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DEFEXPO INDIA 2012

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[SNAPSHOTS]



PHOTOS: H.C. Tiwari and Abhishek Singh

NEXT DEFEXPO INDIA IN 2014

The Defence Minister A.K. Antony who inaugurated the 7th edition of Defexpo India 2012 at Pragati Maidan in Delhi, announced that the 8th edition would be held from February 6 to 9, 2014 at the same venue.

Defexpo 2012 has been organised by the Defence Exhibition Organisation, Ministry of Defence and the event is managed by the Federation of Indian Chambers of Commerce and Industry (FICCI).



DEFENCE MINISTER A.K. ANTONY INAUGURATING THE DEFEXPO INDIA 2012. DR M.M. PALLAM RAJU IS NEXT TO HIM.

ENHANCE PRIVATE SECTOR PARTICIPATION, REVITALISE PUBLIC SECTOR: ANTONY

BY R. CHANDRAKANTH

The mantra at the 7th edition of Defexpo India 2012 has been to enhance private sector participation and revitalise the public sector to accelerate defence production in India. The agenda for this was set by the Defence Minister A.K. Antony who inaugurated the biggest Asian event for land, naval and internal security here.

The Defence Minister said Defexpo has recorded unprecedented growth, both in terms of company participation and official delegations. The conference hall was chock-a-block, reflecting the growing interest in the Indian defence market.

Antony emphasised that India had to achieve a high level of indigenisation in defence and 'this is our thrust area'. "Our emphasis is on public-private sector partnership in the defence industry. Enabling policy framework has been put in place to develop indigenous capabilities through harnessing the potential and utilising resources available, both in the public and the private sector. Our defence industry is now open up to 100 per cent for Indian private sector participation, while foreign direct investment (FD) is permissible up to 26 per cent."

GREATER TRANSPARENCY AND SPEED. In line with the industry requirements, review of the Defence Procurement Procedures (DPP) to usher greater transparency and speed in the defence acquisition process is continuously on. "The introduction of 'Buy & Make (Indian)' category in DPP is aimed at encouraging proactive participation of the Indian industry by way of forming joint ventures with any foreign manufacturer."

He said that offset banking was permissible in the Defence Offset policy, the scope of which has now been expanded to include civil aerospace, internal security and training within the ambit of eligible products and services for discharge of offset obligations. The licensing condition has already been rationalised. As

part of the continuous process of periodic review of our Defence Procurement Procedure, review of the Defence Offset policy is also being undertaken and further changes are expected in due course."

DEFENCE OUTSOURCING HUB. The Indian defence industry, he said, had matured over the years and substantial capabilities have been developed in land, naval and air systems. "As a result of the introduction of Defence Offset policy, India is gradually becoming a key outsourcing hub for the global defence industry."

Defexpo India 2012, he mentioned, showcased India's capabilities in land, naval and security systems, as well as its emergence as an attractive destination for investment in defence sector. "The event will also demonstrate our capability to design, develop and deliver a wide range of military and civil products and services to meet the stringent specifications and, that too, at most competitive prices. We are open to enter into mutually beneficial agreements with friendly countries in the field of critical and state-of-the-art futuristic defence technologies. We would welcome all such proposals in our endeavour to modernise our armed forces."

Antony stated that "at the politico-security level, India has always been recognised as a responsible power and a stabilising factor in this region, in the face of various security challenges originating from different sources around us. India has traditionally been a peace-loving nation. However, we have to be ready to meet any challenge to our territorial integrity and sovereignty. Our armed forces need to have access to the latest defence technologies, equipped with state-of-the-art platforms, equipment and systems to meet any threat. Our government's efforts are directed towards modernisation of our armed forces."

DEFENCE SPEND AROUND 2 PER CENT OF GDP. India's defence expenditure in the recent past has been around

PHOTOS: H.C. Tiwari and Abhishek Singh



ALL SMILES: (TOP) SP GUIDE PUBLICATIONS CMD AND EDITOR-IN-CHIEF JAYANT BARANWAL PRESENTING A BOUQUET OF FLOWERS TO DEFENCE MINISTER A.K. ANTONY; (ABOVE) DEFENCE MINISTER VISITS SP'S BOOTH IN HALL 14

Continued from page 1

2 per cent of the GDP, which is consistent with our security needs, as well as our requirements in the area. With the projected annual growth of the Indian economy expected at a trajectory of 8 to 10 per cent for the next two decades, expenditure on defence in absolute terms is bound to increase.

The Minister of State for Defence Dr M.M. Pallam Raju said that the introduction of the new category of acquisition 'Buy and Make (Indian)' is a major shift enabling Indian industries to enter into joint ventures with foreign OEMs. The route opened up ways for technology transfer.

LONG-TERM INTEGRATED PERSPECTIVE PLAN (LTIPP) SOON. Dr Pallam Raju said that lack of adequate information regarding the defence requirements has been a major impediment in the growth of the defence industry in India. The government is in the process of finalising the long-term integrated perspective plan (LTIPP) of the armed forces. Consequent to its finalisation, a public version of the document outlining the technology perspective and capability roadmap of the armed forces covering a period of 15 years will be published on the MoD website. This, he added, would enable the domestic industry to plan investment in the defence sector and take up research and development, technology upgradation and forge tie-ups with foreign OEMs.

The Secretary (Defence Production) Shekhar Agarwal, in his welcome address, said that Defexpo was growing progressively from the year 1999 and the number exhibitors this year is 560, up from 412 in 2010.

The President of the Federation of Indian Chambers of Commerce and Industry (FICCI), R.V. Kanoria, in his vote of thanks, said that the private sector would rise up to the expectations of the government in building India's defence industry. The defence sector is a sunrise sector and the private sector would make best use of the opportunities that were opening up. •

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Moving towards 40 per cent indigenisation

BY R. CHANDRAKANTH

India is fast moving towards 40 per cent indigenisation of defence production from the present 30 per cent, thanks to the many initiatives the government has taken in the recent past, the Defence Minister A.K. Antony announced here.

Conceding that the pace of indigenisation was not as desired, efforts were now on to speed up as well ensure greater transparency. India has not been able to develop state-of-the-art technologies for many years, but that is changing. "We are now developing sensitive technologies such as radars, electronic warfare systems etc...but that is not enough. We have to move fast and cautiously."

One of the reasons for the slow pace of indigenisation, he attributed it to the technology denial regime by the West following the Pokhran explosion. "Now these countries realise that India is a responsible military power and that the technology denial regime is a thing of the past."

This year the government had formulated a policy for joint venture production and last year the government had expanded the offset policy. "Because of the new offset policy, this year onwards, we will have more absorption." In



DEFENCE MINISTER ADDRESSING THE DELEGATES

certain critical areas, the armed forces need equipment now and in such areas we 'cannot wait' and have to import.

INDIGENISATION GAINING MOMENTUM

Considering the mandatory offset obligations, the quantum of offset would increase 10 times, hence calling for review of the offset policy. "Both the public and private sector will not be able to match the requirements and we have to upgrade the policy. The Defence Acquisition Council will review the same."

In the backdrop of India's sensitive surroundings, Antony said, the modernisation process of the armed forces had to be stepped up and that called for enhanced allocation for capital expenditure. "This year has been difficult for the government, however the budgetary allocation for defence has gone up by nearly 18 per cent."

On allowing Indian defence companies to export, the Minister said that the export policy has been liberalised, but the government priority is to meet the domestic requirements. "Depending on the proposal of a company to export, we will take a decision," he clarified. •

Defence procurement and export procedures being streamlined

Dr M.M. Pallam Raju, Minister of State for Defence, declared here today that the government is in the process of liberalising the export procedures for the defence sector. The changes are in different stages of discussion. He also mentioned that the government plans to enhance partnerships between public and private sector and looks forward to design state-of-the-art defence technology in India. "In India procurement of defence equipment is growing. Amendments are being made in the existing act to expand the process of procurement," he added.

Dr Raju affirmed that in India defence forces are in modernisation phase, and for that the Defence Procurement Procedures were reviewed regularly. The introduction of the new category of acquisition 'Buy and Make Indian' is a way towards indigenisation. Now SMEs in India are also contributing to defence programmes and playing a critical role in delivering defence equipment requirements.

Dr Raju stated that there is huge scope for expanding defence offset



DR PALLAM RAJU

policy and Ministry of Defence is now working to make the policy more liberal in order to enhance partnerships, joint ventures and alliances with overseas defence equipment suppliers.

Shekhar Agarwal, Secretary, Department of Defence Production, Ministry of Defence, said, "In the last 20 years, India's defence sector has witnessed rapid advancement. This change came about after the liberalisation of Indian economy." The defence production in India was striving to achieve self-reliance.

M.V. Kotwal, President, Heavy Engineering Division, Larsen and Toubro (L&T) Limited and Chairman, FICCI Defence Committee, welcomed the government's commitment to actively involve the private sector in the defence sector.

There is tremendous opportunity in defence sector but under utilised capabilities have to be explored to set up a robust industry. The potential for partnership between public and private sector within India itself is huge, Kotwal observed. •

WASS unveils Flash Black NextGen lightweight torpedo

BY SUCHETA DAS MOHAPATRA

On the first day of Defexpo 2012, Finmeccanica company Whitehead Alenia Sistemi Subacquei (WASS) unveiled the Flash Black, which according to the company, is the world's first next generation lightweight torpedo. The torpedo, which is yet to be developed has finished the design stage and the company has made its first presentation in India. WASS is talking to the Defence Research and Development Organisation (DRDO) for possible collaboration.

Addressing a press meet on the occasion, Renzo Lunardi, CEO of WASS, said, "The Flash Back has been designed to meet all challenging operational requirements of modern ASW and can be launched from any platform. WASS intends to master the lightweight torpedoes' market for the next 25-30 years."

The Flash Back torpedo is a highly versatile torpedo that has the capabilities to be launched from any platform (underwater and AUV, UUV and



FLASH BLACK LIGHT WEIGHT TORPEDO

USV), against any target and in any environment, including littoral waters and extremely shallow bottom depths and in the presence of the most sophisticated countermeasures. The torpedo has very high speed, long engagement range and incomparable killing probability. It is extremely silent and can be wire-guided.

According to the company, the torpedo due to its low procurement and extremely limited exercise and maintenance costs, has twice the capability-to-life-cycle cost ratio with respect to any other torpedo in the world.

On being asked by when the company is looking at completing production of the first Flash Back, WASS officials stated that it will take 26 months from the start of development. "It is a company financed project and we have

finished the pre-study phase. We will take our design to various exhibitions across the world to check the interest of customers and we are already getting responses. We will present our design before the DRDO soon." •



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UK Minister in India to promote defence trade ties

BY SUCHETA DAS MOHAPATRA

Gerald Howarth, Minister for International Security Strategy, Ministry of Defence, United Kingdom is in India to continue and build on the close historical, cultural and trade ties between the two countries. In an exclusive interaction with *SP's ShowNews* on the first day of the land and naval exhibit Defexpo, the Minister said UK and India have many things in common; an open market, free press, shared cultures, etc and both the countries can benefit from each other. "Transfer of technology (ToT) has taken a real momentum," he said and added that it is not only UK companies tying up with Indian industry, but also Indian companies who are doing really well (Tata-Jaguar, etc) with their partnerships in UK.

Howarth would be meeting the DRDO Chief Dr V.K. Saraswat to discuss on how to take further the bilateral agreement on Energetics signed between DRDO and Defence Science and Technology Laboratory (DSTL), UK in September 2011. "A team of experts from the DRDO will visit UK in June to turn the agreement into a reality."

On being asked about India's decision on medium multi-role combat aircraft (MMRCA) programme, he said that his purpose of coming to India is continuing the British Government's commitment to India. He however, also



GERALD HOWARTH

said that though UK is disappointed with the MMRCA decision, it is still hopeful. "Eurofighter Typhoon is a better performing aircraft and the package that Casidian offered is in excess. But we entirely respect the decision of the Indian Ministry of Defence (MoD). There is a long way to go and we are still hopeful," said the Minister.

On the ongoing debate for a hike in foreign direct investment (FDI) in defence sector from 26 per cent to 49 per cent, Howarth said that it would be beneficial to both countries. He gave the example of 1980s when India was a great help for the British economy.

The Minister is also accompanied by officials from the UK Trade & Investment with the intent of promoting defence trade ties between the two countries. According to UK Trade & Investment officials, India is a massive market and they are looking at bringing British capabilities in land and maritime to India. While in land they are looking at air defence and equipping infantry soldiers with latest communication system, armour, etc; in the maritime domain they are looking at the CBRN system and frigates. They informed that a ship equipped with the latest equipment and technology would

sail from UK to India this year, to demonstrate before the Indian Navy officials UK's latest technologies. The officials also highlighted on the 'lifesaver bottle', which can be used both by the defence forces and civilians. •

DHS eyeing at ₹100 crore from India

BY SUCHETA DAS MOHAPATRA

US company DHS Systems is aiming at generating revenue of ₹100 crore in the next three years from the defence and healthcare sector in India through sale of its deployable shelters. At Defexpo, the company is in full form demonstrating its portable shelters to prospective buyers. The company has already supplied 24 shelters to the Indian Army following a memorandum of understanding (MoU) signed three years back between DHS and the Bharat Electricals Limited (BEL) to provide deployable rapid assembly shelters (DRASH) to the Indian Army.

Speaking to *SP's ShowNews*, DHS officials stated that the company plans to set up a manufacturing facility in India by 2015, again in partnership with BEL and is expecting a substantial 20 per cent of its total revenue to come from the Indian defence sector. Andy Cowling, Managing Director, DHS Systems International Ltd, said, "The advantage lies in working with BEL. We are quite satisfied with our collaboration with BEL and would



DRASH SHELTER

like to build upon it and sustain it."

"India is a huge market for us due to its exponentially growing demand for defence equipment and rescue infrastructure. Armed forces, paramilitary forces and all the risk management government bodies are looking for solutions for quick relief during wars and natural disasters," said Cowling.

Besides the US, the DRASH shelter is used in UK, Italy, Spain, Turkey, Poland, Europe, Middle East, Chile, Brazil, etc. Till date, more than 16,000 shelters and over 5,000 trailers have been deployed worldwide. Cowling said that the DRASH shelters can withstand the harshest of climate from -35° celsius to +55° celsius. They are fire resistant and anti-microbial and can hold over 150 people or a 40 feet vehicle or even a small helicopter. It can be used for multiple applications ranging from maintenance facilities to logistical support facilities,

to mobile medical treatment centres. DRASH features six different series of shelters with 64 models ranging from 33 sq ft to 1,250 sq ft in size, all of which can be interconnected, allowing effective joint operations. •

Selex Galileo signs €25 million contract with Indian Navy

Sexel Galileo has signed a contract with the Indian Navy to provide support and service solutions through to 2022 worth £21 million (€25 million). The agreement will see Selex Galileo supporting the avionics facility at the Centre for Avionics Repair and Software Development (CARES) at India's Naval Aircraft Yard at Kochi. In addition to support, the deal will see the company carry out a comprehensive update of the CARES facility to meet future test requirements.

"The CARES facility is seen as a benchmark repair facility within the Indian Navy, and we're proud to be behind this success" said Alastair Morrison, Senior Vice President, Radar & Advanced Targeting for Selex Galileo,

adding, "to carry out this new contract we'll be working with Indian suppliers to develop test programme sets (TPS) for the upgrade and will be transferring technical expertise to Indian Navy personnel. It's all part of our strategy to partner with India in the long term."

The contract includes knowledge transfer packages that will train Indian Navy personnel in activities including repair techniques, avionics and test equipment technologies. The contract follows on from Selex Galileo's previous agreement with the Indian Navy which saw the company supporting the CARES facility from its opening in 2001. Since then, the CARES facility has been expanded to provide support for a whole range of Indian Navy aircraft. •



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MKU to invest ₹ 100 crore for its new NVD product line

In an instance of Indian private firms working to meet specific expanding needs within the armed forces, MKU, an India manufacturer and supplier of ballistic protection and surveillance equipment for armed forces, paramilitary forces and police worldwide is set to launch its latest and indigenously developed advanced range of Night Vision Devices (NVDs), with a total investment over \$20-million in the 1st phase. These highly sophisticated devices based on the 'Image Intensifier Technology' will be manufactured at MKU's own manufacturing facility which will be setup in a 10,000 square feet area in Uttar Pradesh. For this MKU has entered into a technology transfer agreement with an international company to manufacture the night vision devices. The NVD range will include three night vision devices i.e. Monocular, Binoculars (Single Tube), and Binoculars (Twin Tube, for 3D vision at night).

Neeraj Gupta, MD, MKU Pvt. Ltd says, "In modern combat scenarios and during special operations, troops need to be effectively equipped during night. Developed with the latest 'Image Intensifier Technology', these NVDs provide superior night vision with a longer endurance of 40 hours, hence equipping them with the tactical advantage with respect to position, information and maneuvers at night or during periods of reduced visibility. Our highly reliable helmets and armours used by the soldiers have given us the perfect platform and we are committed to establish a synergy with our existing consumers for personal protection with our NVDs. Our goal is to make MKU as a one stop shop for force multiplier solutions and we will keep coming up with such innovative products in the future to provide a winning edge to the troops."

In addition to above MKU will also manufacture Night Sights which can be attached to carbines, assault rifles, sniper rifles, and machine guns to provide accurate aimed fire capability in dark star light conditions to soldiers. This will enhance the capability of security forces in a regular war as well as anti terrorist operations as it enables night fighters to see, maneuver and shoot at night or during period of reduced visibility. The company recently announced the successful delivery of 59,000 light weight bullet proof jackets to the Ministry of Home for its paramilitary forces. MKU was awarded

this contract by the CRPF for all paramilitary forces under Ministry of Home Affairs (MHA), a contract worth more than \$20-million. The contract was awarded to MKU in April 2010. •

Boeing flies in high

Now, Defexpo may be a land and maritime trade event, but who says aerospace isn't part of the immediate defence firmament. But while the world's largest weapons firm Lockheed-Martin is surprisingly absent from the show this year, arch rival Boeing is here showcasing its comprehensive portfolio of products and services, including the C-17 Globemaster III, P-8I Neptune (An attraction at the Boeing exhibit is a demonstration of a P-8 Mission Console), AH-64D Apache, CH-47F Chinook, V-22 Osprey, ScanEagle and 737 Airborne Early Warning & Control – all products either ordered, in competition, or on offer to the Indian armed forces.



"India is a significant market for Boeing and we are committed to working closely with the defence ministry, armed forces and indigenous industry to meet India's defense and security needs," says Dennis Swanson, vice president, International Business Development, Boeing Defense, Space & Security in India. "In 2012, we will continue to strengthen our relationships in India through delivering on our promises on our existing P-8I and C-17 contracts; expanding our partnerships with the Indian aerospace industry; and demonstrating how the CH-47 and AH-64 are the right choices to meet India's heavy-lift and attack helicopter requirements." Decisions on the Indian Air Force's heavy lift and attack helicopter procurement efforts are expected later this year. •

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MDS aspires to develop home-grown military hardware and products

The adequate increase in the defence budget is a welcome sign for the defence players like Mahindra & Mahindra Ltd (M&M). India's defence budget has gone up by 17.6 per cent to ₹1,93,407 crore—that is approximately around \$38 billion. M&M is gearing up to absorb the opportunities which will emerge from the steady rise in the defence allocations. M&M feels privileged while contributing to the efforts of the government towards indigenisation, serving the nation and the defence services through their customised indigenous home grown military hardware and products.

Formed in the year 2000, Mahindra Defence Systems (MDS) is an operating group of Mahindra & Mahindra Ltd. MDS is present in land systems, naval systems, vehicle armouring in the UAE and in defence electronics. The MDS group consists of the following operating business units.

DEFENCE LAND SYSTEMS INDIA (DLSI). DLSI, a JV between M&M Ltd (74 per cent) and BAE Systems plc (26 per cent) is focused on design, development and manufacture of light armoured vehicles, mine protected vehicles (MPV), high mobility specialist vehicles, infantry combat vehicles, artillery systems and their upgrades. It has a state-of-the-art facility at Prithla near Faridabad with an annual capacity of 750 vehicles. The customers are the Indian Army, paramilitary forces, state police and exports to foreign armies and police forces.

Currently, DLSI is the largest private sector manufacturer of light armoured vehicles in the organised sector. Its current products are: Rakshak, the combat proven light bullet proof operational vehicle; Rakshak Plus, the new light armoured vehicle; Marksman, a capsule-based armoured operational vehicle; In service 6 x 6 mine protected vehicle; Armoured Scorpio, a VIP discreet protection vehicle; Axe, an all-terrain, off road vehicle and Rapid intervention vehicle, an anti-riot vehicle. DLSI is also the design authority and lead systems integrator for the Indian Army's futuristic infantry combat vehicle (FICV), for which Mahindra & Mahindra Ltd is the development authority and the prime contractor.

DLSI is also pioneering indigenisation of artillery systems in India. Besides

being a lead vendor for the sub-systems to OFB for manufacture of erstwhile Bofors gun in India, it is also bidding/involved in the future artillery projects of Indian Army.

MAHINDRA DEFENCE NAVAL SYSTEMS (MDNS). MDNS is constantly innovating and endeavouring to be at the forefront of technology and is open to the idea of working jointly with both Indian and overseas agencies.

Mahindra Defence Naval Systems has its operational plant at Chinchwadgaon, Pune, where it manufactures components for sea mines, torpedo decoy launchers, triple tube torpedo launchers, specialist products for submarines and few other products. They are supplying to the Indian Navy, the Ordnance Factory Board and DRDO organisations. Mahindra Defence Naval Systems would soon be hived off as a separate company with one of the leading international defence players.

PROPOSED JV WITH TELEPHONICS. In November 2011, Mahindra & Mahindra Ltd and Telephonics Corporation, a leading designer, developer and manufacturer of high-technology integrated information, communication and sensor system solutions to military and commercial markets worldwide, announced MoU to form a JV company. The JV company would provide the Indian Ministry of Defence (MoD) and the Indian civil sector with radar and surveillance systems, identification friend or foe (IFF) devices and communication systems. In addition, the JV intends to provide systems for air traffic management services, homeland security and other emerging surveillance requirements.

MAHINDRA EMIRATES VEHICLE ARMOURING (MEVA). Mahindra Emirates Vehicle Armouring (MEVA) with its production facility in Ras al-Khaimah, UAE, brings in complete vehicle armouring solutions. Specially designed armoured vehicles act as security stimulators in all terrains and conditions.

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TEXTRON Systems

Battle of the tanks: The Future

BY SP'S SPECIAL CORRESPONDENT

For the first time in public, the Russian T-90S and Indian Arjun main battle tanks are on display together at Defexpo 2012. While the Army plans to operate a total so far of only 248 Arjun tanks (in a mix of Mk.1 and Mk.2 configurations), the Russian T-90S is seeing operations in much greater numbers that will progressively exceed 1,300 tanks when the licence build programme by the ordnance factory is complete. The lifeblood of both tanks, in many ways, is tied to the other: the success of one tank almost inevitably means that the Indian Army may reconsider greater numbers of the other. It was in 2003 that then Army Chief General N.C. Vij ordered comparative trials of the T-90 and Arjun to gauge to efficacy of both. Over the next nine years, the Arjun has proven to be a worthy opponent to the T-90, reportedly outrunning and outgunning the T-90 during week-long final comparative trials in 2010. Be that as it may, the Army is looking for an improved Arjun, with greater defensive and offensive capabilities than the Mk.1. Either way, the Army is already looking at an indigenously developed future main battle tank (FMBT) that draws from the lessons of the Arjun and put into a truly modern platform.

The new tank necessarily needs to espouse hybrid electric vehicle technology and incorporate digital vehicle electronics (vetronics) to provide intra-vehicle and inter-vehicle communication capability that will greatly improve sit awareness and enhance operational effectiveness.

For mobility, in order to achieve 'extraordinary' acceleration, the Army observes that it is necessary to couple the conventional diesel engine of the proposed tank to a turbine. The 'Hyberbar' engine will be able to accelerate from zero to full power at 1,500 hp in 2.8 seconds, while a conventional diesel engine requires 8-12 seconds. The quest for more compact power pack has led to renewed interest in gas turbines, which needs to be explored, the Army feels.

The Army wants an active suspension system with sensors, control units, and a hydraulic power source in combination, to automatically alter the suspension characteristics to more closely match the speed of the vehicle and the terrain profile, especially in Indian terrain conditions.

The Army has always held the view that signature management was almost completely ignored in the development of the Arjun. The Army hopes that lesson has been learnt now. Current and expected future threat scenarios require signature management measures of a multi-spectral type, and they require an extremely short reaction time. The Army says it requires signature management in design measures, basic camouflage, additional camouflage and temporary camouflage.

Explosive reactive armour now: The Army points out that the main battlefield threats against tanks are anti-tank guided missile (ATGMs), unguided anti tank rockets and grenades; shaped charge high explosive anti-tank (HEAT) gun rounds; kinetic energy (KE) gun rounds; and top-attack weapons like intelligent sub-munitions, terminally guided artillery rounds, etc. There is a need for developing explosive reactive armour (ERA). Given optimised designs, integrated ERA offers tanks highly effective protection against both the penetrators of armoured piercing fin stabilised discarding sabot (APFSDS) projectiles and the jets of shaped charge weapons, including those with tandem warheads.

The Army says it wants a high-performance armour system on its FMBT with advanced materials incorporating the following qualities (a) Reduced penetration by most lethal weapons, (b) Elimination of parasitic mass leading to a weight reduction, (c) Excellent corrosion resistance, (d) Inherent thermal and acoustic insulation properties.

The Army has stressed that the FMBT needs infrared (IR) detectors, target identification systems, laser warning systems, radar warning receivers and devices to coordinate their signal and instantaneously control a countermeasures suite. These countermeasures fall into two categories: soft-kill system and hard-kill system. The soft-kill sensors must discriminate true and false targets and they must discriminate between missiles or other rounds that threaten the vehicle being protected and those that will miss or are aimed at other targets.

The Army wants an automatic protection systems (APS) on the FMBT. The radar should determine threat levels adequately, and the self-defence rockets should not cause high levels of collateral damage, particularly to accompanying dismounted infantry.

Top attack weapons: Conventional tube weapons are the product of a mature technology, and have now reached a high level of performance. However, on account of the gas-dynamic processes of thermally transformed powder, the muzzle velocity of projectiles is theoretically limited to approximately 2,300 m/s. Contemporary tank guns still offer a considerable growth potential, and electronic guns will be able to exceed this and become an attractive proposition. Tank-fired missiles, which carry shaped-charge warheads, were susceptible to various countermeasures, especially reactive armour. The Army says it is reasonable to expect development of high velocity KE missiles with heavy-metal, long-rod penetrators to defeat current and future tanks both within and beyond line of sight. Such extended-range missiles would enable armoured vehicles to engage targets beyond the direct fire zone. The high/medium-energy level (100 kJ) vehicle-mounted laser is expected to be a lethality option against rockets, air vehicles, light ground vehicles, antennas of armoured vehicles and electro-optical sensors. Hard-kill system to provide full-spectrum defence against top attack weapons, ATGMs, guided missiles and gun-launched KE and HEAT rounds.

Fire control system: Ground sensors, non-line-of-sight launch system and the network capability will enhance soldiers' understanding of their situation in dynamic battlefield conditions by promoting a common perspective of enemy and friendly locations on digital maps and provide timely actionable intelligence.

Very importantly, the Army has stressed that there is a need to manufacture modern simulators using lasers, micro-processors and magnetic tapes, thereby creating near actual combat conditions during training. Development of driving, gunnery and tactical simulators. •



ARJUN MBT

The Indian Army is still juggling concepts of precisely what it wants from its FMBT, but a wishlist already exists. And considering the DRDO's new worldview towards partnerships and synergies with global technology houses, the FMBT programme could offer several opportunities for international cooperation. The following description of the Army's wishlist from the FMBT provides a valuable guide to potential opportunities for companies in India and abroad.

For starters, the Indian Army insists that stealth be built into the FMBT from the ground up – including paints/materials to provide limited invisibility in IR/visible spectrum and for scrambling and avoidance of detection. The Indian Army wants the tank to have an Identification Friend or Foe (IFF) system "to obviate chances of own tanks firing at each other in battle", and a whole new reliable and secure mobile communication system capable of data transmission, audio and video conference. Protection in the form of soft-kill system requires IR detectors, laser warning, radar warning and devices to instantaneously integrate these signals and control a countermeasure suite. Such systems are threat specific so all would have to be carried on a vehicle to gain protection against more than one part of the EM threat spectrum.

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BrahMos Block III test-fired, Indian missile field open

BY SP'S SPECIAL CORRESPONDENT

At around 11.30 a.m. on March 28, the Indo-Russian BrahMos Block III supersonic cruise missile with an advanced guidance algorithm was flight tested from a test range off India's east coast. The missile flew through its designated ceiling range of 290-km at Mach 2.8 and achieved high precision with a steep dive manoeuvre towards the end. The network of telemetry stations and down range ships confirmed that the missile followed its pre-designated flight path. The Indian Army's activation of a second BrahMos regiment this month has put the jointly developed weapon system on even keel in India's conventional arsenal. The success of the BrahMos model has shown the way for future missile partnerships in India, with at least two ambitious programmes currently in progress between Indian and foreign developers.

The missile field is wide open, and the presence of the world's leading munition houses establishes that once again.

For instance, MBDA, currently in an enviable position for a recent contract to supply MICA missiles for the IAF Mirage 2000 upgrade programme, and for its one-up position to arm the Rafale that was selected to be India's MMRCA, has a display with full-scale models of the Mistral MANPADS system which is being proposed for India's VSHORAD requirement and the PARS 3 LR anti-armour weapon being proposed for India's HAL Dhruv helicopter. Both weapon systems, if selected, offer the prospect of significant industrial cooperation within the Indian defence sector, according to MBDA and Defexpo offers them the chance to meet these possible partners from Indian industry. MBDA's India chief Loïc Piedevache says, "Our stated strategy in India is to link and to work with local industry and to advance technology transfer wherever feasible. So should Mistral MANPADS be selected, we are exceptionally well positioned to get local production capability of the Mistral missile up and running as soon as required." The company is also displaying the Fire Shadow (loitering munition that could compete for an Indian Army requirement), ASTER-30 medium range air defence and other weapon systems. The Fire Shadow loitering munition is in the process of being delivered to the British Army.



BRAHMOS MISSILE TEST-FIRE

Arch rivals Raytheon, with a traditionally impressive presence at Defexpo, are back. Raytheon India President William L. Blair says, "We fully expect partnerships with Indian companies to be mutually beneficial for business, and not merely driven by offset or industrial participation obligations. While a singular programme may lead to a partnership, we are advocates for a longer-term view of potential collaborations with our partners. This may include co-development to Indian requirements, co-production and long-term customer support." The company's Javelin, chosen by the Indian Army and used at least in two exercises by Indian troops, will be on display. The company also has an impressive layered missile defence demonstration.

It may have lost out in the MMRCA, but Saab of Sweden has major plans for India. At Defexpo, the company has on display the RBS 70 NG a versatile missile system developed for all combat situations, the BAMSE system a unique unjammable, all-weather automatic command to line-of-sight missile system, and the Carl Gustaf M3 Weapon System. Inderjit Sial, Managing Director, Saab India Technologies Pvt Ltd, says "Defexpo is a biennial opportunity to showcase the full range of products. As India is looking at a high level of defence spending and technology transfer, we see the Defexpo as an opportunity not merely to display our capabilities but also scout for partners who can absorb the transferred technology." Recently Saab opened its R&D centre, Saab India Technology Centre in partnership with Mahindra Satyam in Hyderabad. At Defexpo Saab displays the 9 LAND BMS and DCAST in the Mahindra Satyam stand and RBS 15, Saab 2000 and CSEG, and the collaboration regarding Combat System Engineering Group, in the Pipavav stand.

Rafael of Israel, which is in the process of supplying India with the Spy-Der quick reaction air defence missile system, has the system on display for the first time, along with the Iron Dome anti-rocket system that has seen highly visible recent use in Gaza defence operations. The Spike electro-optic, tactical, precision-guided missile system family is also on display. Diehl of Germany is also at Defexpo with its air-to-air and air-to-ground weapons portfolio. The Indian Army is actively in the market for a new QR-SAM system, SR-SAM, self-propelled air defence gun missile system, medium range loitering missiles, VSHORADS and others. •

Autonomous vehicles on top for India's DRDO

BY SP'S SPECIAL CORRESPONDENT

The star attractions at Defexpo 2012 by India's Defence Research and Development Organisation may be its brand new missile interceptor simulator and a 3D virtual reality theatre, but the organisation has placed special focus on autonomous vehicles this year, all of them outdoor exhibits. For the first time, DRDO has put on display MUNTRA, an unmanned tracked ground vehicle, a platform that the Army is greatly interested in for operations in a nuclear-biological-chemical environment, surveillance and mine clearance. The DRDO is in discussions with the Army to finalise all contours of the \$100-million programme soon. Remotely operated vehicle (ROV) Daksh is back at Defexpo 2012 after a high-profile showing in 2010. On January 31 this year, the first batch of five Daksh ROVs entered operational service with the Army.

Also on display are UAVs Nishant, Rustom and Netra, lightweight sensor integrated composite bridge, the long range solid state electronically scanned active phased array radar LSTAR, Disha EW system, Scorpio Jammer, heavy weight torpedo Varunastra, Pinaka multi-barrel rocket system, Prahar tactical range ballistic missile system, and Arjun main battle tank. The indoor exhibits and models will cover nearly the entire gamut of R&D in DRDO. Prominent models include Nag,



DAKSH ROV

Akash, BrahMos, Aerostat System, AEW&C System, BMP survival kit (BUSK), Sarvatra and other bridges. Different types of parachutes, the family of small arms, torpedoes and decoys, military communication equipment, electronic warfare systems, night vision devices, microwave devices, NBC protective systems, soldier support systems will also be seen.

An indigenous explosive detection kit (EDK), and swine flu diagnostic kit are among over 70 products and technologies developed for defence applications with potential civilian applications that have been identified for commercialization under the DRDO-FICCI ATAC (Accelerated Technology Assessment Commercialization) programme. These two products will be launched March 31, 2012, Day 3 of Defexpo. The EDK, developed by Pune-based High Energy Materials Research Laboratory, can quickly

detect and identify even traces of explosives. The handy kit is ideally suited to be carried and used everywhere. The swine flu diagnostic kit, developed by Defence Research and Development Establishment, Gwalior, can detect H1N1 virus within an hour. The kit does not need sophisticated instruments and can even be used in villages where electricity is not available.

Defexpo will also provide a platform for original equipment manufacturers (OEMs) to identify areas for collaboration and to initiate dialogue with DRDO in areas of mutual interest for joint development. •



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ITT Exelis and Tata Advanced Systems partner to manufacture Generation 3 night vision devices in India

ITT Exelis and Tata Advanced Systems Limited (TASL) have formed a strategic alliance to support Generation (Gen) 3 night vision requirements in India.

Under a memorandum of understanding, Exelis and Tata Advanced Systems will partner to supply manufacturing capabilities in India, maintenance and life-cycle support for Gen 3 night vision products. To start with, Exelis will provide TASL with the latest Gen 3 night vision image intensifier tubes, kits and other materials required to build night vision devices in India, to expedite the delivery of the systems to customers in India. This will be followed by manufacture of high precision components and sub-assemblies of the devices by TASL.

"This is an important alliance for Exelis and TASL. It allows us to increase our international footprint and provides our allies with the superior products they need to be successful during night missions," said Nick Bobay, Vice Presi-



F9800 SERIES
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IMAGE INTENSIFIER

dent and General Manager of the night vision business area at ITT Exelis. "We look forward to a strong and healthy partnership with Tata Advanced Systems to meet the growing needs of Indian customers."

"The alliance with Exelis is an important step in Tata Advanced Systems strategy to enhance the capabilities of the Indian armed forces by bringing to India cutting edge technology and undertaking their manufacturing in India. We are tremendously excited by the potential of the partnership with Exelis," said Vijay Malik, General Manager (Defence and Security) at TASL. "TASL has set up world class production facilities in collaboration with some of the largest global technology companies to build capability in India, and we aim to replicate the

same with Exelis to provide cutting edge night vision solutions to our defence, paramilitary and police forces in the coming years."

The signing ceremony took place on March 29 at Defexpo India 2012. •

Subimal Bhattacharjee to head General Dynamics India



General Dynamics has recently opened its India registered entity General Dynamics Corporation India Pvt Ltd and has appointed Subimal Bhattacharjee as its head. At the cutting edge of many technologies, General Dynamics will have much more inroads into the futuristic programmes. General Dynamics entities in India have about 200 employees and the presence of a India registered subsidiary will pave the path for more technology into India. Besides Bhattacharjee, a few other senior officials have also been appointed. •

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TOP 08

Defexpo heralds India's re-entry to nuclear club

BY SP'S SPECIAL CORRESPONDENT

As India's submarine programme ramps up towards the next big maritime procurement effort in Project 75 India, DefExpo 2012 comes just days before India quietly slips back into the nuclear club. On April 4, the Indian Navy will commission the Russian-built Akula-II class nuclear powered attack submarine K-152 Nerpa rechristened as INS Chakra into service. The 8,000-ton double-hulled boat heralds a new beginning for the Indian Navy, which last operated a nuclear attack submarine – the previous INS Chakra, a Charlie-class boat – between 1988-92. With its commissioning, India is back in that exclusive little club of nations that operate such submarines. The new INS Chakra will operate on lease with the Indian Navy until 2022, after which its lease may be further extended if necessary. According to the Navy, the nuclear boat will help in consolidating operational dynamics of a complex technology and assist in developing doctrines for the future. The INS Chakra comes armed with anti-ship and anti-submarine torpedoes, anti-ship missiles and surface-to-air missiles deployable from the surface. The submarine will be commissioned into service at Visakhapatnam, where India's own nuclear-powered ballistic missile boat Arihant is reportedly set for its final journey before being commissioned into service. In development for years, it was only in July 2009 that the Indian government revealed the programme to the world. A second hull is already under fabrication on a line that will ultimately produce at least three SSBNs for the Indian Navy. Several large and small Indian and foreign companies that have contributed indispensably to the Arihant-class SSBN programme are here at DefExpo. The opportunities for companies in the Indian submarine space are huge: First, of course, the ongoing Scorpene license-build programme at Mazagon Dock Ltd. DCNS, recently concluded a contract with India's SEC Industries worth Rs 310-cr for the indigenization of several bits of equipment for the Scorpene submarines including hull hatches, cofferdam doors, knuckle hoses, ballast vent valves, high pressure air cylinders, weapon handling and storage system. More companies will be brought on board the programme progressively. The other two big submarine opportunities are the Project 751 and in many ways the country's strategic underwater assets effort as well.

The most immediate, of course is the \$11-billion Project 75 India, a competition expected to be fought four ways between the Rubin Design Bureau Amur 1650, DCNS Scorpene, Howaldtswerke-Deutsche Werft Type 214 and Navantia S-80. All four companies are at DefExpo. One of the key requirements of the new submarine line will be closed cycle or air-independent propulsion for greater endurance. All four companies are off the mark on this count: while DCNS will be displaying a model Scorpene with the MESMA AIP system, Russia on Tuesday offered to assist India in developing an AIP system for the Amur 1650, and perhaps future vessels built jointly. "Russia is currently completing tests of a new air-independent propulsion system. This is a critical factor for the Indians. So our chances here are good," said Viktor Komardin, deputy leader of Rosoboronexport's delegation to DefExpo 2012. The underwater battle has already begun with the Russian delegation declaring the Amur 1650 technologically superior to its very worthy competition. •



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www.dcnsgroup.com



Selex Galileo leads in electronic warfare systems

Tim Savory
Vice President, Far East Regional Marketing, Selex Galileo



SP's ShowNews (SP's): Can you trace the history of your company and the track record of engagement with India and its range of products?

Tim Savory (Savory): Selex Galileo has decades of experience in the defence electronics sector and has worked in India for long. Thanks to legacy Sea King and Sea Harrier sub-systems Selex Galileo has established repair facilities here and has trained Indian personnel in the design of key test solutions. The company has also been operating the Mirach 100/5 target drone at the Indian MoD's Integrated Test Range (ITR) successfully for some years.

Selex Galileo has a strong heritage in electronic warfare (EW) having developed this technology since the 1940s. Over the last 15 year, it has moved towards integrated EW systems and is now Europe's number one supplier of EW technology and ranked third worldwide. It has a number of other world-leading technologies including airborne radar technology which has been under continuous development, for decades, culminating in the current range of AESA-based fire-control and surveillance radars.

SP's: Which arms of the Indian Armed Forces form the part of current focus of your company?

Savory: Selex Galileo is currently focusing on providing the latest technology to all of India's armed forces as well as the DRDO, the Coast Guard, the Indian Navy and the Ministry of Home Affairs.

SP's: Can you specify the specific programmes of the forces that are being addressed currently?

Savory: In Electronic Warfare (EW) Selex Galileo is currently pursuing a number of opportunities that focus on both the air domain – for the Hawk, the LCA, the Su-30, MALE UAV's and Aerostats – and in the naval domain it is pursuing an opportunity to develop a next-generation off-board RF decoy in collaboration with the DRDO.

Selex Galileo is also currently pursuing opportunities related to Indian upgrades of the Seaking and Kamov ASW helicopter retrofit programmes. For the Kamov, the company is teamed with Rosoboronexport to integrate a complete avionic suite based on our airborne tactical observation and surveillance (ATOS) system which has been sold worldwide with over 40 systems installed on a range of platforms. This will include the Seaspray 7300e, one of Selex Galileo's cutting edge active electronically scanned array (AESA) radars.

To enhance force protection capability, Selex Galileo is offering the laser inertial navigation and pointing system (LINAPS) for the M777 155mm ultra-light howitzers that the Indian Army is in the process of procuring.

SP's: Would you like to indicate on the challenges, if any, you face in the process of cooperation with the forces?

Savory: Selex Galileo does not expect any challenges cooperating with the Indian forces who are technologically-aware customers. The company knows that it has world leading technologies and is convinced that it has the skills and capacity to share them with the best Indian industries. Selex Galileo is aware that this will require starting new developments and building a specific defence electronics capability in India.

SP's: Have you worked out any strategies to address offset obligations?

Savory: Selex Galileo understands that offset is a crucial part of any effort to address the Indian market and it is therefore one of the company's main priorities. Indeed, Selex Galileo sees India's offset requirements as an opportunity to embrace; by combining the capabilities of Indian industry with Selex Galileo's world leading technologies, the company can help to meet India's key aspiration to develop an effective and capable defence manufacturing sector. Selex Galileo is already in discussions with several Indian companies with the end goal of forming joint ventures and transferring technology.

SP's: How would you compare your solutions versus the competition in terms of quality and in terms of cost-effectiveness?

Savory: Selex Galileo prides itself on offering its customers a technical edge that they just can't get elsewhere. The company invests 15 per cent of revenue into research and development and has produced a number of advanced technologies such as world-leading electronic warfare systems and AESA radars that have been selected by many international customers including the United States.

Selex Galileo also understands that winning contracts in today's competitive global marketplace requires products to be highly cost effective. The company hopes that its collaborations with Indian industry will result in some extremely high-value products.

SP's: What all will be displayed at Defexpo? How do you view this show?

Savory: With India being such an important market, Defexpo is a critical show for Selex Galileo. The company will be exhibiting its technologies in four key areas: AESA radar including the Seaspray and PicoSAR; electronic warfare systems such as HIDAS, SEER and SAGE; unmanned vehicles such as the MIRACH target drone and mini UAVs and electro-optic and fire control systems for infantry and mechanised forces. •

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Allison Transmission wins Golden Peacock quality award

Allison Transmission India has won the Golden Peacock National Quality Award (GPNQA) for Total Quality in the automobile sector. The award recognises excellence in world-class organisations and use of the GPNQA logo demonstrates Allison Transmission's overall commitment to its customers. Dr M. Veerappa Moily, Union Minister for Corporate Affairs, presented the award at the 22nd World Congress on Total Quality in Bangalore on January 20, 2012. David L. Parish, Vice President of Allison Global Operations, and Allison India Plant Manager K. Moses accepted the award on behalf of Allison Transmission India.

"I'm thrilled to accept this award on behalf of Allison," said Parish. "The success of any organisation depends on the consistent quality of its products regardless of where they are manufactured around the world. Our customers demand the best and expect Allison Transmission to meet the absolute highest industry standards."

The GPNQ Awards are presented to organisations that have made the most significant achievement in the field of total quality. The Institute of Directors leadership team visited Allison facilities in Chennai and assessed the total quality standards in all functions of the organisation. Allison demonstrated robust quality systems throughout its business functions: organisational leadership, strategic planning, information management, human resource management, production process management, employee engagement, customer satisfaction and corporate social responsibility. Allison Transmission India also won the Golden Peacock Award for Occupational Health and Safety in June 2011.

Allison India's facility outside of Chennai is a 100 per cent export-oriented unit (EOU), having 19,000 sq metres of zero-discharge manufacturing space. It has a state-of-the-art visual factory with best-in-class global manufacturing



DAVID PARISH AND MOSES RECEIVING THE AWARD FROM M. VEERAPPA MOILY, UNION MINISTER FOR CORPORATE AFFAIRS

practices, supported with a strong work culture of employee engagement and self-directed work teams. The plant, one of the benchmarking facilities in the Chennai industrial belt, achieved zero PPM in 2010 and 2011 and recently passed three million safe man-hours. The facility houses a product training centre, and customisation and regional parts distribution centres will also be housed in this facility. •

Nexter subsidiary in India this year

NEXTER SYSTEMS CAESAR SELF-PROPELLED WHEELED ARMoured VEHICLE



NEXTER'S XP2: TECHNOLOGY DEMONSTRATOR FOR VBMR



Nexter Systems has inherited the centuries old experience of French land defence experts and is an European leader in defence industry.

Nexter Systems has been designing and supplying land defence systems for the French Army for several decades. Nexter also provides highly advanced combat systems, armoured fighting vehicle (AFVs), artillery systems, modern weapons systems, communication systems, ammunitions and logistics services to many armed forces around the world.

In addition to weapon systems for land forces, Nexter Systems addresses the requirements of air and naval forces, and these advanced systems supplied by Nexter Systems are combat proven and are currently deployed in operational theatres overseas, such as Afghanistan and Lebanon.

Since 2004, Nexter is participating in Defexpo in India, exhibiting its equipment and showing its know-how in advanced-combat systems. Besides providing the most advanced artillery systems, ammunitions and AFVs to the Indian Army, Nexter plans to open up new areas of cooperation in the Indian and global defence market by developing partnerships with the 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; and to collaborate with the DRDO for modern and high technology research and development projects.

Nexter Systems has established cooperations in India to collaborate in the artillery programmes for the Indian Army. Nexter Systems and Larsen & Toubro (L&T) of India signed an agreement on June 18, 2010, for 155mm mounted gun system (MGS) for the Indian Army. On September 2, 2011, Nexter Systems of France and Larsen & Toubro (L&T) of India signed a second agreement for TRAJAN 155 mm/52 cal towed gun system (TGS) for the Indian Army.

Both agreements announce the formation of a Nexter Systems-led consortium for the 155mm/52 cal mounted gun programme and the 155mm/52 cal towed gun programme and the upgunning of the M46 for the Indian Army.

Due to the importance of the Indian Artillery and other programmes and the willingness of Nexter Systems to become a leading partner of the Indian defence industry, Nexter Systems has decided to establish a wholly owned subsidiary, Nexter India, in 2012. •

ALMAZ-ANTEY

RUSSIA'S ANSWER FOR SECURE SKIES

The "Almaz-Antey" Concern is a commercial organization established to contribute to Russia's defense capacity and security, develop military-technical cooperation between Russia and foreign countries, and make profit from its business activities.

JSC "Kupol" Izhevsk Electromechanical Plant is part of the "Almaz-Antey Concern" specializing in the manufacture of short-range air defense systems developed by MREMI "NIEMI" ("Almaz-Antey" Concern's daughter member).

Over the years, the plant has launched more than 40 types of military equipment into production including the "OSA-AKM" SAM system.

This SAM system is still in service in more than 15 countries including India, and has been in successful operation for several decades. It has been repeatedly involved in combat operations and shown excellent results in local armed conflicts in «hot spots» around the world.

The development of "Tor-M2E" ADMS in 2007-2008 was a further step towards improving the firepower and ECM immunity of short-range SAM systems. It features enhanced ECM immunity, new integration, control and target allocation opportunities, as well as the capability to simultaneously engage up to four targets. Field-testing conducted in period of 2007-2009 confirmed that the "Tor-M2E" engages all types of air targets in its class of range.

Work is underway to develop a modular version, the "Tor-M2KM", whose combat assets can be placed fixedly or on a variety of platforms of an appropriate capacity: trucks, semitrailers, trailers, and platforms.

"Tor-M2E" ADMS can be easily integrated into existing air defense systems and also be used independently - it includes the proper acquisition and control equipment. As a representative of a new-generation of the "Tor"-class short-range air defense weapons, it features high efficiency in repelling massive air raids



of the most advanced air attack weapons in a heavy ECM and counter-fire environment.

The "Almaz-Antey" Concern has been offering overhaul of combat equipment at the "Kupol" plant's facilities as well as maintenance and repair at the specialized service centers at the customer's territory to extend service life of these SAM systems. Any types of the repair works can be combined with modernization one, including:

- interface installation for communication with the battery command post;
- national "friend-and-foe" device incorporation;
- AC installation;
- "Saman-M" target complex creation on the combat vehicle basis;
- recording equipment installation aboard combat vehicles as well as other improvements.

Upgrading or modernization "OSA-AKM" ADS allows to receive a modern automatic ADS complex for efficient warfare against precision weaponry, aircraft, helicopters and UAVs with life-cycle extension for another 15-20 years.

"OSA-AKM" ADS and "Tor" ADS include as components the missiles of VMP "Avitek" - one of the "Almaz-Antey" Concern leading enterprises for missiles production for ADSs variety.

Started initially manufacture with missiles developed by the IDB "Fakel" ("Almaz-Antey" Concern's daughter member as well) for S-125 - "Pechora" ADS and "Volna" ship borne ADS, AVITEK continued production of the new generation missiles: 9M33M for ship borne SHORAD "OSA-M" type; 9M33 for "OSA" autonomous army all weather ADS, 9M33M2 for "OSA-AK" and 9M33M3 for "OSA-AKM" respectively.

Then serial production of the 9M330 - the following type of missiles - the generation of vertical launch missile for "Tor" ADS was organized. The new missile ammunition was developed by VMP "Avitek" soon - 9M334 modules consisting of 4 solid-fuel 9M331 missiles each, installed inside 9Ya281 transport-launching container. Nowadays 9M334 modules and its modifications are part of "Tor-Mi" and "Tor-M2E" ADSs.

Missiles types 9M33M2, 9M33M3 and 5B27 with finishing service life time can be used to be developed into "Saman" and "Pischal" solid-fuel targets as well as its modified missile versions.

"Almaz-Antey" Concern teamed by VMP "Avitek" experts has been cooperating with foreign partners in the field of refurbishment and extension of service life of the existing missiles for "OSA" and "Tor" ADSs.



For more information please visit
www.almaz-antey.ru

Precision Electronics: In the service of armed forces

India's rise as an economic power and its hostile neighbourhood has altered the threat perception and has necessitated a relook at its defence preparedness. The defence budget is expanding and the Indian armed forces are undergoing a massive modernisation drive. The mantra is self-reliance and freedom to exercise its options even under a denial regime. The national vision enunciated through the Defence Production Policy document mandates creation of a defence industry that can reverse the current import of 70 per cent to less than 30 per cent.

Precision Electronics Ltd (PEL), a Noida based company, has been engaged in the defence sector for the last 15 years. It leveraged its in-house telecom design and engineering, manufacturing and project implementation capability for the armed forces and has since then been serving all the three wings of the armed forces.

For the Army, PEL has undertaken turnkey development, manufacturing, supply, installation and commissioning of communication/data network such as the mobile ASCON node, voice loggers, tactical PCM MUX and secured radio communication system wherein the encryption system was designed and manufactured under agreement with CAIR, DRDO. PEL undertook the ruggedisation of all COTS communication and computing sub-systems and the platform integration of the same on shelterised assemblages under proj-

ect "Parikshak", a precursor to the present-day tactical communication system programme.

For the Indian Air Force (IAF), PEL-designed 10-channel radio relay system formed the backbone of the air defence communication network. Additionally, PEL supplied digital voice and data recorders are being used at all the airfields of the IAF.

Modernisation of Airfield Infrastructure (MAFI) is a turnkey contract to upgrade 59 IAF airfields under two phases has been won by Tata Power SED. PEL has been contracted by Tata Power SED to undertake civil construction work, electrical work (including HT and LT), trenching and cable laying (inclusive of HDD), installation of airfield lighting system (AFLS), installation of navigational aids, and is utilising its expertise on remodelling of ATC building which is the nerve centre of any aircraft movement.

For the Indian Navy, PEL has provided its telecom project implementation expertise to install and commission the critical network of network on ships which includes the sensors, weapons, communication consoles and CMS as a part of the system. It has been contracted to provide this service on all the Indian Navy new builds.

PEL is committed to fulfil the national vision of self-reliance through in-house design, development, manufacturing and life-cycle support. •

Classic Stripes is geared up to meet the exacting requirements of New Age Camouflage in terms of scalability, infrastructure and technology

Classic Stripes Private Limited (CSPL), a dynamic diversified global company offering innovative solutions with a drive to excel, is a premium imaging solutions provider with comprehensive end-to-end solutions ranging from design and product development to printing, fabrication, installation and application capabilities.

The company led by the Chairman and Managing Director, Kishore Musale, has recently been acknowledged as a world leader in print technology, with Musale being awarded the FESPA Hall of Fame securing second position in the World Print Championship.

One of the largest manufacturers of imaging graphics in the world, Classic Stripes manufactures decals of approximately 15 million graphic sets per annum, with applications across all vehicular segments, with over 70 per cent market share of the automotive original equipment (OEM) market in India. The company also has a sizeable presence in overseas markets exporting products to the USA, Middle East and Europe.

It operates four world-class manufacturing plants in India, all of which are environment friendly, temperature and humidity controlled, dust free, positive pressure equipped and managed using SAP R3 ERP system. The company is well geared up to meet exacting requirements in terms of scalability, infrastructure and technology.

With a well-established and developed in-house design studio, CSPL has established a strong presence in the following verticals:

- Fleet graphics for corporate fleets
- OEM graphics for the auto industry
- Large/small format graphics, dashboard trims and other car accessories for the retail aftermarket
- Outdoor/indoor POP products and signage for retail outlets

- Large/small format graphics and domed labels for global markets
- Polycarbonate fascia for the domestic consumer durables industry

Commitment to quality and innovation has won the company numerous awards over the years, an acknowledgement of the creative designs developed in its in-house design studio establishing the company as a leader in new product development.

An ISO 9001/14001 and OHSAS 18001 company acknowledged for excellence in printing by global printing associations, CSPL also has the ISO 9001:2000 (Systems), ISO 14001: 2004 (Environmental) and an OHSAS 18001: 1999 (occupational, safety and health) certifications.

For the last seven consecutive years (2005-11), Classic Stripes has featured in the "Top 25 Best Places to Work in India", in a survey conducted by "Great Places to Work", Institute (India) in partnership with *Business World* and *Economic Times*.

Integrating the knowledge gained and applying it to innovative concepts, Classic Stripes has developed intelligent pattern (iPAT) camouflage wraps, the most advanced digitised and pixelated camouflaging solution in the visual segment offering effective camouflage through colour matching, counter shading, and disruptive colouration to achieve the key deliverables of concealment and deception.

With ongoing research and development (R&D) the company has also achieved a measure of success in reduction of heat signature with application of the "iPAT Camouflage Wrap", Technology.

iPAT Camouflage Wraps are site specific, highly durable and able to withstand the harshest of environmental terrains and temperature variations of -40° C to +80° C. •

Website www.ipat.co.in



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'ShinMaywa means "new, bright, and harmony" and the company is eyeing such opportunities'

Commodore (Retd) Sujeet Samaddar
Chief Executive Officer, ShinMaywa Industries India Private Limited

SP's ShowNews (SP's): ShinMaywa is a very recent entrant into the Indian aerospace segment. Can you brief us the historical background of the company and its relevance in India?

Commodore (Retd) Sujeet Samaddar (Samaddar): About 90 years ago, ShinMaywa Industries began its business operations as the Kawanishi Machinery Company when the Kawanishi Type 1 amphibian aircraft was manufactured for Japan Self Defense Force. It was a leading aircraft manufacturer for many decades. After World War II, the company utilised its expertise in the aerospace segment to diversify into special purpose trucks, industrial machinery for many customers. Later, the company was renamed ShinMaywa Industries Ltd (ShinMaywa means, New, Bright, and Harmony) and expanded its business to once again start manufacturing seaplane. Since then our product range has expanded to include passenger boarding bridges, environmental systems, pumps, direct drive motors, automated car parking systems, etc. We now have customer network in over 100 countries with overseas manufacturing plants in five countries. ShinMaywa has recorded sales of about \$1.3 billion last year. ShinMaywa is committed to substantial contribution in the social sector and upliftment of weaker sections of the society. Our corporate policies attach great importance and priority to safety and quality standards, work ethics, efficient production delivery schedules and costs in all its operations. The company has supplied about 50 seaplanes to the Japanese Maritime Self Defence Force (JMSDF). Its latest product is the US-2, which is in operational service with the JMSDF.

SP's: What are the reasons for ShinMaywa to plant its footprint in India?

Samaddar: Since its independence, Japan has maintained very cordial and friendly relationship with India. We truly value the relationship with India. India was the only country that signed a separate peace treaty with Japan and waived off all war claims. Japan has significantly participated in India's efforts in major infrastructure development and revolutionising/revitalising industrial base/facilities/infrastructure. Under bilateral agreements there are several state-of-the-art projects most successfully executed, across India. The year 2012 marks the 60th anniversary of the establishment of diplomatic ties with India. In this context it was appropriate for ShinMaywa to also to share its domain expertise and skills with our trusted friends.



US-2 STOL AMPHIBIOUS AIRCRAFT

SP's: What is the India vision of ShinMaywa, specially relating to the defence sector?

Samaddar: Encouraged by the sustained bilateral relationships between our two countries, ShinMaywa has also decided to share its proven technology for the ongoing modernisation of Indian defence forces. It has been brought out that ShinMaywa's advanced platforms and technologies have served the JMSDF extremely well over the past several decades. In fact ShinMaywa has taken first baby steps towards possible cooperation in defence sector and its participation in Defexpo 2012 should be viewed in this perspective. We are really overwhelmed with the response that we have received and it is clear to us that the Indian people have great trust in Japan and its work culture, technologies and unique products. We see our high-end technology products not only as a sale to India but a step towards elevating our relationship further through sharing such unique technology for the good of Indian defence sector. •

—To be continued

Star attractions from DRDO

State-of-the-art military systems and technologies by the Defence Research and Development Organisation (DRDO) are on display at Defexpo. The star attractions are a "missile interceptor simulator" and a "3D virtual reality theatre". In this edition of Defexpo, DRDO has given special focus to autonomous vehicles.

The outdoor exhibits include Muntra, the unmanned tracked ground vehicle, remotely operated vehicle Daksh, unmanned aerial vehicles Nishant, Rustom and Netra, light weight sensor integrated composite bridge, the long-range solid state electronically scanned active phased array radar LSTAR, Disha EW system, Scorpio Jammer, heavy weight torpedo Varunastra, Pinaka multi-barrel rocket system, Prahar tactical range ballistic missile system, and Arjun main battle tank. The indoor exhibits and models cover nearly the entire gamut of R&D in DRDO. Prominent will be models of missiles Nag, Akash, BrahMos, aerostat system, AEW&C system, BMP survival kit (BUSK), Sarvatra and other bridges. Different types of parachutes, the family of small arms, torpedoes; and decoys, military communication equipment; electronic warfare systems, night vision devices; microwave devices; NBC protective systems; soldier support systems will also be seen.

Defexpo will also provide a platform for original equipment manufacturers (OEMs) to identify areas for collaboration and to initiate dialogue with DRDO in areas of mutual interest for joint development as partners in promoting peace and economic growth.

DRDO has amply demonstrated the capability to design, develop and realise highly complex multidisciplinary weapon platforms for Army, Navy and Air force. These systems are among the most extensively evaluated systems in harsh environmental conditions, meeting stringent quality requirements of our services. The production value of products inducted/under induction is more than ₹1,40,000 crore, effectively translating to creation of about two million jobs in the country. The figures will see a sharp rise in near future once the systems in advanced stages of user acceptance are inducted. Further, DRDO has enabled a number of small and medium industries from the private sector in the design, development, manufacture of defence related products apart from DPSUs and ordnance factories. No doubt, the indigenous production of these systems at a fraction of the cost of imported systems is significant contribution to nation's economy, besides ensuring freedom from possible blockades in the times of need. •



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Besides, BEML is also manufacturing equipment to other core sectors of economy like Mining & Construction and Rail & Metro. Aerospace, Dredging, Trading and e-engineering are other business segments of the company. Apart from holding lion's share in the domestic market, BEML is exporting its products to over 55 countries with local presence in Indonesia, China, Brazil and Malaysia and Dealer Tieups at Zimbabwe & Thailand. 4 Manufacturing Complexes, 11 Regional Offices, 16 District Offices, 4 Zonal Service Centres and a Global Service HQ ensure 24 X 7 service support to the valued customers.

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Continued from SP's ShowNews Day 1



Rockwell Collins providing net-centric communications

T.C. Chan
Vice President and Managing Director-Asia Pacific, Rockwell Collins

SP's ShowNews (SP's): What software defined radios (SDRs) do you offer? Do they operate on multiple wavelengths and can they communicate with legacy radios of the Indian defence forces?

T.C. Chan (Chan): Rockwell Collins has a long history with radios and has been an industry leader in the development of SDR technology. To this end, we offer a variety of SDRs for a variety of capabilities and form factors to meet a spectrum of user requirements.

We have an airborne SDR—based on our ARC-210 generations 4 and 5—that operates in the V/UHF bands. We also have a V/UHF fixed-site SDR based on our proven 721S product line. And we offer the FlexNet-One and FlexNet-Four SDRs for ground mobile applications. FlexNet-One covers the V/UHF range. FlexNet-Four spans from two to 2,000 MHz, covering the HF, VHF, UHF and L-Band frequency ranges. All of them are designed to software communications architecture standards.

Being compliant to software communications architecture standards doesn't mean that any SDR can "talk" with any other right out of the box. However, it does make it possible to port waveforms running on the Indian defence forces legacy radios onto our radios for interoperability with legacy and future Indian radio systems.

SP's: Does Rockwell Collins have a small satellite communication (SATCOM) terminal suitable for single-person transport and operation in mountainous terrain, at high altitudes and by Special Forces?

Chan: Yes, indeed. OurmiSAT man-portable SATCOM terminal is one of the lightest and most portable in its class. It is ruggedised to military standards and sets up from storage configuration to deployment transmission in five minutes. We also offer ground transportable, ground fixed, airborne and maritime SATCOM terminals.

SP's: Does Rockwell Collins plan to compete for the battlefield management system (BMS) planned for acquisition by the Indian Army, especially considering that the cen-



FLEXNET-FOUR H/V/UHF VEHICULAR MULTICHANNEL SOFTWARE DEFINED RADIO (FN4)

tral armed police forces in India, which are engaged in counter-insurgency and counter-terrorism, will also eventually acquire such a system?

Chan: The BMS is definitely of interest to us and aligns well with our technology capabilities. With BMS, the Indian Army is taking concrete steps toward achieving network-centric operations (NCO), both strategically and tactically. NCO requires the integration of sensors, shooters and decision-makers, and the core of it all is a communications infrastructure that can provide robust networking—something we do very well.

Rockwell Collins is able to bring a variety of proven capabilities through our extensive experience with software defined radios coupled with our soldier situational awareness and fires solu-

tions called FireStorm. The flexibility in our systems means we can offer multiple sensor interfaces, providing the shooter with the tools to be fully informed during the decision-making process.

SP's: What are the cost-effective options that Rockwell Collins can offer to Indian defence forces for information assurance; options that are of the programmable, plug-and-play variety? Can the buyer superimpose another security layer over the offered solution?

Chan: We have developed information assurance products that are based on commercial standards and are fully exportable to India. They blend highly secure, exportable crypto capability with commercial elements for cost-effectiveness, flexibility and ease of implementation. And yes, the buyers can superimpose their solution over ours. Our technologies have shown interoperability with commercial high assurance Internet protocol encryption devices.

Rockwell Collins information assurance solutions are typically integrated with our communications products, but we also can offer them as a stand-alone option. Rockwell Collins excels at these sorts of blended military and commercial solutions in part because our business model is balanced between government and commercial technologies. When we see an advantage to integrating military and commercial capabilities in a customer solution, we're in a unique position to do that seamlessly and cost-effectively for our customers. •

Airbus Military C295: The versatile tactical workhorse

The Airbus Military C295 is a new generation, very robust and reliable, highly versatile tactical airlifter able to carry up to nine tonnes of payload or up to 71 personnel, at a maximum cruise speed of 260 kt/480 kmph. Fitted with a retractable landing gear and a pressurised cabin, it can cruise at altitudes up to 25,000 ft, while retaining remarkable short take-off and landing (STOL) performance from unprepared short, soft and rough airstrips, as well as excellent low level flight characteristics. Powered by two Pratt & Whitney Canada PW127G turboprop engines, the C295 provides excellent manoeuvrability, outstanding hot and high performance, low fuel consumption and consequently a very long endurance of up to eleven hours in the air.

Performance. The C295's STOL capability combined with a strong landing gear enable it to operate in the most austere locations with the worst conditions for take-off and landings. The aircraft is a tactical military transport with a light footprint to enable operations from short (no longer than 670 m/2,200 ft), soft and rough (CBR 2) unprepared airstrips. The C295 is also designed to provide outstanding low-level flight characteristics for tactical missions, flying at speeds down to 110 kt/200 kmph.



C295 AEW

Proven. The C295 aircraft is combat proven and has successfully completed military missions in all types of environments. It routinely operates in the hot and humid conditions of the Brazilian jungle and Colombian mountains, in the dusty and very hot deserts of Algeria and Jordan, and in the extremely cold and icy winters of Poland and Finland.

The C295 has become the most trusted airlifter in its category, being used either as a single transport type, or as a versatile and efficient complement to heavy airlifters and transport helicopters. The C295 can also be used for casualty or medical evacuation (casevac or medevac) using either basic litters or mobile intensive care units (ICU) with life support equipment. The C295 is also available in an anti-submarine warfare (ASW) version.

Advanced technology. The C295 is fitted with the highly integrated avionics system (HIAS), an advanced integrated avionics system based on the Thales Topdeck Avionics suite. The flexible architecture concept and the use of dual technology civil/military equipment ensure success on demanding tactical missions, growth potential for future equipment as well as compatibility with the latest civil airspace environment. •

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CAE helping bridge the UAV training gap



GLOBAL HAWK; (LEFT) UAS IOS

CAE aims to transform unmanned aerial vehicle (UAV) training deficiencies and turn them to efficiencies with its unmanned aerial system (UAS) Mission Training Solution, specially designed to develop highly skilled crews who can operate in the highly complex mission environment.

A huge gap currently exists between desired UAV training and reality. Currently, UAV assets and personnel are often deployed quickly to the front line to meet the demands of the battlefield. The result is live "training" UAVs are generally unavailable, and airspace in which to hone skills is highly restricted. Just as importantly, crews are typically thrust into the real-world combat environment without first developing the mission crew teamwork afforded by dynamic simulation.

According to aerospace industry forecasts, a worldwide deployment of almost 30,000 UAVs—serving both military and civil markets—is expected by 2018, which will place an increasingly heavy burden on training these operators. India is expected to be one of the leading markets for UAVs.

Ananth Ramaswami, Managing Director of CAE India Pvt. Ltd, explained: "Military customers, including here in India, want a dynamic synthetic environment that enables them to link training systems together, just like they will fight on the battlefield. Plus, they want the ability to conduct mission rehearsals, train as a coordinated team, and reconfigure the synthetic training environment quickly so they can readily adapt to technology advances and constantly changing threats."

"They need the entire mission training system to be cost-effective because militaries all over the world are facing significant budget constraints," added Ramaswami.

CAE's UAS Mission Training Solution addresses these needs. It supports multiple players, including the UAV pilot, sensor pilot, and mission commander/instructor. The system can include a ground control station (for the pilots and sensor operator) and a mission management station where the instructor may create and monitor the environment and scenarios during training sessions.

CAE's open-architecture and common database allows operators to reconfigure vehicle and payload packages—a valuable feature in a world where crews are often trained mainly on platform-specific simulators. Operators also may switch between real and synthetic environments, as CAE's UAS mission training solution is designed to be STANAG 4586-compliant (NATO Standardisation Agreement 4586). Also, there is no limit to the number of scenarios operators may build to match changing mission requirements, and the system offers a broad high-fidelity sensor suite that includes imaging (FLIR), radar (synthetic aperture radar), and electronic warfare.

To develop its solution, CAE teamed with consultancy unmanned experts to create a simulation and training solution that is aligned with real-world opera-

tions. Unmanned experts team of subject matter experts are seasoned fighter pilots, UAV pilots and sensor operators, and instructors who have gained real-world operational experience and "know what it takes to build success on the battlefield," says Unmanned Experts Director of Operations Keven Gambold.

Gambold, a former Royal Air Force Tornado fighter pilot and Predator/Reaper UAV pilot, offers more than 20 years of military experience.

"An effective UAV operator, through realistic simulation scenarios, hones the observational and decision-making skills necessary to make correct decisions in combat," note Gambold.

In contrast, a poorly prepared crew could make costly, if not fatal mistakes on the battlefield.

"When you practice, prepare, and rehearse in a synthetic environment, it becomes second nature to act and make informed, intelligent decisions when in combat," added Gambold.

While the cost of a UAS Mission Training Solution can vary, depending on customer requirements, Ramaswami is quick to highlight the compelling advantages of simulation.

"A budget-conscious military wants to cut costs where possible and save equipment for operational use, but never at the expense of training its personnel for mission readiness and success," says Ramaswami. "And that's where high-fidelity simulation excels. You can provide realistic mission training in a simulation-based synthetic environment at a fraction of the cost."

CAE anticipates the UAV simulation and training market will have a bright future with militaries around the world, as well as in the civil sector as national aviation authorities adopt regulations permitting the use of UAVs for civilian applications. Countries are utilising or exploring UAV applications in areas such as border patrol, surveillance of hydroelectric lines, and emergency management. The International Civil Aviation Organisation is setting guidelines for UAV licensing, and civil aviation authorities such as the Federal Aviation Administration (FAA) are exploring pilot and operational requirements for flying UAVs in civil airspace.

CAE's large global footprint and experience in training commercial pilots in the highly regulated commercial aviation market, helps make the company well-positioned to meet manned and unmanned vehicle training demands.

"We invest about 10 per cent of our bottom line annually into research and development specific to simulation and training," notes Ramaswami. "At CAE, it's never 'one size fits all'. The company makes certain it can provide cost-effective solutions that offer leading-edge simulation technology. We think we have done that with our UAS Mission Training Solution."

CAE will be demonstrating a range of simulation-based solutions at Defexpo 2012, including its UAS Mission Training Solution. CAE is located in Hall 10, Booth #2. •

Diehl presents defence competence in India

Diehl Defence is showcasing state-of-the-art products with guided missiles for arming combat aircraft. On 100 square metres exhibition space at the German Pavilion, the company is not only presenting air-to-air and air-to-ground missiles, but innovative system solutions as well setting new standards in ground-based air defence.

The exhibition also includes examples of modern infantry and artillery ammunition as well as a portable, non-lethal effector based on high power

electro magnetics – a technology, which has proved its performance against improvised explosive devices. The vehicle upgrade demonstrator (VUD) is also on show, reflecting solutions for re-motorisation, modernisation, modification as well as light-weight tracks in steel and rubber band designs.

Finally the subsidiaries Junghans Microtec, world market leader for fuzes, and AIM Infrarot-Module, manufacturer of modern thermal and target imagers, are presenting their products under the roof of Diehl Defence. •

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India could prove to be a good market AW609 Tiltrotor programme

AgustaWestland is moving forward with the development of the AW609 Tiltrotor programme following the completion of its acquisition in November 2011. The company will continue the certification process with the Federal Aviation Administration (FAA) targeting AW609 certification in the first half of 2016 and deliveries following immediately afterwards.

India could prove to be a good market for the AW609 for public service, search and rescue (SAR) and coast guard type roles due to its long coastline and large land areas to be served. With the ability to cruise at twice the speed of a helicopter and a range almost twice that of a helicopter, the AW609 can provide coverage for an area five times that of a helicopter.

AgustaWestland has established two main locations dedicated to the AW609 programme development, namely Cascina Costa di Samarate (Italy) and Arlington (Texas, USA). A single Integrated Development Team is now based in Cascina Costa, headquarters to around 250 people providing engineering and flight test support, prototype assembly and programme management. The plant features a dedicated hangar, a development simulator and a vehicle management system integration laboratory capable of testing the flight control system software and hardware. The second prototype carries on test activities in Cascina Costa where the third is being assembled and the fourth will follow. The new AgustaWestland Tilt Rotor Company (AWTRC)



subsidiary has now been established at the new site in Arlington to continue FAA certification and flight testing of the first prototype. The dedicated facility includes a hangar and office accommodation for up to 150 people.

The first two prototypes have achieved more than 650 flight hours so far and have validated the AW609's unique flight envelope including the ability to fly at altitudes of up to 25,000 feet and cruise at speeds up to 275 knots, all at the aircraft's maximum weight. The test programme continues to check all the points of the flight envelope, 85 per cent of which has been completed, as required by both the FAA and EASA.

The tiltrotor concept is the answer to the growing need for an aircraft matching the vertical take-off and landing capabilities of the helicopter with the speed, range and altitude capabilities of a fixed-wing aircraft. AgustaWestland is investing in the next generation of rotorcraft technologies and the AW609 and future tiltrotor concepts are part of the company's innovation commitment. Preliminary orders for approximately 70 AW609s have been placed by about 40 customers in almost 20 countries to perform a range of commercial and government roles. The AW609 provides customers with a new way to fly and AgustaWestland expects significant worldwide market opportunities for the aircraft with no aircraft in the marketplace that can come close to offering a similar capability. •

Samtel in the forefront of indigenisation

As high-profile big-ticket defence purchases turn the focus of the entire world towards India, the Indian defence industry gets ready to cater to the offset and technology transfer requirements as an outcome of these purchases.

As a response to these challenges, the Indian defence industry has embarked on an intensive indigenisation campaign. Leading this wave in India is Samtel Display Systems and its joint venture companies, which are ready to provide perfect solutions and partnerships for all avionics requirements.

At its stall LH.30, at Central Hall, Lake Hanger at Defexpo 2012, Samtel Display Systems is showcasing its wide range of military and cockpit displays and modern avionics systems. At the exhibition, Samtel aims to showcase its technical competence in defence and commercial avionics, the range of products in the avionics domain, its international experience and the strength of its partnerships.

Rugged Displays: To cater to the vast and growing requirement for indigenous rugged displays for land, naval and airborne requirements for our defence forces, Samtel is ready with its vast range of rugged displays. RSD series of ruggedized AMLCD displays specifically crafted to cope with adverse and demanding environmental conditions at the same time maintaining extremely high levels of performance. Its applications include, console displays for airborne platforms, displays for tanks, armoured vehicles, air defence guns and operational shelters, naval displays for captains console, information and command systems, process control and automation, naval radars, rugged workstation consoles, security and surveillance. The rugged displays showcased are: 20.1" airborne and 20.1" ground/land-based applications, 19.0", 17.0", 15.0", 10.4" with Bezel keys and 10.4" with Touchscreen.

Multifunction displays and smart MFDs: With the production of Colour MFDs for Su-30 MKI Block-III & Block-IV production aircraft at Samtel's DGAQA qualified manufacturing facilities, the Samtel HAL JV has achieved the unique distinction of being the first public-private partnership in defence avionics space in India to have a primary cockpit display qualified and produced for induction on a fighter aircraft. These MFDs were developed



under the aegis of DARE programme, with qualification and flight testing done under aegis of HAL and CEMILAC, and IAF. Samtel booth has these 5" x 5" and 6" x 6" MFDs on showcase at their booth, along with MFDs and next-generation large-size smart MFDs for some future star platforms.

Also being put up for display are the multifunction indicators—3ATI & 4ATI. The 3ATI and 4ATI display unit features a high-resolution AMLCD and ARINC 429 and discrete interface. The unit is designed to replace existing electromechanical instruments, allowing a single part to display attitude, airspeed and altitude. The 3ATI & 4ATI display unit consumes little power, is

low in weight and high in reliability. The unit is designed for commercial or military installations and an NVIS compatible version is available. The 3ATI & 4ATI display unit is ideal for new build or retrofit applications.

Besides these, a new product offering from Samtel-electro luminescent (EL) displays—cockpit panel flood light (CPFL) and integrally lit cockpit panel (ILCP) are also being showcased at the booth. The purpose of the cockpit panel flood lights is to provide the aircraft pilot the visibility of the various legends on cockpit instruments, LH & RH consoles in the cockpit while flying at night, while the integrally lit cockpit panel (ILCP) helps the various legends and symbols on instrumentation and control panels on the cockpit consoles to be visible to the pilot with flying at night.

The booth also features demo films on Samtel's product range through its JV with Thales-Samtel Thales Avionics Ltd. The Indian helmet mounted sight and display for fighter aircraft is based on Thales' advanced and proven technologies; and is already flying on Indian Navy MiG-29K and qualified on M2000. The Samtel-Thales JV aims to locally develop, customise, manufacture, sell and maintain indigenous helmet-mounted sight and display systems, infrared search and track (IRST), and modern avionics systems. A demo film on infrared search and track (IRST) showcases the capabilities of this passive long-range tracking and imaging device, which is used for automatic tracking and detection of multiple targets. Samtel is located at LH.30, Central Hall, Lake Hanger, Paragti Maidan. •

KBP-DESIGNED MODERNIZED FIGHTING COMPARTMENT OF BMP-2 – AN EFFICIENT WAY OF UPGRADING ARMORED VEHICLES

The service life of the armored vehicles is rather lengthy, amounting to 30-40 years. Many countries of the world are retrofitting the majority of their combat vehicles. The Russian-made BMP-2 IFV being the main CV of the land forces in many countries was put into service in 1980 and appeared to be superior to the majority of its foreign counterparts in terms of combat characteristics. Currently, the BMP-2 still complies with the modern requirements as regards its armor protection and riding performance.

The lethality of the combat vehicle is determined by the weapon system, and it is improvement of the weapon system that enables to achieve the highest enhancement of combat effectiveness. The BMP-2 has large potential of evolution of the weapon system. KBP Instrument Design Bureau has solved the problem of enhancing the fire power of current BMPs that ensures their superiority over all existing IFVs.

The retrofitting is performed on the basis of the standard BMP-2 turret with the 2A42 automatic gun (while retaining the hull and internal layout of the turret) within a short period of time. In terms of design it includes the following:

- installation of two armoured launchers of the Kornet-E anti-tank guided missiles on the sides of the turret. Each launcher is for two ready-to-fire missiles and is fitted with stand-alone electromechanical elevation laying drives;
- installation of the gunner's combined sight (instead of the BPK-2 sight) with an independent LOS stabilization system. The sight includes optical, thermal imaging and laser range finding channels, as well as the missile guidance channel;
- installation of the digital onboard computer with a system of sensors;
- installation of the TV/thermal automatic target tracker;
- installation of the 30mm grenade-launcher with an autonomous drive from the gun and a magazine of up to 300 grenades;
- installation of the commander's panoramic sight with an independent LOS stabilization system, which includes TV and laser range finding channels.

It's worth to mention the realized principle of modular arrangement of the proposed fighting compartment. The customer according to his own requirements under the limited financing can select the upgrade package variant: full or partial package.

The upgraded BMP-2 with the advanced B05Ya01 fighting compartment has the following advantages as compared to the standard BMP-2:

- Thanks to the day-and-night FCS it provides the precise firing by all types of ammunition including newly developed, guided and unguided rounds against moving and stationary targets, engagement of all targets nomenclature in stationary position, on the move and afloat by day/at night including automatic gun firing at ranges up to 4000m, Kornet-E ATGW - up to 5500m and automatic grenade launcher - up to 2100m.
- Kornet-E ATGW armor penetration increase up to 1000-1200mm provides the reliable engagement of advanced ERA-protected tanks. Besides the HEF warhead of the missile destroys concrete fortifications and pillboxes.
- Four (4) ready-to-fire guided missiles positioned in two (2) stabilized launchers of the upgraded BMP-2 significantly increase the ATGM fire rate.



- The use of TV/TL target autotracker makes it possible to increase by 3-6 times the tracking accuracy as compared to the manual mode.

- Kornet ATGW firing with elevation above LOS practically excludes the missile detection by the enemy.

- ATGM laser guidance system with missile TV-lining in the beam guarantees high immunity to all types of jamming because the jam source cannot be in the IFV rear and can not have the same codes.

- Salvo firing by two Kornet-E ATGMs in one beam is provided to penetrate the targets active protection and to have 100% engagement of some highly important targets.

- The automatic gun and grenade launcher fire accuracy (by all types of ammunition) is highly increased.

The effective firing range of 30mm rounds of the automatic gun is increased from 1100-1400m to 1800-2000m.

- The BMP-2 AD fire effectiveness is also greatly increased: the kill probability when firing from automatic gun against usual air targets like "helicopter", "assault aircraft" is increased by several times and is close to kill probability of specialized AD missile-gun close-in systems, with less ammunition expenditure. Therefore the BMP universalization principle is successfully realized by giving the AD capabilities without additional costs.

- The manpower is effectively engaged at ranges up to 2100 m including behind terrain slopes and in trenches thanks to low ballistic weapons (AG-30M automatic grenade launcher with new GPD-30 grenades).

- Potential of combat operation of the IFV's commander extends owing to installation of the panoramic TV sight with technical vision. Such a sight is installed in the BMP for the first time. The commander has panoramic field-of-view in azimuth. The field-of-view in elevation is extended to 60°. The LOS maximal angular velocity increases from 5-6 to 20 degrees per second. This allows to increase the number of targets detected by CV in 2.5 times and also to raise the accuracy of target designation for the gunner in 10 times and completely

duplicate the commander's operation as well as to fire against aerial targets in the automatic mode.

Modernization of the BMP-2 answers the purposes of advanced IFVs in the next 20-30 years, and the modernized BMP-2 can be successfully used till 30-40-ties of the 21st century.

Calculations of the effectiveness of the improved and organic BMP-2 in combat conditions both as independent unit and while supported by tanks showed that the required number of vehicles can be reduced by a factor of 3.8 while keeping the same level of probability of successful mission fulfillment.

The proposed version of BMP-2 modernization was successfully demonstrated outside Russia. In 2004 a foreign crew trained within a day and a half conducted firing trials and showed the results comparable to those of the Russian crew. The trials were held with the BMP-2K commander's vehicle, which was re-equipped by joint efforts of Russian and foreign specialists within 15 days at a local plant without preliminary production preparation.

The Russian party delivered the FCS, Kornet-E anti-tank guided missile launchers, grenade launcher unit and cable set. Foreign specialists together with the Russian specialists dismantled the standard fighting compartment, upgraded the armored cupola, and prepared mounting seats for installation of the weapons, FCS units including sights.

The fighting compartment was assembled, adjusted, the acceptance trials were held and the fighting compartment was mounted on the standard chassis of the local-made BMP-2. After firing at a shooting-range the upgraded BMP-2 was accepted. In 2003, 2004 and 2005 the upgraded BMP-2 successfully passed demonstration trials in various countries of the world.

Thus the advantage of the BMP-2 IFVs equipped with the B05Я01 (B05Ya01) fighting compartment is high fire power and proven technology of the BMP-2 modernization. Moreover, retrofitting of combat vehicles can be performed not only at serial-production plants, but also at plants, which repair armoured vehicles.

The article is written by General director of KBP I.V.Stepanichev and Chief designer L.M.Shvets.

Continued from SP's ShowNews Day 1



'The availability of T-RAM to allies such as India would be up to the US Government'

Kevin J. Cosgriff, Senior Vice President, International Business and Government, Textron Systems Corporation

SP's ShowNews (SP's): Could you throw light on the Textron Systems' designed landing craft air cushion (LCAC) hovercraft system? What are its capabilities and possible usage by the Indian security forces in different types of terrain in India?

Kevin J. Cosgriff (Cosgriff): The LCAC is a high-speed, over-the-beach, fully amphibious landing craft currently employed by the US and Japanese Navies. Designed to be deployed from a landing platform dock (LPD), such as those being acquired by the Indian Navy, LCAC makes nearly any coastline accessible for military, rescue or humanitarian operations. Used around the world in places such as Somalia, Bangladesh, Liberia, Haiti and Kuwait, LCACs also proved invaluable in 2004 following South Asia's devastating tsunami. The LCAC, which has a range of 250 miles (400 km) and is capable of carrying up to 75 tonnes at speeds over 40 knots, is an ideal platform to bring personnel, equipment and supplies ashore.

Textron Marine & Land Systems, an operating unit of Textron Systems and the original manufacturer of the LCAC, is currently bidding on the US Navy's next-generation LCAC—the ship-to-shore connector (SSC). Textron Systems brings in unique expertise as well as engineering and manufacturing capabilities to the LCAC, SSC and the amphibious requirements of the US, Indian and allied navies.

SP's: The much acclaimed 'Overwatch', a subsidiary of Textron Systems, remains in the forefront of technology innovation in providing advancements in the multi-source and geospatial intelligence fields. What are its major innovations/software solutions in creating capabilities for the different organs of national security? How could these be applied in the context of the security environment in India? Please explain.

Cosgriff: Overwatch delivers leading intelligence solutions for collecting, processing, analysing, exploiting and disseminating multi-source and geospatial intelligence to create greater situational understanding and deliver actionable intelligence. These solutions are ideal for counter-terrorism and irregular warfare as well as civil applications such as climate control, ecosystem management and environmental planning.

For example, new analytical investigation tools, such as intelligence monitoring, pattern analysis and collection toolkit (IMPACT), enable intelligence analysts to better manage and accurately analyse information in a manner that allows them to more readily uncover, analyse and understand the complex connections, relationships, patterns and trends typically hidden within vast databases of disconnected information. As a result, they can more readily identify patterns and disrupt criminal networks before an act of terrorism is committed.

Additionally, cutting-edge technologies such as the InSite smart phone application bring critical intelligence to mobile teams and operations centres, such as police and soldiers in the field. Through InSite, users gain collaborative capabilities for on-scene operations, situational analysis and emergency management. Able to run on private and public networks, depending on the users' need for both privacy and collaboration, InSite is fully operable within any 3G/4G cellular and WiFi network.

Both solutions as well as other innovative data fusion and analysis tools from Overwatch have the ability to bridge India's intelligence community and could prove invaluable in monitoring terrorist networks as well as predicting and preventing their activities within the country.

SP's: Could you tell us something about the lethal miniature aerial munition system (LMAMS) programme developed by Textron. Would the weapon system be made available to the Indian armed forces, if asked for?

Cosgriff: LMAMS is a US Air Forces Special Operations Command Programme. Textron Systems has developed a specialised back-pack carried and tube-launched unmanned aircraft vehicle (UAV) for this programme, called the tactical remote aerial munition (T-RAM). With loitering capability and delivery from open or defilade position, the T-RAM provides precision lethal effects against personnel and light vehicle targets. The availability of T-RAM to allies such as India would be up to the US Government. •

—To be continued

Punj Lloyd has identified key technological partners and plans to manufacture defence products at its facility

Punj Lloyd Group is a global diversified conglomerate providing integrated design, engineering, procurement, construction and project management services to the energy and infrastructure sectors. The Group has international offices in over 22 countries spread across the Middle East & Africa, the Caspian, South Asia, Asia Pacific and Europe.

The Group has strategically diversified into the defence industry and developed capability and infrastructure which can be effectively leveraged for aerospace and defence programmes. Punj Lloyd has set up a world class Greenfield manufacturing facility on 24 hectares of land at Malanpur, near Gwalior. The facility has capability to undertake fabrication, precision machining, welding and heat treatment and final testing of components and assemblies.

The Group holds industrial licenses for:

- Guns, rockets and missile artillery systems and related equipment
- Electro optical systems, fire control systems, C3I systems and power packs associated with armoured fighting vehicles
- Precision manufacturing of aero structure and dynamic components for aerospace and land systems products for defence application
- Fabrication and manufacture of aero-structures, airframes and accessories using composites

tures, airframes and accessories using composites

The group has a multipronged defence strategy with an objective to:

- Become a supplier of choice to the Indian armed forces
- Be a preferred partner for transfer of technology from global primes by setting up manufacturing facilities in India
- Be a part of the global defence equipment supply chain
- Undertake maintenance, repair and overhaul of defence equipment
- Work in partnership with global primes to meet offset requirements as per the Indian Defence Procurement Procedure.

Punj Lloyd has identified key technological partners and plans to manufacture defence products at its facility to meet the Indian armed forces' requirements. The Group is actively pursuing artillery and air defence programmes and is all set to field its solution for upgraded Zu 23-2B air defence gun for NCNC trials. The Group is committed to work with the Defence Research and Development Organisation (DRDO) and the Ordnance Factory Board (OFB) to indigenously develop genuine force multipliers to provide a decisive edge to the Indian armed forces. •



Continued from SP's ShowNews Day 1



BEL eyeing \$800 million electronic warfare, avionics and radar pie

Anil Kumar
Chairman & Managing Director, Bharat Electronics Limited

SP's ShowNews (SP's): Now that the MMRCA deal has come through what are BEL's areas of interest in the project?

Anil Kumar (Kumar): As per the provisions of request for proposal (RFP), the vendor has to undertake offset contracts to a minimum of 50 per cent of the value of foreign exchange component of the commercial proposal. The total value of offset contracts in the area of BEL's interest (electronic warfare, avionics and radar) is expected to be around \$800 million. BEL has initiated discussions with vendors to secure a significant part of the above opportunity and have signed MoUs with OEMs and their major suppliers.

SP's: Can you name some of your current R&D projects?

Kumar: Some of the ongoing R&D activities in BEL are in areas such as software defined radios, high capacity radio relays, tactical communication system, phased array radars, missile systems, Doppler weather radars, eye safe lasers and laser target designators, un-cooled and cooled thermal imagers, fire control systems, network-centric warfare & C4I command control systems, new generation electronic warfare and avionics technologies and new generation Sonars.

Some of the research and development (R&D) projects which are under development or in advanced stages of completion include weapon locating radar, Aslesha, Bharani, Doppler weather radar, software defined radio,

routeers, encryptors, 100W HF Radio for BSS, VHF radio for coastal surveillance, electro optic fire control systems, coastal surveillance system, towed array sonar, track and wheel integrated EW System for Army, Integrated ESM and ECM systems for Navy, missile warning systems for Air Force, combat management system for various ships, Akash for Army, L70 gun upgrade, eye safe LRF modules, multi-function hand held thermal imager, high repetition LRF for air defence, NBC Recce vehicle and sighting and fire control systems.

SP's: Is BEL getting into any new joint venture (JV)?

Kumar: The amendments in DPP have given an opportunity to BEL to form JVs with leading global defence players and acquire the required critical technologies. The above approach will also put BEL in a position, wherein it can source state-of-the-art subsystems/products from such JVs and play the role of a system integrator for large strategic defence systems.

We are very actively pursuing a JV with Thales, France, for the manufacture of civilian and select defence radars. This JV is in advanced stage of finalisation.

Continued on page 38



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Goa Shipyard Limited is a leading ISO 9001-2008 certified shipyard on India's west coast. Ever since its inception, GSL has been on the vanguard of the country's shipbuilding and ship repair industry. Equipped with world class infrastructure, GSL has designed, built and commissioned a wide range of cutting edge vessels especially tailored to meet specific requirements of customers for varied application in the defence and commercial sectors, with special expertise in the construction of sophisticated vessels of steel and aluminium hull structure.

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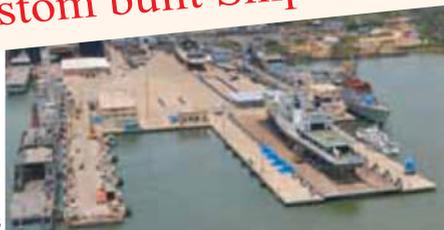
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Systems integration is the way ahead for India's BMS: General Dynamics

General Dynamics UK's pedigree in advanced C4I solutions will be important to India's military and security services who are intending to modernise their command and control systems in order to protect their country and its citizens from attack. The company's tried and tested approach to C4I fully answers the requirement of the Indian Army's battlefield management system (BMS). It also meets the aspirations of civil security organisations who see interoperability and centralised control as key to ensuring the best and fastest possible response to an emergency or attack affecting their citizens.

The Indian military's BMS is a complex and ambitious programme that aims to integrate tactical command and communication for the Indian Army. Such a complex programme requires a systems integrator that has experience of large, sophisticated projects. Having delivered Bowman, the British armed forces C4I programme, plus similar capability to other armed forces around the world including the Netherlands and Romania, and integrated over 15,000 legacy and new armoured fighting vehicle platforms—everything from BMPs and T-72 tanks to light protected vehicles and Land Rovers—General Dynamics UK believes it is the right partner for the job.

BCIP 5.4: The latest version of the British Army's Bowman programme not only provides secure communications, secure data and secure situational awareness originally envisaged, but now delivers further cutting-edge capa-

the British Army include:

- Improved connectivity between forward operating bases (FOB) and patrol bases (PB).
- Improved tactical situational awareness (Tac SA)
- Improved shared situational awareness (SSA)

IMPROVED CONNECTIVITY BETWEEN FORWARD OPERATING BASES AND PATROL BASES

One key challenge that commanders in Afghanistan face is how to provide similar levels of communications capability available in FOBs to troops operating in locations where it is inappropriate to use either command vehicles or larger fixed installations. Responding to calls from end-users the system is called M-DOR – a modular dismantled operations room C4I capability. This system enables the user on the ground to establish a PB with similar levels of VHF, HF and high capacity data radios (HCDR) to a FOB.

M-DOR provides a deployable and flexible C4I capability in support of deployed, fixed bases. It delivers a lightweight, transportable, modular system that allows rapid and simple deployment of a range of C4I capabilities, including the ability to communicate the location of IEDs using secure data. Benefits of M-DOR will include reduced user workload and easing of rapid deployment and establishment of "Greenfield" FOB/PB by trained Bowman personnel.



bilities that have only come about through its development in the heat of operations. BCIP now allows British forces to set up individual communications networks or "pools" literally anywhere in a theatre of operations; can be a carrier for many other capabilities such as surveillance feeds or vehicle health and usage monitoring (HUMS) data; and most importantly delivers interoperability with allied forces on the ground, ensuring cooperation through a better common operating picture.

The reason why General Dynamics UK is pre-eminent among C4I systems integrators is because it understands that each military force has very specific requirements for their C4I system; that achieving the right effect means integrating equipment from many capability providers, many of whom will be indigenous to the customers country and that knowledge transfer is at the core of the customers' requirement. For General Dynamics UK, partnership is at the heart of delivering the best solution.

General Dynamics UK is featuring its C2 applications at Defexpo which can be tailored to the users' need. Its Geosuite programme provides tactical intelligence to patrol commanders in military and civil domains whilst the Commanders Collaborative Decision Aid (CCDA) is a toolset to assist in the circulation of information in decision-making, typically at Brigade, Division and Corps headquarters level.

In addition, it will be discussing some of the capabilities that have grown out of the original Bowman programme that have been developed to meet changing operations needs. Three of these capabilities recently procured by

IMPROVED TACTICAL SITUATIONAL AWARENESS (TACSA)

Commanders at the tactical level benefit from a Tac SA solution. This allows commanders to plan and conduct their patrols more effectively and safely, as well as collect and report on patrol activity so that the information gathered, such as locations of IEDs, can be shared and exploited across the operational environment.

Using the M-DOR platform, the Tac SA solution can access the Bowman BCIP 5.4 HCDR network and share tactical ground reporting information.

IMPROVED SHARED SITUATIONAL AWARENESS (SSA)

SSA provides interoperability between Bowman and other less tactical, in-theatre communications and information systems (CIS) such as Overtask. This solution allows SSA to move between Bowman and CIS enabling tactical commanders to see the common operational picture (COP) on a single terminal, giving them access to all appropriate information at once. Authorised users will be able to automatically transfer situational awareness information between systems including tactical graphics and operational staff work information, and allow direct interaction between systems operators via their respective chat services.

The success of these capabilities in the hands of the British Army demonstrates General Dynamics UK's ability to react rapidly to new requirements, working in partnership with their customer. To know more about General Dynamics UK's solutions for BMS visit Stand 14-24 at Pragati Maidan. •

SeaCat inspects drinking water tunnel

In a mission lasting almost seven hours, an autonomous underwater vehicle made by Atlas Elektronik "dived" through a water supply tunnel 24 kilometres long in the vicinity of Stuttgart, successfully investigating the tunnel for damage. With this survey on March 6, 2012, it at last became possible to inspect the "Albstollen" tunnel in the state of Baden-Württemberg for the first time in 40 years.

The "SeaCat" underwater vehicle is produced by the Bremen-based company Atlas Elektronik, a world leading manufacturer of marine electronics, such as sonars, submarine technology, mine warfare systems and unmanned underwater vehicles (UUVs).

After a thorough disinfection, the craft was lowered into the inflow reservoir at Büttlau and guided into the tunnel by remote control. For the first 300 metres, the SeaCat was controlled through a laptop via a fibre-optic cable. After the vehicle had passed several obstacles in the first section, the cable was cut and the autonomous guidance system was activated to take control for the next seven hours and 24 kilometres. The speed was about a metre per second, corresponding about two knots or 3.6 kmph.

Sven Hesse, head of the UUV programme at Atlas, said after the mission: "Never before has a water-filled tunnel of this length been inspected by a diving robot navigating on its own. And rarely has such an entirely autonomous vehicle completed such a demanding task." Volker Paltzo and Dieter Rottsieper, Managing Directors of Atlas Elektronik, commented: "We can certainly be proud of this achievement. It proves that Atlas Elektronik is right on course to carve out a world leading role in this new field of technology." The "Albstollen" tunnel, with a length of 24 kilometres and a diameter of 2.25 metres, forms part of the water supply system operated by Bodensee-Wasserversorgung (BWV) with headquarters in Stuttgart. As the largest German long-distance water distribution systems, it provides fresh



water from Lake Constance to four million people in 320 communities. As one of two main lines, the Albstollen passes through the Swabian Jura range to supply Stuttgart and the northern part of Baden-Württemberg.

The vehicle was tasked with recording video data over the total length of the tunnel, while moving continuously through the concrete tunnel and remaining centred with the aid of laser distance sensors. For the first time in 40 years, it became possible to look deep into the tunnel and to document its present condition.

The exit point of the trip after 24 kilometres was the shaft surge chamber at Talheim, a concrete structure comprising a shaft 38 metres deep and about eight metres in diameter. This pressure-balancing well is normally half-filled with water. The water tunnel is routed through the well, forming a semi-circular channel at the bottom. A diver's lamp was positioned at this point to provide a light indicating that the AUV had reached its final destination. This visual signal was detected by the vehicle, causing the autonomous guidance system to stop the vehicle and let it rise to the surface.

This pioneering accomplishment was made possible by outstanding teamwork between the staff of BWV and of Atlas Elektronik. While the mission demonstrated the technical reliability of the SeaCat, it also showed that the water tunnel was still in good condition after 40 years of continuous use.

The SeaCat AUV is a torpedo-shaped underwater vehicle about 2.5 m in length and 30 cm in diameter. Being a hybrid vehicle, it can be operated either remotely controlled or fully autonomously with an endurance of up to eight hours and a range of 40 km. Video cameras and a variety of sonars can be carried as the payload sensors. Typical areas of application include the inspection and mapping of inshore lakes, coastal sea areas, harbours, and marine structures such as dams or the foundations of wind turbines. •



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BEL eyeing \$800 million...

Continued from page 35

Even though we will continue to focus on development of new technologies through in-house research and development (R&D), we will pursue JVs in specific areas where we do not have the technology.

We are in talks with Rafael for establishing a JV in the field of seekers and missile electronics. We are also in the process of identifying a third partner who can add value to the JVC and who is acceptable to both companies.

BEL is also discussing with BHEL for setting up a JVC for Solar PV manufacturing. The business plan for setting up of the JVC has been finalised and both the companies are in the process of obtaining board approvals.

SP's: What is the impact of the new government guidelines on defence PSUs and private sector corporations on BEL?

Kumar: The Indian market scenario for defence and civilian electronic products/systems is rapidly changing. With the opening of the defence electronics market to private participation, the competition is likely to intensify. In this scenario, BEL is taking proactive steps to protect and further consolidate its leadership position in the Indian defence market while at the same time accelerating efforts to get into new business areas.

BEL is looking for new growth opportunities in areas aligned with BEL's core strengths either through organic growth in existing/new areas or inorganic growth through JVs and such other methods.

As per the new production policy, preference will be given to indigenous design, development and manufacture of defence equipment if it can be developed within timelines required by the defence forces.

Also all equipment/weapon systems/platforms required as per long-term integrated perspective plan (LTIPP) will by and large be developed/integrated/made within the country. To take advantage of these policy decisions, BEL has renewed its thrust on indigenous development either through in-house efforts or in collaboration with Defence Research and Development Organisation (DRDO)/academic institutions. BEL has made significant progress in the development of major systems listed in LTIPP like CCS, NCO for Navy, BMS, EW track and wheeled programme. BEL is also exploring possibilities of joint ventures to take advantage of 'Buy and Make' Indian category of defence purchases.

BEL has been increasingly outsourcing its requirements to private industry. At present about 30 per cent of our requirement is outsourced to the private sector. We are also partnering with private players for development programmes in technology areas. BEL has been outsourcing a large chunk of its hardware and software requirements for projects like Akash, WLR, CAR, etc. •

SIG SAUER SP2022

The SIG SAUER SP2022 features all the safety and lock-up of a Classic SIG SAUER pistol with a durable, lightweight, and wear-resistant polymer frame. With the added versatility of an integrated accessory rail, a modular fire control unit as well as grip and trigger options, there is no question why this pistol is best-in-class.

The SIG SAUER SP2022 has earned an enviable reputation and proven track record of reliable performance in the hands of law enforcement professionals worldwide, including the French and Columbian National Police Forces.

The SP2022 is a polymer framed pistol engineered to perform, built to protect and tough enough to be called a SIG SAUER. •



SIG SAUER SIG516

The SIG516 series brings the proven reliability of the SIG SAUER four-position short-stroke gas piston operating system to a true AR platform tactical rifle. A free floating forearm provides unparalleled accuracy, while a chrome-lined and phosphate coated barrel provides maximum durability and corrosion resistance. A 7075-T6 aircraft grade aluminium forged lower receiver adds to the durability and reliability. With five available barrel lengths, including a heavy barrel 457mm configuration, there is a SIG516 for a variety of combat uses and situations. •



MUST VISIT

Akshardham Temple: The main monument at the temple is about 141 feet high with a beautiful statue of Lord Swaminarayan.

- Location: NH 24, New Delhi
- Entry Cost: Free
- Opening Hours: 9.00 a.m. - 9.00 p.m. from Tuesday to Sunday. Closed on Monday

Qutab Minar: The Qutub Minar made of red sandstone rising to the height of 72.5 mts is an architectural marvel of the 13th century. Also a must is the visit to Ashoka Pillar dating back to the 5th century. The complex is listed as a UNESCO World Heritage Site and is one of the most popular tourist destinations in Delhi.

- Location: Mehrauli, South Delhi
- Entry Cost: ₹250
- Opening Hours: Sunrise until sunset, daily

Red Fort: Better known as the Lal Quila, the Red Fort is an eloquent reminder of the glory of the Mughal era and its magnificence leaves many wonder-struck and breathless.

- Location: Netaji Subhash Marg, Opposite Chandni Chowk
- Entry Cost: ₹250
- Opening Hours: 10.00 a.m. to 4.00 p.m. Monday closed.

Bahai (Lotus) Temple: The Bahai Temple is commonly referred to as the Lotus Temple, as it's shaped like a lotus flower.

- Location: Near Nehru Place, New Delhi
- Entry Cost: Free
- Opening Hours: Daily, from 9.00 a.m. to 6.00 p.m., Monday closed

SHOPPERS' PARADISE

Dilli Haat: Thatched-roof cottages lend it a village atmosphere and a quaint ambience. The market offers an exciting blend of handicrafts, food, and cultural activities—craftsmen display wares from across the country and over 25 food stalls serve a variety of regional specialities. The cultural and music evenings are enthralling. The entry fee is ₹15 (30 cents).

- What to Buy: Indian handicrafts and artifacts
- Location: INA and Pitampura, New Delhi
- Opening Hours: Daily from 10.30 a.m. to 9.00 p.m.

Janpath & Tibetan Market: This very popular and lively market has something for everyone. You'll find goods from everywhere in India and Tibet here.

- Location: Janpath, near Connaught Place
- Opening Hours: Daily
- What to Buy: Handicrafts, hippy clothing, shoes, paintings, brassware, Indian artifacts, etc.

Chandni Chowk: The lanes of Chandni Chowk are divided into bazaars with different areas of specialisation. For fabrics, head to Katra Neel. In the Bhagirath Palace area, you'll find a huge range of electronics. Dariba Kalan is Old Delhi's ancient silver market full of silver jewellery. Food vendors in Chandni Chowk also serve up a delicious assortment of Delhi street food.

- Location: Old Delhi
- Opening Hours: Monday to Saturday
- What to Buy: Fabrics, jewellery and electronic goods

EATING OUT

North Indian Cuisine

- Haveli: Hotel Taj Mahal, 1, Mansingh Road, New Delhi, Phone: 011 23026162
- Gulati: 6, Pandara Road, New Delhi, Phone: 011 23388836, 011 23782949
- Pind Balluchi: Connaught Place, Lajpat Nagar, Deer Park, Safdarjung, etc

Chinese Cuisine

- Berco's: G-2/43, Connaught Place, New Delhi, Phone: 011 49422222
- Fa Yian: A-Block 25/5, Connaught Place, New Delhi, Phone: 011 41516788

Mughlai Cuisine

Karim's: Jama Masjid/Nizamuddin, Phone: 011 23269880, 23264981
Moti Mahal: Daryaganj, Phone: 011 23273011/23273661
Timings: 12 noon to 12.30 a.m.

South India Cuisine

Sagar Ratna: Defence Colony Market, New Delhi
Swagat: Defence Colony & Janpath Hotel, Janpath, New Delhi
Dakshin: Marriott Welcome Hotel, District Centre, Saket, New Delhi
Saravana Bhavan: 46, Janpath, Connaught Place, New Delhi

Thai Cuisine

Baan Thai: Oberoi Hotel, Zakir Hussain Marg, New Delhi
Spice Route Restaurant: The Imperial, Janpath, New Delhi
Ichiban Restaurant: Shop No. 9, Pandara Road, New Delhi



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