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50 YEARS OF SP'S
1964-2014

[snapshots]

GUNCERTAINTY!

MSTA-S SELF-PROPELLED 152MM HOWITZER

BY **SP'S SPECIAL CORRESPONDENT**

If there's one word that typifies everything that could be wrong about the defence modernisation process in India, few would argue that it's 'artillery'. At Defexpo 2012, cautious optimism had replaced cynicism following a decade of stops and starts that had reduced the field to farce. Since the show two years ago, there had been every hope that the Indian artillery canvas would have something to show for this renewed intention to modernise efficiently. Sadly, no competition has ended in a contract yet. Each one of the several gun bids is in various stages of the meandering procurement process. The stoic patience and commitment of international vendors wears thin, even as the Indian Government makes efforts to involve the Indian private sector in a big way. If there's anything to celebrate, in the last two years, plenty has happened in that field at the very least. But deliverables? Not yet.

Psychologically and symbolically, it had been hoped that the government would have by now signed a deal for 145 BAE Systems M777 ultra-light artillery pieces, in a government-to-government contract with the US Government. That hasn't come to fruition either, with recent reports now suggesting that a belated decision will have significant cost implications for the Indian Army. The truth is, budgetary constraints have stalled an immediate decision on the procurement, though there is reason to believe it will be activated as soon as the funds become available post the Union Budget shortly.

For the lack of any real results over the years, it is well known that there's no shortage of requirements. The Indian Army is in the process of acquiring the following gun types: 155mm/52-calibre towed guns, 155mm/52-calibre tracked (self-propelled) guns, 155mm/52-calibre wheeled (self-propelled) guns, 155mm/52-calibre mounted gun system (MGS) and 155mm/39-calibre ultra-light howitzers (ULH). Each competition has been something of a psychological endurance test for vendors involved. Re-tenders, postponements, deferments, blacklistings have sullied the field, driving confidence steadily downward. But top Army sources tell ***SP's,*** "It has been a difficult decade, but we intend to put that behind us. The process is in place now to follow the field artillery modernisation plan very closely and deliver quick results. We have certain time bound result areas, which we will be hoping to meet in the next plan period."

For companies that have fielded their equipment in multiple trial rounds with little clarity or guidance on a decision, that's cold comfort. There is a renewed recognition now that by all accounts, one of the key war-winning arms of the Indian Army remains the Artillery Regiment. The Indian artillery modernisa-

BAE'S M777 HOWITZER

tion programme is at once large as it is ambitious. Indications at Defexpo 2012 had been heartenингly positive not just for continuing interest from established technology houses worldwide, but the incredible amount of interest from Indian private firms willing to go out on a limb. That trend spikes significantly at this year's show, with companies like the Bharat Forge and L&T entering the state of play in a big way.

The Indian Army's $400-million tracked gun competition for approximately 100 guns is turning out to be an enormously interesting one, seeing a face-off between Russia's UZMT and a tie-up of India's most experienced private defence player Larsen & Toubro Limited (L&T) and South Korea's Samsung Techwin (STW). At the last Defexpo in 2012, STW announced that they would be cooperating in the Indian Army's Tracked Self Propelled Artillery Programme. A proposal to develop the 155mm/52-calibre tracked, self-propelled artillery,with L&T as the lead partner, had been submitted in 2011 to the Ministry of Defence (MoD), and things have moved forward well in 2013-14. The tie-up has inspired other companies to consider similar collaborations (ahead of Defexpo this year, Sweden's Saab and India's Ashok Leyland revealed they had teamed up to jointly bid for the Indian Army's SRSAM programme with a BAMSE-based solution). Samsung Techwin is the OEM for the Korean "K9 Thunder" self-propelled howitzer, one of the largest and most successful of the 155mm/52-calibre Self-Propelled Artillery Systems in the world today. Larsen & Toubro, as the lead partner, announced in 2012 that it would indigenously produce the self-propelled howitzer, a huge boost to indigenous impulses at the MoD these days. As part of the cooperation agreement between the two companies, STW provides key technologies to L&T for localisation of the K9 Thunder. During the production phase of the Indian tracked artillery program, the joint offering would have over 50 per cent indigenous content including components like fire control system, communication system, NBC & AC, APU, life support system, etc which have already been used in India. This phase will also include significant localisation of hull / turret structure and major subsystems. L&T also plans to set up the integration and testing facility for roll out of these guns from its world-class, dedicated defence equipment facility in Talegaon, near Pune.

Field evaluation trials are currently still on in the tracked gun competition, involving Russia's UZMT MSTA-S tracked self-propelled howitzer gun system, one of the focus areas for Rosoboronexport at this year's Defexpo. Speaking to ***SP's*** before the show, Rosoboronexport sources said, "The MSTA-S fits very well with Indian Army requirements. We are confident that it will be selected. The Indian Army has very rigorous processes for trials, but we are confident of success."

Bharat Forge is moving forward substantively with plans to compete for the Indian Army's 155mm/52-calibre towed gun requirement, a competition that has confounded all involved and come to symbolise the decrepit state of artillery modernisation in the country. It is this requirement that was originally to replace the old Bofors field howitzers, and it is this requirement that has led nowhere so far. At Defexpo 2012, Bharat Forge's executive Director Amit D. Kalyani had announced, "We are developing a towed gun of 155mm/52-calibre mainly for the supply to the Indian Army. We have already responded to a tender for supplying this gun. We have initially committed ₹100 crore only on development. If we win the tender we will need another dedicated line of investment for the assembly line." The company has followed through with an initial investment of $20 million to build capacity and acquire technology to develop and build the new gun at a facility in Pune that has come up well. Company Chairman Baba M. Kalyani was personally present at the show on February 7 for major announcements on progress following its tie-up with Israel's Elbit Systems.

Despite the continuing disappointment of no contract on the tantalisingly close ultra-light howitzer deal, BAE Systems is back at Defexpo this year with its M777. ***SP's*** has reported consistently on a purchase that has been painfully close, but stymied by budgetary considerations and priorities at virtually the final stage. The government has placed on record that the field evaluation of the ultra-light howitzer comprised three parts – user trials, DGQA trials and maintainability trials. "The performance of the gun can be ascertained only after evaluation of all three trial reports," Defence Minister A.K. Antony said in his last official communication on the deal in 2012.

This year's show marks a significant development in something that had been envisaged two years ago. In Parliament in 2012, Antony had said, "The government had secured the right of transfer of technology (ToT) during the purchase of Bofors guns. Though all the technological documents as per the ToT contract were received by the Ordnance Factory Board (OFB) from M/s AB Bofors, the transfer of technology was not carried forward as the dealings with the technology provider, (M/s AB Bofors) were suspended. Further, no indent was placed by Army on OFB for manufacture and supply of complete gun system. Capital expenditure of ₹376.55 crore has been sanctioned by the Government in March 2012 for creation/augmentation of large calibre weapon manufacturing capacity in ordnance factories." This

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SP GUIDE PUBLICATIONS

OFB'S DHANUSH GUN

year, the Ordnance Factory Board-Army initiative, the Dhanush gun is on display again in an improve avatar – a significant leap over the FH77 Bofors gun that India procured in the 1980s. For instance, the Dhanush sports an all-new aiming and positioning system, a unified sighting system, an ammunition and charge display unit, a 30 per cent range increase on the original gun, improved efficiency on the modified double baffle muzzle brake and a modified loading trough. The Army-OFB initiative is currently going through a cycle of trials with the user and is being seen largely as a stopgap arrangement ahead of larger 52-calibre gun procurements.

France's Nexter returns to Defexpo this year with renewed enthusiasm. After promising at Defexpo 2012 that "Due to the importance of Indian artillery and other programs and the willingness of Nexter Systems to become a leading partner of Indian defence industry, Nexter Systems has decided to establish a wholly-owned subsidiary, Nexter India, in 2012", the company, true to its word, set up Nexter Systems India Pvt Ltd in Delhi on December 13, 2012. This year, the Nexter Group displays at its booth a wide range of products, from artillery systems (Caesar, Trajan) to guns & turrets offer (mock-ups of ARX20, POD NC621, Narwhal), armoured vehicles (mock-ups of VBCI, TITUS®), and also equipment from the company's subsidiaries: Nexter Mechanics (Syegon, Safepro), Nexter Robotics (NERVA®), Nexter Electronics, NBC-Sys and Optsys. Nexter Munitions is also displaying its entire medium calibre range, and some of its 155mm and intelligent ammunition. In 2012, the company had said that, "Nexter plans to open up new areas of cooperation in the Indian defence market by developing partnerships with Indian industry (transfer of technology, joint ventures, sale of components etc.), to support and provide the local industry with the latest technology for the "Make India" projects and any new requirement of the Ministry of Defence of India, to collaborate with the Defence Research and Development Organisation (DRDO) for modern and high technology research and development projects." The company has established cooperations in India to collaborate in the Indian Army's artillery competitions. For instance, Nexter Systems and Larsen & Toubro signed anagreement in June 2010 to cooperatively develop a 155mm mounted-gun system (MGS) for the Indian Army. In September 2011, the company and L&T signed a second agreement for the Trajan® 155mm/52-calibre towed-gun for the Indian Army. Both agreements announce the formation of a Nexter Systems-led consortium for the 155mm/52-calibre mounted-gun programme and the 155mm/52-calibre towed gun programme and the upgunning of the M46 for the Indian Army, both in various stages of progress.

Finally, an eyecatcher at this year's show is undoubtedly the Arjun Catapult system, unveiled for the first time at this year's show. The system, comprising a Russian-origin M-46 130mm 'Catapult' gun on a modified Arjun chassis and automotive system, has been successfully demonstrated in prototype form to the Indian Army in 2012. The system will enter a phase of technological fine-tuning in coordination with the Army later this year before targeting production by 2015-16. The Arjun chassis is likely to be exploited in other ways too, with inquiries pouring in from international vendors who want to partner with DRDO to create hybrid systems based on the indgenous platform. •

Security Integrated Systems for Strategic Asset Protection by Rafael Advanced Defense Systems

Strategic assets such as oil and gas pipelines and rigs, power stations, ports, and harbours, are vulnerable to terrorist and criminal threats.

Such infrastructures have a high economic and political value, and the low probability of detection of threats, due to the relative anonymity and the sensitive geographical location of these the infrastructure environments, makes them an attractive target.

The potential immediate and long-term economic, environmental and political consequences that can emerge from an attack on such infrastructure, and the potentially high cost in human lives, requires governments to forge an holistic approach, which will address the complexities of such challenges.


PROTECTOR

OIL WELLS

Many oil wells are located in rural areas adjacent to roads, and in some cases near a village or other urban area. One can access them easily through their surrounding roads, making them highly vulnerable to sabotage and practically impossible to secure.

PIPELINES AND PUMPING STATIONS

The pipeline system is an area of great concern to oil companies and the global economy.

Terrorist groups represent the primary threat to the pipeline network. Single-issue extremist groups, people from within the branches and mentally unstable individuals can also be a threat to the system.

The most common method of attack of pipeline infrastructure in the world is the improvised explosive device(IED). Large sections of pipeline without supervision are difficult to protect.

Rafael Advanced Defense Systems is well-versed in complex large-scale integration and development of solutions for critical asset protection programmes, both for Israel and for various countries around the world.

The core element of Rafael's solution is its IMILITE command, control, communication, computers and intelligence (C4I) system, which keeps all security elements – from military personnel on the ground to unmanned airborne vehicles (UAVs) in the air – connected, informed and synchronised in real-time. Rafael's solution supports connectivity with customer-defined sensors. Rafael offers a solution based on three major security foundations:• Robust communication infrastructure and systems (triple-way: voice, video and data)

• Command, control, communication, computer and intelligence (C4I) capability (IMILITE)

• Stationary, mobile and airborne surveillance systems

Rafael's security solutions incorporate technological building blocks which supplement and complement each other's capabilities.

• Ground-based sensors (stationary and mobile), including:
  - **Terra-Sonic:** A passive warning and detection system designed to alert to possible threats on or in the vicinity of the pipeline
  - **Toplite:** An advanced day/night electro-optic system (EOS) mounted on a mast to provide large area continuous surveillance.

• **Stalker:** A multi-sensor system mounted on a customer-furnished vehicle for efficient surveillance, based on an advanced day/night electro-optic pod and radar, mounted on an electrically-operated telescopic mast.

• **SpotLite-P**: Tripod-mounted system for the detection of small arms fire sources.

• *Airborne Sensors*, including:

• **RecceLite:** A self-contained self-cooled multi-sensor tactical reconnaissance system, consisting of an airborne pod based on the litening targeting and navigation pod and a ground exploitation station.

• **Recce-U:** A self-contained, multi-sensor ISR system (based on the RecceLite Tactical Reconnaissance Pod). In addition to the persistant ISR payload, the system also comprises of a Ground Data Link Station (GDLS) and Ground Exploitation Station (GES).

• **Unmanned Airborne Vehicle (UAV)**: A tactical surveillance system, which consists of a stabilised day/night electro-optical payload mounted on a customer-furnished UAV

• *Positioning Devices*, including:

• **Global Positioning System (GPS):** All deployable IMILITE systems, mobile sensors and IMILITE-ARVTs will be provided with a GPS.

• *C4I Layer,* including:

• **IMILITE** Situational Awareness Command and Control Centres that act as the command and control operational hubs.

• **Mobile and deployable IMILITE Surveillance, Command and Control Systems:** Installed in a vehicle that can be deployed to strategic locations to closely manage and control specific events and operations.

• **IMILITE-ARVT:** Vehicle mounted mobile Advanced Real-time Video Terminal that allows field forces to view video and data from any selected source. The video is transmitted from the IMILITE centers to the IMILITE-ARVT.

• *Communication Layer*:

• A communication system that is used to connect all the sensors and to allow video and data transfer between the IMILITE centres and the ground forces. This could be discussed together with your team.

The system is modular, deploys according to terrain cells that are defined jointly with the customer, and are interconnected to a national Command and Control Centre.

• Continuous video surveillance of selected areas and points of interest using the stationary video surveillance systems. Video and data from the stationary video systems are transmitted to the IMILITE centres through the communication network.

• Deployment of mobile video surveillance sensors (Stalker, Airborne Toplite) to cover specific events and operations. The mobile sensors are deployed in optimal locations to cover the event/operation from various angles. They can be quickly relocated depending on the scenario and operational needs. Stalkers are suitable for ground surveillance and a quick mobile response.

• Display of all video sources at the IMILITE Situational Awareness Command and Control Centres, for the commanders and decision-makers.

• Display of selected video sources in the Mobile IMILITE system for efficient control of local and specific operations.

• Display of field forces GPS-located coordinates at the IMILITE center and dissemination of the location data to the mobile IMILITE systems and to other field forces.

• Dissemination of video, situational data and command and control directives to field forces using the communication system. Video and data are displayed on the IMILITE-ARVTs using geographical maps, thus conveying the situational awareness to the field forces in the most efficient way.

• Full voice and data interoperability between the command and control Centres, field forces and other agencies using the C4I-connect system.

• Export or streaming of selected video sources and textual data to a National Command and Control Centre. This centre will disseminate information further, e.g., to other law enforcement units, government agencies and the media, as may be required, for expanded response and decision-making purposes.

OTHER STRATEGIC SITES

In addition to critical infrastructure, there is a growing need to provide protection to a variety of other sensitive civilian facilities, such as government sites, airports, hotels, tourist attractions, sport facilities, etc. Such requirements include:

— Observation and surveillance of potentially violent zones (e.g., kidnapping, theft, violence) and main roads
— Quick response to criminal activity
— Crowd control
— Long-term routine security

The solution must be able to deter the threat, detect, identify and manage it, and finally, provide the force with all the relevant information that, if necessary, will allow it to eliminate the threat effectively and swiftly, while minimising the potential risk to the engaging force •

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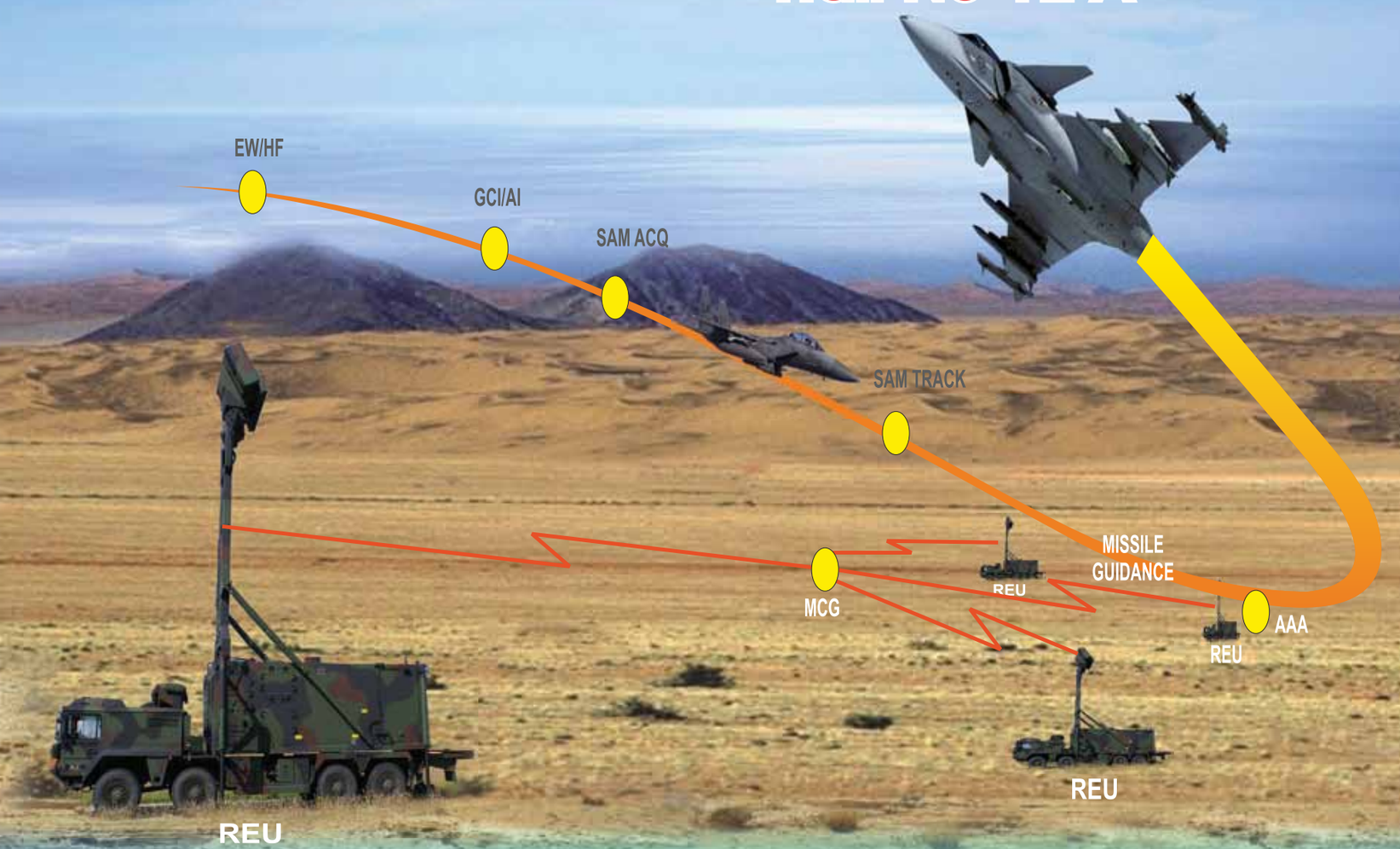

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Alpha Design Technologies to Partner Airbus on Radars

BY **R. CHANDRAKANTH**

Bengaluru-based Alpha Design Technologies Limited (ADTL) is working on the modalities of signing an agreement with Airbus for research and development work in the realm of radars, according to Colonel (Retd) H.S. Shankar, Chairman and Managing Director, ADTL. The agreement would be signed in the next three to six months and that both companies would be investing in the co-development programme.

Colonel Shankar told *ShowNews* that the company had been declared as the L1 for the 57 BMP simulators for the armed forces for which Alpha has a tie-up with Logos, a Russian firm through Rosoboronexport. The deal is worth ₹40 crore. Among the other projects the company is working on Software Defined Radio (SDR) programme. In association with IAI–Elta, the company is in for the Indian Air Force programme for SDR.

CHANGE IN CATEGORISATION SOUGHT FROM GOVERNMENT

Colonel Shankar said that as per the Government policy the SDR had been categorised as a 'Make' project whereas the industry has been asking for 'Buy and Make' project. The manufacture of SDR for the army, he said, is not a problem, bu the critical component was waveform generation and Alpha has the capabilities.

"We want the government to broadbase and not limit the competition to only big companies with over ₹1,000 crore turnover. The medium-scale industries have the capabilities and quick response time to provide expand the defence industrial base. If the government simplifies the criteria for 'Make' system by bringing down the turnover to ₹100 crore, it would encourage the SME sector." •

Rafael's Spike Team Trainer for Tactical Training

BY **R. CHANDRAKANTH**

The NATO forces in Afghanistan have been predominantly using Rafael's Spike family of multi-purpose precision-guided missile systems for the infantry. Rafael is making an aggressive pitch for the Spike family, including the Spike Team Trainer (STT), for the Indian armed forces.

In a presentation to ***SP's*** editorial team, Rafael experts explained how the STT provides tactical training for a Spike combat team. It enables the training of single gunners, section and integrated platoons. STT facilitates training of the unit's full operational sequence from standard operating procedures (SOP), deployment, target acquisition and engagement, repositioning, and battle damange assessment through debriefing.

Seeral Spike Indoor Trainers (IDTs) are connected to offer a simulated battlefield where training for several Spike combat teams is simulataneously conducted. Each Spike section conducts the training session in a separate training room, in order to simulate reality in which the various Spike sections deploy separately but still maintain mutual dependence.

The simulated battlefield scenery is transmitted into the eyepiece of the gunner's command launch unit (CLU) and the commander's binoculars, which also serve as a laser ranger finder (LRF) and compass. It's projected on to wide panoramic screen to simulate the real scenery viewed from the Spike's section's point of view. Spike section commanders communicate by simulated radio communication using a tactical headset and can deploy in different locations to view the battlefield from a variety of attack positions.

SPIKE FAMILY

The Spike family consists of Spike MR (man-portable and platform-adaptable, operating in a fire and forget mode with a target range of up to 2.5 km); Spike LR (a fourth-generation lightweight fire and forget plus with a range of up to 4 km); Spike ER (a multi-purpose, multi-platform missile system for ranges up to 8 km); and the Spike NLOS (multi-purpose, multi-platform missile system with real time wireless data link for ranges up to 25 km). •

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Awaiting Frontline Indian Warships

BY **SP'S SPECIAL CORRESPONDENT**

The world is waiting and watching closely. After delays, come March-April, the Indian Navy will induct two deeply anticipated surface combatants, both carrying on their decks a world of expectation and indigenous toil. The lead ship of the Kolkata class indigenous stealth-guided missile destroyers (to be christened INS Kolkata) and the lead ship of the Project 28 Kamorta class anti-submarine warfare corvettes.

The INS Kolkata has sparked worldwide interest for a variety of reasons, not least because it is the most complex indigenously designed, developed and built frontline warship to enter Indian service. 163 metres long, propelled by four gas turbines, it is designed to achieve speeds in excess of 30 knots. The indigenously designed ship, currently drydocked after undergoing final sea trials in the Arabian Sea, sports advanced weapons and sensors, stealth features, an advanced action information system, a comprehensive auxiliary control system, world-class modular living spaces, sophisticated power distribution system and a host of other advanced features. The destroyer class, certain to be the Navy's pride after the formidable Delhi class of guided-missile destroyers, comes integrated with the supersonic BrahMos anti-ship and land attack missile system, enabling the ship to engage shore-based and naval surface targets at long range. The ship's air defence capability, designed to counter the threat of enemy aircraft and anti-ship cruise missile will revolve around the vertical launch, long-range surface to air missile system, which is being co-developed by the Defence Research and Development Organisation (DRDO). Four AK-630 rapid-fire guns provide the ship with close-in defence capability while a medium-range gun will enable her to provide effective naval gunfire support. Indigenously developed twin tube torpedo launchers and rocket launchers will add punch to the ship's anti-submarine capability.

The Directorate of Naval Design is proud of the Kolkata class. A top official with the department tells ***SP's,*** "The P15A destroyer adds a new dimension in naval warfare for the Indian Navy. The ship will have modern weapons and sensors, advanced action information system, total atmospheric control system and a host of other advanced features. These ships with updated weapon package and new look exteriors for improved stealth will transform surface warfare. The navy is excited on the follow-on four Project 15B improved Kolkata class destroyers."

Just as anticipated is the lead ship of the Project 28 Kamorta class of four anti-submarine warfare corvettes. With an aim of 90 per cent indigenisation in the class's manufacture at the Garden Reach Shipbuilders and Engineers Ltd (GRSE) shipyard in Kolkata, efforts made by the Indian Navy towards its national goal of indigenisation and self-reliance isn't just a castle in the air. The brand new ASW platforms will stealthily seek and destroy lurking enemy submarines. While the Kamorta will enter service next month, the remaining three ships are to be delivered progressively until 2016. The Kamorta class corvettes also mark many firsts including introduction of the 'rail-less helo traversing system' to handle a helicopter on board the ship, foldable hangar door, use of indigenous DMR 249A steel and carbon fibre reinforced plastic (CFRP) superstructure integrated with the steel hull of the ship. Besides reducing the overall top weight, this provides the ship with improved stealth features and reduces life cycle maintenance costs. The ship's hull form is efficient with excellent sea-keeping and manoeuvrability characteristics having an overall length of 109 metres. The ship can cut through the sea at a very high speed of 25 knots. Hull of the ship is built with warship grade high tensile indigenous steel. The ship's advanced stealth features will make her less susceptible to detection and help in effective deployment of soft kill measures. The ships will be fitted with complete indigenous state-of-the-art weapons and sensors, including a medium-range gun, torpedo tube launchers, rocket launchers and close-in weapon system. These ships are also equipped with a bow-mounted sonar and are capable of deploying a helicopter, adding considerable punch to the ship's anti-submarine capability. These ships also feature an advanced Integrated Platform Management System for controlling and coordinating the propulsion, auxiliary and power generation equipment. •

Eurofighter Typhoon:
On Deployment, On Operation, Combat Proven

Eurofighter Typhoon is the most advanced next generation multi-role/swing-role combat aircraft available on the world market. Its track record is outstanding: More than 400 deliveries in 10 years and more than 220,000 flying hours with unprecedented levels of reliability.

It is combat proven since Operation Ellamy (known as Operation Unified Protector) in Libya. The aircraft proved that it can more than 'cut the mustard' performing tirelessly over 3,000 flying hours and 600 sorties during a six month stint with 100 per cent engine reliability.

It is on Quick Reaction Alert (QRA) duty for Air Forces in Europe and the Middle East. It's been selected as the guardian of major international summits, like the World Economic Forum 2014 at Davos, and the protector of major international sporting events like the 2012 Olympic Games in London.

Routinely in Germany, the UK, Italy, Spain, Austria and the Middle East, the Eurofighter Typhoon is the aircraft the Armed Forces choose as the ultimate protector of national interests. In the UK's case that interest extends to the other side of the world where Eurofighter provides a bastion of strength and confidence for the Falkland Islanders doing its daily duties with the minimum of fuss and with a small maintenance footprint.

All of the above might not be so special, if it didn't have an excellent reputation with aircrews and those that deploy them. And the famous 'Typhoon Grin' which used to be reserved for rookies on their first stint with the aircraft, is now spreading to the faces of experienced users who know when they take to the cockpit they are about to experience something special.

Small wonder then that with more than 700 aircraft on contract and over 570 aircraft on order, The Sultanate of Oman, signed up in December 2012. The expectation is that new customers will follow soon in the next few years. •

Indian Boomer in Service This Year?

BY **SP'S SPECIAL CORRESPONDENT**

India's home-built nuclear-powered ballistic missile submarine Arihant is all set to enter service with the Indian Navy by the end of this year, DRDO chief Dr Avinash Chander said on Day 2 of Defexpo. Indicating that the platform had been integrated with weapons and was undergoing full power tests in harbour at the Ship Building Centre (SBC) in Visakhapatnam, Dr Chander said he was confident that the platform would be ready for induction into the Indian Navy before the end of 2014.

The last year has been a tremendous one for the Arihant programme. 2013 kicked off splendidly with the successful underwater launch of the B05 submarine launched missile from the Bay of Bengal in January. The B05 will be the shorter range surface-to-surface weapon deployed by the Arihant. Noting the achievement, DRDO had said, "The missile launched from a pontoon, was tested for the full range and met all the mission objectives. All the parameters of the vehicle were monitored by the radar all through the trajectory and terminal events have taken place exactly as expected." Sources say integration of the weapon system for further tests, including submarine tests is under way, with a first test later this year.

In August 2013, Arihant's 83MW pressurized water reactor went critical, clearing the submarine platform to leave its dock and prepare for sea trials. Over the last six months, the submarine has been undergoing harbour and systems test, including full power trials. It was a big day in the Indian scientific establishment. Prime Minister had noted, "Today's development represents a giant stride in the progress of our indigenous technological capabilities. It is testimony to the ability of our scientists, technologists and defence personnel to work together for mastering complex technologies in the service of our nation's security. I look forward to the early commissioning of the INS Arihant."

The Arihant programme, which envisages a total of three submarines of the class, is a fine example of partnership between the Defence Research and Development Organisation (DRDO), Indian Navy and private industry. With design and development help from Russia, the vessel has taken its time, but entering the final lap before it enters service, the Navy may feel justifiably proud of an indigenous effort for such a critical strategic capability.

The Russian Akula-II class INS Chakra nuclear-powered attack submarine entered service with the Indian Navy in April 2012. In the last two years, the vessel has proved to be a formidable presence in the Indian Ocean region, providing the Navy with a capability that has become indispensable. India is in the process of firming up the modalities to lease a second Akula-II submarine from Russia for a period of 10 years.With two Akulas, the Indian Navy will have an unpredecented force projection capability in its area of responsibility. The Chakra is providing the Indian Navy with valuable training capabilities to refresh procedures in anticipation of the Arihant and a second Akula-II. As reported in *SP's ShowNews* for Day-1, the Indian Navy's submarine arm could do with a whole lot of work.

In many ways, India's nuclear submarine programme has happened in reverse. The country continues to build foreign technology conventional attack submarines, but the first indigenous boat will be the most complicated submarine type of all – a nuclear-powered ballistic missile platform. While the two following boats will also be SSBNs, there has been a loud call for an indigenous nuclear-powered attack submarine. At this stage, the DRDO's Naval Materials Research Lab (NMRL) is developing a fuel-cell based air independent propulsion (AIP) plug for the 5th and 6th Scorpene off the Mazagon Dock Limited production line. The DRDO and Naval Architects are not, however, formally creating a nuclear-powered attack submarine design. •

For Indian Navy, No Place Like Home

BY **SP'S SPECIAL CORRESPONDENT**

The arrival of INS Vikramaditya in January has ushered in a special new era for the Indian Navy. Not in 16 years has it been in a position to deploy two aircraft carriers. The formidable 44,500-tonne refurbished Soviet-era aviation cruiser, reinvented as a STOBAR carrier, has been a monumental effort. As we speak, the Indian Navy is stretching the ship's legs in the Arabian Sea ahead of a ceremonial welcome by the government in Mumbai soon. Truthfully, the Navy is far more interested in the implications of the ship that follows – the new Vikrant, India's first indigenous aircraft carrier, currently under construction at the Cochin Shipyard in southern India. That, and the 45 other ships and submarines that populate the Indian Navy's current order book. There's something special about the order book, and it was captured by Chief of the Naval Staff, Admiral D.K. Joshi two months ago when he said, "Our theme for this year's Navy Week is 'Maritime Security Through Self-reliance' encapsulates our commitment to indigenisation in quest for strategic autonomy in the region. We are proud of the fact that all 45 ships and submarines, which are currently on order for Indian Navy, are being constructed in India in both public and private shipyards."

The Indian Navy currently operates two aircraft carriers, an amphibious landing platform dock (INS Jalashwa, the former USS Trenton), 9 landing ship tanks, 8 guided missile destroyers, 15 guided missile frigates, one Russian nuclear-powered attack submarine, 13 diesel-electric attack submarines, 24 missile corvettes, 7 mine countermeasure vessels, 32 patrol vessels, 4 fleet replenishment tankers and various smaller auxiliary vessels. Currently under construction for the navy are seven Project 17A indigenous improved Shivalik class stealth guided missile frigates (four to be built at the Mazagon Dock Ltd (MDL) and three at the Kolkata's Garden Reach Shipbuilders and Engineers Ltd (GRSE), three Project 15A Kolkata class indigenously designed guided missile destroyers, four Project 15 Bravo improved Kolkata class guided missile destroyers to be built by MDL (construction of first two began in October 2013), four Project 28 Kamorta class anti-submarine warfare corvettes (the lead ship enters service shortly), two Sunayna class offshore patrol vessels built by the Goa Shipyard Ltd (in addition to two already commissioned starting January 2013), three 4,000-tonne cadet training ships being built by the ABG Shipyard in Gujarat, five 500-tonne steel hull-aluminium superstructure hydrographic survey catamarans being built by Alcock Ashdown Shipyard in Gujarat (in addition to first ship commissioned in September 2012), four landing platform docks (two to be built by the Hindustan Shipyard, and an additional two by the winner of a tender between three private shipyards – Pipavav, L&T and ABG), eight mine countermeasure vessels (two to be built by South Korea's Kangman and six to be built by Goa Shipyard Ltd), two deep submergence rescue vessels (DSRV), six Scoepene class submarines at Mazagon Dock Ltd, among several other smaller auxilliary vessels. This, of course is in addition to the Arihant nuclear submarine programme that will see the construction of two more SSBNs of a modified class moving ahead. In addition, the Goa Shipyard Ltd is currently building six advanced offshore patrol vessels for the Indian Coast Guard, plus several other smaller auxilliary ships.

The opportunities for cooperation in the shipbuilding, weapons and electronics spheres are enormous as far as the Indian Navy is concerned. To put things into perspective over how much has happened since the last Defexpo, a month after the 2012 show, the Indian Navy commissioned the INS Chakra Akula-II class nuclear attack submarine into service. The same month, it began inducting the there improved Talwar class frigates, with the last (INS Trikand) entering service in June last year. Four months after the 2012 show, the Indian Navy commissioned the final Project 17 stealth frigate, INS Sahyadri into service. Then outgoing Navy Chief, Admiral Nirmal Verma had said, "The Indian Navy's preferred choice of inducting ships and submarines has always been through the indigenous route. Today, of the 46 ships and submarines presently on order, 43 are from Indian shipyards. The intended induction programme is structured to continue at a pace such that over the next five years we expect to induct ships and submarines at an average rate of 5 platforms per year provided the yards deliver as per contracted timelines. At the same time it would be amiss if I did not emphasise the need for our public and private sector shipyards to scale up their capabilities to deliver state-of-the-art warships that meet our future needs in time frames that match global standards. To offer a perspective, the global average for building a ship similar to a Delhi class is about 36 months, that too with a stringent cap on man days. These are the standards that our shipyards must emulate so as to contain costs of shipbuilding. This would result in higher productivity and capacity utilisation. The provisions of the Defence Procurement Procedures to 'Buy and Make Indian' must be adopted to synergise capabilities and implement leap-frogging technologies. The Navy's forthcoming LPD programme is a unique opportunity in this context."

The Indian navy has espoused the self-reliance mantra far more substantively than the other two services, not least owing to necessity and reliability issues with foreign sourcing of frontline ships. Several foreign shipbuilders at Defexpo recognise that transferring technology to Indian shipyards is the only way forward. This year's show affords an excellent platform and opportunity to further discussions on maritime business in India and around the world. In the last 15-20 years, India has proven its prowess in quality warship building, intensifying the possibility of India being hub for warship construction and supply to other countries the world over.

Two European shipyards are among those taking the Indian Navy's modernisation philosophy very seriously.

"Defexpo is a very important platform for DCNS to showcase the services we can provide to our customers through genuine transfer of technology," says Bernard Buisson, Managing Director of DCNS India. "DCNS India set up a dedicated indigenisation programme as part of the transfer of technology (ToT) agreement with Indian naval shipbuilder Mazagon Dock Limited. It received the prestigious 'Excellence in Indigenous Technology' award at Aerospace and Defence Awards 2013".

German rival ThyssenKrupp Marine Systems is back at Defexpo this year in a big way. According to the company, "As a leading full-service naval shipbuilding systems and solutions provider, ThyssenKrupp Marine Systems enjoys long-standing strategic ties with India. For more than a quarter of a century, the Indian Navy has been operating four HDW class 209/1500 submarines, locally known as the Shishumar class. The after-sales service provider Marine Logistik GmbH (MARLOG)—which was integrated into ThyssenKrupp Marine Systems last year — has been a partner to the Indian Navy for more than two decades, delivering spare parts for the Shishumar class. This successful cooperation is now being continued under the new affiliation. At present, ThyssenKrupp Marine Systems is in discussions with the Indian Navy to support the upgrading of two of these vessels through the integration of the latest weapons and sensors, including Harpoon anti-ship missiles. Furthermore, the company is supplying sophisticated composite structures for the P-28 corvettes currently being built at the Garden Reach Shipbuilders and Engineers Ltd."

INS MAKAR

Obviously, Defexpo isn't just about big frontline warships. In fact, with order books for large ships mostly filled at this stage barring a few crucial tenders, major business opportunities exist in allied systems, support equipment, combat systems and advanced electronics. Which is why US firm Textron Systems returns to Defexpo this year with a range of maritime capabilities ranging from the Common Unmanned Surface Vessel to the next-generation Ship-to-Shore Connector amphibious landing craft – both smaller requirements among the larger scheme of things for the Indian Navy. Airbus Defence and Space has introduced the SCOTPatrol SPM800X next-gen naval terminal, designed to extend satcom capabilities to smaller ships such as offshore patrol vessels (OPVs), with the capability to transmit large volumes of data over Ku, Ka and X bands, SCOTPatrol can act as a beyond-line-of-sight (BLOS) relay for video, multispectral and radar imagery, from intelligence, surveillance and reconnaissance (ISR) assets such as helicopter UAVs. At this year's show, Israel Aerospace Industries Limited has lifted the curtains off its brand new unmanned ship, Katana, designed to actively protect critical maritime establishments, including ports, undersea energy pipelines and energy rigs. •

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Revitalising Goa Shipyard

BY **REAR ADMIRAL (RETD) SUSHIL RAMSAY AND R. CHANDRAKANTH**

Goa Shipyard Limited (GSL), which is going through difficult times due to a lean order book, is keenly awaiting the final approval for the commencement of the mine counter-measure vessels (MCMVs), announced the new Chairman and Managing Director, Rear Admiral (Retd) Shekhar Mital. The plan is to build up to eight MCMVs to replace the 12 existing Soviet-made Pondicherry/Karwar class ocean minesweepers that have been in service for the last 25 to 30 years. GSL is expected to build six of them through transfer of technology.

Mital told *SP's ShowNews* that GSL and the Indian Navy had spent about ₹650 crore on the shipyard's modernisation for its MCMV project. GSL turnaround hinges on the early commencement of work on this project. The project has special significance from operational necessity angle for the Indian Navy and in the absence of MCMVs, the naval flotilla will be bottled up in the harbour for want of mine-sweeping facilities.

GSL, he said, is aggressively planning to diversify product range and mentioned the aircraft landing facility on INS Hansa; damage control simulators, etc.

Mital said that GSL is going through challenging times and that the net profit had declined steeply from ₹177 crore in 2010-11 to about ₹15 crore in 2012-13 and is under severe financial stress in the current year. "Our order book is at its minimum and can barely support yard production for about two-three years. With so much government resources spent on modernisation, corresponding order book is essential to remain viable." •

DSM Dyneema high-end protective solutions for Indian market

BY **R. CHANDRAKANTH**

With the soldier modernisation programme underway in the country, DSM Dyneema is hoping to make significant breakthroughs in the market with their path-breaking technologies, one of which was launched for the Asia-Pacific market at Defexpo. On February 6, the company introduced Dyneema Force Multiplier Technology for life protection and at the show there has been enthusiastic response.

Shitij Chabba, Global Business Segment Director (Life Protection) and Nicole Ng, Marketing Manager, Life Protection, APAC, told *SP's ShowNews* that there is increased awareness not just in the armed forces, but also in the VIP segment for 'lighter protection' materials. The innovative technology has reduced the weight of the protection vests by almost 30 per cent as per the current industry benchmarks.

DSM Dyneema is on a two-path process of introducing technologies in various markets. The radical innovation process is spread over three years while micro-innovation process designs quality products at an affordable price, said Chabba.

The market in India is huge and DSM Dyneema will be co-partnering with an Indian partner to address the needs of India, said Nicole. The key countries in APAC at present are Korea, Thailand, Malaysia, Singapore and also India. •

Indo-Israeli LR-SAM Naval Test This Year

BY **SP'S SPECIAL CORRESPONDENT**

Delayed by over four years, but this one is truly better late than never. In what will be a significant boost to the Indian Navy's quest for a credible air defence system deployable on its frontline vessels and aircraft carriers, the Indo-Israeli long-range surface-to-air missile (LR-SAM) system will be tested in a naval configuration towards the end of this year, reveals the Defence Research and Development Organisation (DRDO) Chief Dr Avinash Chander. The missile underwent a first test from a land launcher in 2010, and has since been tested an unspecified number of times. The collaborative programme, involving Israeil Aerospace Industries Limited (IAI), DRDO and the navies of India and Israel is criticial to modernisation of the surface fleet.

The LR-SAM test will take place at the integrated test range (ITR) off Odisha's coast. Exactly a year ago, the ITR announced interest in procuring a wide band telemetry receiver specifically for the LR-SAM test schedule. The test is expected to be conducted at ceiling range against an aerial target. The trial schedule in India may include at least three tests in the November 2014-March 2015 period.

The LR-SAM, designated Barak 8 by IAI, when inducted, will be housed in four vertical launch units (VLUs), each housing eight missiles, on each of the three Project-15A destroyers, seven Project-17A stealth frigates and aircraft carrier Vikrant, i.e, each of India's next-generation warships will carry at least 32 LR-SAMs. The combat suites of both vessel classes will be built around the Elta EL/M-2248 MF-STAR. Scientists and engineers from DRDO have visited Israel regularly to gauge progress on the system, that the Indian Army and the Indian Air Force (IAF) have also expressed interest in. The dual-pulse smokeless solid rocket motor propelled missile is being built with an effective range of 70 km and a ceiling of 16 km. The missile's high agility is being provided by a tungsten jet vane system for thrust vector control and a highly evolved electro-pneumatic control actuation system. Following fresh interest evinced by IAF and the Indian Army, the dual-mode guided weapon (GPS + data link for mid-course guidance/seeker for terminal homing) will be deployable on mobile launchers as well. The weapon system can engage 12 targets with 24 missiles.

From short- to long-range, from supersonic sea-skimmers to high-altitude targets in all-weather conditions, the LR-SAM is capable of multiple simultaneous engagements in severe saturation scenarios. The system boasts a stand-alone data link for optimised task forces and missiles coordination.

The missile system's flexible dual pulse motor system provides high manoeuvre capability at target interception range throughout its wide envelope.

Its low weight and small size (about half of similar systems, claims IAI) – makes for a small footprint on any frontline ship. Low signatures (carry, launch & flight) makes for high ship survivability. Robust multi-missile coexistence and multi-target capability (supported by seeker, DL & WCS) enables operation in highly saturated operational scenarios. Finally it sports a high performance warhead with a robust kill mechanism.

A senior Indian Navy officer said, "The LR-SAM programme has been somewhat delayed by a few years. This has been a cause for concern. But the end product looks promising. The ships that will deploy this missile will begin to enter service this year, in fact very shortly. It is therefore imperative that IAI and DRDO expedite the test programme so that final integration and user trials can commence on time and on plan. The significance of point defence and air defence capability for our fleet cannot be overstated, given the myriad threats available in our area of operations."

The DRDO entered into a contract with IAI in January 2006 to jointly develop the LR-SAM system for the Indian and Israeli navies. The ₹2,606-crore programme is envisaged to be completed by December 2015. •

Coast Guard Sea Hunter Aircraft Bid to Kick Off

BY **SP'S SPECIAL CORRESPONDENT**


BOMBARDIER-IAI-ELTA Q400 MULTI-MISSION AIRCRAFT

Apart from the Indian Navy's medium range maritime reconnaissance (MRMR) competition, the Indian Coast Guard (ICG) is officially looking for nine multi-mission maritime aircraft (six initially, with options for three more). Over the next few months, the ICG and the Defence Research and Development Organisation (DRDO) lab the Centre for Airborne Systems (CABS) will kick-start the tender process to identify an aircraft platform that will be the vehicle for the system being developed in-house by CABS in Bengaluru. According to a request for information published last September, "The initial requirement is for six certified and modified aircraft. Another three aircraft are envisaged in Phase II and shall be under option clause. The future requirement is for another 10 such aircraft."

SP's can confirm that discussions have taken place between ICG officials and representatives of aircraft companies in first week February ahead of Defexpo, though the formal tender process will begin only towards the middle of this year. CABS will be lead integrator: It has floated tenders for the platform's intended maritime patrol radar and electro-optic system/infrared (EO/IR) suite, in addition to a pollution surveillance suite. The stated roles for the proposed airborne platform include maritime surveillance and interdiction, search and rescue, cargo and personnel transportation, air ambulance and pollution surveillance.

The Indian Coast Guard desperately needs an equipment overhaul, especially in the maritime domain awareness area. The force currently depends on a fleet of Dornier Do-228 maritime surveillance aircraft for the job. A senior ICG officer at Defexpo told ***SP's,*** "As of now, as the Raksha Mantri said, there is little money to spend on capital acquisitions. But the scenario will change with the next fiscal. The ICG is planning ahead so that there are no unforeseen delays of any kind. Revamping our aviation wing is a priority area for the ICG Director General, and will be pursued with determination. Apart from multi-mission fixed-wing aircraft, the ICG also requires shore-based and ship-based multi-role helicopters. These processes are in various stages."

The MMMA request for information is an unusually detailed document going into the minutae of missions and technical configuration of aircraft, sensors, electronic systems and maintenance. The ICG, which has consulted with the Indian Navy on the programme, will likely base the aircraft in Gujarat and Andhra Pradesh, though this is yet to be decided officially.

As is well known, CABS is currently flight testing the DRDO-Embraer AEW&C aircraft in country, suggesting that the Brazilian airframer may have a type advantage, though the ICG has said that a fresh bid will involve a fair and open competition between interested companies. Companies likely to evince interest in the programme include Boeing, Lockheed Martin, Alenia Aeronautica, Airbus Defence, Dassault Aviation, Bombardier, Gulfstream, Beechcraft and Saab. A degree of commonality with the Indian Navy MRMR programme is obvious, though at this stage, both competitions are distinct.

Speaking recently, ICG Director General Vice Admiral Anurag Thapliyal said, "The addition of 29 surface platforms (one each pollution control vessel and offshore patrol vessel, 12 fast patrol vessels, eight air cushion vessels and seven interceptor boats) and supporting shore infrastructure which includes a Regional Headquarter (North-East) at Kolkata and District Headquarters-14 at Port Blair in the recent past is an earnest effort by this growing service to ensure presence all along the 7,500-km-long Indian coastline and render swift response to emergency contingencies at sea. We expect to add another 15-20 vessels this year. Today, the Indian Coast Guard has an organisational structure comprising five Regional Headquarters, 14 District Headquarters, 41 Stations and 9 Air Stations/Enclaves with suitably equipped surface and air units dispersed along these stations on 24 x 7 days task of surveillance round the year." •

Cochin Shipyard Hoping to Increase Share of Ship Repair Market

BY **REAR ADMIRAL (RETD) SUSHIL RAMSAY**

Cochin Shipyard Limited (CSL) which has grown phenomenally in the last six to seven years continues its expansion mode. From a turnover of about ₹300 crore in 2000-01, it is now at ₹1,600 crore levels and is growing at a rapid pace. In an interview with ***SP's ShowNews,*** **Commodore K. Subramaniam**, Chairman and Managing Director, gives details of the expansion plans.

SP's ShowNews **(SP's): Could you tell us about your first experience at Defexpo 2014?**
Subramaniam: It is very interesting and a bit early to predict the response and interest for CSL. Certainly, we find Defexpo is the place that CSL should be on a regular basis considering our focus on warship-building programmes.

SP's: What are the defined milestones for Indian aircraft carrier (IAC) I?
Subramaniam: The launch of INS Vikrant was indeed a historic milestone not just for CSL but also for the country. India joins a very select club of half a dozen nations capalbe of designing and building an aircraft carrier. The work on the IAC is proceeding at a brisk pace. The ship is being built in phases. The launch on August 12, 2013, signified the completion of phase I. The present work on phase II is targeted for end 2016. The aviation and weapons would be integrated in phase III.

SP's: CSL wishes to be considered for the LPD (landing platform dock) programme, could you tell us about CSL capabilities in this field?
Subramaniam: CSL has demonstrted its capability for construction of warship by our work on Vikrant. We are confident of building and delivering the LPD for the Indian Navy.

SP's: Could you give us details of CSL's modernisation plans?
Subramaniam: We need to keep the momentum of growth and for this we need to invest in expansion and modernisation. The immediate focus is to look at increasing our share of ship repair market. For this CSL has taken about 40 acres of land from the Cochin Port Trust and would develop it with an international standard ship repair facility at a cost of about ₹480 crore. •

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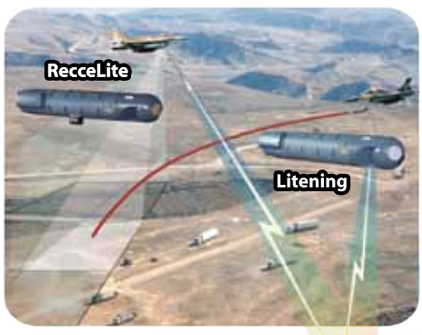

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