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-Editor

**RESPONSE**

'Raksha Anirveda' editorial  
team is always happy to receive  
comments on its articles and to  
hear readers' views on the issues  
raised in the magazine Contact  
details can be found on page.

# Editorial

## Innovation, Collaboration and Right Implementation: Key to Self Reliance



The idea of  
having my  
own magazine  
focussing on  
defence and  
strategic affairs  
was an outcome  
of a casual  
interaction with  
a friend from the

defence sector. The real igniting  
point was the fact that in the  
70th year India was still importing  
70 per cent of its defence  
requirement.

It came to fruition only two  
months before when three like-  
minded people including me  
joined hands to venture out with  
a magazine of our own on this  
strategically important subject. We  
three, come from three different  
backgrounds of Editorial, Marketing  
and Graphic Designing, found  
it easy to embark on the path,  
probably destined to by none other  
than the almighty God.

We also planned the release of  
our magazine named '**Raksha  
Anirveda**' keeping in mind the  
DefExpo-2018, the world's one  
of the most promising biennial  
defence event, which was round  
the corner, would be the momentous  
occasion for the release of the  
same.

The meaning of '**Raksha  
Anirveda**' is self explanatory and it  
means 'self reliance in defence'. In  
the inaugural issue of the magazine,

which would be a defence and  
strategic affairs quarterly, we  
tried to analyse how India can  
achieve self reliance in defence  
manufacturing through an insightful  
article by a former defence ministry  
official.

At present Indian defence sector  
is going through an interesting  
and exciting phase and with  
government's special thrust  
on indigenous manufacturing  
and self reliance through it's  
Make in India initiative, DefExpo  
2018 has garnered the eyeballs  
with overwhelming and record  
participation of countries and  
defence manufacturers.

We are also privileged to have a  
detailed interview of Defence Public  
Sector Navratna Bharat Electronics  
Ltd CMD MV Gowtama's interview  
in the inaugural edition itself.

I must take this opportunity to  
thank and congratulate all our  
advertisers/sponsors, who reposed  
their faith on the new venture,  
came forward to support us at  
the beginning of this journey itself  
and finally liked to be on board  
following which the herculean task  
of bringing the quarterly became  
possible.

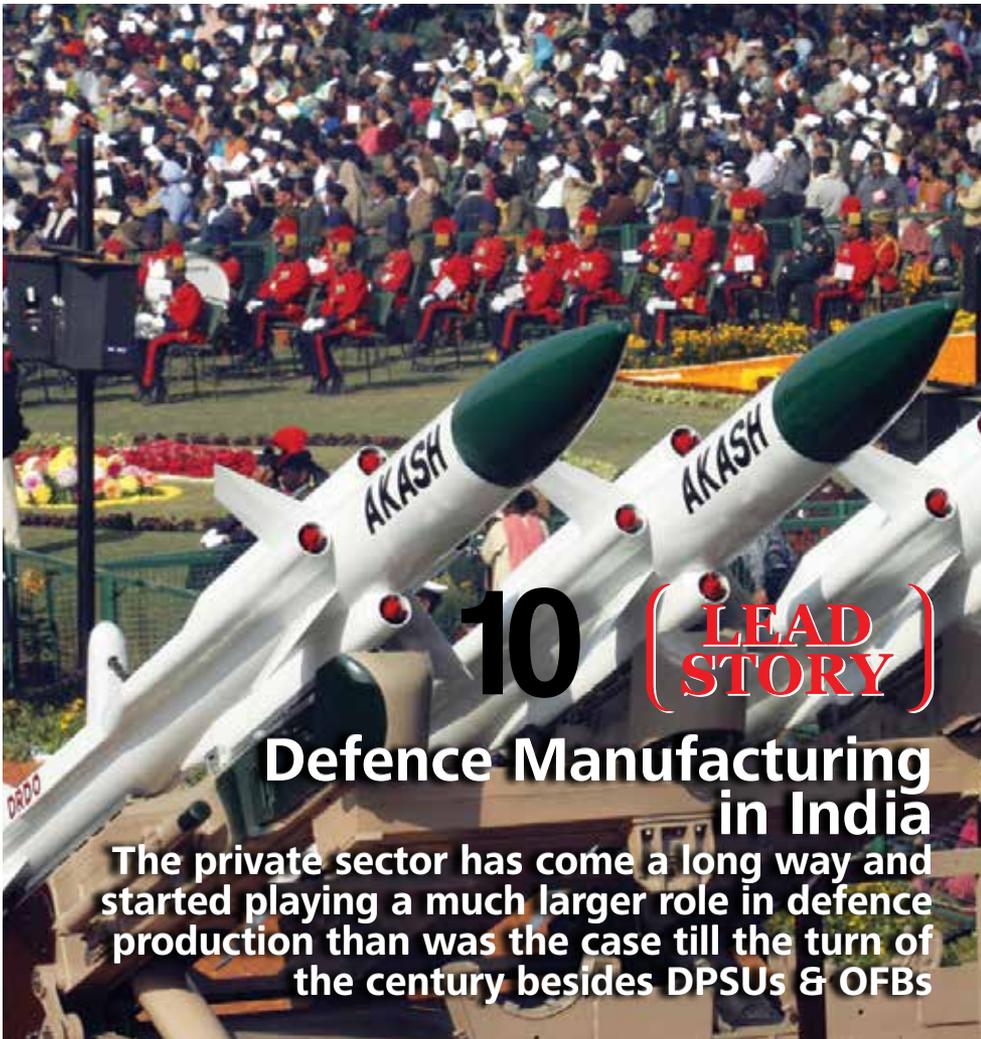
Last but not the least, we are  
indeed overwhelmed and honoured  
and thankful to the writing  
contributors, who took out precious  
time to contribute their analytical  
and insightful write-up to make it a  
worthy reading.

**Ajit Kumar Thakur**  
Editor

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# Army Modernisation is Gradually Picking up Pace

The army is finally cranking up its modernisation drive, with around 680 procurement projects worth over Rs 200,000 crore for the 12th Plan (2012-17) period, to plug operational gaps as well as ensure 'capability development' along both the western and eastern fronts. **BY BRIG GURMEET KANWAL (RETD)**

**E**MPHASIS ON MAKE IN INDIA: Since it was voted to power in May 2014, Prime Minister Narendra Modi's NDA government has accorded approval to defence procurement projects worth Rs 1,50,000 crore. In an interview with the author, Mr. Manohar Parrikar, the former Defence Minister, had said that contracts worth Rs 90,000 crore had been signed and of these 70 percent are in the categories to 'buy and make in India' or 'make in India'. After a decade of stagnation under the two UPA regimes, military modernisation appears to be gaining momentum once again under the new government. And, there is a distinct push towards realising the PM's directions to make in India.

General Dalbir Singh Suhag, the previous COAS, had said, "Force modernisation incorporating contemporary technologies is a key priority.... Making up of critical deficiencies of weapons and equipment is on fast track." One year before the NDA government assumed office, it had been reported that, "The army is finally cranking up its modernisation drive, with



Arjun Mark II and T-90S Main battle Tanks of India

around 680 procurement projects worth over Rs 200,000 crore for the 12th Plan (2012-17) period, to plug operational gaps as well as ensure 'capability development' along both the western and eastern fronts." General Bikram Singh, General Dalbir Singh's predecessor, had identified 31 of these 680 pending modernisation projects as Priority-1. These included

assault rifles, howitzers, bullet-proof jackets, tank and artillery ammunition and missiles.

According to a recent news report, "17 new contracts worth Rs 2,820 crore were signed for the Army in 2011-2012. The figure jumped to 29 contracts worth Rs 7,222 crore in 2012-2013. The tally stands at 17 contracts worth Rs 11,777 crore in the ongoing fiscal. Another 23

contracts, worth around Rs 12,000 crore, are in the pipeline. The important ones include the over Rs 2,000 crore deal for 15,000 3UBK Invar missiles for T-90S tanks and the Rs 1,200 crore one for two additional “troops” of the Israeli Heron spy drones. The really critical projects are still stuck in the long-winded procurement process.” These include those for the infantry: bullet-proof jackets, ballistic helmets, new-generation assault rifles with interchangeable barrels, close-quarter battle carbines and light machine guns have all been hanging fire for several years.

## Enhancing the Combat Power of the Mechanised Forces

While Pakistan has acquired 320 T-80 UD tanks and is on course to add Al Khalid tanks that it has co-developed with China to its armour fleet, vintage tanks continue in the Indian army’s inventory despite their obsolescence. Even though the indigenously developed Arjun MBT has not fully met the army’s expectations due to recurring technological problems and cost over-runs, the tank has entered serial production to equip two regiments and orders for a few more may be

**Indian Army’s BrahMos Mobile Autonomous Launchers (MAL);**

**M777 Ultra-light Howitzer guns**

placed soon. Consequently, 310 T-90S MBTs had to be imported from Russia. In December 2007, a contract was signed for an additional 347 T-90 tanks to be assembled in India. Meanwhile, a programme has been launched to modernise the T-72 M1 Ajeya MBTs that have been the mainstay of the army’s Strike

Corps and their armoured divisions since the 1980s. The programme seeks to upgrade the night fighting capabilities and fire control system of the tank, among other modifications. Approximately 1,700 T-72 M1s have been manufactured under license at the Heavy Vehicle Factory (HVF), Avadi.



The BMP-1 and the BMP-2 infantry combat vehicles, which have been the mainstay of the mechanised infantry battalions for long, are now ageing and replacements need to be found soon. A project to build 2,600 Future Infantry Combat Vehicles (FICV) costing approximately Rs 60,000 crore has been approved by the government. The 22-24 tonne FICV will be indigenously designed and manufactured. Among others, Larsen & Toubro, the Mahindras and the Tatas have shown interest.

## Modernising Artillery and Air Defence Firepower

Despite the lessons learnt during the Kargil conflict of 1999, where artillery



**'FH77 B02' 155mm  
52Caliber Artillery  
Bofors' FH77 B02'  
155mm 52Caliber  
Towed Artillery;**

**BMP-2 Infantry  
Combat Vehicle  
Sarath - Indian Army**



firepower had undeniably paved the way for victory, modernisation of the artillery continues to lag behind. The last major acquisition of towed gun-howitzers was that of about 400 pieces of 39-calibre 155 mm FH-77B howitzers from Bofors of Sweden in the mid-1980s. The MoD is now in the process of acquiring 145 pieces of 155 mm/39-calibre M777 howitzers for the mountains through the Foreign Military Sales (FMS) route from the US in a government-to-government deal. The Defence Acquisition Council (DAC) chaired by the Defence Minister has approved a proposal from the Ordnance Factories Board (OFB) to manufacture 144

howitzers of 45-calibre indigenously with the option to acquire another 400 provided the prototypes successfully meet the army's GSQR in user trials. Meanwhile, the DRDO has embarked on its own venture to design and develop a 155 mm howitzer in partnership with a private sector company.

The DAC has also approved the acquisition of 814 truck-mounted 155 mm/52-calibre guns under the 'buy and make in India' category. While the first 100 guns will be imported, the remaining will be made in India. The total project cost is estimated to be Rs 15,750 crore. Several Indian companies are known

**THE DAC HAS APPROVED A PROPOSAL FROM THE OFB TO MANUFACTURE 144 HOWITZERS OF 45-CALIBRE INDIGENOUSLY WITH THE OPTION TO ACQUIRE ANOTHER 400 PROVIDED THE PROTOTYPES SUCCESSFULLY MEET THE ARMY'S GSQR IN USER TRIALS**

to be interested in the indigenous design and development of modern artillery systems in conjunction with overseas partners. Bharat Forge (partner Elbit of Israel), Tata Power SED (Denel, South Africa) and L&T (Nexter, France) are likely to bid for this contract when the RfP is issued by the MoD. However, it will be only after six to eight years that the first indigenously produced guns will roll out of the factory.

A contract for the acquisition of two regiments of the 12-tube, 300 mm Smerch multi-barrel rocket launcher (MBRL) system with 90 km range was signed with Russia's Rosoboronexport in early-2006. The BrahMos supersonic cruise missile (Mach 2.8 to 3.0), with a precision strike capability, very high kill energy and maximum range of 290 km, was inducted into the army in July 2007. These terrain hugging missiles are virtually immune to counter measures due to their high speed and very low radar cross section. The indigenously designed and manufactured Pinaka multi-barrel rocket system is likely to enter service in the near future. These three weapon systems will together provide a major boost to the artillery's ability to destroy key targets at long ranges. It is also time to now consider the induction of unmanned combat air vehicles (UCAVs) armed with air-to-surface missiles into the artillery for air-to-ground precision attacks.

Counter-bombardment (US term counter-fire) capability is also being upgraded, but at a slow pace. At least about 40 to 50 weapon locating radars (WLRs) are required for effective counter-bombardment, especially in the plains, but only a dozen have been procured so far. In addition to the 12 AN-TPQ 37 Firefinder WLRs acquired from Raytheon, USA, under a 2002 contract worth US \$200 million, Bharat Electronics Limited is reported to be assembling 28 WLRs. These radars will be based on both indigenous and imported components and are likely to be approved for introduction into service after extensive trials that are ongoing. The radar is expected to

match the capabilities of the Firefinder system and will have a detection range of about 40 km.

The Corps of Army Air Defence is also faced with serious problems of obsolescence. The vintage L-70 40 mm AD gun system, the four-barrelled ZSU-23-4 Schilka (SP) AD gun system, the SAM-6 (Kvadrat) and the SAM-8 OSA-AK have all seen better days and need to be urgently replaced by more responsive modern AD systems that are capable

**Indian Army soldiers during Yudh Abhyas;**

**Hindustan Aeronautics Ltd Advanced Light Helicopter (ALH) Dhruv**



of defeating current and future threats. While the Trishul surface-to-air missiles have not yet been successfully fielded by the DRDO, the first Akash missile regiment was inducted into the army in May 2015. Manufactured by BEL, the missile has a range of 25 km. The short-range surface-to-air missile (SR-SAM) and medium-range (MR-SAM) acquisition programmes are embroiled in red tape. The first flight test of the long-range SAM (LR-SAM), being jointly developed in collaboration with Israel, was conducted in November 2014. Air defence is one area where the army has lagged behind seriously in its modernisation efforts.

### Army Aviation: Obsolete Helicopters need to be Replaced

The modernisation plans of the Army Aviation corps have also not made much headway. According to the Standing Committee on Defence report tabled in Parliament in April 2012, there is a huge shortage of helicopters with the Army Aviation corps. The army faces a shortage of 18 Cheetah, 76 Advance Light Helicopters (ALH) and 60 ALHs with weapon systems. The corps has acquired a small number of Dhruv ALH but still lacks medium lift

helicopters that are critical for the mountains. The total requirement of ALHs is about 150 to 160. The new NDA government has cancelled the RfP for 197 light utility helicopters and approved the project for indigenous development under the 'buy and make Indian' category. While this decision will give a boost to Indian aviation industry, it is bound to delay the acquisition by at least five to seven years.

The positive development is that a few army aviation brigade bases have been raised recently for better coordination of aviation operations, particularly in operational areas like Ladakh where the daily demand is very high. The army plans to acquire attack helicopters for close air support. The acquisition of six Apache helicopters from the US has been approved.

### Force Multipliers for the Infantry

The modernisation plans of India's cutting edge infantry battalions, which are aimed at enhancing their capability for surveillance and target acquisition at night and boosting their firepower for precise retaliation against infiltrating columns and terrorists holed up in built-up areas, are moving forward but at a snail's pace. The army has initiated a project to equip all its infantry battalions with a system that had for long been called the Future Infantry Soldier as a System (F-INSAS). The new system will be a force multiplier and will include a modular weapon with a thermal imaging sight, UBGL and Laser range finder that will replace the INSAS rifle, a combat helmet equipped with a head-up display and communications head set, a smart vest with a body monitoring system, a back pack with integrated GPS and radio and protective footwear. The new combat system is expected to be built indigenously with COTS components being imported. It





resembles the US Army Land Warrior system and is expected to cost over Rs 25,000 crore to equip 350 infantry battalions. Plans also include the acquisition of hand-held battlefield surveillance radars (BFSRs), and hand-held thermal imaging devices (HTTIs) for observation at night. Stand-alone infra-red, seismic and acoustic sensors need to be acquired in large numbers to enable infantrymen to dominate the Line of Control (LoC) with Pakistan and detect infiltration of Pakistan-sponsored terrorists.

However, bullet proof jackets in sufficient numbers and modern assault rifles continue to elude the army. A project with an outlay of approximately Rs 10,000 crore for the induction of 1,78,000 new-generation assault rifles was initiated, but has not made much headway.

## Concluding Observations

The lack of progress in the replacement of the army's obsolescent weapons and equipment and its qualitative modernisation to meet future threats and challenges is a cause for concern. The mechanised forces in the plains are still partly night blind and the capability to launch offensive operations in the mountains



continues to remain inadequate to deter conflict. The capability to launch precision strikes from ground and air-delivered firepower, which will pave the way for the infantry to win future battles, is much short of the volumes that will be required. The army also needs to upgrade its rudimentary C4I2SR system and graduate quickly to network centrality to optimise the use of its combat potential.

While India's military modernisation has been stagnating, China's People's Liberation Army (PLA) and its sister

IAI Heron Unmanned aerial vehicle;

MKU Bullet Proof Jackets and Helmet

services – the navy, the air force and the nuclear strike force the Second Artillery – have been modernising at a rapid pace for almost two decades, backed by a double-digit annual hike in the defence budget. At US\$ 106 billion, China's official defence budget for the current year is US\$ 131.57 billion (Yuan 808.23 billion), 12.2 per cent more than the previous year and it is over three times India's planned defence expenditure. As China invariably conceals many items of expenditure on security, its actual expenditure is likely to be over US\$ 160-170 billion.

Despite the long list of obsolescent weapons and equipment in service with the Indian armed forces, the present military gap with China is quantitative rather than qualitative. In case India's military modernisation continues to stagnate, this gap will soon become a qualitative one as well. By about 2020-25, China will complete its military modernisation and will then be in a position to dictate terms on the resolution of the territorial dispute if India continues to neglect defence preparedness.

To enable the army to fight and win the nation's future wars in an era of strategic uncertainty, the government must give a major boost to the army's modernisation drive. The army's modernisation plans require substantially higher budgetary support than what has been forthcoming over the last decade. The defence budget must go up from the present 1.60 per cent of the GDP to 2.0 to 2.5 per cent. Also required is the speeding up of the weapons and equipment acquisition process and the simultaneous upgradation of recruitment standards and, consequently, personnel skills so as to be able to absorb high-tech weapons systems. Doctrine, organisation and training standards will need to keep pace with technological modernisation to make the Indian army a 21st century force to be reckoned with.

*The writer is Distinguished Fellow, Institute for Defence Studies and Analyses (IDSA), New Delhi. 2,280 words. Approximately 1,700 words if the highlighted portions are deleted.*

# DefExpo 2018: A Curtain Raiser

**D**EFEXPO INDIA has become one of the largest events of its kind in the world for the last 10 years. The 10th edition of DefExpo is being held in Chennai from April 11 to 14 and there is tremendous response to the event. The location of the event is Tiruvidanthal, Kancheepuram district on the East Coast Road near Chennai.

DefExpo 2018 will, for the first time, project India's Defence manufacturing capabilities to the world. This is reflected in the tagline for the Expo, 'India: The Emerging Defence Manufacturing Hub'. DefExpo 2018 will help brand India as a defence exporter of defence systems and components. While showcasing strengths of India's substantial public sector, it will also uncover India's growing private industry and spreading MSME base for components and sub-systems.

In total 671 exhibitors have confirmed their space booking in DefExpo as on March 30, 2018. These include 517 Indian exhibitors and 154 international exhibitors. Nearly 15% of the total exhibition space has been booked by MSMEs.

Indian participation include majors like Tata, L&T, Kalyani, Bharat Forge, Mahindra, MKU, DRDO, HAL, BEL, BDL, BEML, MDL, GRSE, GSL, HSL, MIDHANI, Ordnance Factories, and many others.

Major international companies including Lockheed Martin, Boeing (USA), Saab (Sweden), Airbus, Rafael (France), Rosonboron Exports, United Shipbuilding (Russia), BAE Systems (UK), Sibat (Israel), Wartsila (Finland),

Rhode and Schwarz (Germany) among many others.

That apart, 47 official delegations from different countries have confirmed their participation in DefExpo as on March 30, 2018. 13 of these delegations are at Ministerial level. Several countries have large delegations with over 10 delegates showing tremendous interest in DefExpo 2018. Ministerial level delegations are from countries including USA, UK, Afghanistan, Czech Republic, Finland, Italy, Madagascar, Myanmar, Nepal, Portugal, Republic of Korea, Seychelles, Vietnam.

Some important programme details are as follows:

**April 11:** The show will be open for business visitors. Business visitors can get entry badges on registration at DEFEXPO website [www.DefExpoindia.in](http://www.DefExpoindia.in) and payment of Rs. 2000 / USD 40. Details like name, age, gender, ID (Passport, Govt ID, Aadhar Card) are required to be entered online and a unique registration ID no. is generated. A copy of the same is required to be carried and passes collected from the venues given below:

The venue for collection of Badges is as follows:

Badges can be collected from April 3-10 (between 1000 hrs to 1700 hrs). Bharat Electronics Ltd (BEL) Guest House (AASHRAY) - opposite Army Public School, MES Road, NANDAMBAKKAM, Chennai.

Please Contact Sakthivel (Mobile: 9381208898) in case of any queries regarding location of the venue.

There will be live demonstration of large platforms and also flying display

by HAL and IAF. Defence Minister Nirmala Sitharaman will hold a press briefing after the live demonstration. Six parallel business seminars are planned on the day. These are being organized by industry associations and business chambers. The Defence Minister would also be hosting a reception for the guests on the evening of April 11.

**April 12:** Formal Inauguration of the event will be held followed by live demonstration of Naval Systems, Aero Systems and Land Systems. Live Demonstration will be done for systems which are designed/built in India. The show will be open for business visitors after the formal inauguration. Three business seminars are planned by industry associations/business chambers. There will be Night illumination of anchored Navy vessels which will be a visual delight from the coast.

**April 13:** The show will be open for business visitors.

The India Russia Military Industry Conference will be held on the sidelines of DefExpo 2018 at the venue. Over 100 Russian and over 200 Indian industry leaders are expected to participate. The India Russia Military Industry Conference is being coordinated by SIDM from industry side.

Indian Navy ships will be available for onboard viewing on Chennai harbour. The public interested in viewing these ships should carry their ID (Passport, Govt ID, Aadhar Card) proof and should not carry any baggage, water bottle, mobile or any eatables. They should approach Chennai port gate, from where they will be picked up and escorted to the ship and brought back. There will be live demonstration of large platforms and also flying display by HAL and IAF at the DefExpo venue.

**THERE WILL BE LIVE DEMONSTRATION OF LARGE PLATFORMS AND ALSO FLYING DISPLAY BY HAL AND IAF. DEFENCE MINISTER NIRMALA SITHARAMAN WILL HOLD A PRESS BRIEFING AFTER THE LIVE DEMONSTRATION. SIX PARALLEL BUSINESS SEMINARS ARE PLANNED ON THE DAY. THESE ARE BEING ORGANIZED BY INDUSTRY ASSOCIATIONS AND BUSINESS CHAMBERS. THE DEFENCE MINISTER WOULD ALSO BE HOSTING A RECEPTION FOR THE GUESTS ON THE EVENING OF APRIL 11**

Although the private sector is now playing a much larger role in defence production than was the case till the turn of the century, the main indigenous source of supply of defence products continue to be the 41 ordnance factories and 9 Defence PSUs.

**BY AMIT COWSHISH**



# Defence Manufacturing in Present and Future

**A**T THE time of its independence, India inherited the defence production capability created by the British over the years initially to sustain their hold over the sub-continent and later to sustain their war efforts in the 1940s.

Starting with a gun factory, set up at Ishapore in 1787 the production capability had expanded considerably by the time they left India in 1947, leaving behind a chain of ordnance factories and companies like Hindustan Aircraft Limited and the Garden Reach Workshop Limited, which later on morphed into public sector undertakings (PSUs).

Defence production has come a long way in since then but only after passing through a prolonged phase of inertia for almost quarter of a century. This phase was marked by dependence on the legacy systems, occasional purchases and manufacturing in India by a few public sector units and the departmentally run ordnance factories to a limited extent.



# India: Past,

Even the wars with China and Pakistan in 1962 and 1965 respectively did not bring about any change in the policy of according primacy to development goals. Delivering the budget speech for 1963-64 within months of the disastrous war with China, the then finance minister told the parliament that it would not be prudent 'to provide for the paramount claims of

defence by sacrificing the claims of development'.

A similar statement was made in the budget speech of 1966-67, following the war with Pakistan. "It has always been our policy to restrict expenditure on defence to the maximum extent possible so as to conserve all possible sources for securing the well-being of our people", the finance minister told the parliament.

Though he also said that the nation could not "afford to take any chances with the security of the nation, devoted though we are to the cause of peace", there was practically no increase in defence capital outlay in the budget presented by him.

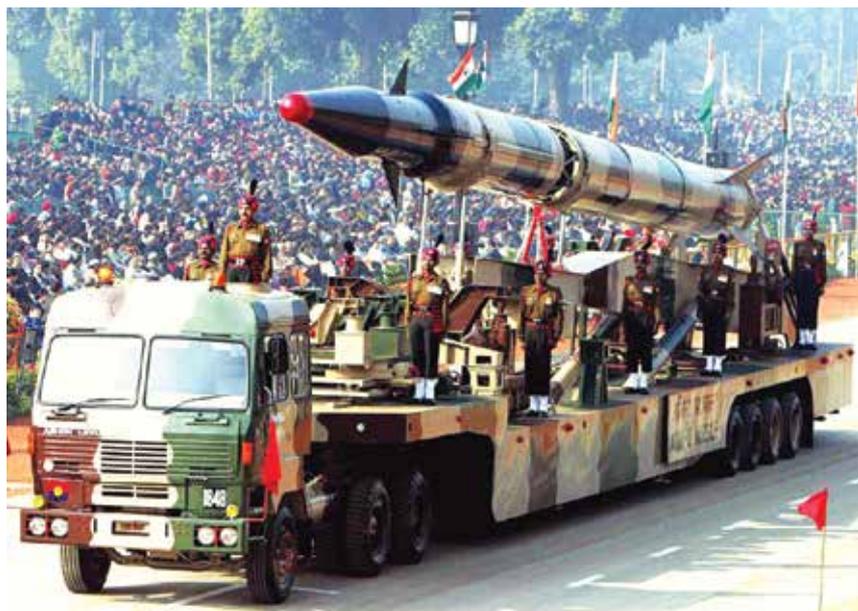
All this changed in a significant way with the signing of the Indo-Soviet Treaty on Peace, Friendship and Cooperation August 1971. To be sure, defence cooperation between the two countries had started much earlier, the 1971 treaty arguably took the cooperation to a different level with substantial transfer of technology to the Indian public sector undertakings and the ordnance factories.

This phase, marked largely by

licensed-production based on transfer of technology, lasted till the USSR disintegrated in 1991. By this time, however, the defence establishment had realised that India must move towards self-reliance in defence production. Accordingly, a roadmap was evolved by late Dr APJ Abdul Kalam to increase the share of procurement from the indigenous sources from 30 per cent to 70 per cent over the next 10-15 years.

The roadmap had little impact on India's dependence on foreign technology and equipment till the government decided to take some concrete steps following the Kargil war in 1999. Within the next two years, defence production was opened to the private sector and Foreign Direct Investment (FDI) permitted up to 26 per cent. Many other structural and procedural changes were made to streamline defence procurement. The first Defence Procurement Procedure (DPP) was promulgated in 2002.

Efforts at systematising defence manufacturing and acquisitions have continued since then. In 2006, the 'Make' procedure was introduced in the DPP to



## Defence Manufacturing

promote indigenous design, development and manufacture of the prototypes of high-technology complex systems. The same year a Defence Offset Policy was adopted to boost the fledgling Indian defence industry. In 2011, a Defence Production Policy was laid down. Since 2014, there has been a renewed effort to energise defence production under the government's 'Make in India' initiative.

Although the private sector is now playing a much larger role in

defence production than was the case till the turn of the century, the main indigenous source of supply of defence products continue to be the 41 ordnance factories and 9 Defence PSUs. The equipment, weapon systems, other platforms and ammunition supplied by them are largely made with the help of, or based on, technology-transfer from the foreign manufacturers.

The products manufactured by the Defence PSUs and the ordnance factories include arms and ammunition, tanks, armoured



vehicles, heavy vehicles, fighter aircraft and helicopters, warships, submarines, missiles, ammunition, electronic equipment, earth moving equipment, special alloys and special purpose steels. The total value of their production has gone up from Rs 43,746.48 crore in 2013-14 to Rs 52,968.13 in 2015-16.

However, there have been concerns about the productivity of these units. The cost and time overruns are endemic and, in some cases, the quality of the products has been questionable. Most of the Defence PSUs have not been making no, or considerably low, profits. Their combined profit increased by less than Rs 200 crore from Rs 4,470.77 crore in 2013-14 to Rs Rs 4,625.34 crore in 2015-16.

Self-reliance in defence production depends to a large extent on research, design and development. This has largely been the exclusive domain of the Defence Research and Development Organisation (DRDO), which is a department of the Ministry of Defence (MoD). It has been engaged in research efforts



aimed at making India self-sufficient in defence technologies relating to missiles, radars, sonars, electronic warfare, engineering systems, surveillance and reconnaissance systems, just to name a few.

The DRDO has also been working to provide state-of-the-art communication systems, electro-optics, night vision devices, information security products, naval and airborne weapons etc. Each of these is being, or has been developed, using indigenous manufacturing and testing facilities to the maximum possible extent.

Meanwhile, the private sector has made some significant strides. Major players like Larsen & Toubro, Tata Group, Mahindra Defence Systems, Bharat Forge and 6,000-odd Micro-Small and Medium Enterprises (MSMEs) are playing a greater role. According to MoD's Annual Report for the year 2016-17, the Department of Industrial Policy and Promotion (DIPP) has issued 342 Industrial Licences to 205 private companies till June 2016 for manufacturing a wide range of

**THE PRIVATE SECTOR HAS MADE SOME SIGNIFICANT STRIDES. MAJOR PLAYERS LIKE LARSEN & TOUBRO, TATA GROUP, MAHINDRA DEFENCE SYSTEMS, BHARAT FORGE AND 6,000-ODD MICRO-SMALL AND MEDIUM ENTERPRISES (MSMEs) ARE PLAYING A GREATER ROLE**



defence items and 52 of these licensed companies have so far commenced production and started supplying equipment to the armed forces.

The Minister of State for Defence informed the Lok Sabha on 07 February 2018 that expenditure on procurement from the Indian companies, presumably including those in the public sector, had increased from Rs 39,598.91 crore in 2014-15 to Rs 41,872.03

crore in 2016-17, out of total procurement of Rs 65,583.77 crore and Rs Rs 69,150.12 crore respectively.

This is impressive but clearly not good enough for two reasons. One, this dissembles the fact that India is currently the largest importer of arms, accounting for 12 per cent of the global imports between 2013 and 2017. Two, no big ticket contracts have been awarded to the Indian companies



in the recent years, though this is not for want of an effort by the government which has taken several steps in the past four years to change the narrative.

In 2016 a new procurement category, called 'Buy (Indian Designed, Developed and Manufactured)', was created. This, along with other categories, such as Buy (Indian) and Buy and Make (Indian), focuses on ensuring involvement of the private sector in defence manufacturing. About 60 per cent of the new procurement proposals have been approved in principle under these categories which means that only

the Indian companies will be able to participate in the tender.

More importantly, between 01.04.2014 and 30.11.17, as many as 119 contracts involving Rs 1,16,523 crore have been signed with the Indian companies whereas only 68 contracts involving Rs.1,24,291 crore have been signed with foreign companies. These figures could go up significantly as contracts for 'Make' projects entailing development of the prototype of defence products start getting awarded and the projects being funded by the DRDO under the Defence Technology Fund start

showing results.

But clearly this is not enough as challenges in promoting indigenous defence production still abound. To begin with, there seems to be no overarching plan for achieving self-reliance through indigenisation. Consequently, several policy initiatives are being taken in a disjointed manner without tying up all loose ends.

A case in point is introduction of the Strategic Partnership model under which Indian companies will be required to make platforms like aircraft, helicopters, submarines and armoured fighting vehicles with the help of transfer of technology from



the foreign manufacturers chosen by the MoD.

Not only does this model overlap with several other existing modes of procurement, such as Buy and Make, Buy and Make (Indian) and Make, but enough thought does not seem to have been given to the process of selecting the Indian companies as potential strategic partners. No wonder then that more than a year after the model was introduced the process of selecting the Indian companies is yet to begin.

This is also true of the steps taken by the government to raise the cap on FDI in defence to 49 per cent which has resulted in inflow of just

**A CASE IN POINT IS INTRODUCTION OF THE STRATEGIC PARTNERSHIP MODEL UNDER WHICH INDIAN COMPANIES WILL BE REQUIRED TO MAKE PLATFORMS LIKE AIRCRAFT, HELICOPTERS, SUBMARINES WITH THE HELP OF TRANSFER OF TECHNOLOGY FROM THE FOREIGN MANUFACTURERS CHOSEN BY THE MOD**

about Rs one crore by way of investment in the last four years. It is a no brainer that investment will come only if there is a business case. With a virtual 49 per cent cap on FDI the foreign investors are unlikely to invest in joint ventures as it does not give them a decisive say in its management. It is not surprising that the government is already thinking of raising it further to 74 per cent but such vacillation reflects poorly on policy making.

Be that as it may, the pace and quality of decision-making within the government in general and MoD in particular have put paid to many a promising project, such as manufacture of transport aircraft to replace the Avro-fleet of the Indian Air Force. The project, which by now would have been on way to creating a parallel aircraft manufacturing capacity in the private sector, has been hanging fire for the more than five years.

Many of these problems

are because of the procedural complexities and a total disconnect between aspiration of achieving self-reliance and the financial viability of achieving those goals. The problem also lies with a fractured organisational structure with different entities within the MoD handling research, production and procurement. The procurement process itself is handled by several agencies with no single-point accountability.

A committee set up by the MoD in 2016 had recommended setting up of a semi-autonomous Defence Acquisition Organisation to ensure a holistic approach to promote indigenous research and development, production of equipment and timely procurement of the capabilities required by the armed forces with due regard to the financial constraints. It is time to give it a serious thought.

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

# INDIA-ISRAEL: Broadening Defence Ties

Israeli Prime Minister Benjamin Netanyahu's visit to New Delhi in January 2018 marked 25 years of India establishing diplomatic ties with the former. The visit came 6 months after Prime Minister Narendra Modi's visit to Israel, the first ever by an Indian Prime Minister

**BY AJIT KUMAR THAKUR**

INDIA AND Israel have an extensive economic, military, and strategic relationship. Relations between the two countries have widened remarkably since India recognised Israel diplomatically in 1950.

Benjamin Netanyahu's visit to New Delhi in January 2018 marked 25 years of India establishing diplomatic ties with Israel. It came six months after Prime Minister Modi visited Israel, the first ever by an Indian Prime Minister, bringing ties out of the closet.

Netanyahu is only the second Israeli Prime Minister to visit India—the first such visit took place in 2003 when Ariel Sharon was in New Delhi at the invitation of then Prime Minister Atal Bihari Vajpayee.

## A Brief History

Once seen as a strong backer of Palestine, New Delhi announced the opening of diplomatic ties with Israel in January 1992 after Israeli and Palestinian delegations began peace talks that culminated in the Oslo accord between the two in



Prime Minister Narendra Modi with Israeli Prime Minister Benjamin Netanyahu at the Ceremonial Reception at Rashtrapati Bhavan, in New Delhi

1993. India-Israel ties have soared since then with defence, agriculture, water conservation, technology and innovation being the focus areas for cooperation. But there was little open acknowledgement of the depth of the relationship in a bid to balance ties with India's partners in the Arab world.

Following India's recognition of

Israel on September 17, 1950, Indian Prime Minister Jawaharlal Nehru had stated: "India would have recognised Israel long ago, because Israel is a fact. We refrained because of our desire not to offend the sentiments of our friends in the Arab countries." In 1953, Israel was permitted to open a consulate in Bombay (now Mumbai). However, the Nehru government did not want to

pursue full diplomatic relations with Israel as it supported the Palestinian cause, and believed that permitting Israel to open an embassy in New Delhi would damage relations with the Arab world.

The relationship between the two countries remained mainly informal in nature till the early 1990s. India's opposition to official diplomatic relations with Israel stemmed from both domestic and foreign considerations. Domestically, politicians in India feared losing the Muslim vote if relations were normalised with Israel.

Also, India did not want to risk the large amount of its citizens working in Arab States, who were helping India maintain its foreign-exchange reserves. India's domestic need for energy was another reason for the lack of normalisation of ties with Israel, in



terms of safeguarding the flow of oil from Arab nations.

## **Cementing Defence Ties**

In January 1992, India formally established relations with Israel when it opened an embassy in Tel Aviv after decades of non-aligned and pro-Arab policy. Ties between the two nations

**Mr Netanyahu signing the visitor's book at Hyderabad House in New Delhi;**

**PM Modi welcoming Mr Netanyahu during his visit to New Delhi**

have flourished since, primarily due to common strategic interests and security threats.

Since the Modi government came to power, there has been a flurry of high-level visits. Apart from Modi's own visit to Israel, then President Pranab Mukherjee in 2015 and Foreign Minister Sushma Swaraj in 2016 also travelled to Israel,

signifying an upscaling both in terms of visibility and focus. Netanyahu too acknowledged the role played by Narendra Modi to strengthen the India-Israel partnership. "The diplomatic relations existed for 25 years but something different is happening now because of Modi's leadership".

Relations further expanded during Prime Minister Narendra Modi's administration, with India abstaining from voting against Israel in the United Nations at several occasions during passage of various resolutions.

India and Israel have outlined a blueprint for deepening bilateral relations in the next 25 years during the first visit to India by Israeli Prime Minister Benjamin Netanyahu. The blueprint lays particular emphasis on traditional areas like defence, homeland security and agriculture besides newer areas like oil and gas and cyber security.

In defence, the two ministries are to hold discussions this year with the active involvement of the public and private sectors in order to create the basis for viable, sustainable and long-



**Mr Modi and his Israeli counterpart during the joint statement**

term cooperation in the defence industry.

Modi also urged Israeli defence firms to take advantage of the “liberalised” Foreign Direct Investment (FDI) regime.

The defence and security cooperation is the most crucial strategic asset for both nations. To identify collaborative ways to deal with the mutual threats requires military and counter-terrorism experts to conduct in-depth deliberations.

India is Israel’s biggest arms market, buying around \$1 billion worth of weapons every year. The arms acquisitions range from Phalcon AWACS (Airborne Warning and Control Systems) and Searcher, Heron and Harop UAVs (Unmanned Aerial Vehicles) to Aerostat and Green Pine radars, Barak anti-missile defence and several types of missiles and laser-guided bombs. Despite the cancellation of the missile deal, India’s defence ministry plans to buy 131 Barak surface-to-air missiles built by Rafael worth \$72 million.

India is the largest buyer of Israeli military equipment and Israel is the second-largest defence supplier to India after Russia. The military business between the two nations was worth around \$9 billion from

1999 to 2009. Military and strategic ties between the two nations extend to intelligence sharing on terrorist groups and joint military training.

India sent a C-130J ‘Super Hercules’ aircraft in November 2017, along with a 45-member contingent, including Garud commandoes, to Israel to take part in a multilateral ‘Blue Flag-17’ exercise. The exercise was the first instance of an Indian contingent participating in a military exercise in Israel. This was also the first occasion when the air forces of the two nations came together in a multilateral exercise setting.

In February 2014, India and Israel signed three important agreements — Mutual Legal Assistance in Criminal Matters, Cooperation in Homeland and Public Security, and Protection of Classified Material. Under Cooperation in Homeland Security, four working groups in the areas of border management, internal security and public safety, police modernisation and capacity building for combating crime, crime prevention and cybercrime were established.

Israel was one of the main suppliers of weapons to India during the 1999 Kargil War with Pakistan.

Israeli defence players are also

actively participating in the “Make in India” initiative and they have formed a number of Joint Ventures (JVs) with Indian partners. The Elbit group of Israel has formed a number of JVs with Indian companies such as Adani-Elbit Advanced Systems India Ltd, a JV to manufacture UAVs in India. Israeli defence companies such as Israel Weapon Industries and Rafael Advanced Systems already have a presence in India.

Israel Aerospace Industries (IAI) signed an MoU with Kalyani Strategic Systems in early 2017 to develop, build and market selected air defence systems and lightweight special purpose munitions. The Israeli defence major has also entered into an agreement with Dynamatic Technologies and Elcom Systems for the production and maintenance work of mini-UAVs in India. IAI’s Golan Industries Division signed an MoU with Taneja Aerospace & Aviation Ltd (TAAL) for the development, production, marketing and sale of civil and military aircraft seats. IAI has also inked a MoU with Premier Explosives Ltd, and IAI and



Wipro Infrastructure Engineering (WIN) have announced a strategic alliance to manufacture composite aero structure parts and assemblies.

India's Tata Power Strategic Engineering Division (Tata Power SED) has aligned with Israel's DSIT Solutions to supply portable diver detection sonar (PDDS) to the Indian Navy.

Mahindra group has also formed JVs with Israeli defence partners. Mahindra Aero Structures signed a MoU with Cyclone, a subsidiary of Elbit Systems, to collaborate on the production of aero structures parts and assemblies. Mahindra group's Mahindra Telephonics has signed an agreement with Israel's Shachaf Engineering. Both companies will jointly develop strategic electronics sub assemblies and systems for aerospace, marine and automotive applications.

India's Dynamatic Technologies Ltd and Magal Security Systems of Israel have entered into an arrangement for India's smart border management initiative. Both companies have rich experience in developing advanced technological solutions crucial for the

**PM Modi and Mr Netanyahu witnessing the signing of an agreement;**

**(Below) Mr Modi and Mr Netanyahu at a delegation level meeting**



protection of critical infrastructure and border management.

Kalyani Strategic Systems, a defence arm of Kalyani group, entered into a JV with Israeli government-owned Rafael Advanced Defence Systems. The Kalyani Rafael Advanced Systems Pvt Ltd has invested in the high-end technology and advanced manufacturing techniques to develop missile technology, command and control systems,

guidance systems, electro-optics, remote weapon systems, precision guided munitions and more. Rafael has also signed an agreement with Hyderabad-based Astra Microwave Products Ltd to build tactical radio communication systems, electronic warfare systems and signal intelligence systems. India's Punj Lloyd and Israel's IWI (Israel Weapon Industries Ltd.) have set up the first private sector small arms manufacturing plant in Madhya Pradesh, to produce equipment for both local and export use.

India's Small and Medium Enterprise (SME) sector's contribution in Israel's defence industry is significant too. Though relatively low in numbers, these SMEs support the bigger firms and are vital for enhancing Israel's defence exports. A number of MSMEs (around 6,000) across the country act as suppliers to DPSUs (Defence Public Sector Undertakings, ordnance factories, Defence Research and Development Organisation (DRDO) and private industries, according to the Dharendra Singh Committee report. This relationship is crucial for future security and prosperity of both the nations and maximising the military and commercial engagements should be the next goal of the India-Israel partnership.



# India's Shipbuilding and Submarine Programmes: The Make in India Journey Through Self Reliance

The Navy of independent India formed the Corps of Naval Constructors on November 23, 1956 as part of the Engineering branch of the Indian Navy, to undertake indigenous repair, design and construction of warships. **BY CMDE RANJIT B RAI (RETD)**

***"We cannot afford to be weak at sea. History has shown that whoever controls the Indian Ocean has, in the first instance, India's sea-borne trade at her mercy and, in the second, India's very independence itself.".....***

*– Prime Minister Pandit Jawaharlal Nehru on board INS Delhi ( Former HMS Achilles)*

**T**HE WORLD 'navigation' comes from the Sanskrit word 'Navagati' and India's ancients were seafarers. Soon after Independence India's first Prime Minister Pandit Jawaharlal Nehru who knew India's history and how it was conquered from the seas, appreciated the importance of the seas for India, and respected the rich ancient maritime traditions with involvement with the oceans and the art of shipbuilding in its history, which goaded him to write the above lines when he took a passage to Indonesia in the cruiser INS Delhi. It was in 1736, Lovji

Nusserwanjee Wadia began the Wadia shipbuilding dynasty, when he obtained a contract from the British East India Company for building docks and ships in Bombay docks and two remain, with teak wood for the hulls that proved sturdier than the oak wood built ships abroad. The Wadias built many wooden sailing warships for Royal Navy(RN) like HMS Foudroyant and Minden at Bombay, but with the advent of steam propulsion the technology was denied to India.

With British ascendancy to power in India, the Indian shipbuilding was gradually destroyed and shipping industry became restricted to the export of Indian goods to Europe.

(Below) A Scorpene submarine (File photo)



One of independent India's niche triumphs therefore has been the resurrection of naval ship design and building skills that were stifled during the colonial period.



**(Above) Prime Minister Narendra Modi with Navy Chief Admiral Sunil Lanba at Navy Day Reception;**

**Indian Navy's diesel-electric attack submarine INS Shishumar (S44) at Port of Duqm in Oman**



The Navy of independent India formed the Corps of Naval Constructors on November 23, 1956 as part of the Engineering branch of the Indian Navy, to undertake indigenous repair, design and construction of warships whilst simultaneously bringing the aspects of onboard maintenance of hull under the Corps.

Noted Naval Architects Shri Paramanandan, Shri Sam Dotiwala and Shri VS Dhumal were the pioneers of the nascent Corps. The first uniformed Naval Constructor in the Indian Navy was Late Cmde Ved Prakash Garg (1929–1983). While the first Constructor officers were trained at Royal Naval College at Greenwich, UK, Naval Architects from IIT Kharagpur were inducted from 1958 onwards. As the demands for increasing the strength of the Corps grew, the Navy recruited Engineers from other disciplines and trained them initially at IIT Kharagpur and later at IIT Delhi. The first such conversion course started in 1973. From a very modest beginning the Corps has grown today to a sizeable strength of about 300 men and women officers. The shipwright sailors about 100 are annually trained in their specialisation at the Navy's Shipwright school at Visakhapatnam.

**IN A SHORT SPAN OF HALF A CENTURY THE INDIAN NAVY BOASTS OF AN ESTABLISHED SHIP DESIGN CAPABILITY IN THE NAVAL DESIGN DIRECTORATE FOR SURFACE SHIPS AND SUBMARINES AND WHICH HAS BEEN SUPPORTED BY WEESE FOR ELECTRONICS, SOFTWARE AND COMMUNICATIONS**

The Indian Navy has to be justifiably credited for its efforts to revive and 'Make Warships and Submarines In India', a decade and a half after gaining Independence. The Navy's leadership had the vision to set up a design bureau in Delhi's Greater Kailash with officers trained at IIT (Kharagpur), in UK at Greenwich and Bath where RN had a design bureau and Russia's world famous Severnoye, Rubin and Krilov Institutes to design and build ships in India. As of writing 30 warships are being built in India and none being imported except the two advanced

Submarine Rescue Vessels from UK.

The Navy's Corps of Naval Constructors completed 50 years on 17th Nov 2006 under the Director General of Shipbuilding and arranged an International Constructors Seminar in New Delhi. The invited Russian, American and British experts lauded the 350 strong Corps who are currently actively contributing in diverse fields such as ship and submarine design, construction, repair and maintenance, and also R&D in Naval research.

In a short span of half a century the Indian Navy boasts of an established ship design capability in the Naval design Directorate for surface ships and submarines (DGND)

and which has been supported by the Weapons Electronics Engineering Establishment (WEESE) for electronics, software and communications. These two organisations under NHQ have supported and guided Indian Public Sector Shipyards (PSUs) and private shipyards to build and arm platforms which include Navy designed destroyers ( 3 Type 15s, 4 Type 17 Shivaliks, 6 elongated Leander frigates with missiles, 3 ASW P 28 corvettes and OPVs and survey ships, tankers and supported four conventional submarines of

## Shipbuilding

German design at Mazagon Docks Ltd and are designing the Project 75India submarines with AIP (Air Independent Propulsion). See list).

### PRIVATE SHIP BUILDING

There are three main private sector players who have invested in shipyards in India. These include Pipavav Shipyard Limited (PSL) now Reliance Defence, ABG Shipyard Limited and L&T Shipyard. PSL is the largest shipyard in India and also one of the largest dry docks in the world. Two Goliath cranes of 600 T capacity each, service the dry dock and adjoining pre-erection berth, enabling PSL to handle up to 1200 T pre-outfitted ship blocks. PSL is using modern shipbuilding processes, including modular construction and line heating technique. Presently it has a order of 5 OPV orders.

ABG Shipyard Ltd located in Surat in the state of Gujarat is also one of the largest with state of the art, manufacturing facilities including a "Ship-lift Facility" with a lift capacity of 4500 tons, side transfer facilities, CNC plasma cutting machine, Bending rolls, Hydraulic press, Cold shearing machine, Frame bending machine and steel processing machinery. The ABG Shipyard has successfully delivered three pollution control vessels and Interceptor Boats (45 knots vessels) in Aluminum hull with Water Jet Propulsion to the Indian Coast Guard and has orders for three Naval training ships but has declared bankruptcy.

There has been successes in private ship building for L&T (Larsen & Toubro) which has two yards, one at Hazira, Gujarat and Kattupalli Shipyard located near Ennore Port in Tamil Nadu. The company has projects from the Coast Guard to manufacture 7 OPVs and 36 high speed "interceptor" vessels which can travel up to 45 knots per hour. The facilities at the shipyard include



pre-fabrication such as shot blasting and priming, CNC cutting, and a slipway to launch the vessels along with a jetty for outfitting jobs for the ships under construction. L&T has builds nuclear submarines under Naval supervision under DRDO.

India's versatile Constructor officers have even played a role in the naval variants of the country's prestigious Guided Missile Programmes on warships, and the successful fitment of BrahMos on surface ships (4 Rajput class, 3 under construction 4Type 15Bs, and 3 Krivacks at Yantar and the fitting the B-05/K-15 underwater 750 km nuclear tipped twelve missiles on India's first made in India nuclear submarine INS Arihant built at the Ship Building Centre (SBC) Vishakapatnam which was commissioned in 2016 are operational successes.

India has commissioned the three Project 28 indigenously made anti-submarine corvettes -INS Kiltan, Kamorta and Kadmatt at GRSE which have 90% indigenous content and last Kavaratti will be

(Clockwise) Delhi Navy Project 15, Project 15A and Project 15B DDGs

**INDIA HAS COMMISSIONED THE THREE PROJECT 28 INDIGENOUSLY MADE ANTI-SUBMARINE CORVETTES -INS KILTAN, KAMORTA AND KADMATT AT GRSE WHICH HAVE 90% INDIGENOUS CONTENT AND LAST KAVARATTI WILL BE MORE MODERN, WITH A NEW LIGHT WEIGHT MAST AND WILL BE COMMISSIONED END OF 2018**

more modern, with a new light weight mast and will be commissioned end of 2018. The project was approved in 2003, and first ship - INS Kamorta and second- INS Kadmatt were commissioned in 2014 and 2016 respectively. The remaining one INS Kavaratti is under construction and is slated to be completed by the end of 2017.

The Naval designers took on The DRDO-Navy Project Akshanka (Hope) formerly the classified Advanced Technology Vehicle (ATV) nuclear submarine project which is guided by PMO to build two more larger than Arihant nuclear submarines at the Ship Building Centre (SBC) Vishakapatnam hived out of the sprawling Naval Dockyard in a Public Private Partnership (PPP) with the Engineering giant Larsen and Tubro (L&T). The 85MW nuclear reactor is supplied from BARC, the turbines from BHEL and many ancillary Indian industries with Russian consultants. Currently India is on the threshold of completing its first indigenous aircraft carrier 37,500 ADS Project 71 Vikrant at Cochin Shipyard Ltd (

See latest April picture).

The Government after Independence took over the repair yards left by the British and therefore Indian Navy and the private sector was barred from ship building, which was termed a strategic industry till the early 1970s. The Mazagon Docks Ltd took over the building of Leanders with design from Yarrow Shipyard at Glasgow and to lessen dependency on imported warships and support the three Government controlled Public Sector Shipyards(PSUs), namely MDL at Bombay, GSL at Goa and GRSE at Calcutta.

The Ministry of Shipping set up a green field shipyard at Cochin with Japanese aid and Mitsubishi collaboration specifically for merchant shipbuilding, and the yard is currently engaged in building India's first 37,500aircraft carrier INS Vikrant with rising costs and delays. I has been a most challenging task, not undertaken before. Fincantieri is assisting in meshing the four LM-2500 engines with the gear box and

**(Clockwise) Vikrant at Cochin Shipyard Ltd;**

**The Brahmos being test fired from INS Chennai (File photo);**

**Kalvari Undocking;**

**INS Karmuk, a Kora-class corvette of Indian Navy**



Mactaggart Scott UK is assembling the side aircraft lifts for the MiG-29Ks and the diesel generators are being supplied by Wartsila of Finland.

A 30 year Submarine Building Plan (1999) document for two line submarine building was also issued after the confidence shown by the designers. Navies need long term strategic plans and sustained funds as the gestation period of building ships is long and setting up building yards, is a capital intensive and risky proposition. The pride of the Naval Make in India programme are three Shivalik Project Type 17 home designed and home built frigates with Klub and Barak AA system missiles with Elta supplied AMDR radar can be ranked as equal to latest in the world. All ships have Bharat Electronic Let(BEL) sonars and Israeli or Russian EW systems. Seven Type 17A with assistance from Fincantieri will be constructed in modular manner at Mazagon Docks

Ltd and Garden Reach Shipbuilders and Engineers Ltd (GRSE). and line Project 75 India to augment the submarine force in the long term is still to be progressed.

“By virtue of its inherent attributes, Indian planners have been at pains to explain that naval power is generally self-contained not only to deal with security challenges across the maritime ‘spectrum of conflict’, but also for its government to achieve geo-strategic objectives beyond these, in peace. This stems from the wide range of options that the Navy offers to its government - while its versatility enables transposition of roles ranging from ‘military’ to ‘constabulary’ and from ‘diplomatic’ to ‘benign’, its attributes of reach, sustenance and poise in international waters enable power-projection in a calibrated manner. The Indian Navy appears to be getting ready for the task.

– Cmde Ranjit B Rai (Retd) is former Director of Naval Intelligence and Operations and author of Navy Diary -2018



# Army Aviation Turns 31

The Army Aviation should possess a mix of light fixed wing aircraft and all categories of helicopters including attack/gunships for various roles like reconnaissance, surveillance, combat fire support, airborne command posts, combat service support, special operations and logistics. A report by **LT GEN BALLI PAWAR (RETD)**

**T**HE ARMY'S air arm the 'Army Aviation Corps' completed 31 years of its existence on November 1, 2017. From operating the Auster/ Krishak two seater fixed wing aircraft as part of erstwhile Air Observation Post (AOP) units, to the induction of light observation helicopters (Chetak/Cheetah) in early 1970s, the birth of the Corps

in 1986 and the induction of the Hindustan Aeronautical Ltd (HAL) manufactured twin engine Advanced Light Helicopter (ALH) and its armed version the 'Rudra' in 2002 and 2013 respectively, has been a challenging journey. However its growth has been nowhere near what was envisioned in 1963 by the then Chief of Army Staff Gen JN Chaudhary – today it lacks the requisite firepower,

manoeuvre and assault capability in terms of attack and lift helicopters.

A survey of military aviation organizations, worldwide reveals the inadequacies of the Army Aviation. All major armies of the world including our adversaries China and Pakistan have a full - fledged air arm of their own, comprising all types of helicopters and fixed wing aircraft. The Pak Army Aviation boasts of an inventory consisting of all class of helicopters, including attack and fixed wing aircraft. In contrast, the Indian Army Aviation remains a reconnaissance and observation force with a few light utility helicopters. At present the army aviation assets are inadequate for the size of the Indian Army and the tasks it is required to perform. The expansion of the Aviation Corps is therefore imperative. The Army Aviation should possess a mix of light fixed wing aircraft and all categories of helicopters including attack/gunships for various roles like reconnaissance, surveillance, combat

fire support, airborne command posts, combat service support, special operations and logistics.

However, despite its stunted growth and curbed status, this fledgling arm of the Indian Army continues to receive accolades for its performance, be it the Kargil conflict, the ongoing Counter Insurgency Operations or the unrelenting operations in the Siachen Glacier, the highest battlefield in the world. Routinely operating at 20000 feet and above, on extreme fringes of the current helicopter's flight envelope, the Army Aviation has virtually been the lifeline of the troops deployed on the Glacier- a feat unparalleled anywhere in the world.

## Army Aviation – Role & Employment Philosophy

The primary mission of army aviation is to fight the land battle and support ground operations. Its battlefield leverage is achieved through a combination of reconnaissance, mobility and firepower that is unprecedented in land warfare. Reconnaissance, attack, utility and cargo helicopters complemented by light fixed wing and support services like the air traffic control and logistics, are all required to support the army in its range of military operations. Aviation assets are force multipliers that provide the field force commanders the capability to conduct operations across the entire range of military conflict-this versatility is the very essence of Army's air arm.

A major challenge facing the Indian Army today and in the future is counter insurgency/counter terrorist (CI/CT) operations. The protracted nature of CI/CT operations may seem to negate the need for a war fighting doctrine that emphasizes on speed and tempo. However it actually invites the pure application of terms, where speed is relative and exploits the natural advantages in mobility of

(Left) HAL Krishak, display in Air Force Museum, Palam, New Delhi;

(Below) Indian Army's Hindustan Aeronautics Limited (HAL) Rudra;

Nag missile with the NAMICA in the background

security/special forces through use of helicopters. In our context the use of helicopters for these operations has been restricted to troop carriage, logistics, surveillance and casualty evacuation. We have been reluctant to use gunships/attack helicopters because of concerns for collateral damage. While this is of concern in built up areas, in remote mountainous terrain/ jungles this option needs to be looked at by the army and assets acquired accordingly.

## Army Aviation - Growth Perspective

Presently the Army has in its inventory the largest number of helicopters amongst the three services (300 plus), majority being the light observation class (Cheetah and Chetak). These helicopters are obsolete and have been in service for 40 years - keeping this fleet operational itself is becoming well-nigh impossible due to its



vintage and spares criticality – a fact corroborated by both HAL and the Army. The ‘Cheetal’ helicopter (upgraded Cheetah) fielded by HAL as an interim measure is not a satisfactory solution. However to overcome the present criticality, 30 Cheetal helicopters are planned for induction in the next 2-3 years. The Army today has few helicopters to carry out a number of extremely specialized roles in the Tactical Battle Area (TBA). While the induction of the ALH is making steady progress(though plagued by poor maintenance support and serviceability), the medium and heavy lift helicopters which form the core of the tactical lift capability, continue to be with the Air Force . A similar situation exists with regards to attack helicopter units, which despite the Government order and being an integral part of the land battle, remain with the Air Force . Their optimum employment is not possible in the present set up. The army’s requirement of small fixed wing aircraft (Dornier Class), in limited numbers for roles like command and control, aerial

**THE GOVERNMENT’S DECISION TO GO IN FOR THE INDUCTION OF 200 RUSSIAN KA-226T HELICOPTERS IN A GOVERNMENT TO GOVERNMENT DEAL IS WELCOME STEP. WHILE THE DETAILED FORMALITIES ARE YET TO BE WORKED OUT, THESE HELICOPTERS WILL BE MANUFACTURED IN INDIA UNDER THE MAKE IN INDIA PROGRAMME**

communication hubs, logistics including casualty evacuation and communication flights has also not fructified due to objections of the Air Force – one unit per operational command has been planned. This, despite the fact that even the Coast Guard and Border Security Force have fixed wing aircraft in their inventory.

### Army Aviation - 2025

However, finally there is some light at the end of the tunnel on the issue of the replacement of the ageing fleet of Chetak/ Cheetah helicopters. The Government’s decision to go in for the induction of 200 Russian Ka-226T helicopters in a Government to Government deal is welcome step. While the

detailed formalities are yet to be worked out, these helicopters will be manufactured in India under the Make in India programme. The JV for the same has already been signed between HAL and Russian Helicopters and as per reports the contract is likely to be signed soon. In addition the HAL has also undertaken the development and manufacture of a three ton class light utility helicopter (LUH). This is to cater to the light reconnaissance & observation class of helicopters for all three services. As per HAL the LUH is expected to complete flight certification in the next few months and go into production thereafter. The plans are to manufacture 184 LUH in the new helicopter complex to be built in Tumakuru in Karnataka.

- Overall there is requirement of almost 500 helicopters of the light observation class, with Army’s requirement amounting to approximately 280-300, including the replacement of Chetak/Cheetah.

In the utility/lift category the induction of indigenously manufactured ALH commenced in 2002. Since then 70 helicopters have been inducted and operationalised so far-another 60-70 are planned for induction in the coming decade. The latest version of ALH fitted with the more powerful ‘Shakti’ engine an upgrade of the earlier engine fitted on the ALH, has also entered service. These helicopters will form part of the Aviation Brigades of each Corps.

Another variant of the ALH is the armed version called the ‘Rudra’, which was officially handed over to the army during the Aero India show in February 2013 - the first unit is already operational and another under raising. Rudra is a typical armed helicopter with an array of weapon systems including gun, rockets, air to air (Mistral) and air to ground missiles, along with a modern sighting system and integrated electronic warfare self - protection suite. However,

(Right) HAL’s Light Utility Helicopter Chetak;

(Below) Indian Army’s Cheetah





in its present configuration it has not been integrated with a suitable ATGM, as the air version of Nag ATGM 'Helina', being developed by the Defence Research and Development Organisation (DRDO) is not yet ready. It is pertinent to note that non availability of a suitable airborne ATGM will not only impact the operational capability of the Rudra but also the Light Combat Helicopter (LCH) project of HAL. The ATGM is the main weapon system of an armed/attack helicopter and without it the helicopter merely

remains a gunship, inhibiting the exploitation of its full potential.

The army is also looking to acquire a suitable helicopter in the 10-12 ton class with stealth features for its Special Operations Units as well as enhancing its overall tactical lift capability. The HAL has been looking at the feasibility of a joint venture with a foreign vendor for a 10-12 ton class multirole helicopter whose variants would also be available to the Navy and Air Force. However, so far very little progress has been made on this project.

With the decision of the MoD on the ownership issue of attack helicopters in army's favour, the army had projected its own requirements of attack helicopters – 39 Apache Mk III for its Strike Corps. In a recent development the Government has cleared the acquisition of only six Apache's.

Though not an ideal situation but a beginning has been made and the Army is looking forward to induct these, state of art Apache's into its inventory. It is understood that the latest version of the upgraded Apache Block-III (Guardian) is to be inducted into the Indian military, which demonstrates many of the advanced technologies being considered for deployment on future attack helicopters. In this regard HAL's development of the LCH is a landmark achievement. The LCH is stated to be a state of art attack helicopter with capability to operate at high altitudes (16000 feet) and would meet the unique requirements of the Indian Army. The LCH uses the technology of the existing ALH and its configurations except that the fuselage is suitably modified and streamlined for tandem seating. A number of

**THE LCH IS STATED TO BE A STATE OF ART ATTACK HELICOPTER WITH CAPABILITY TO OPERATE AT HIGH ALTITUDES (16000 FEET) AND WOULD MEET THE UNIQUE REQUIREMENTS OF THE INDIAN ARMY**



(Above) Hindustan Aeronautics Ltd Light Combat Helicopter (LCH)

development flights have taken place since its maiden flight on 29 Mar 2010 and HAL hopes to achieve initial operational clearance this year- hopefully. Both the Army and Air Force are the potential customers for the LCH with the Army's requirement pegged at 114 helicopters.

## Infrastructure Development

There is an urgent requirement to build suitable infrastructure and have it in place to absorb the new equipment and organizations. Support services like air fields, air traffic control, met equipment, maintenance equipment etc, would also need upgrading and refurbishing. Lastly, the most important facet, the training facilities for the training of aircrew and ground crew need

modernisation. The importance of simulators for this purpose cannot be over emphasized. Currently the HAL in a joint venture with a Canadian firm (CAE) has come up with a full motion simulator for training of ALH pilots (civil/military) at their 'HATSOFF' Complex in Bangalore.

Keeping in mind the vast expansion plans of the Army's air wing in the coming years and induction of sophisticated state of art equipment, Simulators will be the way forward for future training methods as they are cost and time saving.

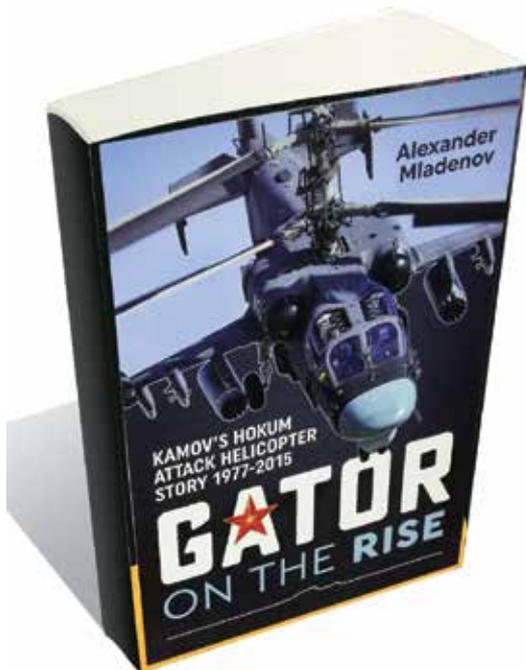
## Conclusion

To make the army aviation a potent force capable of supporting the Indian Army operations across the entire spectrum of conflict in the TBA, it must have a mix of both, helicopters

and fixed wing aircraft with helicopters available in larger numbers. The helicopter fleet should consist of attack and armed helicopters, heavy, medium and light utility (lift) helicopters and light observation helicopters. There also would be a need for specialized helicopters suitably modified for special operations. The aim is to make the force a capability based organization rather than an equipment and inventory based structure, implying commensurate induction of man, machine, organisational and infrastructural requirements. New dimensions in tactical night operations as a direct result of sensor and avionics capabilities, with the ability to operate at low levels at night will yield great dividends. Only then will the Army Aviation evolve as a potent arm of the Indian Army, whereby its combat efficiency is enhanced to the maximum extent.

# Gator on the Rise

## “KAMOV’S HOKUM ATTACK HELICOPTER STORY 1977-2015”



While the book begins with a detailed introduction, clear cut chapters and even a very helpful list of abbreviations, be warned, it is not meant for those with no background in the subject – highly technical and heavily detailed. The book is authored in a way that assumes the reader has prior knowledge and interest on the subject of armoured helicopters and scientific details – or at least a major interest in the same.

**S**OLITARY, TERRITORIAL, predatory if provoked; alligators aren’t known for being cute or cuddly – as far as wildlife is concerned. No surprise then that Kamov Sergey Mikheev, the chief driving force behind the conceptual and real-world implementation of the unorthodox Black Shark and Alligator development programmes named them such.

In Alexander Mladenov’s *Gator on the Rise*, we get an unfiltered, heavily detailed look in to the armoured attack helicopters created by the Moscow-based Kamov Experimental Design Bureau, the crowning achievement of a Dr Sergey Viktorovich Mikheev, the long-time General Designer of the Kamov OKB.

This one’s not for newbies.

While the introductory chapter gives us an overview on Mikheev, it also plunges directly into his contributions to the Kamov OKB, beginning with the design of the Ka-50 and Ka-52 coaxial armoured attack helicopters and their status as the crowning glory contribution of Mikheev. The book then delves into a detailed history with the how it all began chapter taking us back to a 36-year old Mikheev and his earliest contributions – detailing everything from the need for new helicopters for the Red Army, to AAH programme features, coaxial system advantages and more.

Chapters like Birth of the V-80, Never-ending tender, Black Shark grows and evolves, Into the 1990s, Black Shark’s combat debut, The

Ka-52 story begins, In the twenty-first century, International marketing efforts, Ka-52’s development continues, System development and testing completion, In RAA service, Ka-52K for the Russian Navy, Ka-52 for export and But what about the Black Shark and Kamov? are all supplemented by graphic illustrations and full-colour good quality images.

The story delves deep into the exact need for the helicopters, operational history, the initial prototypes, the changing models, the specifications, the production procedures, the updates, budgets, funding and



perhaps inadvertently (or not) ends up revealing about the political and societal environment of the country.

Last but not the least, Alexander Mladenov’s background as an aviation and defence author, journalist and photographer based in Sofia, Bulgaria help give him the necessary expertise required to author a book of this sensitive nature, and he appears to have done full justice to the subject matter at hand. ●

# BEL to be Reliable Partner in Government's Make in India Programme

**M** V. Gowtama has been the Chairman of the Board, Managing Director and Whole Time Director at Bharat Electronics Limited (BEL) since November 8, 2016. Mr. Gowtama served as General Manager of Bengaluru Unit at Bharat Electronics Limited until November 8, 2016. He joined BEL at Ghaziabad Unit in January 1983 as a Probationary Engineer. He was initially posted to the D&E-Radar Division where he contributed to the development of Receiver sub-system of Cyclone Warning Radar. In about three-and-half years, his team was able to design, develop, manufacture, deliver and commission the first Cyclone Warning Radar at Paradip in Orissa (Now Odisha). The Cyclone Warning Radar development team also won the R&D Award.

From 1998 to 2006, he worked on the Sangraha programme of Indian Navy. With ToT from DLRL, his team developed different ESM systems for submarines, helicopters, medium and long-range aircraft. They also developed in-house a light-weight ESM system for small ships called Sanket. Traditionally, project teams at Hyderabad used to look after ToT, development, testing

and installation and commissioning activities. However, a new D&E division was established in 2006 to address future businesses in line with the new defence procurement policy and Mr Gowtama had the opportunity to lead this D&E group as AGM. Mr M V Gowtama took over as GM (Technology Planning)/BEL-Corporate Office, on February 1, 2010. Later he served as GM (Milcom)/BEL-Bengaluru and was Executive Director (Missile Systems)/BEL-Bengaluru till his elevation as CMD, BEL.

Mr M V Gowtama completed his B. Tech in Electronics and Communications from Sri Venkateswara University College of Engineering, Tirupati, in 1983. Later, he completed M. Tech in Advanced Electronics from Jawaharlal Nehru Technological University, Hyderabad, even while in service.

In an interview with **Raksha Anirveda**, Mr Gowtama, delve into the details on how Bharat Electronics has been able to achieve technological leadership in defence electronics over the years, contribution of BEL towards modernisation of Indian Armed Forces, etc.

**Could you talk about how successful BEL has been in**

**attaining technological leadership in defence electronics? Please share details about the major achievements recently?**

BEL, with a vision of making India self-reliant, has been India's foremost defence electronics company since



M. V. Gowtama, Chairman of the Board, Managing Director and Whole Time Director at Bharat Electronics Limited (BEL)

1954. BEL is steadily increasing its portfolio in defence electronics. It has been the most trusted partner of Defence Research and Development Organisation (DRDO) and spends eight to nine per cent of its turnover on R&D. It has strengthened the armed forces (Indian Navy, Indian Air Force as well as Indian Army) with many indigenous defence systems in the field of Radars, Communication systems, Electronic Warfare systems, Weapon systems, Night vision devices, etc.

Some of the systems already delivered include the various surveillance and weapon locating radars, Akash Missile System, IFF radars, Air Defence Control & Reporting System (ADC&RS), Combat Management Systems (CMS) and Sonars for ships & submarines, ship-borne and land based EW Systems, Communication equipment for Navy and Army, Digital Flight Control Computer (DFCC) & Avionics for Light Combat Aircraft (LCA),

**BHARAT ELECTRONICS LIMITED (BEL), WITH A VISION OF MAKING INDIA SELF-RELIANT, HAS BEEN INDIA'S FOREMOST DEFENCE ELECTRONICS COMPANY SINCE 1954. IT IS STEADILY INCREASING ITS PORTFOLIO IN DEFENCE ELECTRONICS**

Night Vision devices, etc.

**How does BEL contribute to the modernisation of armed forces? What are the latest products in defence and aerospace category?**

Modernisation of Armed Forces happens through induction of state-of-the-art equipment and upgrading sensors & weapons on existing platforms. BEL is contributing in both these areas. Today BEL is working on many new products such as AESA based modern Multi-mode Radars, Next Generation Electronic Warfare suites for fighter aircraft, Integrated EW systems for various terrains / ships, Tactical Communication Systems, Battlefield Management Systems, Passive Night Vision Devices, Multi-sensor Stabilisation Systems with sensors, and New Gun Programme with target acquisition and fire control capabilities. Also, BEL

is providing upgrade solutions like for L70 guns.

**Could you talk about the revenue expectations in FY18? Also, please talk about the order book position of BEL?**

Revenue Expectations: BEL is likely to achieve a turnover mark of around Rs.10,000 Crore for FY 2017-18. The company is deploying all efforts to sustain double digit growth in revenues Y-o-Y. Based on comprehensive analysis of the next five year plan, proactive new business initiatives, new order acquisition and future business trends, the company is confident of reaching a turnover of Rs. 15,000 Crore in the next three to four years.

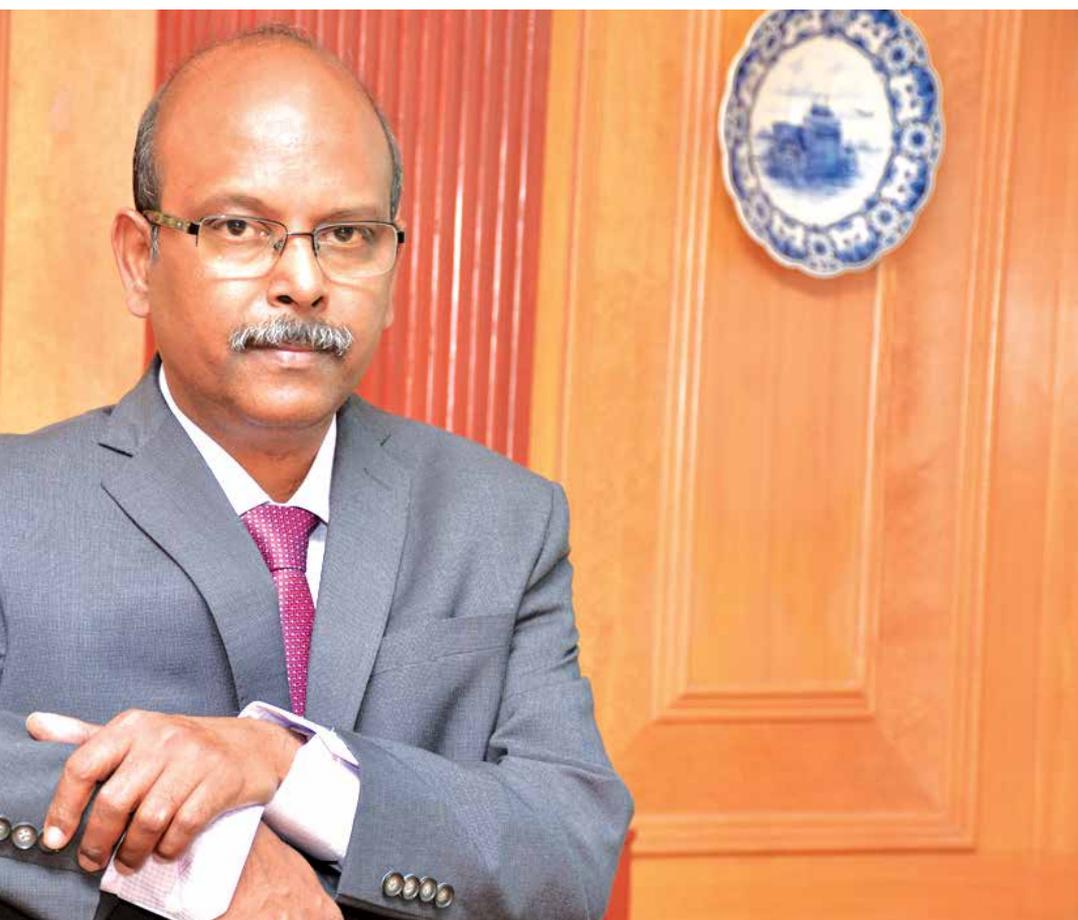
Order Book: The order book of the company as on February 2018 is around Rs. 40,350 Crore. The order book comprises of major programmes like Integrated Air Command & Control Systems (IACCS), Long Range Surface to Air Missile System (LRSAM) and Battlefield Surveillance System (BSS). Then we have various Radar, Sonar and Communication equipment for new class ships, night vision devices, Radars, EW and Gun upgrades for Army, and Electronic Voting Machines with Voter Verifiable Paper Audit Trail (VVPAT) for Election Commission of India.

The Company has an export order book of around US\$ 93 Million as on February 2018, including offset order book of US\$ 19 Million.

**To give thrust to exports is one of the objectives of BEL. Could you give an overview of your export business?**

BEL has a dedicated International Marketing Division for providing an increased thrust for harnessing the export potential of defence electronics products and systems, which represent its core area of business.

BEL has been exporting various





products and systems to friendly countries of India. Apart from this, BEL is interacting with Election Commissions of various democratic countries to market Electronic Voting Machines. Having established a Coastal Surveillance Radar System for few neighbouring countries, BEL is interacting with Government on a regular basis for supply of the system to other friendly countries of India.

BEL has identified the market segments and has a structured market plan for its products and systems. BEL has been visiting customers on a periodic basis to understand their requirements, acquisition process and to establish long-term customer relationship for enhancing export business.

BEL is starting new overseas marketing offices in four countries in the coming months. These countries are strategically located in South

Asia, South East Asia and Middle East with a focussed approach towards enhancement of export.

BEL is the only organisation in the country which is fully geared up to meet the expectations of Make in India programme in the field of professional defence electronics equipment development and manufacturing with a focus on exports. With this, BEL is focusing on the opportunities in the areas of helping Original Equipment Manufacturers (OEMs) to meet their offset obligations in various RFPs of the Ministry of Defence (MoD), on account of the offset policy incorporated in Defence Procurement Procedure (DPP). In this regard BEL is closely working with various major foreign aerospace and defence companies.

BEL has also identified contract manufacturing (both build to

print and build to spec) as one of the areas to address the emerging opportunities with OEMs. Further, efforts are being made to establish long-term supply chain relationships with global players.

BEL participates in International Exhibitions to showcase its products and capabilities and for creating brand awareness among global supply chain partners. BEL publishes periodic advertisements in international / defence magazines / periodicals / journals to enhance the visibility of BEL.

BEL is currently exporting communication equipment, Radars, Coastal Surveillance System, Cable Looms and Mechanical Parts etc. to various countries – mainly Sri Lanka, Myanmar, Maldives, Mauritius, Seychelles, Vietnam, Indonesia, Israel, Switzerland, Germany, Sweden and US.

**Could you talk about BEL's business in non-defence category? Also, please talk about the latest products and major clients?**

BEL is continuously exploring opportunities in non-defence areas for enhanced growth by leveraging its strengths and capabilities acquired in the defence electronics domain. BEL intends to use its knowledge and experience acquired in defence by offering spin-off technology products for civilian applications. The main areas of focus and the products associated with the identified areas for the non-defence include Homeland Security, Smart City elements, Solar Power, Space and satellite integration business, Modern Communication Systems for Police and Paramilitary Networks, in addition to EVMs, Smart Card, Communication equipment and Electro Optic Devices. Some of the clients in non-defence are Election Commission of India, Central Paramilitary forces, MHA, Government agencies, State Municipal Corporation, Public sectors, State Police.

**Please talk about the indigenisation**

**BEL IS THE ONLY ORGANISATION IN THE COUNTRY WHICH IS FULLY GEARED UP TO MEET THE EXPECTATIONS OF MAKE IN INDIA PROGRAMME IN THE FIELD OF PROFESSIONAL DEFENCE ELECTRONICS EQUIPMENT DEVELOPMENT AND MANUFACTURING WITH A FOCUS ON EXPORTS**

**efforts of BEL in line with the 'Make in India' programme?**

In line with the Government's Make in India policy, BEL has taken several initiatives towards indigenisation to achieve self-reliance through In-house R&D, Import Substitution, Outsourcing from Indian Private industries, Public Private Partnerships, Joint Ventures, Capacity expansion, Infrastructure Development / Modernisation and Collaborative R&D. Around 87 per cent of BEL's turnover is generated through indigenously developed products / systems. As part of our efforts to enhance indigenisation, BEL has created an exclusive web link on Make in India in the BEL website (www.bel-india.com), listing the Items for Indigenisation, Items for Procurement from MSMEs, Test Facilities for use by Indian Private Vendors, Collaborative R&D, Nodal Officers to promote Make in India and Start-ups.

**Could you shed some light about your vision and priorities for BEL to achieve its objectives?**

Defence segment continues to be BEL's main business and provides about 85 per cent of revenues. BEL's vision is to be a world-class enterprise in professional electronics. In keeping with the modernisation plans of the Indian Defence Forces, BEL aims to grow at a rate of 12 to 15 per cent in the coming years.

Segments like Network Centric Warfare, Radars, Weapon systems, Electronic Warfare & Avionics, Military Communications and Electro Optics are likely to largely drive the company's growth in the future.

As a diversification strategy, BEL is continuously exploring opportunities in defence and allied non-defence areas for enhanced growth, leveraging its strengths and capabilities acquired in the defence electronics domain. Some of the new areas of focus in defence segment include Electronic Ammunition Fuzes, Inertial Navigation Systems and in non-defence segment include homeland security and smart city



Weapon Locating Radar

**DEFENCE SEGMENT CONTINUES TO BE BEL'S MAIN BUSINESS AND PROVIDES ABOUT 85 PER CENT OF REVENUES. BEL'S VISION IS TO BE A WORLD-CLASS ENTERPRISE IN PROFESSIONAL ELECTRONICS. IN KEEPING WITH THE MODERNISATION PLANS OF THE INDIAN DEFENCE FORCES, BEL AIMS TO GROW AT A RATE OF 12 TO 15 PER CENT IN THE COMING YEARS**

solutions. BEL is also working with Indian Space Research Organisation (ISRO) to address growing needs in satellites and space applications.

India is one of the most lucrative defence markets globally with mega acquisition programmes coupled with the government's firm resolve for defence modernisation. At present, the Indian defence market is undergoing several fundamental changes with the government setting a firm platform for the private sector to play a major role in the Indian defence industry. BEL is poised to face increased challenges due to competition from the private sector. BEL is working closely with platform manufacturers like Hindustan Aeronautics Ltd (HAL) and Ordnance Factory Board (OFB) to become a preferred Electronics Systems Supplier for their programmes.

BEL has been continuously carrying out changes in its organisational structure, business processes and systems to adapt to the changing business requirements. BEL is planning to invest substantially in R&D and also for expansion and modernisation of facilities especially in areas of Radars, Missile systems,

Advanced Electro-optics, Antennas manufacturing, RF & Microwave components and Homeland Security solutions.

**How do you look at DefExpo 2018 as a platform to identify new business opportunities? Could you talk about BEL's highlights at the expo?**

DefExpo 2018 is a wonderful platform to interact with existing and potential customers, partners and suppliers. At DefExpo 2018, BEL will showcase its capabilities spanning every domain of its business – Radar and Fire Control Systems, Network Centric Systems, Communication Systems, Missile Systems, Electronic Warfare & Avionics, Anti-Submarine Warfare Systems, Electro Optics & Laser Systems, Gun Upgrades, Tank Electronics, Home Land Security Systems, Technology Modules, Simulators, Shelters and civilian products. BEL will display its R&D capabilities by launching some of its new products / technologies during the DefExpo 2018. The theme for this year's display is 'Make in India' in keeping with the government's impetus on this initiative.

# ZEN TECHNOLOGIES: A journey to become topmost provider of simulator-based training solutions

Starting from the scratch Zen Technologies has become India's topmost provider of simulator-based training solutions to defence and paramilitary forces in India and abroad. Its customer base spanned across various regiments of the Indian Army but also major state police forces, ITBP, CRPF besides militaries and police forces of a number of countries in West Asia, South East Asia



**Z**EN TECHNOLOGIES Ltd was founded in Hyderabad in 1993 out of a vision by its founder Ashok Atluri, then a 27-year commerce graduate, with dreams in his eyes and a burning desire to contribute to society. Mr. Atluri started out with a capital of five lakh rupees that included his life's savings and money borrowed from friends and family. All the convictions of his youth though were soon to be put to the most rigorous test of his life. Defence has never been the friendliest businesses to break into. In the early 90s when bureaucracy still lorded over most businesses and a lack of transparency was the generally accepted state of affairs, a 20-something going out on a limb to build a company from scratch was considered adventurous by some, foolhardy by most.

The going wasn't easy. Though

the company soon realised that there was a huge opportunity for providing safer and more efficient training solutions to the defence and paramilitary forces, convincing the men who controlled the purse strings was a herculean task. The company led by its determined founder, however, dug in its heels and rolled up its sleeves. Zen was in for a long fight and it was more than ready to face the challenge.

In the bureaucracy and paper-heavy business environment of the 90s though, Zen soon realised that no customer would take them on unless they could show some proof of past credentials or testimonials from existing clients, which of course they couldn't since



being new they didn't have any client. This was a classic Catch-22 situation straight out of a satirical novel. But an entrepreneur cannot afford to complain. As the old adage goes, it is better to light a candle than to curse the darkness. Thus like a truly entrepreneurial venture, Zen set about finding a solution to what seemed like an impossibly circular problem.

Zen decided that the only way to break through was to install its first simulator free

of cost at the National Police Academy in Hyderabad. This entailed further costs and the all too real risk that the company might even go under. However, the gamble paid off. Soon the company bagged its first order in the summer of 1996.

Today Zen Technologies is India's topmost provider of simulator-based training solutions to defence and paramilitary forces in India and abroad. The company counts among its customers, not just the various regiments of the Indian Army but also major state police forces, ITBP, CRPF besides militaries and police forces of a number of countries in West Asia, South East Asia, Africa, and Latin America. With an annual turnover of Rs. 49 Crores, Zen Technologies is all

set to transition to the next level and emerge as a top global player. To this end, the company is focusing on exports and targeting a revenue of Rs 500 Crore over the next few years.

### Zen's Greatest Strength?

Innovation. The company is nothing if not innovative. In a way, Micro, Small and Medium Enterprises (MSMEs) don't really have a choice if they have to survive. They need to be agile, fleet-footed and adapt quickly to the vagaries of the market. It's a brutal environment and most of those who start out with big plans never reach the shore. Only the most innovative survive.

Zen's commitment to innovation is reflected in the amount of resources the company has invested in research and development. The company develops all its products in-house through its team of highly qualified scientists and engineers, followed by rigorous testing to ensure optimum performance even under the most strenuous

**ZEN'S COMMITMENT TO INNOVATION IS REFLECTED IN THE AMOUNT OF RESOURCES THE COMPANY HAS INVESTED IN RESEARCH AND DEVELOPMENT. THE COMPANY DEVELOPS ALL ITS PRODUCTS IN-HOUSE THROUGH ITS TEAM OF HIGHLY QUALIFIED SCIENTISTS AND ENGINEERS**

circumstances. The company attaches special importance to R&D and its unit is recognised by the Department of Scientific and Industrial Research, Ministry of Science and Technology, Government of India.

As of 2018, the company has over 90 patents filed and 23 have been granted in India and abroad.

### The Combat Training Centre - Zen's Marquee Product

After decades of innovation, Zen has been able to streamline its product offerings so that it offers the most sophisticated solutions to its customers' requirements. The Zen Combat Training Centre (CTC) is the end result of decades of listening to its customers' requirements and coming up with innovative solutions.

The Zen CTC is a one-stop training solution for armed forces and state police. The CTC is an integrated training complex configured to improve operational preparedness in both conventional & asymmetric warfare scenarios. It is not only



designed to train sub-units and units in conventional warfare but also for asymmetric warfare-Counter Insurgency (CI) and Counter-Terrorism (CT). Additionally, the CTC is flexible enough with a well defined open architecture to integrate training equipment and simulators of various global Original Equipment Manufacturers (OEMs), making it a truly open and customisable training solution.

### Some of the salient features of the Zen CTC are:

- Live-fire shooting ranges for Smart Target System (ZEN STS®) and Multi-Functional Target System (MFTS®)
- Jungle and rural settings for 'live' force-on-force engagement with simulated laser-fire (Tactical Engagement Simulator— TacSim®)
- Indoor Tracking System





(ITS) for training personnel in tackling enemy/terrorist threat inside buildings/rooms by physical intervention

- Shoot House, a bullet-proof facility, to train security personnel involved in operations to eliminate enemy/terrorist threat in a closed environment of a built-up area
- Area for perfecting lobbing and hand grenade drills with HE36S®



**“Indian defence sector is poised to end India’s worrisome dependence on foreign arms imports in the next decade. All it needs is a business-friendly environment that values innovation”**

Ashok Atluri, Chairman and Managing Director,  
Zen Technologies

- Simulator training (MMG, AGL and Infantry weapons) for improving marksmanship
- Individual marksmanship training with Advanced Weapons Simulator for all small arms with tactical scenarios for judgemental and reflex shooting

### **The Road Ahead**

Having been in the business for 25 years, Zen has seen all the major ups and downs of the industry. Today the business environment has changed considerably as has the mindset of the country’s ruling classes. Creators of wealth are no longer sought to be penalised but rather rewarded for the positive contribution they make to society. Zen Technologies Ltd is looking forward to benefiting from the government’s Make in

India policy. Today the company employs close to 200 people at its offices spread across Hyderabad and Delhi apart from a manufacturing facility close to the Hyderabad international airport. Ashok Atluri, CMD of Zen Technologies feels that the Indian defence sector is poised to end India’s worrisome dependence on foreign arms imports in the next decade. All it needs is a business-friendly environment that values innovation. Since MSMEs are at the core of the innovation ecosystem, it behooves the government to address the most pressing concerns of MSMEs including the age-old problem of prolonged procurement cycles and delayed payments that have been the rock upon which many a promising ship has dashed and sunk.



INDIA'S PENINSULA juts in to the Indian Ocean like a sword, in to the confluence of the waters that lead to the icy Antarctica from the Bay of Bengal and the Arabian Sea from the West. The Indian Ocean Region (IOR) extends from the Suez Canal to Aden in Yemen and East Coast of Africa an area of piracy, to South East Asia's strategic waterways of Malacca Straits, with Indonesia in the East, and Australia in the South East.

The entrances to the Indian Ocean Region are the six choke narrows, of Bab-el- Mandab, Hormuz, Malacca and Sunda Straits and the Cape of Good Hope of

## Indian Ocean Region: Challenges and India's Role for Maritime Security in the Region

70% of the world's oil and cargo trade passes through Indian Ocean Region's waters, at a time when India, ASEAN and China are the world's fastest growing economies, and are also contributing to drive the world's flagging economy

**BY CMDE RANJIT B RAI (RETD)**



(Left) China Admiral Shen JINLONG with author Ranjit B Rai

**THE INDIAN OCEAN REGION IS ALSO THE WORLD'S MOST POPULOUS REGION WITH POCKETS OF POVERTY, AND HAS BECOME STRATEGICALLY, THE WORLD'S MOST IMPORTANT REGION WHERE TERRORISM RAGES IN SOUTH ASIAN NATIONS AND WHERE INDIA'S AND AMBITIOUS CHINA'S MARITIME INTERESTS CLASH**

in a long term plan. China is also helping Pakistan to build PNS Jinnah at Ormara as a submarine base.

The Indian Ocean Region is also the world's most populous region with pockets of poverty, and has become strategically, the world's most important region where terrorism rages in South Asian nations and where India's and ambitious China's maritime interests clash. The Chinese economy has expanded sixty two times, from less than \$200 billion to approximately \$11 trillion between 1979 and 2016 and China is the world's largest exporting nation, the world's largest trading nation and wishes to overtake the United States, but China is also vulnerable in the IOR. China is the world's largest importer of fossil fuels which transits through the Indian Ocean region, at times at the mercy of India and USA which has a base in Diego Garcia. This worries China.

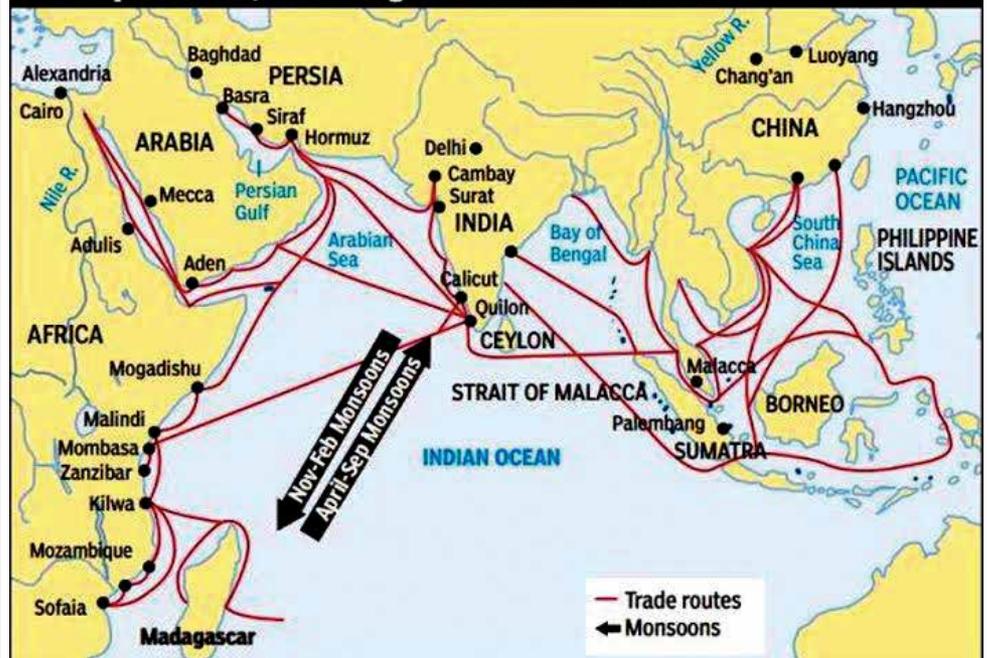
Historically nation's have grown and risen on the world's stage on maritime power and nationalism.

China dubs its nationalism as 'Love For Your Country', (在您的国家 Pinyin Feibao) and are fired by a desire to regain their lost 'Yellow Glory', in a "peaceful harmonious rise", which the world views as a ruse. China has vowed never to be dominated as it was for 100 years (1849-1949) by foreign powers and lost Hong Kong and Taiwan and wants to regain its traditional boundaries.

China has placed its bets on its strategy based on its board game called 'Weiqi' pronounced 'weychee' (igo in Japanese, baduk in Korean) with a 'String of Pearls' of ports to contain India in the Indian Ocean as it seeks a place in the security architecture of the IOR for security of its shipping. China has interests in Myanmar and has built the Kyauk Pyu port for \$10 billion which received its first supertanker carrying 140,000 tonnes of Chinese-bound crude oil in June, the entry point for a pipeline that pumps oil 770 km (480 miles) across Myanmar to South West

South Africa, and India has the Ten Degree Channel in the Andaman and Nicobars. If any of these narrows is blocked for shipping it can lead to disruption of world trade, as 70% of the world's oil and cargo trade passes through this region's waters, at a time when India, ASEAN and China are the world's fastest growing economies, and are also contributing to drive the world's flagging economy. The strangulation of shipping lanes could even lead to war, and nation's militaries in the East are preparing for just that, as insurance, and Indian Ocean is witnessing militarisation. Nations like Bangla Desh, Indonesia and Vietnam are buying submarines and China is building eight for Pakistan

**A sailors' trading map dating to AD 500-1000, based on wind patterns, showing India as the fulcrum**



China and forms a crucial part of Beijing's "Belt and Road" project to deepen its economic links with Asia and beyond.

China has built Gwadar port, has taken lease of Hambantota in Sri Lanka and now controls Gwadar in Pakistan and has an expanding naval base in Djibouti. The PLA (Navy) has shown its capacity for expeditionary forays by continuously fielding an anti-piracy Naval Task Force off the Horn of Africa from 2006, and even carried out successful evacuations from the Mediterranean, and sailed in nuclear and conventional submarines for patrols in to the IOR.

Hence the challenges for India as the predominant military power in the IOR are daunting in its backyard, and is hard pressed to keep China's influence out, which uses money power to eke Tribute from poorer nations, a Chinese trait to use cheque book diplomacy. On 13th May, 2013 Prime Minister Dr Manmohan Singh while laying the foundation stone of the National Defence University (NDU) in Gurgaon declared that India has taken on the responsibility to be the net security in the Indian Ocean Region apparently to provide assurances to the smaller nations. It was propelled by USA's 'Pivot in the East', and the need to contribute as it was towards China.

This security provider role is a big responsibility and is the predominant challenge thrust on India's small but growing 65,000 strong Navy with one aircraft carrier, 133 ships and over 250 aircraft, helicopters and UAVs. The Navy has thirty six ships and six Scorpene submarines on order, but its future ambitious expansion plan has been held in abeyance. India's expanding Coast Guard (ICG) has 42 Patrol ships, 60 Patrol boats and many smaller vessels and 58 aircraft and helicopters to assist in the Constabulary and Search and Rescue role (SAR see Map) in the

IOR. Both arms are proficient but no match in size for the platforms needed for the IOR. India has also gifted platforms to Seychelles and is developing an area on Assumption island, Mauritius has Indian Naval personnel stationed and Sri Lanka maintains close relations. Maldives tends to favour China.

On 25th January, 2015 President Barack Obama was in India for India's Republic Day as Chief Guest and Prime Minister Narendra Modi agreed with Obama on a US-India Joint Strategic Vision for the Asia-Pacific and Indian Ocean Region, which has fostered a closer partnership between the United States and India as indispensable, to promote peace, prosperity and stability in the region in the agreement. Military relations and \$ 12 bill worth of imports of military hardware from USA includes twelve P-8I Boeing 737 latest Maritime Reconnaissance (MR) planes bristling with electronics and Mk 48 torpedoes and Harpoons Mk L84 Block 2 to track ships for Maritime Defence Awareness



"With the commitment and team work of the naval personnel, the Indian Navy has grown into a strong force in the world and is ready to face any eventuality. The navy has been playing an important role in safeguarding the country's security needs. It is constantly on a vigil to protect the maritime interests of the country"

*Admiral Sunil Lanba, Indian Navy Chief*

(MDA), especially PLA(Navy) submarines sneaking into the IOR. Import of twenty four latest long range Guardian Unmanned Aerial Vehicles (UAV Drones) is also on the cards as economical and 24x7 MR platforms which the Indian Navy will operate. They can also be armed.

India and the United States are important drivers of regional and global growth so India has trucked with USA to build a Defence and Support Partnership for inclusive development, and increased regional connectivity by collaborating with other interested partners to address poverty and support broad-based prosperity. The 21st edition of the

(Below) Indian Navy's P-8I Neptune armed with AGM-84 Harpoons



two week Exercise Malabar with US Navy and Japan's Maritime Self Defence, was hosted by the Indian Navy's Eastern Naval Command in the Bay of Bengal in July 2017. It saw participation of thirteen ships and two submarines and the 103,000 ton USS Nimitz, the world's largest aircraft carrier and F-18s flew alongside INS Vikramaditya's MiG-29Ks. It was the most advanced US, Japan and Indian Tri Nation maritime exercise so far, as it had all the components of a powerful Naval Task Force in sub surface, surface and under water warfare operating jointly, with rotational commands as Officers in Tactical Command (OTCs).

China has responded with the Maritime Silk Route (MSR) and had already signed a programme to build and develop Gwadar port and other projects in Pakistan and link it to China's hinterland with the China Pakistan Economic Corridor (CPEC) with investments of over \$ 50 billion. CPEC passes through India's Kashmir occupied by Pakistan (POK), and demanded back by India. China has institutionalised its ambitions at its Belt and Road Forum (BRF) in Beijing in September 2017 with its deep pockets. President Xi Jinping announced the next edition of BRF conclave would be in 2019. India and Bhutan abstained from the conference.

Quite a few world's leading maritime thinkers had foretold the troubled future of the region in the last century. Alfred Thayer Mahan is credited with, "Whoever controls India Ocean Controls Asia. This Ocean is the key to the seven seas. The Future of the world will be decided on its waters". Nearer home the Oxford educated diplomat Dr KM Panikar in his 20th Century treatise on Indian Ocean predicted, "It is obvious that the Indian Ocean will be one of the major problems of the Future. The security it has enjoyed for over 150 years (1864-1941) has been completely shattered by events of



**INDIA AS THE NET SECURITY PROVIDER HAS ITS TASKS CUT OUT TO DEFEND ITSELF AND IT HAS TRUCKED WITH USA AND JAPAN IN THE MARITIME SECURITY FIELD IN A LARGE WAY**

last few years. With major powers developing in the area, America, China, and perhaps Russia will have access to the seas, in a manner totally different from what the Europeans had in the centuries that followed Vasco D' Gama's arrival".

The Greeks define a "thalassocratic" state as a nation with maritime ambitions in the commercial and military spheres, while Khairuddin Barbarosa adviser to the Ottoman Emperor Suleiman the Magnificent (1494 – 1566) said, "He who rules on the seas will shortly rule on the land also". Those messages have been taken on by the Indian Navy which has issued India's Military Maritime Strategy (2007) and Doctrine (2009), docket. The thinker Mackinder's continental theory for Europe, is giving way to Mahan's and China has relied on an aggressive Maritime strategy with a large Navy even to dominate its illegal South China sea claims. Mahan's philosophy of big platforms and submarines and control of trade routes succeeded for America.

Indian Ocean is also prone to disasters like cyclones, earthquakes and Tsunamis and has rich Exclusive Economic Zones in the hands of

smaller island states. Compared with India's 2.3 sq km, Seychelles and Mauritius which have Indian influence have 1.3 sq km each and have combined them for the Blue economy. Maldives where there is Chinese influence has 912,000 sq km and Reunion has 312,000 sq km in the hands of France a riparian state in IOR. These swaths of water need patrolling and even for Piracy, and India assists friendly nations, even nations on the East Coast of Africa like Mozambique.

Hence India as the Net Security Provider has its tasks cut out to defend itself and it has trucked with USA and Japan in the maritime security field in a large way, which irks China. In Humanitarian and Disaster Relief (HADR) Indian Navy proved its mettle in the 2004 Tsunami. The IOR is a much challenged region where the destiny of the world seems to hang and the author quotes K.M. Panikkar, "It is a prerequisite of India's freedom that she should share in the responsibility of guarding in the Indian Ocean as her interest in this area is predominant.' Shan No Varuna.

– Cmde Ranjit B Rai (Retd) is former Director of Naval Intelligence and Operations and author of Navy Diary -2018

# DAC clears procurements of assault rifles, carbines worth Rs 3,547 crore

Simplifies procedure to develop defence equipment through Make in India

BY PK GHOSH

**N**ew Delhi. In yet another boost to Make in India, the Government is in gung ho with soon after Prime Minister Narendra Modi's announcement at Aero India 2015 in Bangalore, the Defence Acquisition Council (DAC) has given a go ahead for the procurement of 72,400 assault rifles and 93,895 carbines on fast track basis for Rs 3,547 crore to

enable the Defence Forces to meet their immediate requirement for the troops deployed on the borders.

The DAC headed and chaired by Defence Minister Nirmala Sitharaman met in New Delhi January 16 and simplified 'Make II' procedure, which prescribes guidelines to be followed to develop and manufacture defence equipment through Indian Industry.

Also, to encourage participation of private sector in defence design and production and giving a boost



Indian Army Jawan with an assault rifle



to Government's pet 'Make in India' programme, the DAC introduced significant changes in the 'Make II' category of the Defence Procurement Procedure (DPP). The Council has simplified the procedure for 'Make II' project and made it industry friendly with minimal Government control considering that no Government funding is involved in it.

The salient aspects of the revised procedure will now allow the Ministry of Defence (MoD) to accept suo-motu proposals from the industry and also allows start-ups to develop equipment



**An Army Jawan in a joint exercise**

for Indian Armed Forces.

Under the simplified procedure, the minimum qualification criteria to participate in 'Make II' projects has also been relaxed by removing conditions related to credit rating and reducing financial net worth criteria.

According to earlier 'Make II' procedure, only two vendors were shortlisted to develop prototype equipment. Now, all vendors meeting the relaxed eligibility criteria will be allowed to participate in the prototype development process.

The decision is also significant in

the sense that the vendor will not be required to submit Detailed Project Report (DPR). After accord of approval of the 'Make II' project by the Council, all clearances will be accorded at Service HQ (SHQ) level.

To hand-hold industry and start-ups, SHQs will now setup project facilitation teams to act as the primary interface between the SHQ and the industry during the design and development stage. These teams would provide technical inputs, trial infrastructure and other facilities as required by the vendor. Even if a single

individual or firm offers innovative solutions, the SHQ will now have the option to accept and process the vendor's development initiative. SHQs will be allowed to hire domain experts/consultants from private sector to increase outreach and enhance awareness among the industry.

Most importantly the latest DAC decision clearly states that there will be no foreclosure of any project after the project is sanctioned, except on default by the vendor, to ensure that the successful vendor has assured orders.

# Scorpene-class submarine INS Kalvari commissioned into Indian Navy

Prime Minister Narendra Modi, while embarking on the Scorpene-class submarine, dedicated it to the nation



the world is one family, and is fulfilling its global responsibilities. India has played the role of “first responder” for its partner countries, in times of crisis, he added. He said the human face of Indian diplomacy and Indian security establishment is our speciality. He said a strong and capable India has a vital role to play for humanity. He said countries of the world wish to walk with India on the path of peace and stability.

The Prime Minister said that the entire ecosystem related to defence and security has started to change in the last three years. He said the skill-set accumulated during the manufacture of INS Kalvari is an asset for India.

Prime Minister Modi said that the Government’s commitment has ensured that the long pending issue

**M**umbai: Scorpene-class submarine INS Kalvari has been commissioned into the Indian Navy. Prime Minister Narendra Modi on December 14 dedicated the naval submarine INS Kalvari to the nation at a function in Mumbai.

Congratulating the people of India on this occasion, the Prime Minister described INS Kalvari as a prime example of “Make in India.” He commended all those involved in its manufacture. He described the submarine as an excellent illustration of the fast growing strategic partnership between India and France. He said the INS Kalvari will add even more strength to the Indian Navy.

The Prime Minister said that the 21st century is described as Asia’s century. He added that it is also certain that the road to development in the 21st century goes through the Indian Ocean. That is why the

Indian Ocean has a special place in the policies of the Government, he added.

The Prime Minister said this vision can be understood through the acronym SAGAR - Security and Growth for All in the Region.

The Prime Minister said India is fully alert with regard to its global, strategic and economic interests in the Indian Ocean. He said that is why the modern and multi-dimensional Indian Navy plays a leading role in promoting peace and stability in the region.

He said the ocean’s innate potential adds economic muscle to our national development. That is why, he added, India is well aware of the challenges such as sea-borne terrorism, piracy, and drug trafficking, that not just India, but other nations in the region also have to face. He said India is playing a key role in tackling these challenges.

PM Modi said India believes that



INS Kalvari during its commissioning at Mumbai

of “One Rank One Pension” has been resolved.

He said that the Government’s policies and the bravery of the Armed Forces have ensured that the use of terrorism as a proxy war in Jammu and Kashmir has not been successful.

The Prime Minister expressed his gratitude to all those who have dedicated their lives to the nation’s security. ●



## After ₹1254 Cr procurement proposal for Air Force, Defence Minister clears 2420 Cr contracts for Navy, Army

**N**ew Delhi. In a big ticket contract of Rs 2419.32 crore, the Ministry of Defence has approved the procurement of P-8I Training Solution and Low Intensity Conflict Electronic Warfare System (LICEWS). The contract proposal related to Indian Navy and the Army was approved by Defence Minister Nirmala Sitharaman January 4, close on the heels of two proposals cleared for Indian Air Force.

Notably, a day ago on January 2, the Defence Minister gave her nod to the procurement proposal of 240 bombs at a cost of Rs 1254 crore from M/s JSC Rosonboron Exports, Russia. These bombs, which fall under the category of Precision Guided Munitions (PGMs), are

used by Indian Air Force (IAF). The P-8I Training Solution, along with 10-year comprehensive maintenance service, will be brought from M/s Boeing for Rs 1949.32 crore. This training solution accurately simulates P-8I aircraft and mission systems. It will help Indian Navy train and realistically rehearse for sophisticated missions involving P-8I aircraft, at a fraction of the cost of live aircraft training.

The first P-8I aircraft was inducted in Indian Navy in 2013 and as of date, eight aircraft, based at INS Rajali, have been fully integrated into Indian Naval operations. In 2016, the MoD placed a follow-on order for four additional P-8I, the delivery of which will begin in 2020. The P-8I aircraft is equipped

for long range anti-submarine warfare, anti-surface warfare, intelligence, surveillance and reconnaissance in support of broad area, maritime and littoral operations. Its communication and sensor suite includes indigenous equipment developed by defence PSUs and private manufacturers. The aircraft is capable of thrusting a punitive response and maintaining a watch over India's immediate and extended areas of interest. The second proposal cleared was for procurement of LICEWS from M/s Bharat Electronics Limited for Rs 470 crore. This system will equip Indian Army with upgraded communications infrastructure to effectively deal with advanced communications systems being used by terrorist groups. ●

# BrahMos becomes benchmark of PPP in Indian defence sector

BrahMos has set precedence by successfully establishing a robust Missile Industrial Complex in both India and Russia. The public and private sector Indian defence firms have been actively involved in designing, developing and producing various components of the missile



**T**HE GAME-changing scenario of world missile systems in the global context have assumed vital importance in the present era. Versatile weapons like BrahMos, a hallmark for 'Make In India', play a significant role in modern-day conflicts and wars as it supersedes the most popular cruise missiles in the world by three times in terms of velocity, flight range and nine times the kill energy range. BrahMos is unique with its higher weapon effectiveness, reliability, multi-platform, multi-mission and multi target capability.

BrahMos missile, the product of an exemplary Joint Venture, between India's Defence Research

& Development Organisation (DRDO) and Russia's JSC MIC NPO Mashinostroyeniya (NPOM), is the most potent weapon system and

a force multiplier in network centric warfare.

BrahMos has set precedence by successfully establishing a robust





Missile Industrial Complex in both India and Russia. The public and private sector Indian defence firms have been actively involved in designing, developing and producing various components of the missile. 100 per cent of integration of the missile systems are accomplished in India and more than 65 per cent of component production are realised in India, around 20,000 Specialists, Engineers & Technicians in more than 200 large and medium industries are participating in realising different systems and sub-systems. The supersonic cruise missile has become a benchmark of public-private partnership in Indian defence sector.

BrahMos Supersonic cruise missile is a precision strike weapon for Army, Navy & Air Force. This universal

**IN TERMS OF FUTURISTIC DEVELOPMENTS, THE HYPERSONIC BRAHMOS IS BEING ENVISIONED TO TRAVEL AT A SPEED OF MACH 5 TO 7 (5 TO 7 TIMES THE SPEED OF SOUND)**

missile can be fitted in ships, Mobile Launchers, Submarines and Aircraft against land and sea-based targets. The Indian Army has benefitted immensely from the induction of BrahMos weapon system. The missile has been successfully tested for firing in steep dive mode which would enable it to be deployed in mountainous regions. The deep penetration capability of the missile system against hardened targets has also been validated. The missile system is inducted in all frontline ships of the Indian Navy and deployment in other future surface warships are under production.

BrahMos supersonic cruise missile created history on 22nd Nov 2017 when, for the first time in the

world, it was successfully flight-tested from the Indian Air Force's (IAF) frontline fighter aircraft against a sea based target in the Bay of Bengal. BrahMos-A, the air-launched version is lighter than its previous two variants but would be equally strong in firepower and devastating capability as its range and maximum speed of above 300 kms and 2.8 Mach respectively will remain unchanged.

The record-breaking feats of BrahMos continues to add feathers of glory, with the most recent successful test-firing of the BrahMos supersonic cruise missile with an indigenous seeker at Pokhran test range in Rajasthan, on 22 March 2018. This launch has boosted India's defence indigenisation efforts which significantly highlights the vital contributions of BrahMos missile to the Govt. of India's ambitious "Make In India" initiative.

The emergence of BrahMos has not only strengthened India's technological base but also elevated its image in the global arena. As a high technology defence product, BrahMos has great potential of becoming India's major weapon export in the coming decades giving the country a share of the global arms business.

In terms of futuristic developments, the hypersonic BrahMos is being envisioned to travel at a speed of Mach 5 to 7 (5 to 7 times the speed of sound). Both governments are also keen to develop next-generation BrahMos, being termed as BrahMos-NG.

The contribution of BrahMos to India's arsenal is noteworthy in a quest to maximise its firepower potential and strengthening the armed forces. With the changing technological trends in the evolving world security scenario, BrahMos definitely promises to play a key role in redefining the future of modern warfare.



# Achievements in Defence Sector in last three years

Since the taking over of Prime Minister Narendra government, there have been various achievements in the defence sector

**N**ew Delhi. Details of New Achievements/Initiatives of the Government during the last three years in the Defence Sector are as below:-

**Reform Measures:** Based on the recommendations of the Shekatkar Committee, the Government has decided to restructure posts of different corps of Army. This will free up approximately 57,000 positions of Officers/JCO's/OR's and civilians which will be redeployed to improve the "teeth to tail" ratio of the Indian Army in future. Further, seven Military Farms have been closed and the cattle of these Farms have been transferred to other Military Farms. Closure of six more Military Farms is in progress.

**Decentralisation in decision making:** To empower the Armed Forces as also to reduce the time

taken in decision making, a number of powers exercised hitherto by the Ministry of Defence have been delegated to the Armed Forces. These include powers relating to procurement of critical Ammunition/ Spares; post-contract management of capital acquisition contracts as well as revenue expenditure; full powers in respect of revenue and capital account with respect to perimeter security etc.

**Strategic Partnership:** Government's policy on Strategic Partnership in the Defence Sector has been finalised. It is intended to institutionalise a transparent, objective and functional mechanism to encourage broader participation of the private sector in manufacture of major defence platforms and equipment.

**Capital Acquisition for the Armed Forces:** During the last

(Top) Indigenous 155mm 52-calibre Advanced Towed Artillery Gun System (ATAGS);

(Below) Mark 46 torpedo at a launch

three years and current year, 119 contracts involving Rs. 1,16,522.89 crore have been signed with Indian vendors and 68 contracts involving Rs. 1,24,291.33 crore have been signed with foreign vendors for capital procurements of defence equipment.

**Policy initiatives in respect of Defence Production:** 'Make in India' in defence sector is primarily driven by providing preference to procurement from Indian vendors under the Defence Procurement Procedure (DPP), promoting indigenous design, development and manufacture of defence equipment, and other policy measures such as liberalization of the licensing regime & FDI policy by raising the cap on FDI in the defence sector, simplification of export procedure, streamlining of defence offset guidelines etc.

## Major Achievements by Defence Public Sector Undertakings (DPSUs):

- Goa Shipyard Limited delivered Naval Offshore Patrol Vessels, Damage Control Simulator, Fuel Barge, Fast Patrol Vessel for the Indian Navy and Coast Guard.
- The Bharat Dynamics Limited developed Akash Weapon System for Army, Long Range Surface to Air Missile for the Indian Navy and test fired the Anti-Tank Guided Missile.
- The Mazagon Dock Shipbuilders Limited launched the Visakhapatnam Class Destroyers and commissioned the INS Kalvari, the Scorpene class Submarine.





One Rank One Pension (OROP) for Defence Forces Personnel.

**Facilitating servicemen to register and vote from their place of posting:** Government has already introduced e-Postal Ballot System in October 2016 to facilitate participation of service voters. The Election Commission of India (ECI) directed to undertake the process of de-novo registration of Service

has been set up w.e.f. 1.1.2016. Under this fund, assistance of Rs.2.00 Lakh is provided to the army battle casualties which are fatal, 60 per cent and above disability and battle casualties invalidated out due to disability and Rs. 1.00 Lakh to disability less than 60 per cent. This will be in addition to other admissible dues.

Some of the new initiatives

- During the period the Light Combat Helicopter attained initial operational clearance, first technical flight of Light Utility Helicopter was undertaken and Brahmos Integration with Su-30 MKI Aircraft was undertaken by Hindustan Aeronautics Limited (HAL).
- Bharat Electronics Limited (BEL) commissioned the secure CDMA Cellular Network at Srinagar.
- Garden Reach Shipbuilders & Engineers Limited delivered the Anti Submarines Warfare Corvette, Offshore Patrol Vessel, Water Jet Fast Attack Aircraft and Landing Craft Utility during the period.

**Research & Development in Defence Sector:**

A number of major products has been developed for defence and civilian use by the DRDO. These include the Light Combat Aircraft (LCA) Tejas; Airborne Early Warning and Control (AEW&C) System; 155 mm / 52 Calibre Advanced Towed Artillery Gun System (ATAGS); Weapon Locating Radar (WLR) Swati; High Speed Heavy Weight Ship Launched Torpedo (Varunastra); Arudhra-Medium Power Radar; Akash Weapon System; Abhay Sonar; Hull Mounted Sonar (HUMSA); Advanced Indigenous Distress Sonar System (AIDSS); various types of Ammunition for MBT Arjun; Anti Torpedo Decoys; Electro-Optical Fire Control System for Naval Ships; Electro-Optical Sensors for Airborne Platforms; Mountain Foot Bridge; Submunition warheads for Pinaka; Terrain Assessment System for Trans-border Deserts etc.

**One Rank One Pension (OROP):** The Government has implemented the



(Top) Weapon Locating Radar (Swathi);

Indian Army Pinaka rocket launcher;

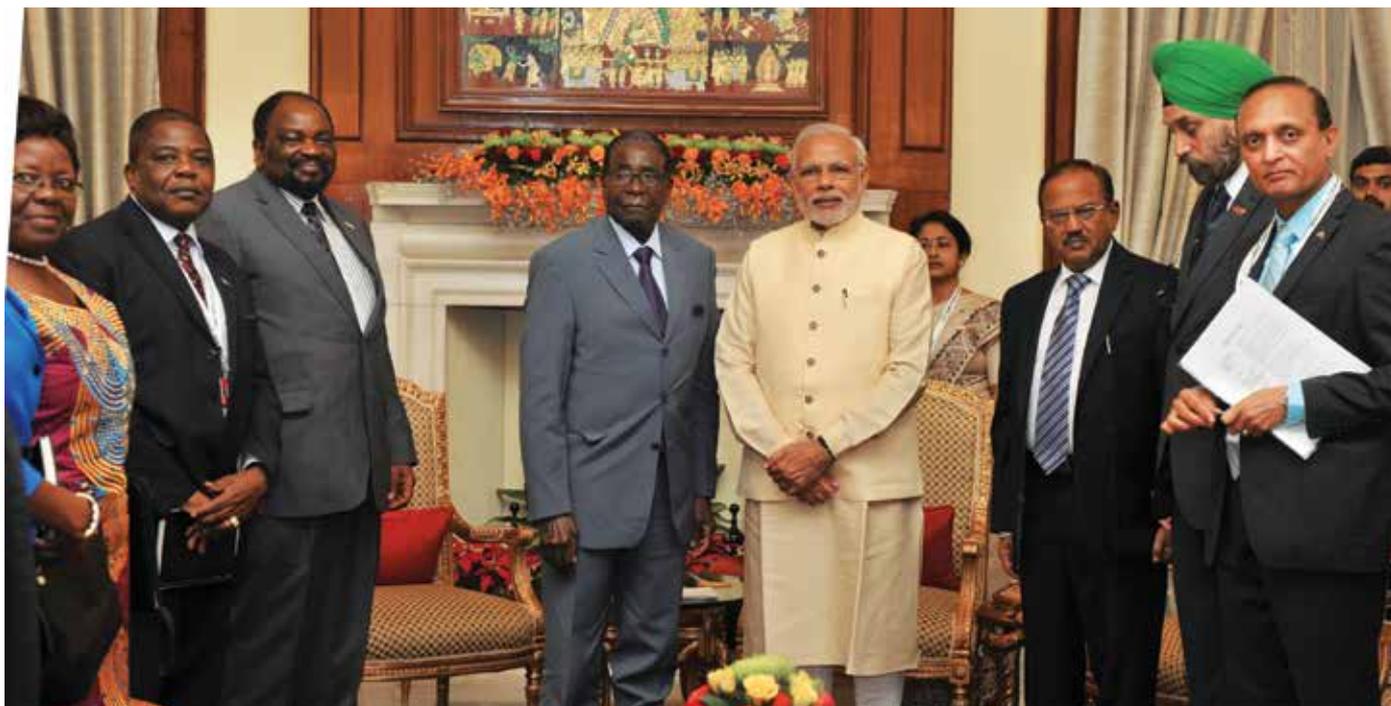
Indian Navy Light Combat Aircraft (LCA) Tejas

Voters. As per ECI data, 13.37 lakh service voter requests from Armed Forces (Indian Army, Indian Air Force, Indian Navy and Indian Coast Guard) have been registered with ECI.

**Army Battle Casualties Welfare Fund:** A Fund namely, 'Army Battle Casualties Welfare Fund'

taken during the last three years, as mentioned in reply to part (a), are long gestating by their nature and will bear fruit in the medium / long term.

This information was given by Minister of State for Defence Dr. Subhash Bhamre in a written reply to Rajya Sabha.



## India's Security Engagement with Africa a Vital Part of Foreign Policy: TS Tirumurti

Time and again, experts are of the view that India's engagement with Africa should be a vital part of our foreign policy making following the emergence of geopolitical security challenges across the region

**N**ew Delhi. Describing India's security engagement with Africa as 'a vital part of our foreign policy', Ministry of External Affairs (MEA) Secretary (ER) TS Tirumurti said that India and the African continent's engagement in tackling a complex set of security challenges has deepened in the recent past, largely due to an unprecedented impetus to political engagements between the two regions.

Mr Tirumurti was delivering a keynote address at the 4th India-Africa Strategic Dialogue on 'India and Africa: Deepening the Security Engagement', organised by the Institute for Defence Studies and Analyses (IDSA), in collaboration with the Ministry of External Affairs, New Delhi March 27.

Elaborating further, the MEA Secretary observed that India's contribution towards providing security cooperation in Africa is well known, and is particularly manifested

in India's extensive participation in the UN peace keeping efforts in Africa over the last six decades.

More than 6000 Indian peacekeepers are today deployed in five peacekeeping operations in Africa, including in South Sudan and Democratic People's Republic of Congo, he pointed out.

India has defence and security cooperation with all littoral states in the Indian Ocean Region (IOR), including South Africa, Mozambique, Tanzania, Kenya, Seychelles, Mauritius and Madagascar, as well as with countries like Nigeria, Tanzania, Egypt and others, observed Mr Tirumurti.





The range of bilateral security issues include training, infrastructural development assistance, peace keeping, defence agreements, joint naval exercises, defence equipment transfers and hydrography etc, he added.

Commenting on India's traditional 'non-prescriptive approach' towards security matters, the Secretary said that India supports the African Union's peace and security initiatives within the African peace and security architecture. India's recent decision to open new Missions in 18 African countries reflects the importance India gives to Africa, he pointed out.

Speaking of multi-dimensional threats to security and development in the region, he said that terrorism and other conflicts in Africa have time and again disrupted the wheels of progress.

Piracy, cross-border threats, and transnational crimes, including narcotics, trafficking and cybercrimes etc add new dimension to the problem, fuelling instability in the region. Such scenario calls not only for deepening, but also broadening and widening security engagements between the two regions by initiating dialogue on multiple fronts, he added.

Describing Africa as a major developing partner of India, Mr Tirumurti pointed out that more than 40 per cent of our lines of credit has been given to Africa. Indian companies have substantially increased their presence in Africa, he concluded.

Speaking on the occasion, Ambassador Alem Tsehaye Woldemariam, Dean of African Diplomatic Corps in India, Eritrea, while observing that the existing security structure cannot necessary address the emerging security challenges in the region, insisted upon the need for India and Africa to design a security architecture that serves both the regions.

Deputy Director General, IDSA, Maj Gen Alok Deb (Retd) read out a statement from Director General Jayant Prasad that described the importance of security cooperation between the two regions as imperative due to the shared interests, challenges and perceptions of mutual benefit.

Besides playing its conventional role in conflict resolution in Africa through the United Nations peacekeeping forces and providing maritime security in the Indian Ocean, India looks to deepening ties with African nations in the areas of cybersecurity, energy, food security, skills and capacity building, the statement read. ●

## Defence Minister discusses Bilateral and Multilateral Defence issues with Russian counterpart



**M**oscow. Defence Minister Nirmala Sitharaman, who has been on three-day visit to Russia to attend VII Moscow Conference on International Security from April 3-5, met Minister of Industry and Trade of the Russian Federation Denis Manturov in Moscow April 3.

Both the leaders reviewed ongoing military technical cooperation projects between the two countries, including measures to promote India-Russia joint industrial activities under the 'Make in India' programme with respect to defence production, especially for after-sales support.

They also discussed participation of Russian companies in DefExpo India -2018 to be held in Chennai from April 11-14.

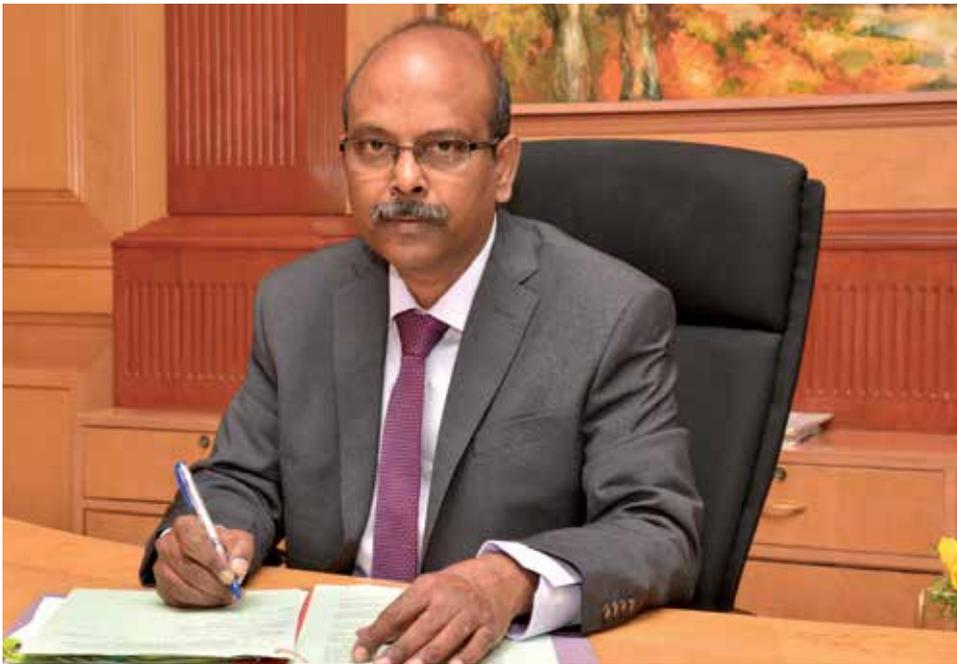
Ms Sitharaman met Russian Defence Minister General Sergey Shoigu and discussed issues of bilateral importance, especially Military-to-Military Cooperation and other regional issues in a delegation level talks.

These included a review of the roadmap of military cooperation involving exercises, training, exchange of visits, and India's participation in International Army Games to be held in Russia later this year.

The defence Minister also attended a concert by Sarod Maestro Ustad Amjad Ali Khan to mark the closing of the year-long celebrations of the 70th Anniversary of India-Russia diplomatic relations. ●

# BEL to Showcase its Might at DefExpo 2018

Defence Public Sector Unit Bharat Electronics Limited (BEL) in the leadership of its Chairman cum Managing Director MV Gowtama all set to showcase its capabilities spanning missile, communication and fire control systems, to name a few



BEL's Chairman &  
Managing Director MV  
Gowtama

**B**HARAT ELECTRONICS LIMITED (BEL) is participating in the biennial Land, Naval and Internal Homeland Security Systems Exhibition DEFEXPO 2018, which is scheduled from April 11 to 14, 2018, at Thiruvadanthai, Thiruporur Taluk, Kancheepuram, East Coast Road, Chennai.

Navratna defence Public Sector Undertaking Bharat Electronics Limited (BEL) will showcase its capabilities spanning every

domain of its business – Radar and Fire Control Systems, Network Centric Systems, C4I Systems, Communication Systems, Missile Systems, Electronic Warfare & Avionics, Anti-Submarine Warfare Systems, Naval Systems, Electro Optics & Laser Systems, Gun Upgrades, Tank Electronics, Home Land Security Systems, Technology Modules, Simulators, Shelters and civilian products. BEL will display its R&D capabilities by demonstrating some of its new products / technologies through

launching of 11 products. The theme for this year's display is 'Make in India.'

BEL will display a host of new radars – 3D C/D Band Air Surveillance Radar (3D ASR), Weapon Locating Radar, Active Electronically Scanned Array - Battle Field Surveillance Radar (AESA-BFSR), Ground Penetrating Radar, Through Wall Radar, 3D Low Level Light Weight Radar, Surface Surveillance Radar and Secondary Radar (Identification of Friend or Foe Interrogator –IFFI MK XII).

The Network Centric Systems on display include Trusted Network Solution-Demo, Combat Management System, C4I technology-Demo, Air Defence Control & Reporting System and Coastal Surveillance System.

Communication Systems/ elements on display will include the Software Defined Radio (SDR) Airborne – Live Demo, SDR Manpack, Combat Net Radio Mk II, Mine Field Recording System, Handheld Satcom terminals, IP Modem & IP Encryptor, Satcom On The Move, Secure Smart Phone, Carbon Fibre Antenna, Secure Military Wireless LAN, 100 Mbps Radio, Advanced VLF Receiver / Modulator, Beacon-Mk III and ULSB MK-III. Also on display will be the Helmet Mounted Display System and Integrated Fire Detection & Suppression System.

Missile System on display will be

Akash Weapon System.

Electronic Warfare & Airborne products on display will include Modern Electronic Warfare System (VARUNA), Manpack Jammer, Radar Finger Printing System (RFPS), avionics for Light Combat Aircraft (LCA) – Digital Flight Control Computer (DFCC), Air Data Computer (ADC), Pylon Interface Box – Inboard, Outboard, Laser (PIB-IB, OB, Laser), Stores Interface Box (SIB), Function Sensor Display Unit (FSDU), Multi Function Rotary switch (MFR), Multi Function Keyboard (MFK), Engine Fuel Indicator (EFI), Get-U-Home (GUH); Multi Spectral Warning System (MSWS), Radar Warning Receiver (RWR) and Rustom Unmanned Aerial Vehicle (UAV) LRUs – Airborne Integrated Payload Processing Unit (AIPPU), Ground Integrated Payload Processing Unit (GIPPU), Airborne Spread Spectrum Modem (ASSM), Ground Spread Spectrum Modem (GSSM) and COMPASS (Compact Multi-Purpose Advanced Stabilized Surveillance System).

Anti-Submarine Warfare Systems on display includes Advanced Composite Communication System (ACCS) for Naval Platform, USHUS-2, HUMSA NG, Hull Mounted Sonar-X, IAC MoD-C, SONAR DOME, Advanced Torpedo Defence System (ATDS)- Maarech and Transducers.

Also on display will be the complete range of Electro Optics, Laser, Tank Electronics and Gun Upgrade Systems – Hand Held Thermal Imager (HHTI) with Laser Range Finder (LRF), Long Range Surveillance System-Prahari, Passive Night Sight for INSAS Rifle / LMG and for Rocket Launcher, Passive Night Vision Binocular, Goggle and Monocular, Thermal Imager Sight for Assault Rifle (Uncooled), Multi-Purpose Reflex Weapon Sight, Laser Warning System, Laser Dazzler, Laser Range Finder – Air Defence Higher Repetition, Light Weight Portable Laser Target Designator (LWPLTD), EOFCS: 5PPS, Electronic Fuses for



Mortars, Artillery Guns and Rockets, NBCRV Model, L-70 Gun Upgrade and Remote Control Weapon System (RCWS).

Technology modules like MEMS Pressure Transducers, CTD Sensors, Quad T/R modules, Pulsed Power Amplifiers, Block-Up Converters, Digital Receivers and Signal Processors will be on display.

Other Systems on display include Border Management System, Command & Control for Homeland Applications, new generation Shelters & Masts,

Electronic Voting Machine (EVM), X-Ray Baggage Inspection System, Chemical Agent Monitor (e-nasika), Point of Sale, Tablet PC and Batteries. Various Simulators will also be showcased.

The highlight of BEL's Outdoor display will be the 3D C/D Band Air Surveillance Radar (3D ASR), Weapon Locating Radar (WLR), Upgraded Schilka Weapon System, L-70 Gun Upgrade, SATCOM on the Move (SoTM) and Gun Shot Detection System.

# DRDO Conducts Successful Flight Trial of 'NIRBHAY' Sub-Sonic Cruise Missile

India's Defence Research and Development Organisation (DRDO) designed and developed Long Range Sub-Sonic Cruise Missile 'Nirbhay' has the capability to loiter and cruise at 0.7 Mach at altitudes as low as 100 m

**N**ew Delhi. India's Defence Research and Development Organisation (DRDO) achieved yet another feat on November 7 last year with the successful test flight of 'NIRBHAY' - India's first indigenously designed and developed Long Range Sub-Sonic Cruise Missile which can be deployed from multiple platforms. It was successfully test fired from the Integrated Test Range (ITR), Chandipur, Odisha. The missile has the capability to loiter and cruise at 0.7 Mach, at altitudes as low as 100 m. The flight test achieved all the mission objectives completely from lift-off till the final splash, boosting the confidence of all



scientists associated with the trial.

The missile took-off in the programmed manner and all critical operations viz. launch phase, booster deployment, engine start, wing deployment and other operational parameters demonstrated through autonomous way point navigation.

The guidance, control and navigation system of the missile is configured around the indigenously designed Ring Laser Gyroscope (RLG) and MEMS based Inertial Navigation System (INS) along with GPS system. The missile majestically cruised for total time duration of 50 minutes, achieving the range of 647 km. The missile was tracked with the help of ground based radars and other parameters were monitored by indigenous telemetry stations

## DRDO Successfully Conducts Interceptor Missile Test



**D**r Abdul Kalam Island, Odisha. Ballistic Missile Defence (BMD) System of Defence Research and Development Organisation (DRDO) successfully scored a direct hit on incoming missile from Dr Abdul Kalam Island off the coast of Odisha December 28, 2017.

The interceptor directly hit the target at an altitude of about 15 km and destroyed it into fragments. The spectacular success puts India in the league of a very few select nations world over in the arena of critical defence technology.

Today's direct interception is fourth in a row, where the missiles have scored a perfect hit on the incoming missile.

In text book style launch, the incoming ballistic missile was launched from LC-III complex of ITR, which followed the exact path of intended ballistic missile. Radars located at different stations far-off, acquired the target, tracked them and passed on to the Master Control Centre (MCC), which generated the expected trajectory of the target and alerted the interceptor missile.

The interceptor was launched from Dr A P J Abdul Kalam Island at appropriate time for interception,

which was initially guided by the Inertial Navigational System and the radars. Later, the seeker took over after a proper lock on to the target and guided the missile towards the target. All the radars, Electro Optical and Telemetry Stations tracked both the missiles and recorded the final interception.

The event was witnessed by Vice Chief of Air Staff (VCAS) Air Marshal Sirish Deo and other senior officials of Armed Forces. Directors of DRDO laboratories namely RCI, ASL, LRDE and ITR reviewed the entire launch operations.

Scientific Advisor to the Defence Minister & Director General (Missiles & Strategic Systems) Dr G Sateesh Reddy present during the launch operation said that the repeat performance of the interception demonstrates the country's professional capability in high technology oriented Ballistic Missile Defence (BMD).

Chairman DRDO & Secretary Department of Defence Research & Development Dr S Christopher congratulated the scientists behind the magnificent feat and said that the test paved the way for self-reliance.

Defence Minister Nirmala Sitharaman congratulated DRDO for elevating the country to few select nations having such BMD capability. ●

developed by DRDO.

Defence Minister Nirmala Sitharaman hailed the success of DRDO Scientists and complimented them for this inspired achievement. She was optimistic that this successful trial would take India to the select League of Nations for possessing this complex technology and sub-sonic cruise missile capability.

Chairman DRDO and Secretary Department of Defence (R&D) Dr S Christopher, DG (Aero) Dr CP Ramanarayanan, Director ADE, RCI, ITR and CEMILAC, along with other senior DRDO scientists and user representatives from Army witnessed the momentous launch and congratulated the team 'NIRBHAY' for making DRDO proud for the long awaited achievement. ●



# BRAHMOS Successfully Flight Tested from IAF's Su-30 MKI Fighter Aircraft

Creating history the World's fastest supersonic cruise missile BrahMos was successfully flight tested for the first time from the Indian Air Force fighter aircraft Su-30 MKI against a target in the Bay of Bengal

**N**ew Delhi. BRAHMOS, the world's fastest supersonic cruise missile created history on November 22, 2017 after it was successfully flight-tested first time from the Indian Air Force's (IAF) frontline fighter aircraft Sukhoi-30 MKI against a sea based target in the Bay of

Bengal. The missile was gravity dropped from the Su-30 from fuselage, and the two stage missile's engine fired up and straightway propelled towards the intended target at the sea in Bay of Bengal.

The successful maiden test firing of BRAHMOS Air Launched Cruise Missile (ALCM) from Su-30MKI will significantly bolster the IAF's air combat operations

**BRAHMOS, the world-class weapon with multi-platform, multi-mission role is now capable of being launched from Land, Sea and Air, completing the tactical cruise missile triad for India**

capability from stand-off ranges. BRAHMOS ALCM weighing 2.5 ton is the heaviest weapon to be deployed on India's Su-30 fighter aircraft modified by HAL to carry weapons.

BRAHMOS, the world-class weapon with multi-platform, multi-mission role is now capable of being launched from Land, Sea and Air, completing the tactical cruise missile triad for India. Brahmos is



## BRAHMOS Supersonic Cruise Missile with Indigenous Seeker Successfully Test-fired



**N**EW DELHI/POKHRAN: India on March 22, 2018 successfully test fired the BRAHMOS supersonic cruise missile with an indigenous seeker at Pokhran test range in Rajasthan.

Defence Minister Nirmala Sitharaman said the missile hit the target with “pin-point” accuracy and the success will further bolster India’s national security.

The test firing comes three months after the BRAHMOS cruise missile was successfully test fired for the first time from the Indian Air Force’s frontline Sukhoi-30 MKI combat jet.

“Formidable Supersonic Cruise Missile #BrahMos was successfully flight tested at 8:42 AM today at Pokhran test range, Rajasthan. The precision strike weapon with Indian-made seeker flew in its designated trajectory and hit the target with pin-point accuracy,” Ms Sitharaman tweeted.

The range of the missile, an Indo-Russia joint venture, can be extended up to 400 km as certain technical restrictions were lifted after India became a full member of the Missile Technology Control Regime (MTCR) last year.

BRAHMOS is a joint venture between DRDO of India and NPO Mashinostroyeniya (NPOM) of Russia.

The Defence Minister congratulated the DRDO following Thursday’s successful test firing.

BRAHMOS missile is the heaviest weapon to be deployed on India’s Su-30 fighter aircraft.

Work has already begun to integrate BRAHMOS on 40 Sukhoi combat aircraft which is expected to fulfil the critical needs of the Indian Air Force (IAF) in the wake of evolving security dynamics in the region. ●

a joint venture between DRDO of India and NPOM of Russia.

Defence Minister Nirmala Sitharaman congratulated DRDO and BrahMos for the outstanding accomplishment. Dr S Christopher, Chairman DRDO & Secretary, Department of Defence R&D congratulated the Scientists and Engineers for this excellent text book kind of flight test.

The missile test was witnessed by Dr Sudhir Mishra, DG (BrahMos) & CEO & MD, BrahMos Aerospace along with senior IAF officials, Scientists and Officials from DRDO and BrahMos. ●



# Tata Boeing Aerospace inaugurates its state-of-the-art Apache fuselage facility

■ Hyderabad facility will be sole producer of AH-64 Apache helicopter fuselages globally ■ Delivery of the first fuselage expected in 2018 ■ Partnership reaffirms commitment to 'Make in India'

**H**derabad. Tata Boeing Aerospace Limited (TBAL), a joint venture between Boeing and Tata Advanced Systems Limited (TASL) on March 1 inaugurated its state-of-the-art facility in

Hyderabad. Spread over 14,000-square meters and employing 350 highly skilled workers, the facility will be the sole global producer of fuselages for AH-64 Apache helicopter delivered by Boeing to its global customers including

the US Army. The facility will also produce secondary structures and vertical spar boxes of this multi-role combat helicopter. The delivery of the first fuselage is expected in 2018.

"I congratulate Tata and Boeing for taking this bold step towards

Make in India and making this substantial investment in the defence space," said Defence Minister Nirmala Sitharaman. "The manufacturing of advanced defence platforms and being integrated with the complex global supply chain will help our aerospace industry acquire technology, build local capability, provide employment and become a global exporter."

TBAL, Boeing's first equity joint venture in India, is the result of a 2015 partnership agreement with TASL. Construction of the manufacturing facility began in 2016 and was completed on schedule. In addition, Boeing and TASL have worked closely to develop a pool of highly skilled aerospace talent through skill development initiatives.

"TBAL is just the beginning of Boeing's future journey of partnership with India," said Pratyush Kumar, president, Boeing India. He further added, "As we progress, we see this as a major step towards future opportunities to pursue the co-development of integrated systems in aerospace and defence. Our partnership with Indian industry fulfils the goals of the 'Make in India' initiative and results in mutual growth and productivity growth for both India and Boeing."

"Tata is a significant player in the global aerospace market focused on leveraging opportunities in global markets and reducing India's reliance on imports in defence related requirements, 60 per cent of which is met through imports. With the streamlining of the export regulation process under the Strategy for Defence Exports (SDE) of the Government of India, and with established capabilities and demonstrated deliveries, we are poised to emerge as a supplier of choice for global OEMs," said Banmali Agrawala, president, infrastructure, defence and aerospace, Tata Sons.



**Defence Minister Nirmala Sitharaman along with Tata Sons Chairman Ratan N. Tata and Boeing India President Pratyush Kumar during the inauguration of Tata-Boeing joint venture Tata-Boeing Aerospace Limited (TBAL) in Hyderabad**

Sukaran Singh, MD and CEO, TASL, said, "The inauguration of the TBAL facility marks an important milestone in our collaborative engineering journey with Boeing. As India focuses on indigenous manufacturing in the defence market, this partnership is testimony to Tata Group's commitment to develop global high-end technology in defence manufacturing, making India more self-reliant."

TASL, the strategic aerospace and defence arm of the Tata group, is a key player in the global aerospace and defence market. With established capabilities

throughout the aerospace value chain from design to full aircraft assembly, it is a premier manufacturing partner for global original equipment manufacturers (OEMs) as well as the Government of India's Defence Research and Development Organisation.

More than 2,300 Boeing-made Apache helicopters are operated by customers around the world since the aircraft entered production. The United States Army Apache fleet alone has accumulated more than 4.3 million flight hours, including more than 1.2 million in combat, as of January 2018. The helicopter has been fielded or selected for acquisition by the armed forces of 16 countries, including India.

Boeing is expanding its engagement with India's Ministry of Defence (MoD) to deliver advanced capabilities and readiness to the Indian military. The company has developed a competitive supplier base in-country that is integrated into Boeing's global supply chain. The Ministry of Defence has also finalised an order with Boeing for 22 AH-64E Apache helicopters in September 2015, deliveries for which are scheduled to begin in 2019.

# Thales all set to present high-tech solutions for land & naval defence at DefExpo

As a reliable partner to the Indian armed forces, Thales would continue to help them master every decisive moment with its high technology solutions across land, sea, air and cyber space

**C**hennai. Thales is all set to participate in the upcoming 10th edition of Defexpo 2018—India's premier biennial Land, Naval and Internal Homeland Security Systems Exhibition—in Chennai from April 11-14.

The Indian government lays significant emphasis on defence modernisation and self-reliance in securing the country's sovereignty. As a reliable partner to the Indian armed forces, Thales would continue to help them master every decisive moment with its high technology solutions across land, sea, air and cyber space.

"From equipping soldiers with the most accurate solutions to strengthening the country's land, sea and air defence capabilities, we fully support the ambitions of the Indian armed forces. We are proud of our various solutions on which the Indian armed forces rely, and of our collaborations built with the local industry over the years. At Defexpo 2018, we will demonstrate how we



help our local customers and partners master every decisive moment through our high-tech solutions," said Emmanuel de Roquefeuil, VP & Country Director, Thales in India.

This year at Defexpo, Thales looks forward to providing visitors with insights and demonstrations in the following areas:

**Thales and 'Make in India':** Present in India since 1953,

Thales has been playing an essential role in India's growth story by sharing its technologies and expertise in sectors such as defence and aerospace among others. It has been actively partnering with the local industry for years, with business and employment generation as key value additions.

At Defexpo 2018, Thales would highlight its efforts in line with the government's 'Make in India' initiative. The spotlight would be

on our flagship PHAROS fire control radar that is jointly developed with our JV company BEL-Thales Systems Ltd. This system in line with the 'Make in India' vision will serve both domestic Indian and international market requirements.

**Going digital:** Thales' integrated defence solutions: In a first, visitors at the Thales stand would be able to get an insight into its extraordinary high-technology solutions across land and naval defence through special digital experience kiosks. Providing an immersive experience, these kiosks will allow visitors to discover Thales' cutting-edge capabilities in air defence, radars, acoustics and optronics, armaments, land and naval communication, UAV, among others.

This wide range includes solutions like multi-role missiles such as STARStreak, Lightweight Multi-Mode (LMM) and Fury, range of rocket systems, surveillance radar such as I-Master, sonars such as, CAPTAS-1 and FLASH, the airborne ISR solution AMASCOS and the most advanced latest generation of contact airborne intelligence,

## Key Points

- **Company to highlight its efforts in line with its strategy supporting 'Make in India and export from India'**
- **Please visit us at 3.2.2c, Hall3, or contact us to arrange a briefing or a one-to-one interview.**



surveillance and security mini-drone UAV system, Spy'Ranger, etc. With 65,000 employees in 56 countries, Thales reported sales of €15.8 billion in 2017.

### THALES IN INDIA

Present in India since 1953, Thales is headquartered in New Delhi and has other operational offices and sites spread across

Gurgaon, Hyderabad, Bengaluru, Chennai and Mumbai, among others. Over 600 employees are working with Thales and its joint ventures in India. Since the beginning, Thales has been playing an essential role in India's growth story by sharing its technologies and expertise in Defence, Transport and Aerospace markets.

## BEL Crosses ₹10,000 Cr Landmark Turnover

**N**ew Delhi. Navratna Defence PSU Bharat Electronics Limited (BEL) has achieved the landmark turnover of more than Rs 10,000 crore (Provisional & Unaudited) during FY 2017-18, sustaining double digit growth over the previous year's turnover of Rs 8,825 crore.

Some of the flagship projects executed during the year include Integrated Air Command & Control System (IACCS), Weapon Locating Radar (WLR), Hand Held Thermal Imager (HHTI), Akash Weapon System (Army), Naval Fire Control System, Integrated



Communication System, 3-D Tactical Control Radar (TCR), Electronic Warfare Systems, L-70 Gun Upgrade, Electronic Voting Machines (EVM) and Voter

Verifiable Paper Audit Trail (VVPAT).

BEL's Chairman & Managing Director MV Gowtama said, "The focus on indigenisation for self-reliance has continued with more vigour, besides capacity building, expansion and enhanced outsourcing to SME sector. Also, BEL has been able to maintain good order acquisition this

year. These efforts will complement BEL to sustain growth, capitalise future opportunities and consolidate market leadership in the Defence business."

# GE and Tata celebrate the ground-breaking of a world class aero-engine centre of excellence in Telangana

The Centre of Excellence (COE) will incorporate the latest technologies and manufacturing practices to deliver complex high precision aero-engine components for the CFM LEAP engine - the world's fastest selling jet engine. Clear demonstration of commitment to 'Make in India' and emergence of India as a manufacturing hub for high-technology products like aircraft engines.



**H**derabad. GE and Tata group, India's leading global enterprise, on February 12 held the ground-breaking ceremony for a world class Structural Center of Excellence (COE) focused on aero-engine components.

The ceremony was held in the presence of KT Rama Rao, Cabinet Minister for IT E&C, MAUD, Industries and Commerce, Mines

and Geology, Public Enterprises and NRI Affairs, Government of Telangana, and other dignitaries from the State government. The manufacturing facility will be located in Adibatla, Hyderabad.

The COE will incorporate latest technologies from GE and best manufacturing practices to deliver complex high precision aero-engine components to the world's fastest-selling jet engine, the CFM LEAP engine.

Telangana IT E&C KT Rama Rao along with other dignitaries at the ground breaking ceremony of Tata GE joint venture for aero engines

This is part of the strategic partnership signed in November 2017 between GE Aviation and Tata Advanced Systems (TASL) to join forces for manufacturing, assembling, integration and testing of aircraft components.

Banmali Agrawala, president, infrastructure, defence and aerospace, Tata Sons, said, "Tata group's partnership with GE will boost the domestic manufacturing expertise, and enhance the



capabilities of the group in the global aerospace industry. We look forward to developing a resilient ecosystem through this collaboration that will help both companies to strengthen manufacturing expertise in the country. This investment will create highly skilled jobs and develop a high-end supply chain that will offer a globally competitive manufacturing ecosystem in India.”

Vishal Wanchoo, President and CEO, GE South Asia, said, “Both GE and Tata have a long and distinguished history of delivering on commitments to help customers solve some of their toughest challenges. The collaboration between the two companies will deliver results for India’s aerospace and defence industry which will be unmatched. Through our technology centres in Bengaluru and Hyderabad, GE has developed high-tech research capabilities in India. Combining GE’s R&D capability with state of the art manufacturing within Tata’s new facility in Hyderabad is a significant step forward in building indigenous capability for the Indian aerospace industry.”

The agreement for manufacturing of LEAP components and establishment of TASL as a COE provides the opportunity for TASL to expand into other GE product lines in both commercial and military engines in the future. GE military engines

have a strong history in India.

GE currently provides the jet engines and marine gas turbines for many Indian military applications including the Air Force Light Combat Aircraft-Tejas Mk 1, Indian Navy P-8I aircraft, and P-17 Shivalik class frigates. Several military programs under development that include the Light Combat Aircraft-Tejas Mk 2, P-17A & P-71 ships, and the AH-64 attack helicopters will be powered by GE engines.

TASL is the strategic aerospace and defence arm of the Tata Group. TASL is fast emerging as a key player in the global aerospace and defence market with established capabilities throughout the aerospace value chain from design to full aircraft assembly.

TASL is a premier manufacturing partner for global original equipment manufacturers (OEMs) as well as the Government of India’s Defence Research and Development Organisation. ●

Naval Group is set to showcase the state-of-the-art innovations created for modern day navies, while demonstrating its capabilities for submarine building and high-tech solutions as a leading naval integrator

**N**EW DELHI. At DefExpo 2018 Naval Group will showcase the state-of-art innovations created for modern navies, demonstrating its capabilities in modern ship and submarine building along with high tech solutions for systems and competence as leading naval integrator. The successful efforts in building industrial partnerships with Indian shipyards and industry will also be highlighted.

#### A LONG-LASTING INDUSTRIAL COOPERATION BETWEEN NAVAL GROUP AND INDIA

Naval Group in India, created in 2008 as 100 per cent subsidiary of the group is live example of its dedication within the country. This long-term partnership has only matured through long term, sustainable industrial cooperation and technology transfers. Naval Group's activities are synced with the 'Make in India' policy of the Indian Government. The P75 programme is an illustration of the successful indigenisation process where the first submarine of the class INS Kalvari was commissioned during end of last year. On January 31 this year the third made-in-India SCORPENE®-class submarine, the Karanj, was launched in Mumbai, highlighting



## Naval Group exhibits at DefExpo 2018



the empowerment of the Indian Navy toward complete self reliance. Alain Guillou, Executive Vice

**Alain Guillou,  
Executive Vice  
President**

President said, "Naval Group is pleased to present its latest innovations at this premier event. Our know-how is the result of our large investment in Research & Development (10 per cent of annual revenues). Our sea-proven technologies benefit from the vast feedback from different navies including that of the French Navy and offers superior and adapted technologies to our customers. Our trained and talented Indian teams at the subsidiary are motivated to serve for the Indian business as well as being integrated in the international projects of the group."

**NAVAL GROUP PRESENTS ITS LEADING TECHNOLOGIES AT DEFEXPO**

**SCORPENE®:** The SCORPENE® is a 2,000-tonne conventional-propulsion submarine designed and developed by Naval Group for all types of missions, such as surface vessel warfare, anti-submarine warfare, long range strikes, special operations or intelligence gathering. Extremely stealthy and fast, it is equipped with six weapon launching tubes and 18 weapons (torpedoes, missiles, mines). 14 submarines were sold by Naval Group internationally; the SCORPENE® is an essential reference product in the area of modern conventional attack submarines (SSK) for navies across the globe. Six Scorpene class submarines are currently being manufactured at Mazagon Dock Shipbuilders Limited (MDL) for the Indian Navy with transfer

**Naval Group, a leading integrator of various systems for navies, will come out with all its capabilities in the form of Scorpene, Barracuda, Aircraft Carrier and Heavy Weight Torpedo**

of technology from Naval Group.

**BARRACUDA**

Naval Group designs and builds the Barracuda, a state-of-the-art and latest generation of strategic submarine for the French Navy dedicated to deal with an ever-growing array of challenges. Through the Australia Future Programme, Naval Group will contribute to the delivery of 12 conventionally powered submarines, whose design is derived from Barracuda type submarines.

**BELH@RRA**

This combat and crisis management frigate empowers modern navies wanting to adapt to the digitisation of the warfare. Ensuring naval supremacy, this compact frigate performs all the operations

conducted by large surface vessels with increased precision and high level capabilities in anti-air, anti-surface, anti-submarine and asymmetric warfare domains.

**AIRCRAFT CARRIER**

Our latest design of aircraft carrier is equipped with the latest generation of combat systems and deploys an on-board aircraft group (up to 40 aircraft). Its advanced conventional propulsion system allows the optimisation of replenishment frequency and ensures a permanent presence at sea within an air-sea group. The crew is adjusted to the actual need thanks to a reasonable level of automation. Through-life support costs are reduced. The catapult aircraft carrier is compatible with most modern carrier-based aircraft (Rafale, F-18, E-2C C/D, etc).



**F21 HEAVY WEIGHT TORPEDO**

The need for having unparalleled performances, while fulfilling the highest enhanced safety rules and standards for French nuclear submarine programme resulted in the development of a totally new F-21 Heavy Weight Torpedo by the French Navy. The F-21 Heavy Weight Torpedo development successfully integrates the mastery of aluminium silver oxide technology which allows the torpedo to enjoy higher range and maximum available speed, making it a much more lethal weapon than other available torpedoes. At the same time, its most important and salient feature is that of safety i.e. designed to never explode on-board a submarine even in case of platform being on fire, itself being dropped, or being fired accidentally. Naval Group as a manufacturer, integrator as well as developer of advanced combat management systems of these torpedoes, also undertakes the complex task of seamless integration of this torpedo on-board the Scorpene® submarines.



# Indigenisation vital in defence sector, says MoS Defence Bhamre

Dr Bhamre said the government has put defence at the core of its 'Make in India' programme and further stated that various companies are expressing their willingness to invest in India

Dr Bhamre said the government has put defence at the core of its 'Make in India' programme and further stated that various companies are expressing their willingness to invest in India by utilizing the country's highly talented and skilled manpower. This has a huge potential and to even export the products to friendly foreign countries. The Minister also inaugurated an exhibition of Solutions and Innovations at the venue.

Speaking at the function, Chief of the Army Staff (COAS) General Bipin Rawat said that the Army has encouraged the academia and the industry in the country to come and understand the requirements with regard to equipment that is needed by the Army.



**N**ew Delhi. Minister of State (MoS) for Defence Dr Subhash Bhamre has said that the quest for indigenisation must be the foremost concern of any organisation and it is even more important in defence sector as it leads to self-reliance which is critical to national security. He was speaking at the inauguration of a seminar on Solutions to Problem Statements with a theme 'Indigenous Technological Empowerment of the Indian Army' in New Delhi on October 25, 2017.

Dr Bhamre stated that significance of indigenisation must be fully absorbed by all stakeholders and must implement 'Make in India' in all future acquisition programmes. He appreciated that the Indian Army has not only organised a series of initiatives towards this objective, but also created the Army Design Bureau (ADB), which

is a unique organisation to facilitate interaction and seek participation of the Indian industry and the academic community.

Commenting that technology has permeated into all facets of daily existence, he said its relevance in warfare is most critical and always the side with access to better technologies will always win. "True self-reliance in defence, therefore will flow out of fully home-grown technology," he said.

The MoS Defence mentioned that the government in the recent past launched several initiatives to develop technologies in niche sectors like defence and aerospace. There is a Technological Development Fund in the Ministry of Defence for specific projects. He said initiatives like the Skill India and Startup India will further create the necessary eco-system in the defence sector to realize a fully Made in India platform.



(Top) MoS Defence Dr Subhash Bhamre speaking at a seminar in New Delhi;

(Below) Army Chief General Bipin Rawat briefing the minister at the exhibition organised on the sidelines of the seminar

Federation of Indian Chambers of Commerce and Industry (FICCI) Secretary General Dr Sanjaya Baru, CMD Bharat Forge Ltd Baba N Kalyani and Lt Gen (Retd) Subrata Saha also spoke on the occasion.

The function was attended by senior officials from the Indian Army, Ministry of Defence, FICCI and the representatives from the industry and academia.

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With another push to government's Make in India programme Naini Aerospace Limited, a subsidiary of Hindustan Aeronautics Limited, commenced delivery of aircraft and helicopter looms

**B**angalore. Naini Aerospace Limited (NAeL), Allahabad made its first delivery of 335 LCA and 28 ALH cable looms after being taken over by Hindustan Aeronautics Ltd (HAL) as a subsidiary.

R K Mishra, CEO (NAeL) presented the Certificate of Conformity of Aircraft and Helicopter Looms to M S Velpari, GM, LCA Tejas Division in the presence of V M Chamola, Chairman (NAeL) and Director (HR)-HAL at a function held at its plant in Naini, Allahabad March 27.

With NAeL commencing its operations the place has turned vibrant as the erstwhile Hindustan Cables Limited (HCL) did not see any production for last 20 years.

"HAL undertook the revival of a sick unit of HCL and provided structured training to the employees for skill development and other infrastructural requirements. The deliveries happened due to the dedicated efforts of workforce at NAeL. A robust quality management system is in place in the loom manufacturing shop and the facility has been cleared by the



## Naini Aerospace Limited Commences Delivery of Aircraft and Helicopter Looms

Joint audit team of DGAQA and HAL," says HAL Chairman and Managing Director T Suvarna Raju.

Speaking on the occasion, Mr Chamola said earning revenue in the very first full financial year of its existence speaks on the commitment of the organization. Full-fledged operationalisation of the plant is expected by June 1, 2018. The top management of HAL is committed to create a center of excellence for aviation loom manufacturing at Naini, Allahabad, he added.

Mr. R. K. Mishra, CEO, NAeL (left) presenting the Certificate of Conformity of aircraft and helicopter looms to Mr. M S Velpari, GM, LCA Tejas Division-HAL (right) in the presence of Mr. V M Chamola, Chairman (NAeL) and Director (HR)-HAL at a function held at Naini, Allahabad

Naini unit of sick Hindustan Cables Limited along with identified assets and manpower was taken over by NAeL on February 1, 2017. The NAeL commenced production activities of wire harnesses of helicopter and aircraft within a record time of five months in July 2017 after providing structured training to the employees for skill development, making registrations with statutory Taxation, Labour and EPFO authorities, obtaining factory license and creating basic infrastructure for aviation loom manufacturing.



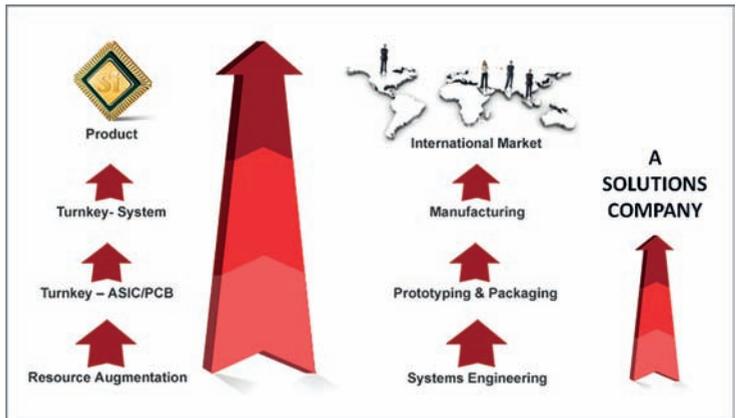
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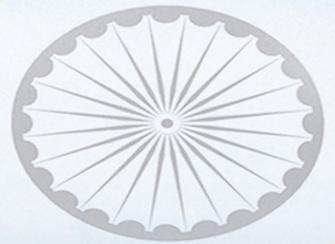
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