengaluru, and in the next few years is expected to employ approx. 4,000 engineers who will be supporting diverse areas across the local and international ecosystem. Construction work of the campus is ongoing.

Are there any options in the contracts for IAF Apache and Chinook helicopters or will a new deal for additional helicopters have to be negotiated afresh?

IAF @89 SPECIAL

BOEING HAS CONTINUOUSLY INVESTED IN LOCAL CAPABILITY BUILDING AS WELL AS CREATED COLLABORATIONS WITH INDIAN ORGANIZATIONS ACROSS MANUFACTURING, INFRASTRUCTURE, ENGINEERING SERVICES, RESEARCH AND TECHNOLOGY, TRAINING AND SKILLS DEVELOPMENT

SA The Apache and Chinook represent the best of high-performing attack and heavy lift helicopter technologies from Boeing that will strengthen India's defence capabilities across a range of military and humanitarian missions in the years to come.

Boeing completed the delivery of all 22 Apache and 15 Chinook military helicopters to the IAF and is fully committed to meeting the operational needs of the Indian armed forces. In 2020, the Ministry of Defence signed the contract for the acquisition of an additional six Apaches for the Indian Army. The Apaches are planned to deliver in country within 48 to 49 months after the contract award. Significant parts of these six Apaches will be built at the state-of-the-art Tata Boeing Aerospace Limited (TBAL) manufacturing facility right here in India.

We are committed to providing the most advanced capability to India's defence forces. We do believe that India has requirements for more Apaches and Chinooks and we stand ready to support them.

Boeing has been very successful in developing strong partnerships with Indian firms, please provide a few examples of some of these partnerships in the sourcing and engineering services domain? How is Boeing able to leverage its successful commercial and defence programmes to aid in the Govt's vision of greater in-country sourcing?

SA Indian suppliers are an integral part of Boeing's strategy for growth, and are key to our commitment to strengthening India's aerospace industry. Our supplier base in India continues to grow and today we have more than 275 suppliers from India who are part of the global supply chain and are manufacturing critical systems and components that go into some of Boeing's most advanced aircraft. Boeing's sourcing from India is at approximately $1US billion today. In 2021, we are developing Micro, Small and Medium Enterprises (MSMEs) in support of our commitment to *Aatmanirbhar Bharat*. In fact, 26 percent of our suppliers from India are MSMEs.

As a company that has partnered with India for more than seven decades in shaping aerospace and defence (A&D) industry, Boeing has always supported the development of indigenous A&D capabilities in India. Boeing has continuously invested in local capability building as well as created collaborations with Indian organizations across manufacturing, infrastructure, engineering services, research and technology, training and skills development. These collaborative programs are developing a skilled and trained workforce in India needed to build an ecosystem conducive to business success. Our Indian suppliers are our partners in the journey towards Aatmanirbhar Bharat and in making India a key hub for A&D manufacturing for the world. Some examples are here.

- Dynamatic Technologies manufactures the ramp and complex aft pylon for Chinook heavy-lift helicopters. Dynamatic Technologies was recently awarded a contract for manufacturing assemblies for Boeing's newest tactical fighter, F-15EX Eagle II. This is a first where aerostructures for the latest and most advanced F-15EX Eagle II will be made in India.
- Rossell Techsys manufactures wire harness and electrical panel for the AH-64 Apache, and the harness for several defence platforms including CH-47 Chinook, F-15 and F/A-18 Super Hornet.
- Bharat Electronics Limited (BEL) manufactures IFF (Identify Friend/Foe) and speech secrecy system for the P-8.
- Tata Boeing Aerospace Limited (TBAL), Boeing's first equity joint venture in India, with Tata Advanced Systems Limited (TASL) has been producing aero-structures for Boeing's AH-64 Apache helicopter, including fuselages, secondary structures, and vertical spar boxes for customers worldwide.

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BUSINESS PITCH

KA SAFE ENGINEERING

PROACTIVE SERVICE EXPERT IN AMMUNITION DEMILITARIZATION PROCESSES

With its expertise, engagement and decades of experience, the company has developed strong capabilities and exceptional know-how of ammunition demilitarization and whole ammunition life cycle..

By **JOSE M. GALISTEO**

Detail view of the automated disassembly equipment

It is a common situation for many countries, that excess stockpiles of unserviceable munitions reach such a level where industrial processes become the only way to achieve the desired volume of munitions disposal ensuring safety, security and environmental protection, and with minimal operating costs. The process, known as **Industrial Demilitarization** is a set of industrial procedures by which in the most cost-effective way, ammunition loses its functionality and is safely dismantled recovering its valuable materials.

Industrial Demilitarization is often a race against time as obsolete munitions tend to become unsafe with time and many countries have not yet incorporated the disciplines of stockpiles surveillance and anticipation with demilitarization processes. On the other hand, the storage of unserviceable ammunition supposes a cost without any return or benefit, and yet, ironically, many of these already totally useless munitions contain materials whose market price is continually rising, and which would more than pay for the investment required to destroy them.

It is here where private companies started worldwide playing an essential role supporting Ministries of Defence with their own facilities, equipment, technologies and know-how, relieving states of all major investment efforts in demilitarization facilities. A case example we present here is the demilitarization of small arms ammunition (SAA).

We present here demilitarization of SAA as an example of the application of best available technologies by a private company to fully support solving a problem of general interest. It is a good example of how private initiative, seeking its economic interest is helping to solve a safety and security common problem in many countries.

SAA loses its functionality

Lay-out of propellant incineration equipment with gas filtering system

General arrangement of the automated disassembly equipment

along time, reaching a state in which it becomes unsafe for storage, and always carries big security concerns. Its small size, low weight and common storage by millions make their disappearance from their legal owners, one of the main reasons responsible for rise in numbers of civilian victims in armed conflicts and by criminal and terrorist organizations. Therefore, any transport or storage of these unserviceable ammunitions is extremely sensitive from safety and security points of view, and this has often discouraged their transfer to demilitarization facilities. Open-burning has been the traditional disposal method, but unfortunately without any reliable control of the number of disposed units, without any environmental care, and with no recovery of valuable materials.

Company KA SAFE Engineering has contributed to solve all concerns related with demilitarization of SAA with the design of **Mobile** demilitarization units, fully **Automated**, and with **Recovery** of valuable materials. The company is incorporated in India as KA Safe Lodestar India Pvt Ltd.

The **Mobile** concept, allows demilitarization to be executed even at depots locations areas, avoiding any need to transfer the ammunition to a specific demilitarization plant, minimizing logistics risks and costs. Mobile demil facilities are composed of ISO containers that can be fully deployed in a few hours with the only request of a flat land surface big enough to place the containers.

The **Automation** minimizes human exposure to risk, minimizes operating costs, and reduces learning curve by not requiring any specific knowledge of ammunition. Automation also favors security by ensuring control of operations, accountancy of the disposed quantities, and remote monitoring of operations.

The **Recovery** for Reuse is fully aligned with current Best Environmental Practices and current Circular Economy trends in which extracted materials life is extended as they are incorporated to different products replacing raw materials, with considerable energy savings, and of course, is also an economic incentive that favors a quick return on the investment needed.

What follows is a description of possible configurations for a SAA mobile demilitarization plant:

For SAA in which the projectiles have no energetic content (bullets), demilitarization can be completed with just a single equipment for the automated disassembly of ammunitions into its components (bullet, inert case and propellant), segregating each component, and therefore allowing recovery for reuse. A single operator bulk feeds equipment with the munitions, and the equipment completes all operations.

For SAA in which projectiles have energetic contend (high explosive, tracers,...), the extracted projectiles must also undergo a thermal neutralization process. A mobile furnace with off-gas filtering system completes this operation.

In case propellant is not appropriate for recovery, the disassembly equipment can be complemented with a propellant incineration mobile facility equipped with a suitable filtering system to guarantee exhaust gas emissions in accordance with legal requirements.

To increase the recovery value of the extracted metals, metals separators devices can be incorporated to segregate metals by nature (steel, plomb, brass...).

Combining all the above together, the complete plant, is accomplished in six ISO containers prepared for plug-and-work, no special infrastructure requirements, no ammunition specialists required, no big investments are necessary.

Thus, a security and protection problem is solved with a short-term return on investment favoured by the increasing market value of raw materials, not to mention the big favour that is done to society and to the environment.

–The writer is Co-founder and COO of KA SAFE Engineering

"THE RECOVERY FOR REUSE IS FULLY ALIGNED WITH CURRENT BEST ENVIRONMENTAL PRACTICES AND CIRCULAR ECONOMY TRENDS. THE LIFE OF THE EXTRACTED MATERIAL IS EXTENDED AS THEY ARE INCORPORATED TO DIFFERENT PRODUCTS REPLACING RAW MATERIALS. THIS MEANS CONSIDERABLE ENERGY SAVINGS, AND OF COURSE AN ECONOMIC INCENTIVE THAT FAVORS A QUICK RETURN ON THE INVESTMENT NEEDED"

Rahul Dalal, MD, KA Safe Lodestar India

POST EVENT REPORT

6TH INTERNATIONAL POLICE EXPO 2021 & 5TH INDIA HOMELAND SECURITY EXPO 2021, NEW DELHI

The latest edition (2021) of International Police Expo and India Homeland Security Expo (5th edition) showcased the latest and modern technology for both security upgradation and force modernization. The expo witnessed participation by 60 Indian and foreign companies. The expo provided police and other armed forces with an opportunity to witness world-class weapons and other security equipment.

The rapid increase in security threats globally have compelled countries across the globe to focus more on renovating their security infrastructure. India, along with other countries, too is focusing on technology development and its seamless adoption for Police and Armed Forces of India. India is also pivoting its disaster management through new approach imbibed with advanced technology due to India's recent encounter of disasters.

Meanwhile, security is the utmost priority of the governments of countries as new breed of criminals and terrorists is more tech-savvy nowadays. Geographical conditions and changing of socio-political equations in neighboring nations are further fuelling the security challenge in a big country like

EXHIBITORS

During the exhibition, the joint venture protective carbine (JVPC), developed by DRDO and Kalyani Industries, a 5.56x30mm carbine has already started replacing the costly Heckler and Koch MP5. The JVPC has been indigenously made and is an excellent replacement for existing sub machine guns (SMGs). A new bullpup assault rifle specialized for close quarter combat (CQB) and a mid-range sniper rifle has also been showcased.

In mobility section, Kalyani Group displayed its latest armored vehicle which can withstand a 50kg TNT

HIGHLIGHTS

blast from the side and can also carry over 11 personnel. The Sherp, a Ukrainian world famous all-terrain vehicle, is going to be manufactured near Mohali in Punjab, was also displayed. The vehicle can go to any terrain and can swim on the water regardless of its depth.

During the expo, few key highlights were the introduction of caged drones which can be useful in rescue of the people during landslides or any mishap in the canals or caves by Indo Wings and Birdseye Assets. The special feature of these drones are that even with getting in contact with any surface, it will keep moving without loss of any visuals.

Police needs modern technology for digital forensic, cyber security and advanced forensic technology for the crime investigation. In this section A US company, Zimperium, who claims that it can protect organizations and individuals from Pegasus, also displayed its technology for the first time in India. Other players like Celebrite from Israel, Credence Security, and Cyber Armor from Dubai etc.

Evitar Systems displayed its system which can make any small arm fit in Machine Guns and was a centre of attraction. The system displayed that any small arm like GLock gets fitted inside the system and it becomes a combat ready weapon. The JSC "Kamenskvolokno" from Russia displayed its bullet proof solutions designed for around-the-clock comfort for the users.

Tata Advanced System also displayed its R-VTOL for the forces where this tactical surveillance system can make Indian border surveillance more efficient. The expo has kept it legacy intact by introduction of the modern products and technology from more than 15 countries.

POST EVENT REPORT

THE EXPO WITNESSED PARTICIPATION BY 60 INDIAN AND FOREIGN COMPANIES. THE EXPO PROVIDED POLICE AND OTHER ARMED FORCES WITH AN OPPORTUNITY TO WITNESS WORLD-CLASS WEAPONS AND OTHER SECURITY EQUIPMENT

India. Apart from Police Forces, this is also a bigger challenge for CAPFs and Indian Armed Forces.

All of these evolving security challenges can be mitigated and controlled through new technology adoption. The vision of Government of India is poised towards making Indian Police as SMART POLICE is absolutely in right direction keeping the recent and future security challenges in mind.

On the milieu of various security goals, 6th edition of International Police Expo was organized along with India Homeland Security Expo (5th edition) on August 18-19 at Pragati Maidan, New Delhi. The expo is considered as an instrumental tool for introduction of latest and modern technology for both security up- gradation and force modernization. As many as 60 Indian and foreign companies came under one roof to display their achievements in security industries. This is not only a big boost to the Make in India initiative of Prime Minister Narendra Modi but also opportunity for police and other armed forces to witness world-class weapons and other security equipment, which have been indigenously made.

VISITORS HIGHLIGHTS

Senior delegates from various forces and departments like Delhi Police, Uttarakhand Police, Anti-Terrorist Squad, Special Protection Group, National Security Guard, Tamil Nadu Police, Kerala Police, Haryana Police, Punjab Police, Odisha Police, DGCA, Ministry of Home Affairs, Air Force, Indian Navy, Ambassadors & Defence Attachés' (Indonesia, Philippines, Fiji, Jamaica, Dominican Republic, DPRK, France, Austria, etc.) DMRC, CISF, CRPF, BSF, NDRF, SSB, BPR&D etc. marked their presence.

AVIATION UNRAVELLING THE CIVIL SIDE OF THE STORY

CIVIL AVIATION NEWS

BOEING AND SKYNRG PARTNER TO SCALE SUSTAINABLE AVIATION FUELS GLOBALLY

Seattle. Boeing, SkyNRG and SkyNRG Americas recently announced a partnership focused on scaling the availability and use of sustainable aviation fuels (SAF) globally. Boeing will also invest in SkyNRG Americas' SAF production project, for which Alaska Airlines is a previously announced partner.

Boeing, SkyNRG and SkyNRG Americas will work together to accelerate SAF development globally, focusing on scaling production capacity, building awareness and engaging stakeholders throughout the value chain, including airlines, governments and environmental organizations.

As a leader in the SAF industry, SkyNRG sources and supplies SAF, develops production capacity, advises on policy decisions, manages corporate SAF programs and takes the high road on sustainability. SkyNRG Americas is a new company focused on growing SAF production in North America. Its first dedicated U.S. production facility for SAF will supply airports and airlines on the West Coast. Boeing's investment in the project includes the advance purchase of SAF from this facility for use in company flight tests and other operations.

The partnership builds on Boeing's long-term industry leadership and investment in SAF. The company began SAF test flights in 2008 and helped gain approval for commercial use in 2011.

The Boeing ecoDemonstrator uses SAF for all flight test programs and completed the world's first commercial airplane flight using 100% SAF in 2018. Earlier this year, Boeing committed that its commercial airplanes will be capable and certified to fly on 100% SAF by 2030.

COLLINS AEROSPACE DEPLOYS BIOMETRICS SOLUTION AT TOKYO HANEDA AIRPORT

Tokyo. Collins Aerospace has completed deployment of its ARINC SelfPassTM biometrics solution at Haneda Airport, one of the busiest airports in Asia, streamlining passenger processing through reduced physical interactions and bottlenecks at multiple passenger touchpoints. Collins Aerospace is a Raytheon Technologies business.

"Our 'Face Express' system will allow passengers to efficiently proceed through procedures at the airport (baggage drop, security checkpoint entrance, boarding gate) utilizing facial recognition, eliminating the hassle of showing their passport and boarding pass," said Shoichi Ohashi, Tokyo International Air Terminal Corporation's senior manager for the Facility Department. "We worked closely with Collins Aerospace to achieve this and enhance passenger convenience at Tokyo Haneda airport."

Rakan Khaled, vice president, Airport Systems for Collins said, "Our ARINC SelfPass biometrics solution at Tokyo Haneda Airport streamlines passenger processing while improving airport efficiency and security. Despite the challenging pandemic environment, we were able to manage staffing and suppliers to ensure smooth delivery of the solution."

This project includes the installation of 98 Self-Service Check-In Kiosks, 30 biometric enrollment kiosks, 104 biometric devices for Self-Bag Drop, 17 biometric Automated Security Gates and 42 biometric Automated Self-Boarding Gates.

COLLINS AEROSPACE TO SUPPORT IATA TRAVEL PASS

ANNAPOLIS, Md. To help passengers manage their testing requirements, governments safely re-open their borders, and restart international air travel, Collins Aerospace, a Raytheon Technologies business, is teaming with the International Air Transport Association (IATA) to support its Travel Pass digital health platform. IATA's Travel Pass enables passengers to store, share and manage verified test results and information that may be needed for travel to other countries.

Collins Aerospace will help integrate IATA's Travel Pass platform into airlines' passenger management systems using the company's TransAction™ solution, which allows passenger data to be safely and securely exchanged between airlines and the IATA Travel Pass mobile app. TransAction is already in use by airlines around the world to share passenger travel information.

DYNAMATIC TECHNOLOGIES COMPLETES 150 SHIP SETS OF AIRBUS A330 FLAP TRACK BEAM ASSEMBLIES

Dynamatic Executive team handing over 150th Ship Set of Airbus a330 Flap Track Beam Assemblies memento to Airbus India team

Bangalore. Dynamatic Technologies Limited has completed 150 ship sets of Airbus A330 Flap Track Beam assemblies and handed them over to Airbus through a virtual event, which was witnessed by senior executives from Airbus in France & India.

This project entails unique collaborative manufacturing in UK & India with high-speed robotic machining at our UK facility and artisanal assembly by skilled craftsmen in India. This is one of

the most successful Make in India programs. The flaps on the wings, which are instrumental in controlling speed, direction and balance of the aircraft, move along high tech guide rails known as Flap Track Beams. These Flap Track Beams are Class 1 Flight Critical Assemblies that are connected to the wings.

Dynamatic Technologies Limited has been producing Flap Track Beam assemblies for Airbus A330 Aircraft as global single source supplier along with single-aisle Airbus A320 aircraft family on a global single source basis.

Udayant Malhoutra CEO & Managing Director, Dynamatic Technologies Limited said, "Our relationship with Airbus is based on delivering uncompromising quality on a global best-value basis.

To achieve this, we have established a decade-long collaborative model utilizing comparative advantages available in India and the United Kingdom. We look forward to broadening our relationship with Airbus on more programs."

CIVIL AVIATION NEWS

AIRASIA INDIA BECOMES THE LAUNCH CUSTOMER OF AIRBUS' SKYWISE HEALTH MONITORING DIGITAL SOLUTION IN SOUTH ASIA

New Delhi. AirAsia India has become the launch customer of the Airbus Skywise Health Monitoring (SHM) digital solution in the South Asia region. As part of the ten-year contract, the airline will also adopt Airbus' Skywise Core aviation data integration platform.

AirAsia India will use both solutions for its A320 fleet. Airbus' SHM will support the airline's maintenance and engineering teams by enabling real-time management of aircraft events and troubleshooting. This will help the airline save time and reduce the cost of unscheduled aircraft maintenance.

Skywise Core, used by more than 140 airlines across the world, will allow AirAsia India to make data-driven decisions to further improve its fleet's operational reliability thereby reducing its operational costs.

The Skywise Health Monitoring digital solution supports airline maintenance and engineering departments to identify, prioritise, analyse and handle in-service events. This enables quicker decision-making and aircraft on-time dispatch while also minimising 'aircraft on ground' risks.

Skywise Core is the preeminent data platform designed by Airbus for the aviation industry. Airlines use Skywise Core to integrate the massive amount of data siloed across departments and service providers.

INDIAN OCEAN BASED AIR AUSTRAL BECOMES FIRST FRENCH A220 OPERATOR

Mirabel, Canada. The first of the three A220s for Air Austral, France's La Réunion Island-based airline, has been delivered from the Airbus A220 Final Assembly Line (FAL) in Mirabel, Canada. The second and third aircraft are expected to join the Air Austral fleet soon. Airbus is delighted to welcome Air Austral as a new Airbus customer and operator. This A220 will be the first of the type to be operated by a French airline in the Indian Ocean region.

Air Austral has selected the Airbus A220-300 as part of its medium and short-haul fleet modernisation plan in order to boost its operational efficiency, offering an enhanced passenger experience in a comfortable two-class cabin layout with 132 seats: 12 in business class and 120 in economy-class.

Bearing the airline's distinctive livery representing La Reunion Island's beautiful landscapes, Air Austral will strengthen its regional network with three A220-300s, flying on routes between La Réunion Island and Mauritius, Mayotte, Seychelles, South Africa, Madagascar, and as far as India.

Powered by latest-generation geared turbofan engines, Pratt & Whitney PurePower PW1500G, the A220 is the quietest and most eco-friendly aircraft in its category. The aircraft features a 50% reduced noise footprint compared to previous generation aircraft, 25% lower fuel burn and CO2 emissions per seat as well as 50% lower NOx emissions than current industry standards. To date over 160 A220s have been delivered, operating routes in Asia, North America, Europe and Africa, proving the great versatility of Airbus' new generation single-aisle family member.

ADAC LUFTRETTUNG TAKES DELIVERY OF ITS FIRST TWO FIVE-BLADED H145S

Donauwörth. ADAC Luftrettung, one of Europe's biggest Helicopter Emergency Medical Services (HEMS) operators, has taken delivery of its first two five-bladed H145s. Furthermore, the German HEMS operator will upgrade its current fleet of 14 four-bladed H145s to the five-bladed rotor system. ADAC Luftrettung operates more than 50 Airbus helicopters from their 37 stations throughout Germany. In June, an ADAC H145 was the first HEMS helicopter to fly with sustainable aviation fuel.

The new version of Airbus' best-selling H145 light twin-engine helicopter was unveiled at Heli-Expo 2019 in Atlanta. This latest upgrade adds a new, innovative five-bladed rotor to the multi-mission H145, increasing the useful load of the helicopter by 150 kg. The simplicity of the new bearingless main rotor design will also ease maintenance operations, further improving the benchmark serviceability and reliability of the H145, while improving ride comfort for both passengers and crew. The helicopter's high-mounted tail boom and wide opening clam-shell doors facilitate access to the H145's spacious cabin. Powered by two Safran Arriel 2E engines, the H145 is equipped with full authority digital engine control (FADEC) and the Helionix digital avionics suite. It includes a high performance 4-axis autopilot, increasing safety and reducing pilot workload. It's particularly low acoustic footprint makes the H145 the quietest helicopter in its class.Today, Airbus has more than 1,470 H145 family helicopters in service around the world, logging a total of more than six million flight hours. For HEMS alone, there are more than 470 helicopters of the H145 family conducting air rescue missions worldwide.

INDIA'S FIRST HYBRID eVTOL MAY BECOME ASIA'S FIRST eVTOL

Whenever the talk about the ongoing pioneering developments in eVTOL concepts is on, it generates curiosity and the focus is on the European and US developers. At the same time, India too is quietly working on a flying car with high-end features and a luxury design that could become Asia's first eVTOL.

The Chennai-based startup Vinata Aeromobility's flying car concept, which was recently presented to India's Civil Aviation Minister, Jyotiraditya Scindia boasts impressive capabilities and a luxury design. Though the company hasn't announced an official launch date so far, its flying car definitely looks promising for commuting, cargo transport and medical emergencies.

As reported by Asian News International (ANI), the minister was "delighted" to be introduced to the concept of the "soon-to-become Asia's first hybrid car".

Vinata's project is all about a flying car which is both hybrid and autonomous. Vinata's eVTOL (vertical takeoff and landing) with a 5,548 mm (18 feet) length, 5,477 mm (17.9 feet) width, and 2,240 mm (7.3 feet) height, has room for two passengers and can withstand a maximum takeoff weight of 1,300 kg (2,866 lbs). It can reach up to 3,000 feet in the sky, and it's equipped with a quadricycle landing gear.

On the performance part, Vinata's flying car promises a maximum speed of 120 kph (74.5 mph) and a 100-km (62 miles) range, with a flight endurance of 60 minutes. Designed with co-axial quad-rotors, the flying car is powered by eight BLDC motors and eight fixed pitch propellers. Thanks to several motors and propellers, it makes the aircraft safer.

Another remarkable feat about Vinata's hybrid VTOL is its panoramic window canopy that offers a great view, and what the company describes as a "luxurious interior", with high-tech features. The onboard entertainment system also provides GPS navigation, soft-landing assistance. An automatic "return-to-home" feature is also enabled.

AIRBUS JOINS CANADA'S SAF+ CONSORTIUM TO ACCELERATE THE DEVELOPMENT OF A NEW SUSTAINABLE AVIATION FUEL TECHNOLOGY

Toulouse. Airbus and the Montreal, Canada-based SAF+ Consortium have signed a Memorandum of Understanding (MoU) to collaborate with major Canadian aviation industry players on sustainable aviation fuel (SAF) development and production in North America. Airbus will be investing through "in-kind" contributions, which consist of technical and certification expertise, economic analysis, communications and advocacy.

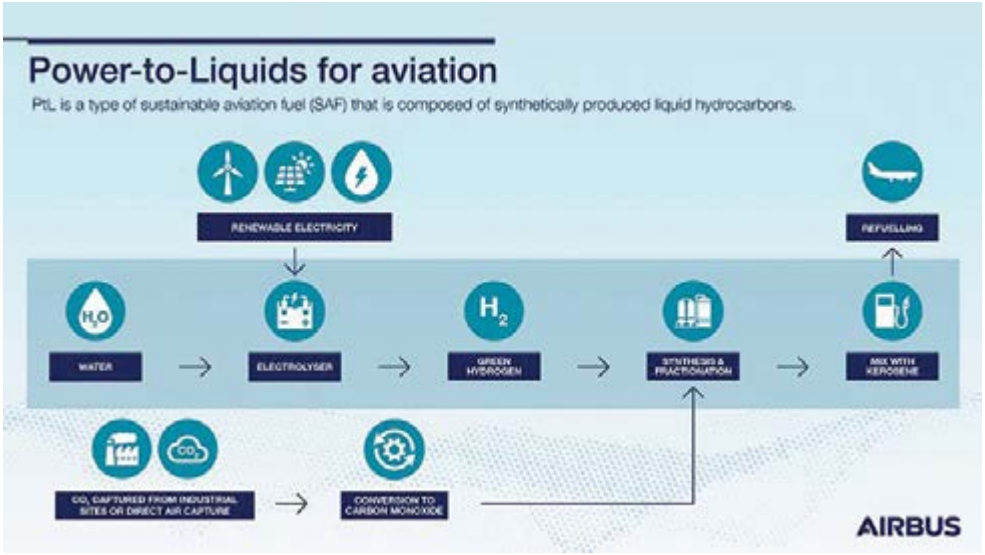
The announcement marks the launch of a new Canadian ecosystem dedicated to stimulating the production of SAF and connecting Airbus with prominent Canadian actors spanning the entire aviation value chain to develop a concrete solution that will make low-carbon flying a reality.

The aviation sector is a global industry and while momentum for SAF is growing, particularly in Europe, investment in SAF's worldwide development is of equal importance to enable the entire sector to achieve significant CO2 emissions reductions around the globe.

The SAF+ Consortium brings together a number of key Quebec-based aerospace companies and research institutions, such as Air Transat, Hydro-Quebec, Aéroports de Montréal, Polytechnique Montréal and Aéro Montréal.

The SAF+ Consortium's goal is to transform Montreal into a sustainable aviation hub in North America through the construction and subsequent operation of a pilot SAF production plant. Situated close to Montreal, this pilot plant will produce a type of SAF known as Power-to-Liquid (PtL), which is an e-fuel consisting of captured carbon dioxide (CO2) synthesised with renewable (green) hydrogen. The process involves capturing CO2 from large industrial emitters and converting it into an alternative fuel. It is estimated that the fuel produced by SAF+ will have an 80% lower carbon footprint compared to conventional jet fuel.

The Consortium builds on Air Transat's commitment to purchase a significant portion of the future SAF produced at the plant for its all-Airbus fleet. SAF+ intends to produce SAF as early as the second half of 2021 at its first pilot plant. A commercial project of 30 million litres is planned for 2025.



FLYADEAL RECEIVES ALL NEW AIRBUS A320NEO

Toulouse. flyadeal, the low-cost Jeddah-based airline owned by Saudi Arabian Airlines, has taken delivery of a brand new A320neo, the first out of 30 to be delivered in the next 3 years.

The aircraft is the first out of 65 A320neo family aircraft ordered by Saudi Arabian Airline at the Paris Airshow 2019, and will join flyadeal's all Airbus fleet.

Powered by CFM LEAP-1A engines, the A320neo will offer flyadeal outstanding operational, economic and environmental performance. flyadeal's A320neo is configured with 186 seats in a comfortable all economy class layout. Passengers onboard the aircraft will benefit from the widest cabin of any single-aisle aircraft in the sky, as well as the latest cabin feature offering optimum passenger comfort.

The A320neo is the ideal aircraft for flyadeal to grow and expand its domestic and regional network. Demonstrating the operational flexibility of the A320neo, the aircraft will allow the airline to efficiently enhance its operations to additional networks and foster closer links with countries across the region and beyond.

The A320neo Family incorporates the very latest technologies including new generation engines, sharklets and aerodynamics, which together deliver 20% in fuel savings and CO2 reduction compared to previous generation Airbus aircraft. The A320neo Family has received more than 7,400 orders from over 120 customers.

PRATT & WHITNEY CANADA ADVANCES SUSTAINABLE HYBRID-ELECTRIC PROPULSION TECHNOLOGY, CONTRIBUTING TO CANADA'S GREEN RECOVERY PLAN

Longueuil, Quebec. Pratt & Whitney Canada (P&WC), a business unit of Pratt & Whitney, plans to advance its hybrid-electric propulsion technology and flight demonstrator program as part of a $163M CAD investment, supported by the governments of Canada and Quebec.

"We see hybrid-electric propulsion systems as one of the key routes to making aircraft of the future even more fuel efficient. We expect that smaller aircraft, including regional airliners, will be the first to benefit from this technology, creating a clear opportunity for India to grow these segments in a sustainable manner," said Ashmita Sethi, president and country head, Pratt & Whitney. "India has one of the newest and most fuel efficient aircraft fleets in the world, powered by our GTF, V2500, PT6 and PW100 engine families. So India's aviation sector is superbly positioned to lead a sustainable flying roadmap in the future."

The new hybrid-electric propulsion technology will drive significant improvements in aircraft efficiency by optimizing performance across the different phases of flight, allowing the demonstrator to target a 30% reduction in fuel burn and CO2 emissions, compared to a modern regional turboprop airliner. P&WC is working with De Havilland Aircraft of Canada Limited (De Havilland Canada) to integrate this hybrid-electric technology into a De Havilland Canada Dash 8-100 flight demonstrator. This demonstrator will include an advanced electric motor and controller from Collins Aerospace, also a Raytheon Technologies business.

"Pratt & Whitney Canada is proud to be a leader toward ever more sustainable aircraft propulsion technologies and be an integral part of Canada's green recovery plan," said Maria Della Posta, president, Pratt & Whitney Canada.

As part of Canada's green recovery plan, the Government of Canada's Strategic Innovation Fund is backing the technology demonstrator, which will help put Canada's aerospace industry at the forefront of global efforts to make aviation more sustainable. Combining advanced technologies developed by P&WC and Collins, this project is a successor to Project 804, launched in 2019 as a joint development program between the two companies and provides a solid foundation for this new demonstrator program to build upon. P&WC will target ground testing in 2022, leading to flight testing of the Dash 8-100 demonstrator in 2024.

Developing hybrid-electric propulsion technology is a core element of Pratt & Whitney's strategy to make aviation more sustainable. The company is also committed to continually advancing the efficiency of gas turbine engines across its portfolio, while supporting the wider use of sustainable aviation fuels, and pursuing alternative fuels. All these elements will be critical for the aviation industry to meet its goals to significantly reduce CO2 emissions by 2050. The company will continue to work with industry partners globally on a wide variety of projects targeted at increasingly sustainable aviation to benefit our customers and the environment.

CIVIL AVIATION NEWS

AZAD ENGINEERING WINS BOEING CONTRACT

Hyderabad. AZAD Engineering bagged a contract from Boeing to manufacture and supply critical aviation components and parts for the global aerospace company's products. The contract will also enable AZAD Engineering to reinforce its efficiency, reliability and deliver greater value to its customers.

AZAD Engineering has the capability to manufacture complex and super-critical components and machined parts for the turbine and aerospace industry. AZAD's technology enhancements over the years and continuous culture of quality and industrial safety have made it a trusted partner for customers across the globe. AZAD will begin delivering the critical components including hydraulic and mechanical fittings to Boeing from Q1 2022.

Industrial partnerships augment capabilities and skill development and lead to identifying new ways to drive innovation. Recently, Azad Engineering announced its plan to set up a second manufacturing facility in Hyderabad with an investment of $80 million over the next 36 months. This will develop a precision engineering cluster, creating job opportunities for highly skilled people in Telangana to leverage and grow the existing aerospace ecosystem.

Azad, an end-to-end solution provider, has established itself as a one-stop partner for reputed global power generation & Aerospace OEMs. The company expects to deepen its relationship as a preferred partner and continue to enjoy the flagship position with a new facility coming up over the next 18 months.

With a mission to put India on the global radar, Azad Engineering has challenged the current mind-set around manufacturing in India to establish India as a one-stop world-class facility and is keen to be the torchbearer of Indian specialized manufacturing for all the end-to-end needs of a global OEM. He envisions transforming the entire manufacturing industry using digital manufacturing and Industrial AI, right from the design process and production floor to the supply chain and administration.

UNITED AVIATE ACADEMY WILL TRAIN NEW PILOTS USING BOEING'S COMPREHENSIVE SUITE OF TRAINING SOLUTIONS

Oshkosh, Wisconsin. United Aviate Academy has selected Boeing to provide a comprehensive suite of training tools, materials and digital solutions to develop and provide early career training to United Airlines' next generation of pilots. The companies commemorated the five-year training agreement with a ceremonial signing event at EAA AirVenture.

The comprehensive training package of courseware and multimedia materials spans Boeing's portfolio of service offerings, including its Jeppesen and ForeFlight solutions, and provides United Aviate Academy with the tools to help cadets master key concepts and information needed to confidently and safely pilot aircraft.

The agreement includes:

- Initial cadet assessment materials with accompanying online courses and e-books, supporting higher program completion rates through analytics of data-driven assessments
- Jeppesen Academy courseware, textbooks and digital learning materials for private, instrument, commercial, multiengine and instructor training
- The ForeFlight Mobile integrated flight app for pilots equipped with Jeppesen NavData®, electronic charts and Airway Manuals, a one-stop shop for flight tasks like routing flights, planning and filing flight plans, managing electronic charts and maps, and gathering destination and weather information
- Pilot supplies including Bose headsets, computers, student flight bags, logbooks and more
- GPS NavData for the United Aviate Academy fleet

Following the agreement signing, Boeing further demonstrated its support for the program and its commitment to diversity by presenting Delia Nina Nava with a scholarship to United Aviate Academy to join a future pilot training class. Nava is a Hispanic woman from Houston with a passion for aviation and aspirations of becoming an airline pilot. She is a graduate of Ross Shaw Sterling Aviation High School and a student at the University of Houston.

SEVERAL MAJOR STEPS TAKEN FOR REVIVAL OF CIVIL AVIATION SECTOR, SAYS MOS – CIVIL AVIATION

New Delhi. With the civil aviation sector including airlines, airports and related services coming under financial stress on account of COVID-19 pandemic, the government took several major steps to revive it.

Replying to queries in Parliament which concluded this week, the Minister of State for Civil Aviation Gen (Retd) V.K. Singh said various policy measures were taken to provide support to airlines.

These steps included providing airport infrastructure through Airports Authority of India and the private operators, promotion of private investments in existing and new airports through the PPP route, an efficient Air Navigation System.

Air Bubble Arrangements were made to ensure fair and equitable treatment to Indian carriers in the international sector, Goods and Services Tax (GST) rate reduced to 5% from 18% for domestic Maintenance, Repair and Overhaul (MRO) services and a conducive aircraft leasing and financing environment has been enabled.

The government also made route rationalization in the Indian airspace in coordination with Indian Air Force for efficient airspace management, shorter routes and lower fuel consumption as also coordination with stakeholders to resolve issues.

The key outcome of these measures has been that despite the pandemic, domestic operations have reached about 50% of pre Covid level. Also the number of freighters has increased from 7 to 28, the Minister said.

HAL'S 'MADE IN INDIA' CIVIL AIRCRAFT ACHIEVES MAJOR MILESTONE, CARRIES OUT GROUND RUN AND LSTT

Bengaluru/Kanpur. HAL successfully carried out the Ground Run and Low Speed Taxi Trials (LSTT) of the Hindustan-228 (VT-KNR) aircraft recently for DGCA 'Type Certification'. The event was part of 75th Anniversary of India's Independence Day celebrations at HAL's Kanpur facility.

HAL's Transport Aircraft Division, Kanpur has been in the business of transport and trainer aircraft for defence customers. The Division has ventured into the manufacturing of Hindustan-228 aircraft to support the Regional Connectivity Scheme (UDAN) of the Government of India. This aircraft could be utilized successfully by civil operators and State Governments for their intra and inter-state connectivity with seamless support towards training, maintenance and logistics.

The Hindustan-228 is a 19-seat multirole utility aircraft built for various applications such as VIP transport, passenger transport, air ambulance, flight inspection roles, cloud seeding, and recreational activities like Para jumping, aerial surveillance, photography and cargo applications.

DELTA AIR LINES ORDERS 30 ADDITIONAL AIRBUS A321NEO AIRCRAFT

Herndon, VA. Delta Air Lines has ordered 30 additional Airbus A321neo aircraft to help meet the airline's future fleet requirements. The newly-ordered aircraft are in addition to the airline's existing orders for 125 of the type, bringing the outstanding orders from Delta to a total of 155 A321neos.

Delta's A321neos will be powered by next-generation Pratt & Whitney PW1100G turbofan engines that bring significant efficiency gains over Delta's current, already-efficient A321 aircraft. Equipped with total seating for 194 customers with 20 in First Class, 42 in Delta Comfort+ and 132 in the Main Cabin, Delta's A321neos will be deployed primarily across the airline's extensive domestic network, complementing Delta's current A321 fleet of more than 120 aircraft. The airline is slated to receive the first of its 155 A321neo aircraft early next year.

Many of Delta's A321neos will be delivered from the Airbus U.S. Manufacturing Facility in Mobile, Alabama. The airline has taken delivery of 87 U.S.-manufactured Airbus aircraft since 2016.

As of the end of July, Delta's fleet of Airbus aircraft numbered 358, including 50 A220 aircraft, 240 A320 Family members, 53 A330 widebodies, and 15 A350 XWB aircraft.

CIVIL AVIATION NEWS

MAHINDRA AEROSTRUCTURES TO MANUFACTURE BOEING 737 INLET OUTER BARREL COMPONENTS

Bengaluru. Mahindra Aerostructures Pvt Ltd (MASPL) has been awarded a contract for manufacturing and supply of the Boeing 737 inlet outer barrel components and sub-assemblies, the legendary single-aisle family of airplanes, at the state-of-the-art MASPL facility in Narsapura, near Bengaluru, India. Production begins in 2023.

Commenting on the new contract, Mr. S P Shukla, Member of the Group Executive Board of Mahindra Group, and Group President, Defence, Aero & Agri sector, observed, "We are privileged to be awarded this prestigious contract for the 737, which is another step in our journey with Boeing to support the Atmanirbhar Bharat initiative of the Indian Government."

"Boeing demands the best, and this contract award is a testament to our delivery and quality performance which was sustained even during the pandemic,"

said Mr. Arvind Mehra, Managing Director & CEO of Mahindra Aerostructures. He added, "We thank Boeing for this recognition of our performance and look forward to creating even more opportunities to add value to Boeing."

Under the new contract, MASPL will supply these parts and sub-assemblies for the 737, directly to Boeing facilities in the United States. Deliveries will ramp-up in synchronization with Boeing's planned increase in 737 production.

AIRCRAFT LESSOR GRIFFIN GLOBAL ASSET MANAGEMENT ORDERS FIVE BOEING 737-8 JETS

Seattle. Boeing and Griffin Global Asset Management today announced the aircraft lessor is expanding its commercial aircraft portfolio with five new 737-8 jets. The purchase is Griffin's first direct order with Boeing as it sees strategic opportunities to place the airplanes during the market recovery.

Designed and built in Renton, Washington, the 737 MAX family delivers superior efficiency, flexibility and reliability while reducing fuel use and carbon emissions by at least 14% compared to the airplanes they replace. The 737-8 seats up to 189 passengers and can fly 3,550 nautical miles – about 600 miles farther than its predecessor – allowing airlines to offer new and more direct routes for passengers. Every 737 MAX features the new Boeing Sky Interior, highlighted by modern sculpted sidewalls and window reveals, LED lighting that enhances the sense of spaciousness and larger pivoting overhead storage bins.

As a leading global aerospace company, Boeing develops, manufactures and services commercial airplanes, defense products and space systems for customers in more than 150 countries. As a top US exporter, the company leverages the talents of a global supplier base to advance economic opportunity, sustainability and community impact. Boeing's diverse team is committed to innovating for the future and living the company's core values of safety, quality and integrity.

IAI AVIATION GROUP TO ESTABLISH NEW PASSENGER-TO-FREIGHTER CONVERSION CENTRE IN ADDIS ABABA, SIGNS AGREEMENT WITH ETHIOPIAN AIRLINES

Tel Aviv. Israel Aerospace Industries (IAI) Aviation Group signed an agreement with Ethiopian Airlines to establish a conversion site for Boeing 767-300 passenger aircraft. The new passenger-to-freighter conversion centre, which will operate from the company's maintenance centre in Addis Ababa, will provide solutions for the rising demand for cargo aircraft of these models. The conversion line in Ethiopia will join existing conversion sites IAI operates at its campus in Ben Gurion International Airport and in Mexico.

Ethiopian Airlines' MRO Centre is well-known and highly experienced. It is approved by the Ethiopian Civil Aviation Authority, the US Federal Aviation Administration (FAA), and the European Aviation Safety Agency (EASA). The new site will be the largest and most advanced in Africa. The conversion site will provide solutions in the field of converting passenger aircraft to cargo configuration, aircraft maintenance and overhaul, staff training and guidance, as well as assistance in acquiring certification and licenses. The establishment of the centre is a testament to IAI's growing impact around the world.

As reported by Raksha Anirveda, IAI recently has begun the structural modification phase in the conversion of the first Boeing 777-300ERSF, in partnership with GE Capital Aviation Services (GECAS). The beginning of the conversion marks the end of the development process and the start of the structural and systems modification phase. The conversion process will take approximately 130 days, at the end of which the passenger aircraft will be turned into a freighter aircraft.

IAI has vast experience in the conversion of passenger aircraft to cargo aircraft. The company has regional conversion centers in different countries and plans to open new ones to cut the time of the conversion. This is based on a forecast for a dramatic increase in the demand of cargo aircraft.

The development process of the 777 conversion is complicated and highlights IAI engineers' extensive experience in aviation, with their envisioned goal of creating a cargo conversion aircraft that will have the high quality and capabilities providing clients with the optimal solution. The passenger-to-freighter conversion includes changing the structure, which involves installing a new cargo door, replacing and strengthening the aircraft floor, installing reinforcements near the cargo opening, and modifying electrical systems to enable safe and convenient operation. In addition, the process will include receiving certification for the converted aircraft by the Civil Aviation Authority of Israel (CAAI), the Federal Aviation Administration (FAA), among others

THE REPUBLIC OF KAZAKHSTAN ORDERS TWO AIRBUS A400MS

Getafe. The Republic of Kazakhstan has placed an order for two Airbus A400M aircraft and becomes the ninth operator together with Germany, France, United Kingdom, Spain, Turkey, Belgium, Malaysia and Luxembourg. With delivery of the first aircraft scheduled in 2024, the contract includes a complete suite of maintenance and training support. Together with the agreement a Memorandum of Understanding has also been signed to collaborate on Maintenance and Overhaul services and with a first step of creating a local C295 maintenance centre.With the capacity to accommodate the country's inventory and conduct military, civil and humanitarian missions, the A400M will enable Kazakhstan to quickly respond to any mission by rapidly deploying game-changing capabilities over long distances and enabling effective access to remote areas.

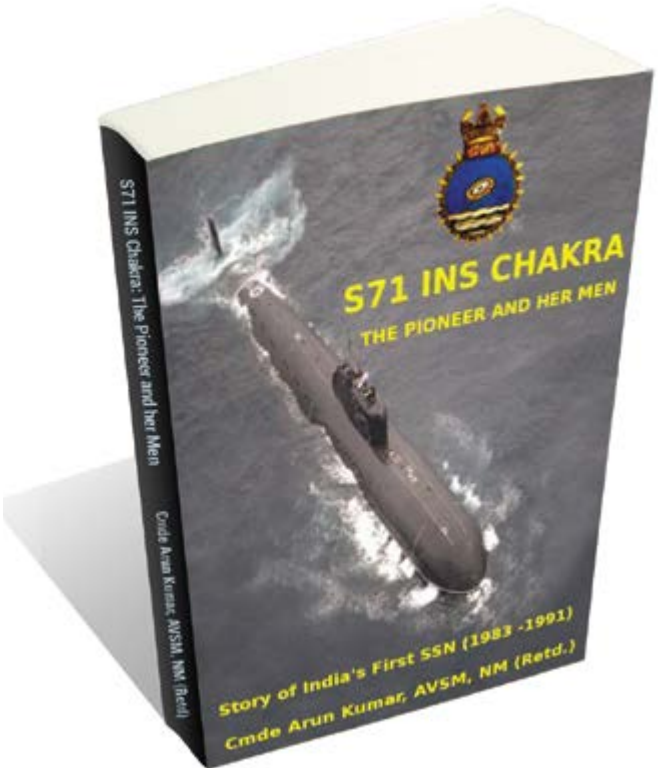
AIRBUS CELEBRATES THE 1,000TH AIRCRAFT COVERED BY FLIGHT HOUR SERVICES WITH FLYADEAL

Toulouse. France. flyadeal, the low-cost Jeddah-based airline owned by Saudi Arabian Airlines, signed a long-term Flight Hour Services (FHS) agreement to support its A320 fleet. The agreement includes the 1,000th aircraft supported by Airbus Flight Hour Services. The carrier will benefit from integrated material services including spare pool access, on-site-stock at the main base and components engineering and repairs. Through the FHS contract, Airbus will guarantee spare parts availability, contributing to securing aircraft technical performance. Airbus has finalised 11 Flight Hour Services contracts with operators worldwide over the last six months.

BOOK REVIEW

THE STORY OF INDIA'S FIRST NUCLEAR SUBMARINE

The book by Cmde Arun Kumar is all about the first INS Chakra – India's first nuclear attack submarine with a blend of his memoirs as the First Lieutenant and Commander of the submarine. The book gives the public and the defence fraternity the story of what the pioneers achieved. The story threads itself of how the crew trained on board in cramped freezing conditions, the challenging submarine training, the emergency and escape drills and life without sunlight for days and how nuclear submariners cope – keeping the readers engaged



By **CMDE RANJIT B RAI**

S71 INS Chakra: The Pioneer and her Men
Author: Cmde Arun Kumar AVSM (Retd)
Publisher : Frontier India Technology
Language : English
ISBN-10:93-91981-01-1
Price: ₹1250/-
Pages: 234

It can be stated that the Indian Navy's submarine arm has truly come of age by operating the spectrum of submarines from the conventional diesel-cum-battery propelled SSKs (Submarine killers of the Foxtrot, Kilo, 1500 and Kalvari class), to the nuclear propelled SSNs (the two Chakras on lease) and the strategic home built 6,500 ton SSBN INS Arihant commissioned in 2014 with nuclear tipped DRDO designed K-15/B05 750-km range ballistic missiles to form a part of India's Triad for nuclear deterrence. It began with the lease of a Charlie class submarine 671 originally commissioned into the Soviet Navy in November 1967. She was taken on lease as INS Chakra (S-71) and operated from 1988 to 1991 under the Indian Ensign, as the sixth nation in the world to operate nuclear submarines.

The Navy's nuclear project with the Department of Atomic Energy (DAE), called the Advanced Technology Vehicle (ATV), began in the 1980s and has been kept under wraps. Commodore Arun Kumar, a submarine officer, has with permission published a memoir of the first INS Chakra in two sections. Section one covers the assembly of officers and sailors at INS Hamla for introduction to nuclear subjects and the selection of personnel and the move after many hiccups in 1985 of 60 officers including two doctors and 140 sailors and some families to Vladivostok. Thus began their three years training till 1988, which was rigorous and professional for nuclear submarine operations and reactor safety by the specially selected Russian team. The book is full of names and the duties each trained for, to appreciate the task that the two-and-a-half crews achieved.

The second section covers the sea training in the Bay of Ulysses and operational sorties with weapon firings and inspection by the Pacific Fleet staff followed by the commissioning, and the passage and operations in India.

THE BOOK ALSO DEPICTS THE CHALLENGING SUBMARINE TRAINING, THE EMERGENCY AND ESCAPE DRILLS AND LIFE WITHOUT SUNLIGHT FOR DAYS AND HOW NUCLEAR SUBMARINERS COPE. REPLETE WITH PICTURES, THE STORY THREADS ITSELF OF HOW THE CREW TRAINED ON BOARD IN CRAMPED FREEZING CONDITIONS

The foreword by Capt Ternov, the safety captain of Chakra and who has written the book "Under Three Flags" is full of admiration for the professionalism of the Indian submariners and the secret base at Visakhapatnam and its safety features. The comments by the three commanding officers Capt RN Ganesh, SC Anand, and RK Sharma and others give a perspective of their contribution to the future nuclear submarines of the Indian Navy.

The Soviets built special accommodation (ZBK and Kirova 29) for the Indian detachment and the story of the 'ups and downs' from 1985 to 1987 of how the project progressed, how many children were born, how the minus 30 degrees cold was braved, how Indian sailors and families charmed the residents of the closed city, which had more damsels than men, makes for interesting reading. It also depicts the challenging submarine training, the emergency and escape drills and life without sunlight for days and how nuclear submariners cope. Replete with pictures, the story threads itself of how the crew trained on board in cramped freezing conditions.

The commissioning date was set in December 1987 but the discussions between President Gorbachov and Regan for nuclear controls put spokes in the wheel, but finally K-43 was commissioned as INS Chakra S-71 on January 5, 1988 in -20 degrees C with a lunch by Ambassador TN Kaul and dinner by C-in-C Pacific Fleet Admiral GA Khvatov, and she was sailed. Surg Cdr Bellubi did the first underwater appendectomy operation. INS Dunagiri rendezvoused Chakra near the South China Sea when she surfaced for the Singapore Straits passage. She was tailed and photographed and reported in Jane's Defence weekly.

THE COMMENTS BY THE THREE COMMANDING OFFICERS CAPT RN GANESH, SC ANAND, AND RK SHARMA AND OTHERS GIVE A PERSPECTIVE OF THEIR CONTRIBUTION TO THE FUTURE NUCLEAR SUBMARINES OF THE INDIAN NAVY

On February 3, Prime Minister Rajiv Gandhi embarked the Chakra off Visakhapatnam and had lunch, while it dived, with the officers and the Coxswain late MCPO GS Nears who has been praised as an asset on every submarine he served. The Chakra operated on both coasts with the fleet with its 63-km Amethyst (NATO name Starbright) missiles, CASEXES (Ship cum Aircraft and Submarine exercises) and torpedo firings, and covered 72,000 nautical miles (133,000 km). The reactor was active for 430 days with five missile and 42 torpedo firings executed under Indian command with a few Russian safety crew on board.

The INS Chakra suffered a fire in the switchboard at sea in 1989, and lost power. The emergency was superbly controlled by blowing tanks by Lt Cdr Patwardhan, and later refitted by Zvezda and ND Visakhapatnam personnel. Since Arun Kumar was the first lieutenant who later served as the commander of Chakra till the decommissioning, he deserves a Bravo Zulu to give the public and the military fraternity the story of what the pioneers achieved. One must never forget the dictum: Submarines are safe unless you forget that they can be dangerous.

APPOINTMENTS

AIR CHIEF MARSHAL V R CHAUDHARI TAKES OVER AS AIR CHIEF

New Delhi. Air Chief Marshal V R Chaudhari September 30 took over as The Chief of the Air Staff (CAS) at a ceremony at Air Headquarters. An alumnus of NDA, he was commissioned in December 1982 in the fighter stream of the IAF. He has flown more than 3800 hours on multiple fighter and trainer aircraft.

During his career spanning almost four decades, the Air Chief who is the 27th has held many significant command and staff appointments. He has commanded a MiG-29 Squadron, two Air Force Stations and Western Air Command. His staff appointments include Deputy Chief of Air Staff, Senior Air Staff Officer at HQ Eastern Air Command, Assistant Chief of Air Staff Operations (Air Defence), Assistant Chief of Air Staff (Personnel Officers), Deputy Commandant of Air Force Academy and Air Assistant to Chief of the Air Staff.

A Cat 'A' Qualified Flying Instructor, he has served as an instructor at Flying Training Establishments and has also been an Air Force Examiner. He was a pioneer member of the Suryakiran Aerobatic Display Team. An alumnus of Defence Services Staff College, Wellington, he has served as a Directing Staff there. He has also served as Directing Staff at DSCSC in Zambia. Prior to assuming the present appointment, he was the Vice Chief of the Air Staff.

The Chief of Air Staff is a recipient of Param Vishisht Seva Medal (PVSM), Ati Vishisht Seva Medal (AVSM), Vayu Sena Medal (VM) and is honorary ADC to the President of India.

In his address to the IAF, Air Chief Marshal Chaudhari said that he was honoured and privileged to have been entrusted with the responsibility of leading the Indian Air Force. Extending greetings to all Air Warriors, Non Combatants (Enrolled), DSC personnel, civilians and their families, he expressed absolute faith and confidence in their ability to accomplish all assigned tasks with resolute dedication while maintaining IAF's operational capability at an all-time high.

Outlining the focus areas for Commanders and personnel, he said, "Protection of our Nation's sovereignty and integrity is to be ensured at any cost". He added that enhancement of operational capability through integration of newly inducted platforms, weapons and equipment with existing assets and dovetailing the same in concepts of operations would remain a priority area. He spoke on aspects of acquisition of new technology, promotion of indigenization and innovation, strengthening of cyber security, rapid adaptation of training methods to meet future demands and sustained work to nurture human resources.

The Air Chief urged all to "always uphold the ethos and credo of the 'Air Warrior', and strive to be an asset to the IAF in any role tasked for".

AIR MARSHAL SANDEEP SINGH ASSUMES CHARGE AS VICE CHIEF OF THE AIR STAFF

New Delhi. Air Marshal Sandeep Singh took over as Vice Chief of the Air Staff (VCAS) on October 1. An alumnus of National Defence Academy, the Air Marshal was commissioned in the flying branch of IAF in December 1983 as a Fighter pilot. The Air Officer is an Experimental Test Pilot and a Qualified Flying Instructor. He has rich and diverse experience in operational and experimental test flying on various types of fighter aircraft and has flown about 4400 hours.

During his nearly thirty eight years of service in the IAF, the Air Marshal has held numerous important command and staff appointments. He has commanded Aircraft and Systems Testing Establishment, a frontline air base and an operational fighter squadron. He has held the appointments of Assistant Chief of the Air Staff (Plans), Senior Air Staff Officer at HQ Eastern Air Command and Deputy Chief of the Air Staff at Air Headquarters. Prior to assuming the current appointment, he held the appointment of AOC-in-C South Western Air Command. The Air Marshal is a recipient of Ati Vishisht Seva Medal (AVSM) and Vishisht Seva Medal (VSM).

AIR MARSHAL AMIT DEV ASSUMES COMMAND OF WESTERN AIR COMMAND

New Delhi. Air Marshal Amit Dev assumed charge as Air Officer Commanding in Chief (AOC-in-C) of Western Air Command on October 1. An alumnus of National Defence Academy, the Air Marshal was commissioned in the flying branch of IAF in December 1982 as a Fighter pilot. A Fighter Strike Leader, the Air Officer has about 2500 hours of operational flying experience on a wide variety of fighter aircraft in the inventory of IAF. During nearly thirty nine years of service in the IAF, the Air Officer has held numerous important command and staff appointments. He has commanded a MiG-21 Squadron, a frontline Air Base, an Air Defence Direction Centre and an Operational Fighter Base. He has also held the appointments of Assistant Chief of the Air Staff (Inspection), Director General Air Operations and Air Officer in Charge Personnel at Air Headquarters. Prior to assuming the current appointment, he held the appointment of AOC-in-C Eastern Air Command.

AIR MARSHAL BR KRISHNA ASSUMES CHARGE OF CISC

New Delhi. Air Marshal BR Krishna October one assumed charge of Chief of Integrated Defence Staff to the Chairman, Chiefs of Staff Committee (CISC). He paid homage to the brave hearts at the National War Memorial here followed by Tri-Service Guard of Honour. Commissioned as a fighter pilot in 1983, Air Marshal Krishna has had a distinguished career spanning over 38 years. A qualified Flying Instructor and experimental test pilot, he has flown a wide variety of fighters, transport aircraft, and helicopters in the inventory of Indian Air Force (IAF). He has over 5,000 hours of flying experience including operational, instructional and test flying. He is an alumnus of National Defence Academy, Defence Services Staff College and National Defence College. During his illustrious career, the CISC has held numerous important command and staff appointments. He commanded a frontline Fighter Squadron and Air Force Test Pilots School. He was Chief Operations Officer of a Forward Air Base, Commandant of Aircraft and System Testing Establishment and commanded a Frontline Air Base.

VICE ADMIRAL SN GHORMADE ASSUMES CHARGE AS VICE CHIEF OF THE NAVAL STAFF

New Delhi. Vice Admiral SN Ghormade, AVSM, NM assumed charge on July 31 as the Vice Chief of Naval Staff from Vice Admiral G Ashok Kumar who retired after more than 39 years of illustrious service.

Vice Admiral SN Ghormade is an alumni of the National Defence Academy (NDA), Khadakwasla, Naval Staff College at the United States Naval War College, Newport, Rhode Island, and the Naval War College, Mumbai. The Flag Officer was commissioned in the Indian Navy on January 1, 1984 and is a Navigation and Direction specialist. The Flag Officer has had extensive operational tenures onboard frontline warships of the Indian Navy. During his career spanning over 37 years, he has been through a myriad of operational and staff appointments. His important operational appointments include Commands of Guided Missile Frigate INS Brahmaputra, Submarine Rescue Vessel INS Nireekshak, and Minesweeper INS Alleppey, and Second-in-Command of Guided Missile Frigate INS Ganga. INS Nireekshak was awarded the Unit Citation for the first time during his command.

UDCHALO APPOINTS ABANI KANT JHA AS CHIEF FINANCIAL OFFICER

Mumbai. udChalo, a leading consumer technology company focusing on Indian Defence Personnel and their dependents, has announced the appointment of Abani Kant Jha as its Chief Financial Officer. Jha, with an experience spanning over 25 years in the industry will bring in his expertise to lead the financial strategy and operations at udChalo. In his role, Abani will contribute to strategy formulation in alignment with the organization's long-term objectives and goals, planning and management of company resources to maximize ROI, identifying cost saving projects and leading the treasury of the organization for effective deployment of funds. He will lead a team of Tax Experts, Consultants, and the Finance Team at udChalo and play a key role in bringing investments for the next growth phase of the organization.

NASMYTH GROUP APPOINTS STUART FYFE AS CHIEF FINANCIAL OFFICER

London. Nasmyth Group has appointed Stuart Fyfe as the Group's new Chief Financial Officer. Having spent the past six years as Group Financial Director for an international company, Stuart has wealth of experience managing a portfolio of brands which develop, design, install, service, maintain and manufacture products and solutions for the HVAC sector. As part of a successful two-man Executive Leadership Team where they profitably doubled the size of the business through acquisition and organic growth, Stuart led the International Finance, HR and IT Teams delivering strong and effective corporate governance in order to enhance performance and manage business risk.

APPOINTMENTS

ISRAEL AEROSPACE INDUSTRIES ANNOUNCES NEW APPOINTMENTS

Tel Aviv. Israel Aerospace Industries (IAI), Israel's largest industrial, defence and technology company, announced a series of appointments in the company's executive management.

Guy Bar Lev has been appointed as Executive VP & GM of Systems Missiles and Space Group. Bar Lev served as deputy GM of Systems Missiles & Space Group and previously as Operations VP at Eltel. After serving in various commanding roles in the IDF's Border Protection Division, Bar Lev finished his military services as Chief Intelligence Reconnaissance Officer.

Shmuel Kuzi has been appointed as Executive VP and General Manager of Aviation Group. Kuzi led the initiative to unite the engines factory, accessories, flight lines, and MRO into a single business entity within the Aviation Group, and served as GM of the unified business line, Bedek-MRO division. In the past, Kuzi served as Executive VP of Central and North America at El Al, as well as Executive VP of Maintenance, Logistics and Engineering. Kuzi joined IAI in 2018, and in his last role in the IDF served as Commander of the Aerial Maintenance Unit.

Eitan Eshel has been appointed Executive VP Chief Technology Officer. Eshel served as Executive VP of Marketing and Business Development in the Land and Military Manufacturing Division at Elbit. Prior to joining Elbit, Eshel served as Executive VP of Signal Intelligence at Elisra, which followed 18 years in the Directorate of Defense Research and Development (DDR&D) in the Israel Ministry of Defense (IMoD), where he served as head of R&D in his last role.

Avi Elisha has been appointed GM of the MBT missile division. Elisha served as IAI's TAMAM Division GM since 2015 and joined IAI in 2013 and served as Manager of Electro-Optics in the TAMAM Division. In his last role in the IDF, Elisha served as Director of Munition Systems in the Technological Division of the IDF Ground Forces.

SUNNY GUGLANI TO HEAD AIRBUS HELICOPTERS FOR INDIA & SOUTH ASIA

New Delhi. Airbus has appointed Sunny Guglani as Head of Airbus Helicopters for India and South Asia. He assumed charge on August 16, 2021, and will be based in New Delhi. Guglani, 37, will be responsible for growing Airbus' civil, parapublic and defence helicopter business in the region, including aftermarket services.

Guglani has been with the company for more than seven years. In his past roles, he has worked in the Airbus CEO's office and led the A380 marketing team based in Toulouse, France. He previously headed corporate communications for India and South Asia region before moving to Europe.

Guglani holds a degree in Electronics and Communications Engineering from Panjab University, India and a Master's Degree in General Management and Finance from LUISS Guido Carli, Italy.

AMIT BANERJEE TAKES CHARGE AS CMD OF BEML LTD

New Delhi. Amit Banerjee took over as Chairman & Managing Director of BEML Limited, a public sector undertaking under Ministry of Defence. Mr Banerjee is a graduate in Mechanical Engineering from IIT (BHU), Varanasi. He joined as Asst. Engineer and has a vast experience of over 37 years in R&D and manufacturing functions. He has worked for indigenous development of Metro Cars for Delhi, Jaipur, Kolkata, Bangalore & Mumbai, Stainless-Steel EMU & Intermediate Metro Cars, Catenary Maintenance Vehicle and PMS Bridge for Indian Army among others. Prior to assuming the present position, Banerjee was Director (Rail & Metro) BEML.

BOEING NAMES ALEXANDER FELDMAN TO LEAD ITS SOUTHEAST ASIA BUSINESS

SINGAPORE. The Boeing Company has appointed Alexander Feldman as the new president of the company's Southeast Asia business. Feldman will be based in Singapore and oversee the company's strategy and operations as Boeing expands its regional presence. Feldman will also become director and chairman of Boeing Singapore Pte. Ltd. and president director of PT. Boeing Indonesia. He succeeds Ralph 'Skip' Boyce, who is retiring after more than 13 years at Boeing in Singapore.

Previously, Feldman was president and CEO of the US-ASEAN Business Council (US-ABC) for over 12 years and also served as its chairman in 2020-2021, helping steer the Council through the COVID-19 pandemic. At the US-ABC, Feldman represented 170 of the largest U.S. businesses, including Boeing, and managed seven offices in Southeast Asia. He regularly consulted with the presidents, prime ministers and cabinets of the ten ASEAN nations as well as with senior U.S. Government officials across three presidential administrations.

Boeing's presence in Indonesia and Vietnam will support the company's growth objectives across its commercial airplanes, defense and services businesses. Feldman drew upon his extensive experience to help assemble a government and industry coalition to provide financial and medical support for Indonesia and the broader region in order to address the surge in coronavirus cases.

Feldman earlier in his career served in the President George H.W. Bush and President George W. Bush administrations, with senior roles in the US Departments of State and Commerce. A graduate of the University of Pennsylvania with a degree in International Relations with an International Business focus, Feldman is also an Eisenhower Fellow and a member of the Council on Foreign Relations.

BOEING ELECTS DAVID L. JOYCE TO BOARD OF DIRECTORS

LCHICAGO. The Boeing Company board of directors have elected David L. Joyce to the board. He will serve on the Aerospace Safety and Compensation committees. An accomplished aerospace executive, Joyce, 64, retired from General Electric (GE) as vice chair in 2020, where he also served as president and CEO of GE Aviation from 2008 to 2020. During his 12-year leadership of GE's largest division, Joyce also led customer and product support for more than 19,000 global engines and 500 airlines customers and oversaw the implementation of an industry-leading safety management system across GE Aviation. A 40-year GE veteran, Joyce joined GE Aviation in 1980 as a product engineer and spent 15 years designing and developing GE's commercial and military engines, before serving in a variety of leadership positions in GE Aviation, including vice president and general manager of Commercial Engines. Joyce earned both a Bachelor of Science and master's degree in mechanical engineering from Michigan State University and holds a master's in business finance from Xavier University. Joyce is a member of the National Academy of Engineering, and is the recipient of the National Defense Industrial Association's James Forrestal Industry Leadership Award and the American Society of Materials' Medal for the Advancement of Research. Since 2010, he has served on the Board of Trustees of Xavier University.

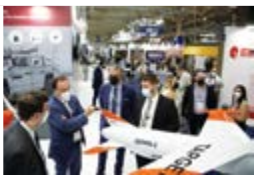
BOEING NAMES MATT WELCH AS INVESTOR RELATIONS LEADER

CHICAGO. Boeing has appointed Matt Welch as Vice President of Investor Relations. Welch will succeed Maurita Sutedja, who has accepted an opportunity outside of Boeing. Welch will lead Boeing's interactions with the investment community, providing shareholders and financial analysts timely, accurate and transparent information on the company's market environment, business, performance and outlook.

Welch is a seasoned leader with more than 20 years of deep financial experience across Boeing's operations. Currently serving as vice president of Revenue Management at Boeing Commercial Airplanes, Welch has held several roles of increasing responsibility, including in Investor Relations; Financial Planning and Analysis; and program finance. As a leading global aerospace company, Boeing develops, manufactures and services commercial airplanes, defense products and space systems for customers in more than 150 countries. As a top U.S. exporter, the company leverages the talents of a global supplier base to advance economic opportunity, sustainability and community impact.

POST SHOW REPORT: DEFEA WAS CARRIED OUT IN TOTAL SUCCESS

Athens. Earning the international praise from high-level visitors and exhibitors alike, the first edition of the prestigious defence exhibition DEFEA was completed in total success, presenting 315 leading exhibiting defence industries from 22 countries and visited by 45 official national delegations, represented at political and military level, from 36 countries.



DEFEA 2021 (July 13-15, 2021) held at Metropolitan Expo, the largest and most advanced exhibition centre in Southeast Europe, hosted highly specialised visitors from 53 countries representing the most important private and state-owned companies in the world, offering top-tier services and facilitations. DEFEA 2021 was globally the first covid-free defence exhibition that took place in total compliance with all safety measures and health protocols, creating efficiently through excellent organisation and planning a safe environment for networking and cooperation.

Inaugurating DEFEA 2021, the Greek Minister of National Defence, Mr. Nikolaos Panagiotopoulos underlined that the exhibition "is a platform for international contacts, industrial cooperation and exchange of information on modern technological developments". The largest and most prominent defence industries around the world participated as exhibitors showcasing their latest technologies and the defence systems that will prevail in the future. Impressive national pavilions with state of the art products and equipment and private companies with the most advanced solutions in every category of the defence and security sector covered the halls of the exhibition centre offering to visitors and officials an integrated view of the capabilities of modern military technology.

The official delegations that visited DEFEA were comprised of political and military leaders of the highest level, invited by the Hellenic Ministry of National Defence. The countries that were represented through official presence were: Albania, Algeria, Armenia, Austria, Bahrain, Bosnia-Herzegovina, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, France, Georgia, Germany, Hungary, Indonesia, Jordan, Iraq, Israel, Italy, Netherlands, North Macedonia, Pakistan, Philippines, Portugal, Republic of Korea, Rwanda, Romania, Russia, Saudi Arabia, Slovakia, Slovenia, Spain, United Arab Emirates, United Kingdom and United States of America.

During the exhibition, leaders of the delegations had important meetings with the Greek hosting Minister of National Defence, Mr. Nikolaos Panagiotopoulos, and the Hellenic military leadership led by the Chief of the Hellenic National Defence General Staff, General Konstantinos Floros.

A roundtable discussion about the European Defence was carried out, in which the Ministers of Defence of Slovenia, Mr. Matej Tonin, of Portugal, Mr. Joao Gomes Cravinho, and of Cyprus, Mr. Charambos Petrides commented. The discussion was coordinated by the Executive Director of European Defence Agency (EDA), Mr. Jiri Sedivy, while the Commissioner of Internal Market, Mr. Thierry Breton greeted through video message. The event was streamed live through the official channel of Hellenic Ministry of Defence and the social media with the presence of the Greek Deputy Minister of National Defence, the Chief of the Hellenic National Defence General Staff and the Chiefs of the three branches of the Hellenic Armed Forces.

The procurement programme of the Hellenic Navy of 4 new frigates, as well as the parallel solution and the upgrade of in-service frigates was again at the centre of general interest. Regarding the development of Greek shipbuilding industry, the Greek Minister of Development and Investments spoke in a related conference in front of an international specialised audience. In parallel with the exhibition, an impressive static display was organised at the nearby international airport of Athens, in a specially designed area. The airport static dispay was comprised of multi-role aircrafts and helicopters, with highlights an AH-64 Apache attack helicopter, a S70 Aegean Hawk naval multi-mission helicopter, a tactical transport NH90 helicopter and an OH-58 Kiowa helicopter for armed reconnaissance.

All participants expressed their satisfaction with every detail of the exhibition and they emphasised their return in two years time. **The next edition of DEFEA – Defence Exhibition Athens will take place on 9th-11th of May, 2023, at Metropolitan Expo, in Athens, Greece.**

GRSE LAYS KEEL OF FAST PATROL VESSEL YARD 2118 & COMMENCES PRODUCTION FOR SHALLOW WATER CRAFTS

Kolkata: Garden Reach Shipbuilders and Engineers Ltd. (GRSE), a Defence PSU and a leading warship building company laid the keel of Fast Patrol Vessel (FPV) Yard 2118 today. The keel laying ceremony was held in the august presence of Inspector General Maneesh V Pathak, TM, Commander, Coast Guard Region (North East), Rear Admiral VK Saxena, IN (Retd.), Chairman & Managing Director, GRSE, Cmde Sanjeev Nayyar, IN (Retd), Director (Shipbuilding) and Cmde. PR Hari, IN (Retd), Director (Personnel) and other senior officials of the Indian Coast Guard, GRSE and M/s TWL, Kolkata. This vessel is being constructed for Indian Coast Guard as a replacement for the recently exported FPV SCG PS Zoroaster which was handed over by the Hon'ble Prime Minister of India, Shri Narendra Modi to Govt. of Seychelles.

The FPVs are medium-range surface vessels with a length of 50 m, a width of 7.5 m and displacement of around 308 T and are proficient at operating in the maritime zones of India. These powerful, fuel-efficient platforms are designed to perform multipurpose operations like patrolling, anti-smuggling, anti-poaching, and rescue operations. The vessels are designed for a maximum speed of 34 knots with an endurance of more than 1,500 nautical miles. It will be equipped with 03 MTU 4000 series engine and built up with Advanced Control Systems, Water Jet Units and Integrated Bridge System for all communication and navigation structures. The ship is also fitted with 40/60 gun as the main armament with improved habitability features of fully air-conditioned modular accommodation for 35 personnel. The entire design of these FPVs has been developed in-house by GRSE as per requirements specified by the Indian Coast Guard.

GRSE also started production of second and third Ship (Yard 3030 & Yard 3031) of the eight Anti-Submarine Warfare Shallow Water Craft (ASWSWC) project on July 14, 2021. 'Start Production' is the first 'Milestone' in shipbuilding and signifies commencement of vessel construction after design engineering phase. The compact and complex stealth crafts are designed by GRSE, and these platforms will be packed with state-of-the-art weapons and sensors like Hull Mounted Sonar, Towed Sonar, Torpedo Launchers and Rocket Launcher to interdict and destroy sub-surface targets in coastal waters. The crafts are capable of 'Search & Rescue' and 'Low Intensity Maritime Operations' and are propelled by water-jets capable of high speed movement.

The shipyard is currently executing three major shipbuilding projects, namely the P17A Project for 3 Advanced Stealth Frigates, 4 Survey Vessels (Large) and 8 Anti-Submarine Warfare Shallow Water Crafts. The Shipyard also received an Export Order from Government of Guyana for Design, Construction and Delivery of 01 Ocean Going Passenger cum Cargo Ferry Vessel.

INDIAN NAVY ACCEPTS FIRST BATCH OF TWO MH-60R MULTI ROLE HELICOPTERS (MRH)

New Delhi. Indian Navy accepted the first two of its MH-60R Multi Role Helicopters (MRH) from US Navy in a ceremony held at Naval Air Station North Island, San Diego on July 16. The ceremony marked the formal transfer of these helicopters from US Navy to Indian Navy, which were accepted by His Excellency Taranjit Singh Sandhu, Indian Ambassador to USA. The ceremony also witnessed exchange of helicopter documents between Vice Adm Kenneth Whitesell, Commander Naval Air Forces, US Navy and Vice Adm Ravneet Singh, Deputy Chief of Naval Staff (DCNS), Indian Navy.

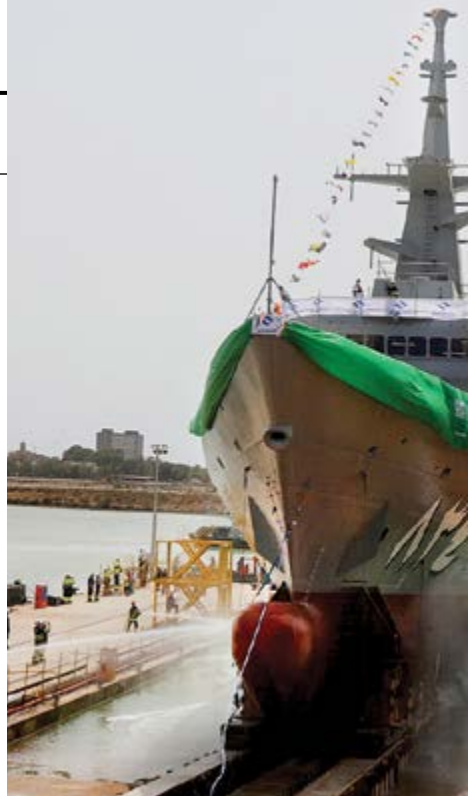
MH-60R helicopters manufactured by Lockheed Martin Corporation, USA is an all-weather helicopter designed to support multiple missions with state of the art avionics/ sensors. 24 of these helicopters are being procured under Foreign Military Sales from the US Government. The helicopters would also be modified with several India Unique Equipment and weapons.

The induction of these MRH would further enhance Indian Navy's three dimensional capabilities. In order to exploit these potent helicopters, the first batch of Indian crew is presently undergoing training in USA.

NEWS ROUND UP

NAVANTIA SAN FERNANDO LAUNCHES THE 4TH CORVETTE FOR ROYAL SAUDI NAVAL FORCES

San Fernando (Cádiz). Navantia launched the fourth of the five corvettes on July 24, being built for the Royal Saudi Naval Forces (RSNF), named JAZAN as a tribute to this city in the Southwest of Saudi Arabia.



The event was attended by the Commander of the Royal Saudi Naval Forces, Vice-Admiral Fahad Bin Abdullah Al-Ghofaily; the Admiral Chief of Staff of Spanish Navy, Admiral Antonio Martorell Lacave; the Chairwoman of Sociedad Estatal de Participaciones Industriales (SEPI), Belén Gualda; the Chairman of Navantia, Ricardo Domínguez; SAMI Vicepresident for Corporate Communications, Wael Alsarhan, on behalf of SAMI CEO, Eng. Walid Abukhaled, who attended the ceremony remotely, and the Mayor of San Fernando, Patricia Cavada. The ceremony took place with strict sanitary protocols due to the pandemic.

The event began with a reading from the Holy Quran, followed by videos about the city of Jazan, about the Avante 2200 program and about the building of this corvette. Both the national anthems of Saudi Arabia and Spain were played. The event also included welcoming remarks from the manager of the shipyard and head of the Defence Programs in Navantia Bahía de Cádiz, José Antonio Rodríguez Poch.

His Excellency the Commander of the Royal Saudi Naval Forces has highlighted the importance of ALSARAWAT (Avante 2200) project as one of the major and key acquisition programs that clearly indicate the Royal Saudi Naval Forces' commitment to achieving its ambitious goal of developing a new era of innovative and state-of-the-art capabilities aligned with Kingdom's strategic Vision 2030.

At the end of the ceremony, the Commander of the Royal Saudi Naval Forces, Vice-Admiral Fahad Bin Abdullah Al-Ghofaily, cut the ribbon. The construction will continue until the delivery to the Royal Saudi Naval Forces in the month of April 2023.

During his visit to San Fernando, Commander Al-Ghofaily visited the shipyard and the Navantia Training Centre (NTC), where the crew and the mantainers of the corvettes are being trained. The Saudi delegation also visited the Land Based Training Site (LBTS) and simulators and has received a presentation on the Technology Transfer (ToT) program that is part of this comprehensive contract.

THE AVANTE 2200 PROGRAM

Corvette JAZAN is the fourth of five corvettes being built by Navantia in the Avante 2200 program. It has a length of 104 meters, a beam of 14 and she will be able to transport a total of 102 people including crew and passengers.

The design of the corvettes is of the latest generation, maximizing the participation of Navantia by incorporating its

own products, such as the CATIZ Combat System, the HERMESYS Integrated Communications System, the DORNA Firing Direction, the Integrated Platform Control System and the MINERVA Integrated Bridge, together with other equipment developed by Navantia under license, such as the MTU Engines or the RENK Reduction Gearboxes.

The contract, which came into force in November 2018, strengthens the immediate future of Navantia and benefits all the shipyards of the company and its auxiliary industry, especially the whole Bay of Cadiz. This program, whose last vessel must be delivered in 2024, includes, in addition to construction, Life Cycle Support for five years, from the delivery of the first vessel, with an option for another five years.

On the other hand, the contract also includes the supply of several services such as, Integrated Logistic Support, Operational and Maintenance Training, Supply of Training and Education Centers for the Combat System and Platform Control System of the ships, the Life Cycle Support previously mentioned, and the systems for the maintenance of the ships in the Jeddah Naval Base.

HENSOLDT AUSTRALIA LAUNCH IN TASMANIA

Hobart, Australia. Technology solutions company, HENSOLDT Australia's, Hobart office was officially opened by the Hon Michael Ferguson Member of Parliament, Minister for Science & Technology. The new office signifies HENSOLDT's investment in developing a sovereign Australian Space Domain Awareness capability, together with the signing of a Memorandum of Understanding (MoU) and the announcement of funding for a PhD scholar at the University of Tasmania.

The MoU, between HENSOLDT Australia, the Tasmanian Government represented by the Department of State Growth (DSG), and the University of Tasmania, establishes the TEAM Tasmania initiative to take the next step in establishing Tasmania as the centre for Space Domain Awareness in Australia. The founding members of TEAM Tasmania bring a unique competitive advantage to the partnership; HENSOLDT, as a global leader in space radar technology and systems development, the University of Tasmania as a world-renowned research institution, with significant expertise and infrastructure in space observation and tracking, and the Tasmanian Government, in funding and building on the MOU with the Australian Space Agency in 2019, to position Tasmania as the centre for space research, development and commercialisation. TEAM Tasmania will create the Southern Guardian Space Domain Awareness System (Southern Guardian) to develop a sovereign competitive advantage for the state and the nation.

The University of Tasmania manages an array of space infrastructure, capable of observing near-Earth orbiting objects, satellites and space debris and further afield objects including the tracking of distant space missions and asteroids. Southern Guardian will capture and analyse this space observation data to track, categorise and identify objects and potential threats. HENSOLDT Australia's Hobart facility will be the centre for the Southern Guardian systems integration and data analysis, which will further fuel innovation and opportunities for both Defence and commercial space operations.

In addition to space, HENSOLDT Australia provides technology solutions across maritime, defence and clean energy, aligning closely with Tasmania's key industry sectors. HENSOLDT's Hobart office cements the TEAM Tasmania partnership with a local base to develop connections and build a local workforce to support space, maritime, clean energy and defence opportunities. The company is currently recruiting, seeking a range of skillsets including systems engineering, electronics, project management, radar, technicians, repair, maintenance, and calibration skills.

NEWS ROUND UP

US NAVY, BOEING CONDUCT FIRST MQ-25 REFUELING MISSION WITH F-35C

St. Louis. The US Navy and Boeing have used the MQ-25TM T1 test asset to refuel a US Navy F-35C Lightning II fighter jet for the first time, once again demonstrating the aircraft's ability to achieve its primary aerial refueling mission. This was the third refueling mission for the Boeing-owned test asset in just over three months, advancing the test program for the Navy's first operational carrier-based unmanned aircraft. T1 refueled an F/A-18 Super Hornet in June and an E-2D Hawkeye in August. During a test flight Sept. 13, an F-35C test pilot from the Navy's Air Test and Evaluation Squadron Two Three (VX-23) conducted a successful wake survey behind T1 to ensure performance and stability before making contact with T1's aerial refueling drogue and receiving fuel.

The T1 flight test program began in September 2019 with the aircraft's first flight. In the following two years, the test program completed more than 120 flight hours – gathering data on everything from aircraft performance to propulsion dynamics to structural loads and flutter testing for strength and stability. MQ-25 is benefitting from the two years of early flight test data, which has been integrated back into its digital models to strengthen the digital thread connecting aircraft design to production to test to operations and sustainment. Boeing is currently manufacturing the first two MQ-25 test aircraft. T1 will be used to conduct a deck handling demonstration aboard a US Navy carrier in the coming months to help advance the carrier integration progress.

'MAKE-IN-INDIA' AWACS: TVS, DRDO IN TALKS FOR A MANUFACTURING DEAL

Chennai. The Defence Corridor in Tamil Nadu could be instrumental in placing India on the global map with a landmark manufacturing deal that is taking shape. A consortium of industries, spearheaded by TVS and Sons, is preparing to set up a Special Purpose Vehicle (SPV) that will enable the manufacture of Airborne Warning and Control System (AWACS) placing India in the group of elite nations, and emerge as the fifth country in the world that can produce indigenous AWACS.

It is learnt that the Aerospace Industries Development Association of TN, is engaged in talks with Tamil Nadu Industrial Development Corporation (TIDCO) to develop a vendor ecosystem for this investment-heavy proposal. "Talks are still at a preliminary stage but the idea is to create a 'Made-in-India' SPV, to strengthen the defence sector," confirmed an official. Entering the defence business will also mark a significant diversification for the logistics player. This new direction would envisage an investment of over Rs 1,000 crore and with the Centre accelerating the 'Atmanirbhar Bharat' mission, especially in the defence front, it is being seen as a timely decision. When contacted, R Dinesh, Joint MD of TVS and Sons did not confirm the developments. Former DRDO Chairman S Christopher, whose dream has been to produce an aircraft in TN, is at the forefront of this project. When contacted, he replied in the affirmative. Creating an ancillary ecosystem requires a long gestation project, involving huge investments, however, once the infrastructure is set, it can be used to execute smaller projects, making this a pioneering initiative to kick-start the entire defence corridor, he added.

The IAF currently has just three Israeli Phalcon AWACS, with a 400-km range and 360-degree radar coverage, and two indigenous Netra AEW&C aircraft. During Dr Christopher's stint at the DRDO as Chief Designer and Program Director, he was instrumental in giving the indigenous touch to AWACS, used by IAF Wing Commander Abhinandan Varthaman of Balakot-fame. As per a KPMG report, Data Patterns (a leader in indigenously developed electronic systems in the defence and aerospace domain, Chennai), Mistral Solutions (Bengaluru), Astra Microwave (Hyderabad), TUNGA (Technology Upgradation of Naval, Ground, and Air Systems, an original equipment manufacturer of new-age drone technologies based out of Chennai with its Centre of Excellence in Design Engineering located at IIT Madras research park) and Airworks (Hosur) are the five companies that will be involved in the prestigious project, while TVS and Sons will act as the nodal company driving it.

RFP FOR CONSTRUCTION OF SIX P-75 (I) SUBMARINES FOR INDIAN NAVY ISSUED BY MOD

New Delhi. As a major initiative towards 'Make in India', Ministry of Defence (MoD) has issued Request of Proposal (RFP) for the first acquisition programme under the Strategic Partnership Model for construction of six AIP fitted Conventional Submarines named Project 75 (India) [P-75(I)] for the Indian Navy on July 20, 2021. The RFP was issued to shortlisted Strategic Partners (SPs) or Indian Applicant Companies for the project viz, M/s Mazagaon Dock Shipbuilders Limited (MDL) and M/s Larsen & Toubro (L&T). The project cost is over Rs 40,000 crore. Project-75 (I) envisages indigenous construction of six modern conventional submarines (including associated shore support, Engineering Support Package, training and spares package) with contemporary equipment, weapons & sensors including Fuel-Cell based AIP (Air Independent Propulsion Plant), advanced torpedoes, modern missiles and state of the art countermeasure systems. This would provide a major boost to the indigenous design and construction capability of submarines in India, in addition to bringing in the latest submarine design and technologies as part of the project.

Post receipt of responses to the Expression of Interest (EoI), shortlisting of potential Strategic Partners (SPs) and Foreign OEMs was undertaken. The shortlisted SPs to whom the RFP has been issued would be collaborating with any of the shortlisted Foreign OEMs viz, M/s Naval Group-France, M/s TKMS-Germany, M/s JSC ROE-Russia, M/s Daewoo Shipbuilding and Marine Engineering Co Ltd-South Korea and M/s Navantia-Spain. These five foreign firms are the world leaders in the field of conventional submarine design, construction and all other related technologies. The foreign OEMs will be the technology partner in the SP Model. Foreign OEMs will enable SP for construction of submarines, achieving high levels of indigenization, and ToT for various technologies. These OEMs would enable setting up of dedicated manufacturing lines for these submarines in India by providing ToT for submarine design and other technologies and make India the global hub for submarine design and production. The project would not only aid in boosting the core submarine/ship building industry but would also greatly enhance manufacturing/industrial sector, especially the MSME by development of an industrial eco-system for manufacture of associated spares/systems/equipment related to submarines. In order to achieve these objectives, the RFP has key features like mandatory level of indigenous manufacture of platforms, ToT for design/ manufacture/ maintenance of submarines and a few critical equipment and systems, setting up of an eco-system in India for such indigenisation and incentivisation for other key technologies, etc. The overall aim would be to progressively build indigenous capabilities in the public/private sector to design, develop and manufacture complex weapon systems for the future needs of the Armed Forces. This will be an important step towards meeting broader national objectives, encouraging self-reliance and aligning the defence sector with the 'Make in India' initiative of the Government.

ORDNANCE FACTORY IN TAMIL NADU LAUNCHES HIGH-TECH CARBINE 'TRICA'

New Delhi. A high-tech, low sound carbine named 'TriCa' with a range more effective than a typical sub-machine gun and small enough to be packed in the jacket of security personnel was unveiled at the Ordnance Factory in Tiruchirappalli, Tamil Nadu.

The lighter and compact weapon, the 7.62X39 mm carbine TriCa is designed for the infantry combat vehicle, helicopter crew and security personnel for operations that call for a compact and relatively powerful individual automatic weapon.

The weapon is also for paratroopers, police and security personnel guarding highly secure facilities such as airports, and for use by the Special Operation Forces, a defence press release here said.

TriCa has a special muzzle booster which helps in hiding the flash and mitigating the sound when fired, the release said. An advantage is that it can use ammunition and magazines as well as the inter-changeable parts of general assault rifles (TAR and AK-47).

The carbine could be concealed in clothes and hidden in jackets of security personnel. It was developed by the in-house research and development unit of the Ordnance Factory.

NEWS ROUND UP

HAL'S PSEUDO SATELLITE PROJECT (HAPS) SET TO GET APPROVAL FOR GOVT FUNDS

Bengaluru. Defence Public Sector Undertaking (DPSU) HAL in collaboration with a Bengaluru-based start-up and the National Aerospace Laboratories is hoping to get approval soon for government funding to the tune of over Rs 700 crore for what is now a self-financed project to develop an indigenous High Altitude Pseudo Satellite (HAPS) as part of a drone warfare programme for the defence forces. HAL chairman R Madhavan confirmed that an institutional prototype will be ready soon. The project is being implemented by HAL in collaboration with a Bengaluru-based start-up and the National Aerospace Laboratories (NAL).

"I can confirm that we are far ahead in terms of development of HAPS. We have started this project as part of our unmanned drone warfare programme called Combined Air Teaming System (CATS). Soon an institutional prototype will be ready. The entire development of HAPS will take a few years. The initial investment which we required was Rs 700 crore, but this will be spent over the years," Madhavan said.

HAPS will weigh more than 500 kg and will utilise solar energy. It will be able to fly at a height of 70,000 feet and even stay there for months. The HAL plan to develop HAPS was revealed during the Aero India 2021 event. The aircraft are designed to act as a bridge between the Unmanned Aerial Vehicles (UAV) and conventional satellites, officials said. The major applications of HAPS are in telecommunication and remote sensing sectors catering to both defence as well as civilian purposes.

DYNAMATIC TO MANUFACTURE AEROSTRUCTURE ASSEMBLIES FOR BOEING'S F-15EX EAGLE II

Bengaluru. Dynamatic Technologies has been awarded a contract for manufacturing assemblies for Boeing's newest tactical fighter, F-15EX Eagle II. This is a first where aerostructures for the latest and most advanced F-15EX Eagle II will be made in India. This contract has given a boost to the Aatmanirbhar program and strengthens US-India collaboration on aerospace and defence industrialisation. Dynamatic Technologies will supply the F-15EX aerostructure assembly requirements from FY 2022. Dynamatic will manufacture these aerostructures from their manufacturing facility in Bengaluru, Karnataka.

Udayant Malhoutra, CEO & Managing Director, Dynamatic Technologies Limited said, "Dynamatic has been associated closely with Boeing as a strategic tier-1 supplier partner for over a decade. The award for manufacturing aerostructures for the F-15EX Eagle II to Dynamatic is a testimony of our partnership with Boeing."

Salil Gupte, President, Boeing India said, "We see tremendous potential for India to contribute to the global aerospace industry as an industrial and technology partner. The award of aerostructure assemblies for the latest and most advanced version of the F-15 aircraft family is a reflection of Boeing's focus on Aatmanirbhar Bharat and a testimony to the world class capability of our industrial partners in India."

Dynamatic Technologies is also partnering with Boeing to help grow the Indian aerospace and defence ecosystem with advanced manufacturing capabilities, training and skill development in alignment with the 'Skill India' initiative of the Government of India.

THALES TO PROVIDE NEW AVIONICS EQUIPMENT FOR DASSAULT AVIATION RAFALE

Paris. Thales has been awarded the contract to supply Scorpion® helmet-mounted sight and display systems and digital multi-function displays for all the Dassault Aviation Rafale aircraft in service with the French Air and Space Force and the French Navy.

From reconnaissance to air defence and precision strike missions, the Rafale has helped ensure the success of countless military operations. But future aircrews will have to analyse more data in less time on combat missions carried out in increasingly complex environments. Coupled with the aircraft's weapon systems, the Scorpion® helmet-mounted sight and display enhances tactical situational awareness and enables crews to respond more quickly and with greater agility to a whole range of threats. Its progressive rollout on the Rafale F4 standard will be a decisive advantage in ensuring the success of airborne missions and protecting populations.

The helmet-mounted display symbology brings together information from the aircraft's onboard sensors to help pilots perform their missions even in the most challenging situations. It creates a continuum between the cockpit and the outside world to radically improve awareness of the tactical situation. Coupled with the weapon system, the display can be used to designate and track targets anywhere in the crew's field of view in daylight and at night.

Scorpion® delivers all of these capability enhancements in addition to the protection and survivability functions of a conventional flight helmet. It is optimised for weight and balance to maximise pilot comfort and mission effectiveness.

The 400 digital multi-function displays on order will replace the lateral displays on France's in-service Rafale aircraft, which are primarily used to inform the pilot about the status of the aircraft's systems and provide imagery from its onboard sensors. The new equipment offers a larger display area, an improved touchscreen interface and greater processing power.

PENTAGON AND LOCKHEED MARTIN AGREE TO F-35 SUSTAINMENT CONTRACTS

Fort Worth, Texas. The F-35 Joint Program Office awarded the Lockheed Martin industry team annualized contracts covering fiscal years 2021-2023 to support operations and sustainment of the global F-35 fleet, supporting mission readiness and further reducing costs. The annual contracts fund critical sustainment activities for aircraft currently in the fleet and build enterprise capacity to support the future fleet of more than 3,000 F-35 aircraft. This includes industry sustainment experts supporting base and depot maintenance, pilot and maintainer training, and sustaining engineering for the US and our allies across the globe. It also covers fleet-wide data analytics and supply chain management for part repair and replenishment to enhance overall supply availability for the fleet. The FY2021-2023 contracts represent a planned next step in further reducing overall operations and support costs for the F-35 program, which are shared between government and industry. Lockheed Martin has reduced our cost per flight hour by 44% in the past five years, with a forecasted reduction of an additional 40% in the next five years. The cost savings in the FY21-23 annualized sustainment contracts support Lockheed Martin's efforts to realize these goals. The savings will be achieved through improved cost and velocity in our supply chain, continued reliability improvements, and greater manpower efficiencies to provide product support solutions across the growing, global fleet. We remain committed to partnering with our customers and teammates to drive F-35 sustainment costs down. The contracts also pave the way for a longer-term, Performance Based Logistics (PBL) agreement for the F-35 program. PBLs are an industry best practice, facilitating agile sustainment solutions for the fleet and incentivizing even further affordability and performance results. The F-35 Joint Program Office, together with each US service, international operators and the F-35 industry team, leads F-35 sustainment and the Global Support Solution. The 2021 annualized sustainment contract will cover industry sustainment activities through December 31, 2021.

NEWS ROUND UP

AEROSPACE ENGINEERS CLINCHES DEAL WITH BOEING

Chennai. Aerospace Engineers Private Limited, located in Salem, won a long-term contract from Boeing to manufacture and supply critical aviation components and parts for the global aerospace company's products.

The contract order was handed over to R Sundaram, CEO and Managing Director, Aerospace Engineers Private Limited by Ashwani Bhargava, Director, Supply Chain Management, Boeing India in the presence of Tamil Nadu Chief Minister MK Stalin. According to a statement issued by the Tamil Nadu government, the cooperation between Aerospace Engineers Private Limited and Boeing is a significant milestone and will provide an impetus to the growing aerospace and defence ecosystem in Salem and Hosur and Tamil Nadu Defence Industrial Corridor. Aerospace Engineers Private Limited will be setting up a new manufacturing facility, dedicated for Civil Aerospace production at Hosur and will also expand its existing Salem facility with an additional covered building space of 50,000 square feet over the next 24 months with an investment of Rs 150 Crore. This additional facility will generate employment for 1000 young people.

ALL-ELECTRIC AIRCRAFT FROM ROLLS-ROYCE COMPLETES

London. Rolls-Royce's first all-electric aircraft completed a 15-minute maiden flight, in the UK. In a statement, the company said the aircraft's trip marked "the beginning of an intense flight-testing phase" that would involve the collection of performance data on its electrical power and propulsion system.

According to Rolls-Royce, the airplane — dubbed the "Spirit of Innovation" — utilized a 400 kilowatt electric powertrain "with the most power-dense battery pack ever assembled for an aircraft." Eventually, the firm wants the aircraft's speed to exceed 300 miles per hour.

The Spirit of Innovation is the result of a program called ACCEL, or Accelerating the Electrification of Flight. Partners in the initiative include electric motor and controller specialist YASA and Electroflight, which Rolls-Royce described as an "aviation start-

PARAS AEROSPACE TIES UP WITH ISRAEL BASED PARAZERO, TO ADDRESS SAFETY REQUIREMENTS

Tel Aviv. Paras Aerospace, an Indian tech development company announced an exclusive partnership with Israel based drone safety systems provider ParaZero. The two companies have joined hands to address the safety requirements of drones, leveraging the technical excellence of Paras Aerospace's infrastructure for manufacturing and product support from India, Paras Aerospace said in a statement. The company also announced the launch of certified drone parachutes in the country. These systems are comparable to the airbag systems in cars for passenger safety. Paras Aerospace is a subsidiary of Paras Defence and Space Technology Ltd, offering a wide range of development, integration, manufacturing and certification of UAV systems. ParaZero specializes in the design and manufacture of autonomous commercial drone safety systems.

The safety of drones in the drone airspace and the people below is of paramount importance for the sector to thrive as currently, there are more than six lakh such unmanned vehicles available in the country, which is expected to grow more in the time to come, company said. Recently, the central government released the Drone Rules 2021, to promote their usage across various industries. In line with the Indian government's policy of ''Make in India, Make for the World'', Paras Aerospace envisions building the strongest strategic vision for the country's drone ecosystem by providing the crucial drone safety parachute systems, manufactured in India for the world market.

As a safeguarding measure, there is an emerging requirement for safety parachute systems that can safeguard the drone in the case of a crash due to various reasons. Drone parachutes can protect a variety of drones, including NPNT-compliant ones, with takeoff weight ranging from one kg to hundreds of kg, it said. Designed with the goal of protecting

MAIDEN FLIGHT

up." YASA is a wholly-owned subsidiary of Mercedes-Benz.

In terms of funding, 50% has come from the Aerospace Technology Institute in partnership with the UK government's Department for Business, Energy & Industrial Strategy and Innovate UK.

In a statement issued alongside Rolls-Royce's announcement, UK Business Secretary Kwasi Kwarteng said the aircraft's flight was "a huge step forward in the global transition to cleaner forms of flight."

Looking ahead, Rolls-Royce — not to be confused with Rolls-Royce Motor Cars, which is owned by BMW —said it would use and apply tech from ACCEL in products connected to the commuter aircraft and electric vertical takeoff and landing markets.

Alongside aircraft manufacturer Tecnam, Rolls-Royce is also working with Norway-headquartered airline Wideroe on the delivery of "an all-electric passenger aircraft for the commuter market."

OF DRONES

the lives of people under the drone and also protecting the liability on the drone owners, the installation of these parachutes also reduces the insurance premium on the mandatory insurance significantly, the company said.

It added that various systems have already received compliance from the international body ASTM as per standard specification for small unmanned aircraft system (sUAS) parachutes. The company also said this internationally acceptable certification enables the system to extend unmatched safety.

SAAB DELIVERS T-7A AFT FOR THE FLIGHT TEST PROGRAM

The production and shipment of this aft airframe section is the latest milestone in Saab's contribution to the design and development of the T-7A Red Hawk trainer for the United States Air Force. The shipment on July 24, 2021 was from Saab's Linköping site in Sweden to Boeing in St. Louis, Missouri, USA. On completion of the Engineering and Manufacturing Development (EMD) production phase, Saab's brand new facility in West Lafayette, Indiana, USA will undertake Saab's production of the aft airframe sections for the T-7A program. Boeing will splice together Saab's aft section with the front section, wings, fins and tail assembly to become a complete test aircraft for use in the EMD's flight test program. The aft section with installed subsystems - hydraulics, fuel and secondary power system - forms the center structure of the aircraft from behind the cockpit to the end of the aircraft.

In April 2021, Saab delivered its first T-7A Red Hawk aft airframe section for assembly as a ground-based structural testing aircraft. Upon arrival at Boeing in St. Louis, Saab's aft section was joined perfectly with the front fuselage in less than 30 minutes. That achievement is a testament to the use of digital design and engineering, which delivers accuracy, efficiency and improved quality throughout the design and delivery of T-7A Red Hawk. T-7A Red Hawk is an all-new, advanced pilot training system designed for the U.S. Air Force to train the next generation of combat pilots for decades to come. The aircraft has benefited from Saab and Boeing's "breaking the norm" approach to military aircraft design, engineering and production, which saw the preceding T-X aircraft go from concept to first flight in just 36 months.

ROYAL AUSTRALIAN NAVY EXTENDS CONTRACT FOR SCHIEBEL'S CAMCOPTER® S-100 CAPABILITY

Australia, Nowra. The Royal Australian Navy (RAN) awarded Schiebel with a 3-year extension contract for the sustainment of its CAMCOPTER® S-100. The extension allows the RAN to continue to experiment and develop knowledge using the S-100. After winning the RAN contract back in 2016, Schiebel has built on its initial acquisition contract resulting in this substantial extension. The contract includes field support services, engineering and logistics elements, as well as the creation of a sovereign Australian CAMCOPTER® S-100 training capability delivered by Schiebel Pacific Pty Ltd. "For Schiebel Pacific the contract extension secures existing Australian jobs and will create further positions for Australian Unmanned Air System (UAS) experts. We are immensely proud that we were able to convince with our CAMCOPTER® S-100", said Hans Georg Schiebel, Chairman of the Schiebel Group. The CAMCOPTER® S-100 holds an impressive track record of supporting naval customers, with missions successfully completed on over 40 different ships on all the world's oceans, in every environment from the tropics to the arctic.

NEWS ROUND UP

L&T OFFERS HOMEGROWN ARTILLERY GUN TO INDIAN ARMY

New Delhi. The Indian army's urgent requirement for towed artillery guns took a new turn with Larsen & Toubro Defence offering to supply 400 towed artillery gun systems, which the army earlier wanted to import from an Israeli firm. The L&T guns, jointly developed with French gun maker Nexter, will be made locally with an indigenous content of over 70 per cent. L&T is understood to have made the unsolicited offer to the Indian army recently. The firm has said it can deliver the first gun in less than a year.

The offer comes even as the army's bid to buy the Israeli guns has hit a dead end. Last month, the defence ministry overruled the army and Department of Military Affairs' (DMA) case to buy 400 artillery guns from Israeli firm Elbit Systems. The procurement was revived after border tensions with China in 2020. As the army's own recent experience showed during the 1999 Kargil conflict, medium artillery fire support is crucial for offensive and defensive operations in the mountains.

In July, the defence ministry cited irregularities in this deal and asked the army to restart the competition, a process which could take up to five years to complete. The L&T offer trial approved guns could thus offer a new route out of the present logjam. The defence ministry wants the L&T guns to be produced under the industry-funded Make-II programme of its Defence Acquisition Procedure. The L&T-Nexter consortium finished 'L2' or the second lowest bidder in the army's 2011 'Buy and Make Global' contract. Under this, a foreign gun-maker could deliver the gun systems through its Indian partner. French gun-maker Nexter did not have a towed gun system of its own when it bid for the 2011 contract. Their 'Caesar' 155x52 mm howitzer had variants mounted on a truck or tank chassis. Between 2011 and 2013, L&T designed the gun's semi-auto loader, auxiliary power unit, trails, ploughs, fire control system and ballistic computer system. Hence, over 70 per cent of two Caesar prototypes, which successfully passed army trials between 2013 and 2017, was indigenous. The new guns will be assembled at L&T's facility in Hazira, Gujarat.

In August last year, the defence ministry put towed artillery guns on a list of defence equipment it will not import after December 2021. The reasons are not far to seek. After decades of import dependence, howitzer manufacturing has taken an indigenous turn. Apart from the state-owned GCF, howitzer production lines exist in private sector Bharat Forge and Tata Advanced Systems in Bengaluru (both firms are making Advanced Towed Artillery Gun System or ATAGS prototypes). The L&T offer could add a fourth gun assembly line.

The army has a requirement of close to 3,000 artillery guns in various forms—towed, tracked, wheeled and mounted on high-mobility vehicles and ultra-light (air-droppable) howitzers.

The L&T proposal comes even as a second indigenous gun system has shown promise, clearing the way for future locally-sourced acquisitions. The DRDO-designed and Tata Advanced Systems-produced gun fired 60 rounds in 60 minutes, demonstrating a sustained rate of fire in summer trials in Pokharan this month. This is the first for an Indian 152/52 mm gun because most guns of the calibre fire 45 rounds in an hour. The gun also cleared cross-country movement in the self-propelled mode through sandy terrain and other mobility trials. Tata and Bharat Forge have fielded prototypes in these army trials. Their successful completion will clear the acquisition of 150 ATAGS for Rs 3,365 crore, which will be divided among the two developers.

INDIAN NAVY SIGNS CONTRACT WITH BEL FOR SUPPLY OF NAVAL ANTI DRONE SYSTEM

New Delhi. The Indian Navy has signed a Contract with Navratna Defence PSU Bharat Limited (BEL) for supply of the first indigenous, comprehensive Naval Anti Drone System (NADS) with both hard kill and soft kill capabilities. The contract was signed by Indian Navy and BEL on August 31, 2021 at New Delhi, in the presence of senior Naval officers and DRDO representatives. Indian Navy has provided consistent support and has played a lead role in the joint development of the anti drone system by DRDO and BEL.

NADS, developed by DRDO and manufactured by BEL, is the first indigenously developed anti-drone system to be inducted into the Indian Armed Forces. Multiple Units of BEL - Bangalore, Hyderabad, Pune and Machilipatanam, and DRDO Labs, LRDE-Bangalore, DLRL and CHESS, Hyderabad, and IRDE-Dehradun, in close collaboration with Indian Navy, were involved in the making of this fully indegenious system, as part of the Atmanirbar Bharat initiative to counter drone threats of adversaries.

The Naval Anti Drone System can instantly detect and jam micro drones and uses a laser-based kill mechanism to terminate targets. The NADS will be an effective all-encompasing counter to the increased drone threat to strategic naval installations.

The NADS was first deployed to provide security cover for the Republic Day Parade this year and later during the Hon'ble Prime Minister's Independence Day speech at Red Fort. The system, which offers 360-degree coverage, was also deployed in Ahmedabad for the Modi-Trump roadshow.

The Naval Anti Drone System uses the help of Radar, Electro-optical/infrared (EO/IR) sensors and Radio Frequency (RF) detectors to detect and jam the micro drones. The DRDO's RF/Global Navigation Satellite System (GNSS) detects the frequency which is being used by the controller and the signals are then jammed. The DRDO's anti-drone technology system provides for both 'soft kill' and 'hard kill' options to the Indian Armed Forces to tackle fast-emerging aerial threats.

Both the static and mobile versions of NADS will be supplied to the Indian Navy within a short time from the signing of contract.

FIRST INDIGENOUS N-MISSILE TRACKING SHIP DHRUV PUTS INDIA IN SUPER LEAGUE

New Delhi. In an effort to enhance its nuclear missile and satellite tracking capabilities, India commissioned its first ship 'INS Dhruv' with the latest gadgets to detect incoming hostile missiles. With this induction, India will join the select group of nations such as France, UK, Russia, the USA, and China that have such vessels. The 15,000-tonne ballistic missile surveillance ship was built by the Hindustan Shipyard in collaboration with the DRDO and the National Technical Research Organisation (NTRO). This ship is part of the Strategic Forces Command. The sophisticated surveillance systems onboard are powered by 14 MW by INS Dhruv itself. The ship was codenamed VC 1118. Its commissioning into the service was delayed for some months due to the corona pandemic, sources said. Built as part of the Make in India initiative, the ship cost more than Rs 730 crores and has a crew of about 300 trained personnel. The project commenced in 2014. INS Dhruv will act as a force multiplier as it will provide the Indian Navy a 360 degree view of the Indo-Pacific and the strategically important Indian Ocean region and help plan offensive operations with a high degree of accuracy. The ship will also increase the maritime capabilities in the backdrop of China's growing naval prowess and muscle flexing in the Indo-Pacific and the Indian Ocean region, they said. The indigenously designed and built ship carries active scanned array radar (AESA) with the ability to scan various spectrums to monitor spy satellites watching over India as well as monitor missile tests in the entire region. The ship can also detect ballistic missile tests carried out by other countries, sources said.

NEWS ROUND UP

INDIA TO RECEIVE 35 RAFALES BY 2021-END, THE LAST ONE IN JANUARY 2022

New Delhi. India would get 35 omni-role Rafale fighters from France by current year end with the last one making a solo journey to soon to be activated Hashimara air base in north Bengal in January 2022. Already 26 fighters have been delivered with 24 in India and remaining two kept for IAF pilot and technician training in France. Given the reliability of strategic ally France, the Indian Air Force (IAF) and the Indian Navy have evinced keen interest in Rafale platform due to its weight to power ratio and maritime strike capabilities. Apparently, the IAF leadership wants to acquire another 36 Rafales in future and the Navy is looking at Rafale-M as a fighter option on-board INS Vikrant (Indigenous aircraft carrier-1), to be commissioned next year. The induction of Rafale into western and eastern theatre has force multiplied Indian war making capabilities as the French fighter is armed with the longest range air-to-air Meteor missile in the sub-continent, Hammer air to ground smart munition and long range SCALP air to ground weapon. The Hammer missile, which has been acquired by India under emergency purchases, can be released at a height of mere 500 feet to hit a high altitude target more than 70 km away. The missile hugs the terrain and then climbs to a height of over 4000 metres before striking the target from a top down action. The Indian Rafales carry specially modified Hammer missiles due to high altitude targets, mountainous terrain and Chinese recently acquired Russian S-400 air defence systems. In fact, the French have offered to jointly develop Hammer and Meteor missiles with India with extended range and heavier payload.

HARPOON JOINT COMMON TEST SETS SALE TO INDIA WORTH $82 MILLION APPROVED BY US

Washington. In a boost to Indian defence forces in the prevailing tension on the borders, the US approved the sale of Harpoon Joint Common Test Set (JCTS) and related equipment to India for an estimated cost of US$ 82 million. This would also help strengthen the bilateral strategic ties and improve the security of a major defensive partner in the Indo-Pacific region.

The Pentagon's Defence Security Cooperation Agency (DSCA) delivered the required certification notifying the US Congress of this possible sale on August 2, according to an official statement.

The Indian Government had requested to buy one Harpoon Joint Common Test Set (JCTS). Also included is one Harpoon Intermediate Level maintenance station; spare and repair parts, support, and test equipment; publications and technical documentation; personnel training; US Government and contractor technical, engineering, and logistics support services; and other related elements of logistics and programme support. The estimated total cost is $ 82 million, it said.

This proposed sale will support the foreign policy and national security of the United States by helping to strengthen the US-Indian strategic relationship and to improve the security of a major defensive partner, which continues to be an important force for political stability, peace, and economic progress in the Indo-Pacific and South Asia region, the DSCA release said.

During the visit of Prime Minister Narendra Modi to the US in June 2016, the US recognised India as a "Major Defence Partner", which commits the U.S. to facilitate technology sharing with India to a level commensurate with that of its closest allies and partners, and industry collaboration for defence co-production and co-development.

The proposed Foreign Military Sale, the State Department said, will improve India's capability to meet current and future threats by providing it with flexible and efficient Harpoon missile maintenance capabilities to ensure maximum force readiness.

Noting that India will have no difficulty absorbing this equipment into its armed forces, the Pentagon said the proposed sale of this equipment and support will not alter the basic military balance in the region. "The principal contractor will be The Boeing Company, St. Louis, Missouri. There are no known offset agreements proposed in connection with this potential sale. Any offset agreement required by India will be defined in negotiations between the purchaser and the contractor(s)," it said.

The Harpoon, first deployed in 1977, is an all-weather, over-the-horizon, anti-ship missile system. It has a low-level, sea-skimming cruise trajectory with active radar guidance, according to Boeing. The Harpoon missile is the world's most successful anti-ship missile and is in service with the armed forces of more than 30 countries, according to the US defence major.

MAHINDRA DEFENCE TO MANUFACTURE INTEGRATED ASW DEFENCE SUITE FOR INDIAN NAVY

New Delhi. The Ministry of Defence (MoD) has awarded a major contract to Mahindra Defence Systems Limited (MDS) worth Rs 1349.95 Cr for the manufacturing of Integrated Anti-Submarine Warfare Defence Suite (IADS) for modern warships of Indian Navy.

Competitive bids from Indian companies were invited by MoD through open tender wherein the systems fielded were put through detailed trials at sea to prove their capability.

IADS is a high-end underwater equipment that uses latest technology. It is designed to detect and protect warships from underwater threats. It is a versatile system capable of operations from all sizes of warships - small, medium, and large. The complex array of sensors in water undertakes surveillance, and provides inputs for signal processing and analysis, to enable necessary action.

Mr SP Shukla, Chairman, Mahindra Defence Systems Limited, said, "It is the first major contract with the private sector meant for underwater detection and protection from threats. This contract once again epitomizes the success of

the Atmanirbhar Bharat initiative."

This advanced technology system is the first of its kind being developed by an Indian company for Indian Navy. Mahindra Defence qualified by proving the capability of the system through comprehensive testing by the Indian MoD in actual operations at sea before being declared as winner on commercial bid. Mahindra Defence would be supplying 14 IADS Systems for the Indian Navy warships.

RADA ISRAEL AND ADTL JV TO OFFER ADVANCED TACTICAL RADARS TO INDIAN ARMED FORCES

Tel Aviv. The new joint venture between Israeli radar manufacturer RADA Electronic Industries Ltd and Indian company Alpha Design Technologies Ltd (ADTL) has already offered some systems to the Indian defence forces. According to RADA, the joint venture is aimed at meeting the Indian Government's policies of "Make in India".

The company says that it decided to partner, with ADTL, a leading local defence company, to offer the private and public defence industry in India, advanced, locally-adapted and produced, tactical radars which are tailored to the unique requirements of the Indian Armed Forces. Among the operational missions in which this advanced technology would be used are: mobile short range air defence, counter UAV, counter mortars, artillery and rockets (C-RAM), active protection of armoured vehicles and others.

RADA is a global defence technology company focused on proprietary radar solutions and legacy avionics systems. The Company is a leader in mini-tactical radars, serving attractive, high-growth markets, including active military protection, counter-UAS, critical infrastructure protection and border surveillance. ADTL is one of the fastest growing defense and aerospace Private Sector Companies in India, which specializes in Fire Control Radars, Surveillance Radars, Upgrade of Missile Control Radars, C3I Systems, Tactical Communications, including SDRs, EW, Avionics and Space Systems. Adani Defence and Aerospace have recently invested heavily in ADTL and together they form a strong combination to take on the Government of India's program for self-reliance, "AatmaNirbhar Bharat".

NEWS ROUND UP

LM AWARDED 5-YEAR CONTRACT TO SUPPORT IAF's C-130J SUPER HERCULES AIRLIFTER FLEET

The contract is a Direct Commercial Sale, and is a continuation of a prior five-year FOS I contract where Lockheed Martin provided similar support for the IAF's C-130J fleet

New delhi. Lockheed Martin has been awarded a $328.8 million, five-year contract from the Indian Air Force (IAF), to provide dedicated and comprehensive support for the IAF's fleet of 12 C-130J-30 Super Hercules Aircraft. Lockheed Martin is the original equipment manufacturer (OEM) of the C-130Js, which is the tactical airlifter of choice for 26 operators in 22 nations.

Through this Follow on Support II (FOS) contract, Lockheed Martin teams manage the program, logistics and engineering support elements necessary to sustain the IAF's C-130J fleet. The contract spans a five-year-period, is a Direct Commercial Sale, and is a continuation of a prior five-year FOS I contract where Lockheed Martin provided similar support for the IAF's C-130J fleet.

The FOS II contract includes Lockheed Martin's sustainment efforts for the IAF's entire Super Hercules fleet, as well as extended options including Lockheed Martin support for the C-130J airframe, Contractor Furnished Equipment (CFE), peculiar and common spareable items, engines, propellers, software, publication services, ground handling equipment (GHE), ground support equipment (GSE) and test equipment.

A total of eight employees representing Lockheed Martin, GE (propeller manufacturer) and Rolls-Royce (engine manufacturer)

serve as on-site technical support for the duration of the contract. Additionally through the FOS II contract, five C-130J Hercules aircraft will undergo 12-year servicing (depot maintenance) at a Lockheed Martin-approved Heavy Maintenance Center (HMC) beginning in 2022.

The Government of India announced its purchase of six C-130J Super Hercules airlifters via a Foreign Military Sale with the U.S. Air Force in 2008. All aircraft were delivered on or ahead of schedule between 2010 and 2011. India received additional C-130Js in 2017 and in 2019.

The IAF's C-130J Super Hercules have a highly integrated and sophisticated configuration primarily designed to support India's special operations requirement. The aircraft also are equipped with air-to-air receiver refueling capability for extended range operations. India's C-130Js are also used to support a variety of critical missions, including humanitarian aid, airlift, natural disaster support, and search and rescue operations. Recently, the IAF has been extensively using its fleet of 12 Super Hercules for humanitarian efforts in the wake of the COVID-19 pandemic as well as for transportation of relief materials, equipment and personnel in the areas affected by cyclones Yaas and Tauktae.

India's connection to the C-130J goes beyond its fleet of Super Hercules with the Tata Lockheed Martin Aerostructures Limited (TLMAL) joint venture that is the single, global source of C-130J empennage assemblies included on all new Super Hercules aircraft. Located in Hyderabad, TLMAL exemplifies the Government of India's "Make in India" objectives and has delivered more than 120 empennages over its first 10 years of operations.

MBDA CONFIRMS INDIAN MISSILE INVESTMENT PLAN

New Delhi. European missile manufacturer MBDA has confirmed plans to invest in a joint missile manufacturing facility with defence public sector undertaking Bharat Dynamics Limited (BDL). The proposed 'final assembly, integration, and test' (FAIT) facility will be established within BDL's existing manufacturing complex in Hyderabad, said an MBDA spokesperson. The spokesperson did not disclose the value of the investment but said it is "significant".

MBDA and Bharat Dynamics are investing in a facility in Hyderabad to assemble and support the European company's ASRAAM. A licencing agreement to support the setting up of the joint FAIT was signed by the companies on August 17 following a memorandum of understanding announced in September 2019. The FAIT is scheduled to start operating in fiscal year 2022–23 to meet both Indian and export market opportunities.

According to the spokesperson, MBDA will transfer "equipment, knowledge, and training" to establish the new facility, which will be focused initially on MBDA's Advanced Short Range Air-to-Air Missile (ASRAAM) under the new agreement.

Under a US $ 250 million contract announced in 2014, ASRAAM was selected by India to equip the Indian Air Force's (IAF's) upgraded SEPECAT Jaguar fighter aircraft fleet. In service with the IAF, the ASRAAM is known as the New Generation Close Combat Missile (NGCCM). The MBDA spokesperson said the FAIT has the potential to also provide maintenance, repair, and overhaul services for the ASRAAM. In the future, the facility could also carry out FAIT services in support of MBDA's Common Anti Air Modular Missile (CAMM). The CAMM is integrated into the company's Sea Ceptor air-defence system, which the spokesperson confirmed MBDA is offering to the Indian Navy to meet its Short Range Surface to Air Missile requirement.

NEWS ROUND UP

BHARAT DYNAMICS AND MBDA TO SET UP FACILITY FOR AIR-TO-AIR MISSILE IN TELANGANA, SIGN PACT

New Delhi. Bharat Dynamics and MBDA are establishing a facility for the final assembly, integration and test (FAIT) of Advanced Short Range Air-to-Air Missile (ASRAAM) at Bhanur near here, a press release on August 17 from the defence PSU said. A licensing agreement was signed by BDL and MBDA, UK in the presence of Siddharth Mishra, CMD of BDL at a virtual ceremony. Under the licensing agreement, MBDA will transfer the equipment and knowledge to BDL for establishing the facility. The facility is expected to commence operations by the year 2022-'23. The new facility will have the potential to also conduct maintenance, repair and overhaul (MRO) of the missiles, besides other capabilities, the release said. The agreement to establish the facility follows on from an earlier Memorandum of Understanding (MoU) between BDL and MBDA on ASRAAM FAIT signed during 2019. BDL Chairman and Managing Director, Mishra said the signing of the licensing agreement reinforces BDL's commitment to contribute towards 'Make in India' and the 'Atmanirbhar' initiatives of

the Centre in the Defence sector. ASRAAM is one of the "Within Visual Range" missiles available and BDL will be manufacturing these at its Bhanur unit here for the domestic and export in future through MBDA. BDL is involved in manufacturing various types of missiles and underwater weapons for supply to the Indian Armed Forces and friendly foreign countries.

BHEL AWARDED ORDER FOR UPGRADED SRGM MAIN GUN

New Delhi. In a major boost to Defence Production under the 'Make in India' initiative and towards achieving self-reliance in the critical field of Defence equipment, Goa Shipyard has placed a maiden order on Bharat Heavy Electricals Limited (BHEL) for supply of an upgraded Super Rapid Gun Mount (SRGM), the Main gun onboard most Warships of the Indian Navy.

The order envisages supply, installation and commissioning of the entire system - Upgraded SRGM and accessories for Triput Class Frigates of the Indian Navy, which will be manufactured by the Haridwar unit of BHEL.

The upgraded SRGM is a state-of-the-art weapon system having additional features such as capability to manage different types of ammunition to engage fast, manoeuvring and non-manoeuvring, radio controlled targets. The upgraded SRGM has the capability to fire advanced Ammunition with higher range and programmable ammunition.

BHEL has been a reliable supplier of

critical equipment and services in the Defence and Aerospace sector for over three decades with the aim of making a major contribution towards self-reliance in these sectors.

Towards this, BHEL has established dedicated, intricate manufacturing and inspection facilities at its manufacturing plants, for production, installation & commissioning and lifecycle support of various products and components. The initiatives taken by BHEL will be a driving force towards the Atmanirbhar Bharat Abhiyan of the government.

DCM SHRIRAM INDUSTRIES BUYS 30% STAKE IN TURKISH DRONE MAKER ZYDRONE DYNAMICS

Istanbul / New Delhi. The Indian embassy in Turkey tweeted August 18 about a "new beginning". It was referring to an Indian company's investment in a Turkish drone maker. On the side lines of the International Defense Industries Fair (IDEF) in Istanbul, Indian company DCM Shriram Industries signed a partnership deal with Turkey's Zyrone Dynamics.

At the fair, Zyrone Dynamics is showcasing two new UAVs, with the highest-flying speed in their class. Defence industry analysts in Turkey and abroad have hailed the performance and growing market share of Turkish-made drones.

Zyrone Dynamics, has received a foreign investment from India's DCM Shriram Industries worth $1 million. DCM Shriram Industries bought 30% percent of the firm's shares – giving it a total valuation of $ 3.5 million –Murat Kanber, co-founder of the Turkish company, told Anadolu Agency (AA). As per the Agreement the Company would subscribe to 30% of the capital of the company comprising of 25715 shares at a total investment of just over $ 1.05 million in five tranches over a period of about a year, subject to necessary approval with regard to foreign investment under FEMA Regulations.

Murat Kanber, co-founder of Zyrone Dynamics, was quoted by Turkey's Anadolu Agency as saying, "Both sides' expectation is the creation of products for civilian use, especially for cargo transportation... Now Zyrone will sell its products to India and its neighbours in the Asian market, after which it also hopes to export drones to Europe and Australia."

Rudra Shriram, representing and speaking on behalf of DCM Shriram, said "The partnership is more than just an investment; it is about creating a global UAV company for various applications in civilian and military fields." The negotiation period – 18 months – with Zyrone was very difficult due to the pandemic conditions. The agreement was successful and fair for both sides, with one boasting high technology and the other with extensive experience in manufacturing and management, he said.

Zyrone Dynamics specialises in the manufacture of small rotary-wing drones. Zyrone Dynamics has been promoting small drones that it calls 'variable volume' UAVs. A variable volume drone is similar to a 'tilt-rotor' aircraft like the US V-22 Osprey that can take off and land like a normal helicopter but can tilt its rotors forward inflight and fly like a normal aircraft, ensuring a helicopter's operational versatility and a fixed-wing aircraft's speed.

With this move, the firm got a large investment and gained a big sales channel, stressed Murat Kanber. Under the partnership, Zyrone will be providing the Indian company with technological support and both parties will support each other in marketing the products in India and around the globe.

ELBIT SYSTEMS UNVEILS ARCAS-AI POWERED SYSTEM

Tel Aviv. Elbit Systems is expanding the line of systems that serve the concept of "Digital Infantry". The Israeli company unveiled the ARCAS, a built-in computerized Artificial Intelligence (AI) powered system that interfaces with the rifle's Electro-Optical (EO) sight, with a helmet mounted eyepiece and with the rifle's assemblies, providing soldiers with real-time intuitive actionable combat information. According to Elbit, ARCAS transforms assault rifles into digital, networked combat machines enabling a step change in the lethality, mission effectiveness and survivability of dismounted soldiers in both day and night. ARCAS provides infantry and Special Operation warriors with combat capabilities that were not available for them before, including: passive range measurement, automatic ballistic correction, detection of fire sources, video motion detection, the ability to shoot around the corner and from the hip, interface with tactical Command and Control (C2), navigation assistance, friend or foe identification, tracking of stoppage and ammunition and weapon zeroing without the need for live fire. An AI-powered computer is integrated into the assault rifle's forward grip, running innovative software and a range of applications. The miniaturized computer unit receives and processes data collected from the soldier's field of view (as perceived by the EO sight), tactical information from C2 systems, data from other ARCAS users in the team and the rifle's mechanical information. The combat information is presented to the soldier as an intuitive augmented reality layer on top of the scenery that is seen through the EO sight or the helmet mounted eyepiece. Soldiers operate the system using a joystick button placed on the rifle's forward grip and a Graphical User Interface inspired by the gaming world.

NEWS ROUND UP

DRDO HANDS OVER AIR DEFENCE MISSILE (MRSAM) SYSTEM TO IAF AT JAISALMER

New Delhi. In a significant boost to India's defence capabilities, the first deliverable Firing Unit (FU) of Medium Range Surface to Air Missile (MRSAM) System was handed over to Indian Air Force (IAF) in the presence of Defence Minister Rajnath Singh at Air Force Station, Jaisalmer in Rajasthan on September 9. The MRSAM (IAF) is an advanced network centric combat Air Defence System developed jointly by Defence Research and Development Organisation (DRDO) and Israel Aerospace Industries (IAI) in collaboration with the Indian industry comprising of private and public sectors including MSMEs. Secretary, Department of Defence R&D & Chairman DRDO Dr G Satheesh Reddy handed over the first deliverable Firing Unit to Chief of Air Staff Air Chief Marshal R K S Bhadauria in the presence of Defence Minister Rajnath Singh. During the event, DRDO and IAI officials demonstrated the capabilities of MRSAM system, as part of On-Site Acceptance Test (OSAT). The MRSAM system provides point and area air defence for ground assets against a wide range of threats including fighter aircraft, UAVs, helicopters, guided and unguided munitions, sub-sonic & supersonic cruise missiles etc. It is capable of engaging multiple targets at ranges up to 70 kms in severe saturation scenarios. The missile is powered by indigenously developed rocket motor and control system for achieving high manoeuvrability during the terminal phase. The firing unit comprises of Missiles, Combat Management System (CMS), Mobile Launcher Systems (MLS), Advanced Long Range Radar, Mobile Power System (MPS), Radar Power System (RPS), Reloader Vehicle (RV) and Field Service Vehicle (FSV).

'ATMANIRBHAR' START-UPS TO BOOST INDIA'S SWARM DRONE ARSENAL, IAF TO ISSUE RFP

New Delhi. In modern warfare, unmanned aerial vehicles (UAVs) are becoming a critical component. The Indian Air Force is set to issue a Request for Proposal (RFP) to five domestic start-ups for swarm drones, which are capable of both punitive action and load-carrying capabilities, media reports said.

According to sources, the RFP will be issued for two sets of swarm drones that will cost about Rs 100 crore in total and there will be a lot of "handholding". This means the selected firm or firms will get assistance from select Base Repair Depots, which have the technical expertise and carry out major repair and overhaul of aircraft and other equipment of the IAF. They will also get armament procured from the Defence Research and Development Organisation (DRDO).

The five companies that will be in the fray — NewSpace Research and Technologies, Veda Defence Systems Pvt Ltd, Raphe mPhibr Pvt Ltd, Dhaksha Unmanned Systems Pvt Ltd and Flaire Unmanned Systems Pvt Ltd — were also the top participants of the IAF's Mehar Baba Swarm Drone Competition, which began in 2018.

Named after the legendary Air Commodore Mehar Singh, affectionately called 'Baba' Mehar Singh by his associates and admirers in the IAF, participants competed to build a swarm of 50 drones in the competition that lasted two years. Two of the top five participants also recently won contracts from the Army for swarm drones.

Explaining the origin of swarm drones in India, sources said that when the IAF began the Mehar Baba Swarm Drone Competition in 2018, they had received 154 applicants from across the country. Of these, 54 were selected in the first round and 20 were selected in the second round.

Sources said that the 20 who were selected were asked to demonstrate 10 drones with 10-km range and 10 medical drops in Pokharan, and were reimbursed Rs 25 lakh each by the IAF. The top five from them were given a task of demonstrating a 50-km range with 20 drones and 20 medical or emergency aid drops in GPS-denied, rogue drone and anti-drone jamming environment. All top five firms of the competition were start-ups and had beaten top defence companies. The IAF eventually awarded Rs 2.5 crore in the final round to each competitor, sources said, adding that the whole process lasted two years. They noted that given the success of the competition, a plan was made for possible joint procurement. However, the plan did not go ahead since the requirements for each service was different.

In December 2020, the IAF had put out pictures of its swarm drone capability, noting that the process of their procurement was on.

MORE 'EYES IN THE SKY' FOR IAF, GOVT CLEARS ₹11,000 CRORE DRDO-IAF PROJECT FOR SIX AEW&C AIRCRAFT

New Delhi. In a major boost to the Indian Air Force (IAF), the Cabinet Committee on Security (CCS) chaired by Prime Minister Narendra Modi cleared a nearly Rs 11,000 crore project of the Defence Research and Development Organization (DRDO) to develop six new Airborne Early Warning and Control (AEW&C) aircraft.

This is in addition to the nearly $ 3 billion deal for procuring 56 C-295MW transport aircraft for the IAF, which was also cleared by the Committee, to replace the ageing fleet of Avro 748 transport aircraft that first flew in 1961. While the CCS decision on the C-295 was the budgetary clearance for the actual signing of the contract, the Committee has cleared the "Acceptance of Necessity" (AoN) for the DRDO project, sources said. This means that the DRDO will now be able to issue a "Request for Proposal" (RFP) for further work on the aircraft.

According to the plan, the six aircraft will be taken from the Air India fleet, which means they will be A-319s and A-321 variants. The original plan, which had also got an AON clearance, was to procure two larger A-330 jets, which were then to be modified and fitted with the AEW&C systems. However, now the six Airbus aircraft will be modified and the indigenous Active Electronically Scanned Array (AESA) radar will be mounted on them.

The DRDO will now issue RFP seeking bids for modification for the six passenger aircraft. Since Airbus is the original equipment manufacturer (OEM), the firm is the frontrunner to bag the contract. Known as the "eyes in the sky", the AEW&C can detect and track all flying objects in the sky, including incoming fighters, cruise missiles and drones, faster than ground-based radars. They can also act as an aerial control room for missions while also keeping track of ships out at sea. The six AEW&C aircraft will add to the existing fleet of the IAF, which includes three Israeli Phalcon AWACS on Ilyushin-76 transport aircraft, and two indigenous 'Netra' AEW&C aircraft on the Embraer aircraft.

The criticality of the AEW&C was felt during the aerial duel between India and Pakistan on 27 February 2019 and the current stand-off between India and China has also meant that the existing assets are being put to use almost round-the-clock and the need for more has been felt.

TPY-4 RADAR EARNS OFFICIAL US GOVERNMENT DESIGNATION, SETTING NEW STANDARD IN AIRSPACE THREAT DETECTION

Syracuse, New York. As the world's most capable and flexible ground based multi-function long-range radar, Lockheed Martin's TPY-4 has received its official US Government nomenclature – AN/TPY-4(V)1 – officially marking the radar's maturity and its ability to deliver fully-digital technology, and therefore setting a new standard for the future of radars. Lockheed Martin's specialized team has spent more than 10 years and more than $100 million in research & development funds for the TPY-4 radar, including the construction, operation, and testing of prototype radar systems. TPY-4 offers multi-mission capabilities, such as early warning, situational awareness, tactical ballistic missile surveillance and air defense. It also integrates the latest mature commercial technologies to create a revolutionary radar architecture.

Recent Testing Achievements: The first TPY-4 is well ahead of any competition and already in production to be unveiled later this year. The radar's production sub-assemblies are passing environmental and performance tests, attributed to the foundation built and validated under Lockheed Martin's investment and the commonality with the US Army's Sentinel A4 radar. The radar's test results continue to surpass model predictions, as validated by open air testing, furthering the qualification of this advanced radar.

The TPY-4 Radar: A Fully Digital Solution for Today's and Tomorrow's Threats: TPY-4 is an internationally available, transportable, multi-mission radar that can operate in contested RF environments and provide the warfighter an ability to detect and track threats better than any previous radar available today. It accomplishes this with a fully digital, software-defined sensor architecture, allowing users to maintain ongoing surveillance throughout the mission. That's because the TPY-4 radar users are not locked by the system's hardware. Users have the ability to transmit and receive digitally, allowing for more enhanced target identification and classification. Earlier radars may have some level of digitization, but Lockheed Martin's software-defined TPY-4 radar is digital at every element and across the entire architecture.

NEWS ROUND UP

GODREJ AEROSPACE DELIVERS LANDMARK 200TH SET OF BRAHMOS AIRFRAME ASSEMBLIES

Godrej Aerospace association with the BrahMos Aerospace goes back to 2001. Godrej Aerospace is a dominant contributor manufacturing most of the metallic sub-systems in the BRAHMOS missile

Mumbai. Godrej Aerospace, business unit of Godrej & Boyce, the flagship company of the Godrej Group, handed over the 200th set of the stealth universal supersonic cruise missile airframe assemblies to BrahMos Aerospace Pvt. Ltd. (BAPL) for use in its missile systems. This will further enhance India's national security through self-reliance. Each airframe of the BRAHMOS missile consists of 138 complicated subassemblies that are manufactured from more than 1500 parts.

The handover ceremony took place virtually and was attended by key leaders and mentors from Godrej & Boyce, BrahMos Aerospace Pvt. Ltd, Defence Research & Development Laboratory (DRDL), and Missile Systems Quality Assurance Agency (MSQAA).

Commenting on the milestone achievement by Godrej Aerospace, Anil Verma, Executive Director & President, Godrej & Boyce said, "It brings me immense joy to handover the 200th BrahMos airframe today. The credits to achieving this milestone goes to teamwork and contribution by the entire team including officers from BrahMos, scientists from DRDL, representatives from MSQAA, and the Godrej Aerospace team. It is a matter of virtue for us to undertake work that enhances national security. The roots of Godrej & Boyce are based on self-reliance. Hence, it is an honor for us to contribute towards the growth of the country. We assure complete support to BrahMos, MSQAA, and DRDO and are looking forward to upscale the production to reach bigger milestones in the coming future".

Dr. Sudhir Mishra acknowledged the milestone in manufacturing advanced missiles and encouraged Godrej to channelize its focus on design & development. On behalf of BrahMos, he extended his support and gratitude to Godrej.

Dr. Sudhir Mishra, Distinguished Scientist & Director General (BrahMos), CEO & MD BrahMos Aerospace said, "Godrej is one of the major trusted partners of the BrahMos Industry Consortium and we are honored to have worked together in the contribution of this endeavor. This project is not merely an achievement in the production and development of the most advanced missiles, but also is a prominent assertion of the Make-in-India narrative. We hope to continue to set such benchmarks in the development and production of sophisticated weapon systems by growing our partnership with Godrej & Boyce."

The BRAHMOS missile is a stealth universal supersonic cruise missile that can be launched from ships, submarines, aircraft, and land-based platforms. It can be used for a precision strike to destroy targets on land and sea.

Godrej Aerospace has been associated with the BrahMos programme since its inception in 2001. Godrej Aerospace is a dominant contributor manufacturing most of the metallic sub-systems in the BRAHMOS missile. Besides the main airframe, they supply control surfaces and nose caps. Godrej & Boyce's business Godrej Precision Engineering also supplies the Mobile Autonomous Launchers, Missile Replenishing Vehicles for the land launched versions.

INDIGENOUSLY DEVELOPED ARINC818 BASED SINGLE BOARD COMPUTER BY LOGIC FRUIT HANDED OVER TO DEFENCE MINISTER AT DRDO DIRECTORS' CONCLAVE

New Delhi. Logic Fruit CEO, Sanjeev Kumar presented its indigenously developed ARINC818 Video Processing and Switching Module (AVPSM) to Vice Chief of Air Staff Air Marshal Sandeep Singh in presence of Defence Minister Rajnath Singh at the DRDO Directors' Conclave 2021.

The event was held at the DRDO Bhawan, New Delhi as part of the two day conclave on the theme 'Redesigning the processes to meet the national aspirations'. Defence minister Rajnath Singh felicitated the innovators and startups that were winners of various DRDO programs and schemes to develop innovative indigenous solutions for defence and aerospace. The Defence minister in his address, reiterated the resolve to make India self-reliant and exhorted the private sector to take advantage of government policies and develop R&D to achieve this goal.

The Technology Development Fund Scheme (TDFS) from DRDO provides an opportunity to small and innovative startups to address national defence challenges through financial aid and technical mentoring. Under the scheme selected start-ups are provided funds up to 90% of the total development cost, with an upper limit of 10 crore.

As one of the winner of the TDF scheme, Logic fruit has developed the Avionic video system for the next generation aircraft upgradation. The project requirement was to develop a solution for video transmission among different aircraft systems based on the latest protocol ARINC 818 that's going to play an integral role in the upgrading the communication system of existing aircrafts like Sukhoi-30, MiG etc. The project required tremendous amount of effort and collaboration with various agency. Logic Fruit is proud to have successfully developed the product to the satisfaction of its customer.

BOEING SIGNS FIRST CH-47F BLOCK II CHINOOK PRODUCTION CONTRACT

Philadelphia. Boeing and the US Army have signed a $136 million contract for the first CH-47F Block II Chinooks. The Army exercised options for four contracted CH-47F Block II Chinooks with the aircraft scheduled for delivery beginning 2023. Separately, the Army awarded Boeing a $29 million advanced procurement contract for the second production lot of CH-47F Block II aircraft.

The Block II Chinook features multiple upgrades aimed at providing additional lift capability and increasing commonality between US and allied fleets, thus reducing maintenance costs. "This is a big step in Chinook modernization, supporting the Army's future multi-domain vision," said Andy Builta, vice president of Cargo & Utility Helicopters and H-47 program manager. "The Block II technologies will drive commonality across the fleet and enable our soldiers to return home safely for decades."

As a leading global aerospace company, Boeing develops, manufactures and services commercial airplanes, defence products and space systems for customers in more than 150 countries. As a top US exporter, the company leverages the talents of a global supplier base to advance economic opportunity, sustainability and community impact. Boeing's diverse team is committed to innovating for the future and living the company's core values of safety, quality and integrity.

IN NEWS

HENSOLDT DEMONSTRATES AIRBORNE SIGINT CAPABILITIES

Taufkirchen. Technologies and deployment modes of airborne signal intelligence (SIGINT) have been successfully demonstrated by sensor solution provider HENSOLDT during a test flight campaign at Hohn Air Base in Schleswig-Holstein. The aim of the six test flights carried out together with GFD GmbH on a Learjet was to give representatives of the German customer an overview of available technologies and their growth potential. The findings are to be incorporated into the planning of future SIGINT capability on a wide variety of flying platforms.

In a so-called "expansion stage 1" of the demonstration, which was financed from company funds, the localisation, bearing, tracking and recording of signals was demonstrated, which located and tracked transmitters with frequencies in the communications range in scenarios of tactical signal reconnaissance. For the demonstration, a system concept was developed and realised that achieved a maximum of bearing accuracy and speed. A later planned "expansion stage 2" of the demo campaign will highlight monitoring and pattern recognition procedures, possibly using AI techniques. Among other things, the findings are to be incorporated into the further development of the modular HENSOLDT product family KALÆTRON Integral® for the realisation of the future scalable ELINT reconnaissance container, which can be used on various platform types – including drones. HENSOLDT HAS BEEN active in the electronic reconnaissance market for decades. The company has developed COMINT and ELINT sensors for the German Armed Forces and other NATO forces, among others, and integrates them into EW systems for the Air Force, Army and Navy.

SAAB TO DELIVER CARL-GUSTAF AMMUNITION TO US ARMED FORCES

Saab has received an order for Carl-Gustaf® ammunition from the US Army. The order value is approximately USD 75 million and deliveries will take place in 2022. The shoulder-fired ammunition order is placed within an Indefinite Delivery, Indefinite Quantity (IDIQ) framework agreement signed in 2019 between Saab and the US Army that allows the customer to place orders for Carl-Gustaf ammunition and the disposable AT4 shoulder-fired weapon systems during a five-year period. This order for the US Army and Marine Corps is comprised of seven different types of ammunition including anti-armor, anti-structure, smoke, and illumination rounds, all underlining the versatility of the multi-purpose Carl-Gustaf system. Saab's Carl-Gustaf system (designated MAAWS in the US) has a long and proven record with the US military. The reloadable multi-purpose system has been in service in the US since 1990, a program of record for the US Army since 2013, and in 2018, the US Army announced it will acquire the latest version of the weapon – the Carl-Gustaf M4 (designated M3E1 in the US).

SARANG PERFORMS AT MAKS AIR SHOW 2021

Russia. The Sarang Helicopter Display Team of the IAF is performed for the first time at the MAKS International Air Show held at Zhukovsky International Airport, Russia. The air show is a biennial fixture and this year's edition was held from July 20-25, 2021. This is the first occasion when the Sarang Team performed its four helicopter aerobatics display in Russia, with its 'Made in India' 'Dhruv' Advanced Light Helicopters (ALH). These HAL manufactured machines have hinge less rotors and are equipped with state-of-the-art avionics, which makes them extremely suitable for military aviation. Apart from the IAF, the Indian Army, the Indian Navy and the Indian Coast Guard also operate this helicopter. The Sarang Team was formed in 2003 at Bangalore and its first international display was at the Asian Aerospace Airshow at Singapore in 2004. Since then, Sarang has represented Indian aviation at air shows and ceremonial occasions in UAE, Germany, UK, Bahrain, Mauritius and Sri Lanka till date. Apart from aerobatics displays at national and international venues, the team has also taken active part in numerous Humanitarian Assistance and Disaster Relief Missions like Op Rahat in Uttarakhand (2013), Cyclone Ockhi in Kerala (2017) and Op Karuna flood relief in Kerala (2018).

UVISION DEVELOPS HERO LAUNCHER SYSTEM, CAPABLE OF HANDLING MULTIPLE LOITERING MUNITIONS

Tel Aviv. The growing demand for different types of loitering weapon systems brought Israeli company UVision Air Ltd. to develop a launcher that can handle different types of its loitering weapon systems. The launcher is capable of launching all the versions of the company's Hero systems

According to UVision, Hero launcher system is giving field forces operational flexibility and enables them to choose and launch the most suitable system, depending on the nature of the mission and target - from the Hero-30 for smaller 'surgical' attacks, through the Hero-120 for medium-sized and armoured targets, up to the Hero-400 for long-range and fortified targets.

According to the Israeli company, forces can now launch the advanced Hero series of munition systems from a single launcher installed on one platform, gaining terrain dominance and a capability to engage targets at tactical ranges in excess of 75 km. The new launcher is designed

for modular adaptation to various types and sizes of platform, from armoured vehicles to large, medium, and small watercraft, manned or autonomous. The ability to store, transport and launch the Hero loitering munition systems from a pre-loaded, sealed canister further increases battle readiness and provides the forces with available and effective missiles.

The Hero series of loitering munitions consists of eight loitering munition systems, designed for different missions at various ranges using various types of payloads. The HERO systems are the fastest sensor-to-shooter loitering munitions, allowing forces in the front-line to independently locate time sensitive targets, and track and attack with pin-point precision. Each munition can handle different missions, ranging from lightweight static or moving targets (such as light-duty vehicles and human targets) to larger fortified or heavily armoured targets such as MBT (Main Battle Tank), enemy air defences and other strategic objectives.

The Hero series' unique design enables the munitions to carry out precision strikes in urban areas or remote locations, with minimal collateral damage. In cases where an attack is aborted, the systems can be recalled and another target selected, or retrieved via an on-board recovery system for a future mission. With extremely low noise and thermal signature, these systems are integrated with highly-advanced, stabilized electro-optic day/night cameras, and are ideal for deployment from air, land and naval platforms.

RUSSIA TO SUPPLY 21 MIG-29 FIGHTERS TO INDIA

New Delhi. Russia will be supplying 21 MiG-29 fighters to India, a spokesperson for Russia's Federal Service for Military-Technical Cooperation said. "The Indian Air Force staff received a tender request for the supply of 21 aircraft in 2021. The Russian side has transferred to Indian partners the commercial offer that is now being considered by the customer," Sputnik quoted spokesperson Valeria Reshetnikova as saying on the side lines of the MAKS-2021 international aerospace show. Last year, the Defence Ministry gave its approval to the Indian Air Force to speedily procure 21 MiG-29 fighter jets besides 12 Sukhoi MK1 from Russia. The Indian Air Force (IAF) had pushed a proposal to the government for acquiring new fighter aircraft, including 21 MiG-29s from Russia in June last year, according to ANI news agency. The 21 MiG 29s that the IAF is planning to acquire are from Russia and meet its requirement of new fighters. The IAF has carried out a study to check the airframe of the MiG-29s. The Air Force has three squadrons of the MiG-29s -- a twin-engine single-seat air superiority fighter aircraft -- which have been undergoing upgrades for extended life and are considered reliable in the air defence roles.

HYDERABAD BASED VEM TECHNOLOGIES MANUFACTURES FUSELAGE OF TEJAS LCA

Hyderabad: In a significant contribution, the city's aerospace industry has manufactured essential parts of supersonic fighter TEJAS. VEM Technologies handed over the centre fuselage to HAL representatives at its facility at Bachupally industrial area. The centre fuselage has been assembled with 1,595 mechanical and composite parts. VEM Technologies' V Venkat Raju said, "We are production partner of HAL. This is the first time a complete complex centre fuselage section for a supersonic fighter aircraft has been built by a private company in India." "We have been working with HAL for the past two decades on all their major platforms. HAL quality agencies inspected our production at every stage of manufacturing before the final assembly. For the final assembly, our colleagues were trained by HAL in Bengaluru," he added. Defence experts said that it was important milestone in the city's aerospace and defence manufacturers' eco system. Also, this development comes less than a week after Tata Boeing Aerospace Limited (TBAL) delivered the 100th fuselage for the AH-64 Apache combat helicopter to Boeing from its facility in the city.

IN NEWS

NAVANTIA SHORTLISTED FOR POLAND TOT FRIGATE PROGRAM

Madrid. The offer submitted by Navantia to the Polish Ministry of Defence to build three frigates in a Technology Transfer (ToT) program has been selected in a 'short list' along with two other finalists. Now, Navantia will participate in the Viability Phase in order to propose a design that further adjusts to the requirements of the Armaments Inspectorate of the Polish Ministry of Defence. The final decision on the contractor is expected in 2022. The offer presented by Navantia is based on the design of the F-100, in service for the Spanish Navy, which has been the starting point for successful export contracts to Norway and Australia. The Miecznik program launched by the Polish Government envisages the construction of three multi-mission frigates at the local PGZ shipyard in Gdynia through a Technology Transfer (ToT) contract with an international company, a business model in which Navantia has a robust experience. Navantia has long track in the design and construction of a wide range of frigates, with proven flexibility, therefore, to suit the needs of the Polish Navy. The company has also proved its ability to efficiently execute different models of ToT programs that have helped develop local capabilities in shipbuilding and life cycle support. It is a business model of high added value in which Navantia has success stories through its contracts in Turkey, Saudi Arabia or Australia.

LOCKHEED MARTIN OPEN TO SETTING UP MRO FACILITY IN INDIA

New Delhi. Representatives of the US aerospace company Lockheed Martin have said that they were open to setting up a maintenance, repair and overhaul (MRO) facility for its F-21 in India in an attempt to further sweeten its bid for 114 fighter aircraft for the Indian Air Force. Michael Kelley, Vice President – India for Lockheed Martin Aeronautics Strategy and Business Development and Brett Medlin, the F-21 India Campaign Lead were in India for meetings with the Indian government and the IAF on the multibillion dollar deal that is expected to see the IAF procure 114 medium multi-role combat aircraft (MMRCA). Lockheed which is offering the F-21 is in competition with Boeing's F18, Swedish SAAB's Gripen, Dassault Aviation's Rafale, EADS' Eurofighter Typhoon and Russia's United Aircraft Corporation MiG-35. Lockheed has already tied up with India's Tata group to manufacture the aircraft in India. It had previously promised to shift its production line to India if it secures the MMRCA deal and not to sell the F-21 to any other country. According to analysts, an MRO facility in India means the aircraft would not need to be taken to the US or any other country where Lockheed has established an MRO unit. Pakistan's F-16 aircraft – manufactured by Lockheed – has its major overhaul done in Turkey where Lockheed has an MRO facility.

SIKORSKY RECEIVES BRAZILIAN AIR FORCE BLACK HAWK HELICOPTER SUSTAINMENT CONTRACT

Stratford, Conn. Sikorsky, a Lockheed Martin company has received a four-year contract from the Brazilian Air Force to provide logistics support for the service's 16 UH-60L Black Hawk helicopters. The contract will improve fleet sustainment resulting from local storage of commonly required spare parts, assistance from a regional Sikorsky field service technician, and direct technical support from Sikorsky Engineering.

"We thank the Brazilian Air Force for selecting Sikorsky to provide the highest level of logistics support for its Black Hawk helicopter fleet," said Felipe Benvegnu, director of Sikorsky sustainment business development. "Local storage of spare parts will eliminate long lead times for material that would keep an aircraft on the ground. Close collaboration with Sikorsky engineers, whether virtual or in person, also will help the Air Force maintainers improve the readiness rates of these utility aircraft for important missions, such as search and rescue."

The Brazilian Air Force acquired its 16 Black Hawk aircraft via Foreign Military Sales between 2006 and 2013.

The Air Force contract is modeled after a multi-year logistics support agreement between Sikorsky and the Brazilian Army. In 2019, after previous agreements with the Army, the flight availability rate of the four Army S-70A (UH-60L equivalent) Black Hawk aircraft reached a 100 percent readiness.

GA-ASI AVENGER EQUIPPED WITH LOCKHEED MARTIN LEGION POD AUTONOMOUSLY FOLLOWS TARGET AIRCRAFT

SAN DIEGO. For the first time ever, over the high desert of southern California on July 2, 2021, General Atomics Aeronautical Systems, Inc. (GA-ASI) used an Avenger® Unmanned Aircraft System equipped with a Lockheed Martin Legion Pod® to autonomously track and follow targets of interest. This industry-funded demonstration brings military aviators one step closer to gaining autonomous systems that support manned-unmanned teaming (MUM-T) in joint all-domain operations. During the flight, Legion Pod's infrared search and track system, IRST21®, detected multiple fast-moving aircraft operating in the area and fed target tracking information to the Avenger's autonomy engine. The autonomyprioritized the targets informing Avenger maneuvers for target engagement. This flight builds on GA-ASI's autonomy flight test series that started in December 2020 to demonstrate next generation air-to-air Unmanned Aerial Vehicle functionality. Integrating Legion Pod software into the Avenger Mission Management System (MMS) took less than three months and was enabled though the Open Mission Systems (OMS) message standards. This OMS demonstration proves that existing operational systems can be rapidly integrated across platforms with minimal cost.

THALES AND IIIT-DELHI SIGN A MEMORANDUM OF UNDERSTANDING ON OPEN HARDWARE RESEARCH AND DEVELOPMENT

Paris/New Delhi. Thales and IIIT-Delhi have signed an agreement for collaborative research and development in the field of Open Hardware and other allied subjects. The collaboration will enable co-development of complex microprocessor architectures and multi-core processing systems using configurations available with the RISC-V open ISA specification. These systems will bring value to applications in areas such as edge computing, smart manufacturing, defence and space. The agreement was signed in the presence of Marko Erman, Chief Scientific Officer of Thales, Philippe Valery, VP Technical Operations - Research and Technology of Thales, Ashish Saraf, VP and Country Director of Thales in India, Satish Menon, Head of Thales' Engineering Competence Centre in Bengaluru, and Prof. Ranjan Bose, Director IIIT Delhi, Prof. Mukesh Mohania, Dean of IRD IIIT-Delhi, Dr. Sujay Deb, Associate Professor, IIIT-Delhi, who will also act as the principle investigator for the research project. Through this association, Thales and IIIT-Delhi will collaboratively address safety issues in designing processors and embedded software for critical applications using open source hardware approach. The activities will commence from August 2021 and will be carried out in phases. Thales seeks to foster innovation and develop an ecosystem for scientific and industrial research by partnering with world-leading universities. In India, Thales has formed partnerships with the Indian Institute of Science Bangalore, the Indian Institute of Technology (IIT) Madras, Bombay and Delhi. Each year Thales invests around 4 billion of euros in R&D including 1 billion of self-funded R&D to develop cutting-edge technologies to best serve its customers across the world.

IAI'S ELTA SYSTEMS IN COOPERATION WITH HENSOLDT TO SUPPLY BMD CAPABLE RADARS TO GERMAN ARMED FORCES

Tel Aviv: German company HENSOLDT is cooperating with Israel Aerospace Industries (IAI) to supply new radars to the German Armed Forces to modernize their airspace surveillance and build up Ballistic Missile Defence (BMD) capabilities. The Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support (BAAINBw) has placed an order for the delivery and installation of four long-range radars worth approximately 200 million euros as part of the "Hughes Air Defence Radar Nachfolgesystem" (HADR NF) programme. For this purpose, HENSOLDT has entered into a cooperation in the field of BMD capable long-range radars with IAI subsidiary, ELTA Systems Ltd. The HADR NF system operates in the S-band, allowing for precise target acquisition compared with other systems. Through IAI's cooperation, the German customer will receive a combination of a national partner in system integration, certification and long-term support, as well as concept proven, market perfected systems. For years Europe has faced long-range weapons threats. In answer to this threat Europe's NATO countries have agreed to establish and expand a defence mechanism. The new capabilities to be integrated into the German armed forces will contribute to this effort. According to Israeli sources the Germans need an advanced air defence radar with a capability to detect ballistic missiles. The new radar will use the S band capable of long range detection. ELTA will be the design authority with production in both countries. The radar is largely based on the ELTA 2258 radar used on navy ships but will have added capabilities.

IN NEWS

KEEL LAYING CEREMONY FOR 1st WARSHIP OF ASW SHALLOW WATER CRAFT PROJECT & 3rd WARSHIP OF SURVEY VESSEL LARGE PROJECT

New Delhi. Keels of the first warship of the Anti-Submarine Warfare Shallow Water Craft (ASW SWC) project and the third warship of Survey Vessel Large (SVL) project for the Indian Navy were laid virtually on August 6, 2021 by VAdm SN Ghormade, Vice Chief of Naval Staff. The ships are being built by GRSE as part of the indigenous shipbuilding program for construction of eight ASW SWC and four SVL for the Indian Navy.

The ships are partly being built under a unique Public Private Partnership model by GRSE at L&T Shipyard, Kattupalli. The Keel Laying is a major milestone activity in the shipbuilding process and indicates the amalgamation of various blocks towards construction of a ship.

VAdm Kiran Deshmukh, CWP&A, RAdm GK Harish, DGND (SSG), RAdm VK Saxena (Retd), CMD/GRSE, and other senior officials of the Indian Navy and GRSE were also present.

Speaking on the occasion, the Chief Guest appreciated the efforts put in by GRSE and L&T in achieving this milestone despite COVID constraints and resultant lockdowns. He called it a noteworthy achievement by the Shipyard and commended the professionalism displayed by all. He highlighted that construction of these vessels is a major boost for AtmaNirbhar Bharat and India's 'Make in India' commitment with most of the weapons, sensors and equipment being indigenous.

He added that the ASW Shall Water Craft equipped with state-of-the-art underwater sensors and weapons will boost the Navy's ASW capability. The SVL ships capable of full-scale coastal survey, deep-water Hydrographic survey and determination of Navigational channels/ routes will also be fitted with state of art equipment.

GRSE AND NAVAL GROUP STRENGTHEN COOPERATION IN FIELD OF SURFACE SHIPS

Kolkata. In a revolutionary step towards transition from 'Make in India' to 'Make from India', Garden Reach Shipbuilders and Engineers Ltd., (GRSE), a Mini Ratna Category 1 Defence PSU and a leading warship building company of India, signed a Memorandum of Understanding (MoU) with Naval Group France, a leader in European Naval Defence Industry to collaborate in the field of surface ship that caters to fulfil the requirement of India and International Naval forces. The MoU was signed by Cmde PR Hari, IN (Retd), Director (Personnel) GRSE. Under the MoU, the two entities will collaborate and engage to offer high-end surface ships based on sea proven Gowind® design developed for export market. Having built over 100 warships for Indian and foreign naval forces, GRSE will work closely with French and Indian industries. The MoU also seeks to leverage the capabilities of both firms for meeting the growing requirements of the shipbuilding industry and offer a robust world class product utilising the state-of-the-art capabilities of both the organisations. This blend of modern technology, innovation and management of resources by Indian and French naval industrial leaders will be a real value proposition for international navies.

EMALS AND AAG PERFORM SUCCESSFULLY DURING CVN 78 FULL SHIP SHOCK TRIALS

SAN DIEGO. General Atomics Electromagnetic Systems (GA-EMS) has announced that the Electromagnetic Aircraft Launch System (EMALS) and Advanced Arresting Gear (AAG) aboard USS Gerald R. Ford (CVN 78) successfully performed as designed as the ship underwent Full Ship Shock Trials (FSST) off the Eastern seaboard during the months of June, July and August 2021. Ford is the first aircraft carrier in more than three decades to undergo FSST, which provides crucial data for analysis to validate the shock hardness of the ship and all systems aboard to withstand battle conditions. After completing FSST, CVN 78 enters a six-month Planned Incremental Availability (PIA) period of modernization, maintenance and repairs. Prior to the recent shock test trials, EMALS and AAG successfully completed various additional milestones during the Post Delivery Trials and Test (PDT&T) period, including the completion of critical Aircraft Compatibility Testing (ACT) and Flight Deck Certification (FDC) involving F/A-18E/F Super Hornets, E-2C/D Hawkeyes and Advanced Hawkeyes, C-2A Greyhounds, EA-18G Growlers, and T-45C Goshawks.

SASMOS -GKN AEROSPACE JV FE-SIL WINS LONG TERM CONTRACT FROM SAAB, FE-SIL TO MAKE ELECTRICAL SYSTEMS FOR T-7A TRAINER AIRCRAFT

New Delhi. Fokker Elmo SASMOS Interconnection Systems Limited (FE-SIL), a joint venture between GKN Aerospace and SASMOS HET Technologies Limited has been awarded a contract to manufacture electrical interconnections systems for the T-7A trainer aircraft by Swedish aerospace company Saab, according to a statement issued on September 8. The trainer aircraft, which has been manufactured by Boeing in partnership with Saab, will train the next generation of fighter and bomber pilots, FE-SIL said in the statement. Under the multi-year contract, FE-SIL will deliver the required wiring systems for the advanced aircraft's aft fuselage. The contract will strengthen FE-SIL's relationship with Saab and Boeing, supporting them with affordable, global solutions. SASMOS CMD H G Chandrashekar said: "We are proud and delighted that Saab has shown confidence in FE-SIL's capability. We are excited to play a critical role in this program and to be the long-term partner for the world's latest technology aircraft." The first EWIS ship-set is scheduled for delivery in 2022 from FE-SIL's Centre of Excellence for Aircraft Harnesses in Bangalore.

ROLLS-ROYCE AND HAL INK DEAL FOR ADOUR ENGINE PARTS TO BE 'MADE IN INDIA' FOR GLOBAL MARKETS

Bengaluru / New Delhi. Rolls-Royce and Hindustan Aeronautics Limited (HAL) have signed an agreement to 'Make in India' engine parts for Adour engines, to support Rolls-Royce's international defence customer base. Through this partnership, Rolls-Royce aims to strengthen the ecosystem for Adour engines in India by building on HAL's existing capabilities for manufacturing and supporting the Adour engines for Indian customers over several decades. This follows the Memorandum of Understanding (MoU) signed by Rolls-Royce and HAL during the Aero India 2021 event to establish an Authorized Maintenance Centre for Adour at HAL to support international military customers and operators. The agreement was exchanged between Mr B Krishna Kumar, Executive Director (Engine & IMGT), HAL and Mr Abhishek Singh, Senior Vice President – Defence, India and South East Asia, Rolls Royce in the presence of Mr R. Madhavan, CMD, HAL, Mr C.B. Ananthakrishnan, Director (Finance), Mr M.S. Velpari, Director (Operations), Mr Amitabh Bhatt, CEO (Bangalore Complex), Mr Kishore Jayaraman, President – India and South Asia, Rolls-Royce and Mr Alex Zino, Executive Vice President – Business Development and Future Programmes (Defence), Rolls-Royce.

L3HARRIS NAMES FIVE NATO TEAMMATES FOR AIRBORNE WARNING AND CONTROL SYSTEM SOLUTION

MELBOURNE, Florida. L3Harris has announced its five team members to bid on the Alliance Future Surveillance and Control (AFSC) program, designed to help NATO replace its Airborne Warning and Control System by 2035.

The team is developing "system-of-systems" options for surveillance and control capabilities across all domains for NATO's AFSC program. These options provide better intelligence and more responsive control by enabling sensors and systems to share information in air, ground, maritime or space. The L3Harris team includes defense and security electronics pioneer Hensoldt (Germany); the global, technology-forward solutions company Jacobs (United Kingdom); ground/maritime battle management and command and control leader General Dynamics (Canada & Italy); modeling and simulation synthetic environment leader CAE (Canada); and air command and control (C2), tactical data links and satellite connectivity from global communications leader Viasat (United States).

The international team will analyze the risks and feasibility of candidate systems-of-systems to enhance the NATO Alliance's military advantage to 2035 and beyond. The L3Harris team has a unique platform-agnostic approach to NATO's feasibility study, enabling the delivery of a transformational concept with actionable recommendations. L3Harris and teammates delivered a High Level Technical Concept (HLTC) study to NATO in 2020. The HLTC focused on data-centric architecture, all aspects of multi-domain surveillance, and control over the full spectrum of benign, permissive, contested and denied operational environments.

IN NEWS

'MAKE IN INDIA' BOOST FOR ARMY, AKASH MISSILE SYSTEM AND DHRUV ALH WORTH ₹14, 000 CRORE TO BE PROCURED

New Delhi. In a major boost to 'Make in India' in the defence sector, the Indian Army has sent proposals worth around Rs 14,000 crore to acquire two regiments of the Akash-S air defence missile system and 25 Advanced Light Helicopters (ALHs).

The proposal is with the Defence Ministry and a decision on the approval is expected soon at a high-level meeting to be chaired by Defence Minister Rajnath Singh, sources said. The Akash-S missiles are a new variant of the Akash missile system with a new indigenous seeker which helps in improving the accuracy in taking down enemy aircraft and cruise missiles at distances up to 25-30 km, they said. The missiles are capable of performing in extreme cold weather conditions in Ladakh and would meet all the requirements of the Indian Army in mountainous and other regions along the boundaries with China and Pakistan. The force is also looking at acquiring 25 ALH Dhruv Mark 3 helicopters for aviation squadrons. The Army is the largest operator of ALH Dhruv helicopters and has also helped in bringing in improvements in the choppers produced by the HAL.

COLLINS AEROSPACE LAUNCHES WORLD'S FIRST MILITARY UNDERWATER NAVIGATION SYSTEM THAT SUPPORTS THE NEW GENERATION OF MILITARY GPS

SYDNEY. Collins Aerospace recently launched the world's first Military Underwater Navigation System with M-Code (MUNS-M), a handheld diver navigation system that provides the diver with precise position and includes secure anti-jamming capabilities during deep sea missions. M-CODE is the military GPS signal required by the US DOD for military operations, and is designed to enhance position, navigation and timing (PNT) capabilities and improve resistance to existing and emerging threats to GPS, such as jamming and spoofing. The MUNS-M solution was developed in partnership with Blue Print Subsea, a UK-based company that manufactures a range of handheld underwater navigation products to assist search-and-rescue and locate objects on the seabed. "Military divers face dangerous, complex underwater navigation objectives that require precise positioning and secure anti-jamming capabilities," said Adam Atkins, principal account manager, Mission Systems. "Our new MUNS-M system is specifically designed to meet the needs of the military diver community and perform in demanding combat environments."

BOEING KC-46A TANKER FOR JAPAN COMPLETES FIRST REFUELING FLIGHT

EVERETT, Washington. The first Boeing KC-46A tanker built for the Japan Air Self-Defense Force (JASDF) recently refueled another KC-46A aircraft in the skies over Washington state. The Japan-bound tanker also successfully received fuel in return.

"Refueling with the first Japan KC-46A is an important milestone for the Japan Air Self-Defense Force," said Jamie Burgess, KC-46 program manager. "KC-46A is the world's most advanced air refueling aircraft and has already transferred more than 42 million gallons of fuel to other aircraft globally through its boom and drogue systems."

Japan is the KC-46 program's first non-US customer and is scheduled to receive its first aircraft this year. The Japan KC-46A is capable of refueling US Air Force, US Navy, US Marine Corps and JASDF aircraft.

The US Air Force awarded Boeing a contract for the JASDF's first KC-46A tanker in December 2017. The agreement was completed through the Foreign Military Sale process between the US Government and Japan.

A second Japan tanker is already in production. Boeing is assembling the KC-46A aircraft for both the U.S. Air Force and Japan on its 767 production line in Everett, Washington. Boeing's Japanese partners produce 16% of the KC-46A airframe structure.

LCA PROGRAM GAINS GROUND, HAL SIGNS RS 5,375-CRORE CONTRACT WITH GE AVIATION FOR SUPPLY OF ENGINES FOR TEJAS

Bengaluru. HAL has placed an order of for USD 716 million (Rs 5375 crores) for 99 F404-GE-IN20 engines and support services with GE Aviation, USA to power the Tejas Light Combat Aircraft. The contract was signed on August 17 at HAL Corporate Office. "This is largest ever deal and the purchase order placed by HAL for LCA", said Mr. R. Madhavan, CMD, HAL. The Company is working closely with GE for its support to pursue the export potential of LCA and also to supply spares to the global supply chain of GE 404 engines, he added. Mr. Chris Cyr, Vice President, Business Development & Sales, GE Aviation who interacted virtually said his company is proud of 16-year-long partnership with HAL and is happy to extend the relationship with this new order. "The F404 family of engines has proven itself in operations all over the world and we have committed to deliver all 99 engines and support services by 2029", he added. The indigenously built Tejas aircraft is one of the best in its class globally, powered by F404-GE-IN20 engines and has been in service since 2004. Ordering of the engines, marks a major milestone in the execution of 83 LCA contract with IAF. The co-operation will be further enhanced with the manufacturing of GE F414 engines in India for the upcoming LCA MkII program. The highest thrust variant of the F404 family, the F404-GE-IN20 incorporates GE's latest hot section materials and technologies as well as FADEC for reliable power and outstanding operational characteristics. The F404 family engines have logged in more than 14 million engine flight hours, and has powered 15 different production and prototype aircraft.

UP DEFENCE INDUSTRIAL CORRIDOR: BRAHMOS AEROSPACE TO SET UP RS 300 CRORE FACILITY IN LUCKNOW

New Delhi. As part of its expansion plan, BrahMos Aerospace has proposed to set up a Rs 300 crore production facility in Lucknow for the BrahMos Next Generation (BrahMos-NG) Missile Project. Sudhir K Mishra, CEO & MD, BrahMos Aerospace, leading a team met UP chief minister Yogi Adityanath on August 24 and apprised him of the plans, requesting a land parcel of 200 acre in the state's capital. The civil construction for the production facility is expected to begin within three months of getting possession of the land. BrahMos Aerospace is a joint venture between the Defence Research and Development Organisation (DRDO) and Russia's NPO Mashinostroyenia that produces the world's fastest supersonic cruise missile-BrahMos. The project is expected to generate direct and indirect employment for more than 5,500 technical workers, as well as for more than 10,000 skilled, semi-skilled and non-skilled workers, said a release by the government. Lucknow is one of the six nodes of the defence corridor in UP, others being Kanpur, Jhansi, Agra, Chitrakoot and Aligarh.

L&T-BUILT SEVENTH OPV, ICGS VIGRAHA COMMISSIONED INTO THE INDIAN COAST GUARD

Chennai. L&T-built Offshore Patrol Vessel ICGS Vigraha was commissioned into the Indian Coast Guard (ICG) by Defence Minister Rajnath Singh at Chennai, showcasing its commitment to 'Aatmanirbhar Bharat' by completing delivery of all seven OPVS ahead of contractual schedule. M K Stalin Chief Minister of Tamil Nadu, General MM Naravane, PVSM, AVSM, SM, VSM, ADC, Chief of the Army Staff, Director General K Natarajan, PVSM, PTM, TM, Director General Indian Coast Guard, Mr JD Patil, Whole Time Director (Defence & Smart Technologies) and Member of the L&T Board and other dignitaries were present at the event. ICGS Vigraha is the last vessel in the series of seven Offshore Patrol Vessels (OPVs) built by L&T under a MoD contract signed in 2015. Seven OPVs programme bestowed many laurels to the Indian Shipbuilding Industry, including:

- Delivery of all 7 OPVs ahead of contractual delivery schedule, including 'First of Class' OPV 'ICGS Vikram'
- For the first time, entire design and construction of the OPV class of ships by an Indian private sector shipyard
- Achieving the build period of mere 19.5 months, clearing all Sea Acceptance Trials in a single sea sortie for 5th OPV 'ICGS Varad'
- Extensive use of Shipbuilding 4.0 tools with in-house developed IT systems for real time data capturing, analysis & decision making for effective project monitoring and control

This was achieved during the tough conditions of COVID-19 pandemic by following COVID-appropriate behaviour among all workmen at our shipyards. The ICGS Vigraha is about 98 metres long, 15 metres wide, has 3.6 metres draught, with 2140 Tones displacement and a range of 5000 Nautical Miles. It can attain a sustained speed of up to 26 knots. The entire design and construction process has been certified by American Bureau of Shipping as well as Indian Registrar of Shipping and overseen by the Indian Coast Guard's resident team at Kattupalli. Since foraying into defence shipbuilding in March 2010, L&T has epitomized the dynamism, and prowess of private shipyard with in-house design, construction and delivery of 66 nos. defence vessels. L&T is also richly contributing to the upkeep of Indian Naval and Coast Guard fleets by routinely undertaking their repairs/refits and upgrades, including emergency repairs and inspections, with exemplary delivery performance at India's most modern defence shipyard at Kattupalli, near Chennai.

IN NEWS

DRDO SUCCESSFULLY TEST FIRES ENHANCED RANGE 122MM CALIBER ROCKET

New Delhi: Defence Research and Development Organisation (DRDO) successfully test fired enhanced range versions of indigenously developed 122mm Caliber Rocket from a Multi-Barrel Rocket Launcher (MBRL) on June 25, 2021 at Integrated Test Range (ITR), Chandipur off the coast of Odisha. Four enhanced range version of 122mm rockets were test fired with full instrumentation and they met the complete mission objectives. These rockets have been developed for Army applications and can destroy targets up to 40 km. All the flight articles were tracked by Range instruments, including Telemetry, Radar and Electro Optical Tracking System deployed by ITR and Proof and Experimental Establishment (PXE). The rocket systems have been developed jointly by Pune-based Armament Research and Development Establishment (ARDE) and High Energy Materials Research Laboratory (HEMRL) with manufacturing support from M/s Economic Explosives Limited, Nagpur. This enhanced rocket system would replace the existing 122mm Grad rockets. Defence Minister Rajnath Singh has congratulated DRDO and the Industry on the successful launch of 122mm Caliber Rocket.

DRDO SUCCESSFULLY FLIGHT TESTS NEW GENERATION AGNI P BALLISTIC MISSILE

New Delhi. Defence Research and Development Organisation (DRDO) successfully flight tested a New Generation Nuclear Capable Ballistic Missile Agni P from Dr APJ Abdul Kalam island off the coast of Odisha, Balasore. Various telemetry and radar stations positioned along the eastern coast tracked and monitored the missile. The missile followed text book trajectory, meeting all mission objectives with high level of accuracy. Agni P is a new generation advanced variant of Agni class of missiles. It is a canisterised missile with range capability between 1,000 and 2,000 kms.

INDIA LOOKS TO ROLL OUT COMPREHENSIVE DRONE POLICY

New Delhi. In the wake of the twin drone attacks at Air Force station in Jammu, Prime Minister Narendra Modi held a high level meeting to chalk out a new policy to deal with emerging threats. The meeting discussed expeditious framing of a broad-based policy to deal with emerging security threats and futuristic challenges facing the country. It discussed subjects such as airspace management, the regulatory framework for the use of drones, their utility as future delivery systems, air passages in which they can be allowed to operate and security issues. The meeting was attended by Union home minister Amit Shah, defence minister Rajnath Singh, civil aviation minister Hardeep Puri and national security adviser Ajit Doval.

The defence ministry and the three services will play a leading role in the formulation of the policy. Air defence units of the Indian Air Force (IAF) are responsible for monitoring all manned and unmanned air operations in the country's airspace. The three forces have been told to adequately focus on bridging the gaps in effectively dealing with new-age challenges such as drone attacks and go for the procurement of the necessary hardware to contain them. The meeting also discussed various other aspects, including equipping the security forces with modern equipment and involving more youngsters, start-ups and the strategic community in the field. According to reports, the three service chiefs, as well as key national security planners, will hold a series of meetings in the next few weeks and months to speed up the work on the policy.

INS HANSA MARKS ITS DIAMOND JUBILEE

New Delhi. INS Hansa, the Indian Navy's premier air station, marked its diamond jubilee on September 5. The Naval Jet Flight set up at Coimbatore in 1958 with Sea Hawk, Alize and Vampire aircraft, was later commissioned as INS Hansa on September 5, 1961. After the liberation of Goa, Dabolim airfield was taken over by the Navy in April 1962 and INS Hansa shifted to Dabolim June 1964. Commissioned as a modest air station with only a few aircraft, INS Hansa has increased its prowess over the last six decades and is presently operating over 40 military aircraft, clocking an average yearly flying of over 5000 hours. The air station also supports civil aviation by handling domestic and international flights 24x7, with an average of 29000 flights in a year.

INS Hansa is the abode of the Indian Navy's frontline air squadrons - INAS 310 'Cobras' with Dornier-228 aircraft, INAS 315 'Winged Stallions' with the long range maritime patrol aircraft IL-38SD, INAS 339 'Falcons' with the airborne early warning Kamov-31 helicopter; INAS 303 'Black Panthers' and INAS 300 ' White Tigers' with the supersonic carrier-borne MiG 29K fighters, and INAS 323 'Harriers' with ALH Mk III helicopters. The air station will soon operate the Boeing P8I long range maritime reconnaissance aircraft with the commissioning of INAS 316. INS Hansa also hosted the prestigious event of presentation of President's Colour to naval aviation by the Hon'ble President of India on September 6, 2021. The event coincides with the diamond jubilee of INS Hansa and the liberation of Goa.

DRDO SUCCESSFULLY FLIGHT-TESTS INDIGENOUSLY DEVELOPED MPATGM FOR MINIMUM RANGE

New Delhi. In a major boost towards AtmaNirbhar Bharat and strengthening of Indian Army, Defence Research and Development Organisation (DRDO) successfully flight-tested indigenously developed low weight, fire and forget Man Portable Antitank Guided Missile (MPATGM) on July 21, 2021. The missile was launched from a man portable launcher integrated with thermal site and the target was mimicking a tank. The missile hit the target in direct attack mode and destroyed it with precision. The test has validated the minimum range successfully. All the mission objectives were met. The missile has already been successfully flight tested for the maximum range. The missile is incorporated with state-of-the-art Miniaturized Infrared Imaging Seeker along with advanced avionics. The test brings the development of indigenous third generation man portable Anti-Tank Guided Missile close to completion.

DRDO SUCCESSFULLY FLIGHT-TESTS SURFACE-TO-AIR MISSILE AKASH-NG

New Delhi. Defence Research & Development Organisation (DRDO) successfully flight-tested the New Generation Akash Missile (Akash-NG), a surface-to-air Missile from Integrated Test Range (ITR) off the coast of Odisha on July 21, 2021. The flight trial was conducted at around 12:45 PM from a land-based platform with all weapon system elements such as Multifunction Radar, Command, Control & Communication System and launcher participating in deployment configuration. The missile system has been developed by Defence Research & Development Laboratory (DRDL), Hyderabad in collaboration with other DRDO laboratories. The launch was witnessed by the representatives of Indian Air Force. In order to capture flight data, ITR deployed a number of Range stations like, Electro Optical Tracking System, Radar and Telemetry. The flawless performance of the entire weapon system has been confirmed by complete flight data captured by these systems. During the test, the missile demonstrated high manoeuvrability required for neutralising fast and agile aerial threats. Once deployed, the Akash-NG weapon system will prove to be a force multiplier for the air defence capability of the Indian Air Force. Production agencies Bharat Electronics Limited (BEL) and Bharat Dynamics Limited (BDL) also participated in the trials.

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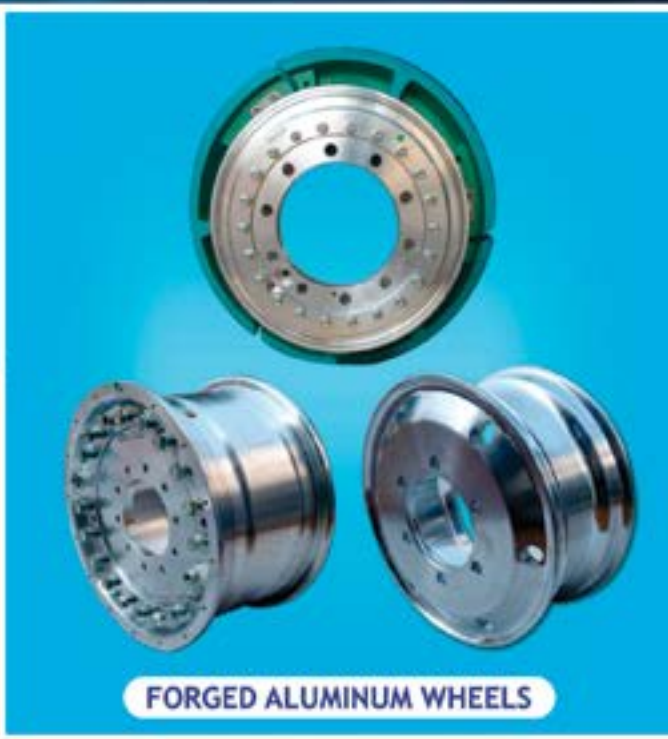

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