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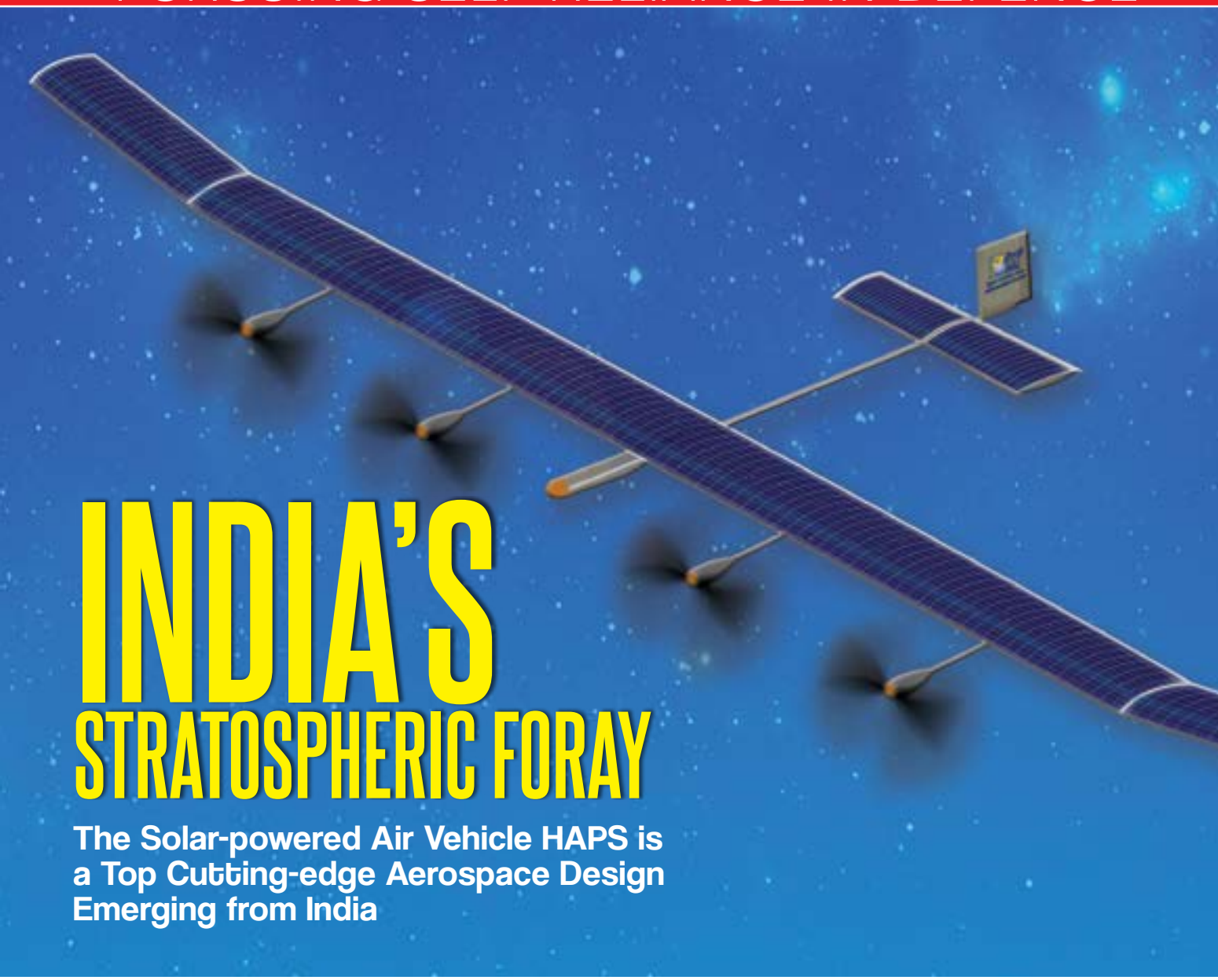
raksha ANIRVEDA

PURSUING SELF-RELIANCE IN DEFENCE



INDIA'S STRATOSPHERIC FORAY

The Solar-powered Air Vehicle HAPS is a Top Cutting-edge Aerospace Design Emerging from India

Need for National Aerospace Strategy

To Boost Indigenous Development and Reverse Import Dependency

Fostering a Vibrant R&D Culture

Nurture an Independent R&D Institution with a Futuristic Focus

Interview: Head – DS, Airbus India & SA

Airbus will Contribute Towards Shaping the Future of A&D in India

AJEET MINI

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RESPONSE

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

Editorial

HARNESSING HOME-GROWN PROWESS IS KEY

It's been a highly enriching and rewarding journey! What began as an initiative of passion four years ago is finally on a firm footing, confident enough to handle the uncertainties of what the future beholds? *Raksha Anirveda's* 16th edition comes to you enriched with renewed focus, riveting content and geared up for a marathon run with the promise to keep its readers continuously engaged.

Two months into 2022, amidst the unexpected turns of events both in the domestic socio-economic–political dimension and the external geopolitical landscape, Aspiring India finds itself surrounded by new sets of multi-dimensional challenges. And to navigate through the extant crisis—India will have to build its credibility through economic consistency and restructuring along with effective leadership so as to rebuild the nation and take its rightful place in the new emerging world order.

The ongoing Russia-Ukraine crisis and the subsequent toothless drama at the UNSC reconfirms that the credibility of the United Nations as an institution has eroded that deep restructuring and reforms is the need of the hour.

For India, it's going to be a tightrope walk all through while retaining its strategic autonomy through calibrated balancing acts and securing itself from being trapped between the US and Russia. China will remain a long-term challenge and strategic rivalry will only gather steam in the forseeable future, forcing Beijing to take it more seriously in its strategic calculus.

As India celebrates the '*Azadi Ka Amrit Mahotsav*' to mark 75 years of independence, fostering a vibrant R&D culture and nurturing an independent R&D institution that competes and collaborates with the DRDO, should be the priority. Expanding its defence capabilities, ensuring significant commitment to a procurement programme for indigenously developed military hardware, and implementing a successful and sustainable defence export policy is a must for India.

Moreover, transparent policy decisions conducive to the business ecosystem that attracts capital, technological prowess and strengthens the defence manufacturing base will be an added advantage. It's a tough task, but doable. All it needs is to bring on board a multitude of stakeholders to work together cohesively and retain the momentum irrespective of regime change.

Similarly, the government should initiate focused efforts to plug in the hidden gaps that challenge self-reliance through the 'Make in India' initiative. For example, limited demand, resilient access to the global supply chain, preference accorded to L1 rather than Quality cum Cost-Based Selection (QCBS) format, and lack of avenues to facilitate participation of high-end technology providers (without local manufacturing base) have repeatedly delayed programmes, affected armed forces' fighting capability, allowed companies to breach the Tier-I & II Supplier criteria, and prevented India from obtaining next generation technologies.

At the same time, absence of conclusive certifications for ascertaining local content have led to procurement of products with high volume of foreign sourced components. As a result, poor product support wins and that eventually leads to weak equipment performance and enhanced lifecycle costs.

Already in the '*Amrit Kaal*' phase, India's '*Path to Pride*' will need a deft handling of its economic and diplomatic challenges while ensuring strategic stability.

Jai Hind!!

Ajit Kumar Thakur
Editor & Business Director

Contents

RAKSHA ANIRVEDA VOLUME 4 | ISSUE 16 | JANUARY - MARCH 2022

30 LEAD STORY

AUGMENTING INDIA'S SHIPBUILDING CAPACITY

Securing India's Maritime Interest is a National Security Imperative

ANALYSIS

NATO Exercise

JOINT MILITARY COMMITMENT: THE INTEROPERABILITY

With military coalitions becoming the norm and interoperability the mode, while there are undoubted force multipliers and many great advantages, there are also big challengers that can pose grave dangers. The way out is to tread with extreme care

By **NATALIA FREYTON**

"I have far less admiration for Napoleon since I've been in command of a coalition": Field Marshal Foch, commander in chief of the allied victorious armies in 1918. A thorough student of Napoleon' tactics, Field Marshal Foch highlighted the difficulty there is in organizing and commanding an operational force, composed of various cultures, be they national or military.

In today's world, coalitions have become the norm, and it remains just as challenging, if not more, due to increased complexity, both human and technical, in modern forces. With cooperation comes additional potential, but also hidden dangers.

The average military operation, today, occurs in one of three scenarios: permanent alliances such as NATO, mission-centred coalitions such as the latest Iraq invasion force, or with the UN as mission coordinator.

According to the setting of the operation, it becomes obvious that in-depth standardization efforts must be carried out at every possible level, so that the armed forces of the contributing nations do not simply crowd each other - or worse, get in each other's way.

These problems are not new, and cases go back to World War I, when poor coordination between allied countries caused major setbacks for troops, or even opportunities for the enemy. Lack of communication or compatibility consistently still today, leads to major setbacks on the battlefield. Recently, The National Defense Magazine "highlighted the poor coordination between U.S. and Polish troops during a joint exercise, resulting from American fuel nozzles not fitting Polish fuel tanks".

NATO, which assembles most of the Western military and composes the largest fighting force in history, defines interoperability as "the ability for Allies to act together coherently, effectively and efficiently to achieve tactical, operational and

strategic objectives. Specifically, it enables forces, units and/or systems to operate together and allows them to share common doctrine and procedures, each other's infrastructure and bases, and to be able to communicate."

Interoperability is formidably complex and detail-oriented, as it impacts every fighting force in the alliance, in all of their dimensions. These dimensions are so many they need their own unpronounceable acronym to summarize them: DOTMLPF. Pronounced Dot-Mil-P-F, it encompasses Doctrine, Organization, Training, Material, Leadership, Education, Personnel and Facilities.

To catch a glimpse of the complexity of the task at hand,

CONUNDRUM

NATO comprises 30 member States, each with thousands of types of equipment, and tens of military unit types, multiplied by three levels: strategic, operative and tactical.

As stated above, failure to implement thorough interoperability will result in drastic loss of efficiency or, worse, friendly fire. But success in the field of interoperability will exponentially increase military potential: by adding capacities, numbers of available boots and resources, not to mention geographically available land area.

In the 1991 invasion of Iraq, "Australia decided against sending some of its F-111C aircraft after issues of provision of jam-resistant radios, electronic countermeasure pods, and Identification-Friend-or-Foe (IFF) equipment were deemed too expensive or difficult to overcome. All of these pieces of equipment are key interoperability items".

This simple lack of technical interoperability proved a major setback for the entire coalition, throughout military active phases. 12 years later, in 2003, lack of standardized procedures again led to blue-on-blue fire, with the US destruction of a UK fighter jet: "IFF problems were highlighted last year by the national audit office, which criticized the Ministry of Defense for not addressing them quickly enough. It said the system was still not fully compatible with the equipment used by other NATO countries, including the US."

Interoperability must be implemented at all levels of the chessboard. Allies must be included in the design of military campaigns only once a mutual understanding of each partner's doctrine has been achieved.

General Dynamics F-111C aircraft

A strategic partnership between the US and Germany, aiming at deployment, would be stillborn, as the US doctrine relies on rapid and distant deployment, whereas German troops are notoriously homebound.

Likewise, deployed troops on a battlefield must understand thoroughly how each one interacts, in terms of who supports whom, and must regularly touch base with each other throughout the phases of the operation.

Finally, at the tactical and technical level, communications and equipment must be compatible, if any type of meaningful and mutual support is to be achieved.

However, even if interoperability is achieved and yields its treasures, it contains one last danger: soft power. If one norm is to be adopted within the alliance, the unspoken question will inevitably be: whose norm?

Here again, NATO gives a telling example of how the leading country of an alliance can utilize norms for its own benefit, at the expense of other, smaller, members.

As far back as 1961, President Eisenhower warned of the power imbalance which was at stake: "In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist."

One of the best examples of this "slow peril" is the 1950s ANZUS agreement, which stipulated no duty on the part of Australia to align with US norms, although it effectively did.

Analyst Gary Brown writes: "ANZUS, Australia has privileged access to US military equipment,

THE AVERAGE MILITARY OPERATION, TODAY, OCCURS IN ONE OF THREE SCENARIOS: PERMANENT ALLIANCES SUCH AS NATO, MISSION-CENTRED COALITIONS SUCH AS THE LATEST IRAQ INVASION FORCE, OR WITH THE UN AS MISSION COORDINATOR

ANALYSIS

Lockheed Martin F-35 fighter jet

AS AMERICAN NORMS BECOME MORE CENTRAL EVERY YEAR, EUROPEAN DEFENCE FIRMS RISK BECOMING LESS RELEVANT

logistics and technology, as well as the opportunity to train and exercise with the US military and its other allies in the region. Australia is also part of a quadripartite arrangement known as ABCA (America, Britain, Canada and Australia) which aims to 'achieve agreed levels of standardization necessary for two or more ABCA armies to cooperate effectively together within a coalition".

In 2021, Australia failed to achieve true sovereignty, as conceived by the French and embodied in their submarines and fell back into American serfhood. The last-minute US contract effectively placed Australia at the beck and call of Washington for the next few decades.

Any country which joins an alliance must pay attention to the balance within the group. Yes, the unification of forces may sometimes be militarily advantageous, or even outright necessary. However, if proper attention is not brought, the economic and geostrategic costs may well exceed the benefits, and place the imprudent country in a vise.

The "norming" country, or standardization leader may exert economic domination upon its partner, by withholding technology - thus forcing the partner to resort to the expensive services of the supplying country for maintenance and upgrades. This will force the "client" country to slowly turn away from its own military industrial fabric and let it die out. Once this has happened, the client country will effectively be entirely dependent on the leader of the alliance, and have lost its sovereignty. Indeed, it will only survive as long as the leading member of the alliance allows it to.

Numerous European countries have purchased the hideously expensive F-35 fighter jet, turning away from the otherwise very competent European industry - and locking themselves permanently into an American dominion.

The European industry has already greatly suffered from these strategic choices and will continue to do so for years to come. As American norms become more central every year, European defence firms risk becoming less relevant. UK supplier Meggitt will, in all likelihood, be absorbed by US competitor Parker Hannifin, as soon as the deal is validated by the government, as the US fields increasing numbers of military vehicles (such as the F-35), in Europe.

India is also coming to terms with its modern reality and realizes that it will only be able to defend its interests adequately, as part of a larger alliance. It is therefore on the brink of a path towards interoperability with whosoever its allies will be, and its leaders must approach this with great strategic height, aware of the risks and opportunities which interoperability can contain.

Other potentially large military forces in the Asian region could also attempt to develop their interoperability with neighbouring nations - either to secure their territorial integrity or to implement reinforcement of diplomatic ties. Whoever does engage on this strategic road will not necessarily be wrong to do so, but must heed the silent creeping shift which will occur underneath the cooperation: each nation within the alliance will be tempted to become the central norming power.

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


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THE NEED FOR NATIONAL AEROSPACE STRATEGY

India needs a comprehensive and coherent national aerospace strategy to accelerate indigenous development in the rapidly evolving geopolitical environment

By **AIR MARSHAL M MATHESWARAN**

As the 2022 edition of the 'DefExpo' gets underway in a few days, it is important to recognise the fact India's 'Defence and Aerospace' sector is growing significantly, aided by the Government's policy initiatives such as 'Make in India' that have created opportunities for many joint ventures with international companies. Platforms like the 'DefExpo' and 'Aero India' are providing the necessary boost and visibility to Indian manufacturing.

Recent announcements on the agreement with the Philippines to export 'BRAHMOS' missile is a significant achievement. Similarly, last week's news that DRDO and SAFRAN will jointly develop the 125 KN engine for the AMCA is major news that could be transformational if the collaboration is well crafted keeping Indian interests in perspective. However, one must keep in mind that much work needs to be done beyond the optics of a defence exhibition. Translating the MoUs into real JVs is a big challenge. Unless the Indian defence industry breaks into the export market in a big way by becoming part of the global supply, the challenges to the Indian industry will continue to be significant.

Geopolitical Turmoil and the likely impact for 'Make in India'

The current war in Ukraine and the geopolitical struggle in Europe is sure to have global repercussions and could lead to a new Cold War. This could have major implications for India's national security and its defence industrial capabilities in the context of its large defence import-dependency. The sanctions policy of the US and the West may threaten India's supply chain. It calls for a serious and well-measured strategic review of India's security strategy. The policy of 'Make in India' needs continuous review for its effectiveness and success. With the right incentives, India can achieve one part of make in India that is manufacturing for the global market through license manufacturing with incremental value additions. However, the second and the most important part relates to technology transfers, joint research, and indigenous developments. The government must focus and stress on collaborative research and joint ventures that mandatorily have access to global supply chains.

Geopolitical storms like the current Ukraine-Russia war can have cascading effects on the rest of the world, particularly on emerging powers like India. It is all the more reason to accelerate the rapid development of Indian industrial capability, particularly in critical technology areas. With Russia being our largest source of defence equipment, sanctions like the CAATSA may begin to bite. Even joint ventures and indigenous developments may come under strain as indirect sanctions will control access to critical hardware like semiconductor chips. China's trade and technology conflict with the US exposed its heavy dependency on the US and Western Europe for semiconductor chips and other advanced electronic components. This vulnerability led China to tweak its 'Make in China' policy to enhance its domestic capabilities in advanced electronic hardware to 40% by 2025. India needs to tweak its policies similarly with a clear-cut strategy. Avenues like the 'DefExpo' must reflect this requirement in attracting investments and joint ventures.

Importance of Aerospace and Defence

The importance of aerospace and defence technologies now transcends the military domain and is far more relevant in the civilian sector. These are critically relevant in a host of applications; navigation in space, air, land, and sea-based vehicles; communications, entertainment, remote sensing, oceanography, meteorology, construction, town planning etc. Design and development depend on a host of aerospace applications for efficient execution. Policies and strategies, therefore, will have to factor leapfrogging strategies to achieve mastery over critical technologies such as aero engines, radar systems, sensors, control systems, algorithm development, material engineering, avionics etc.

National Capabilities in the Evolving Digital World

In today's rapidly evolving digital age, capabilities involving cyber, big data, artificial intelligence, robotics,

complex algorithm developments and 5G/6G communications are already in the centre stage. India's slow decision-making in critical technology areas has hampered its developments, application, and operationalization in critical technology areas concerning defence. The glaring example lies in the areas of NCW and Software Defined Radios. While considerable net-centric capabilities have been achieved in foundational areas like the IACCS of the IAF and the MDA of the Navy, the more critical operationalization of its airborne platforms are still languishing. Equally important, Army's TCS and BMS have been in cold storage for long. There is an urgency to ignite rapid developments in the SDR domain to enhance the military's netcentric capabilities. Drones and swarming have gained a boost in recent years but we must remember they are still at the development stages and the need to mature them quickly should be recognized. All of this needs a comprehensive national strategy to accelerate indigenous development in the rapidly evolving geopolitical environment.

Need for a Coherent National Aerospace Strategy

It is quite evident that major powers of the 21st century will have to be air and space powers, in short, aerospace giants. Almost all elements of aerospace technologies have dual-use characteristics. The implication is quite evident – one is that mastery over these technologies will have immense economic and military benefits to the nation. It will also accelerate the social development of the nation. The flip side is that these are hard to get technologies and will be heavily controlled through various denial regimes. India is an emerging power with a huge population and massive developmental and security needs that can translate into a huge market. Quite obviously we are large buyers of equipment and technology. We need to leverage this attractive market of ours to get access to the critical technologies.

The current unfolding geopolitical turmoil will have a major impact on technology supply chains and technology access. India will need to carefully evaluate the impact and reorient its policies with a clear focus on critical technologies as also its transformation into becoming a major player in the global arms market. The importance of developing a coherent national aerospace strategy becomes ever more urgent.

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

GEOPOLITICAL STORMS LIKE THE CURRENT UKRAINE-RUSSIA WAR CAN HAVE CASCADING EFFECTS ON THE REST OF THE WORLD, PARTICULARLY ON EMERGING POWERS LIKE INDIA. IT IS ALL THE MORE REASON TO ACCELERATE THE RAPID DEVELOPMENT OF INDIAN INDUSTRIAL CAPABILITY, PARTICULARLY IN CRITICAL TECHNOLOGY AREAS

DEFENCE COOPERATION

INDO-US DEFENCE PARTNERSHIP: NEED TO INVEST IN MUTUAL TRUST, VISION

Just as the world is just recovering from a still raging pandemic and a looming global crisis over Russia's military action in Ukraine, India and the US need each other like never before, but will the alliance blossom?

By **SHANKAR KUMAR**

The defence relationship between India and the US has undoubtedly strengthened in the recent past. But with the rapidly changing global situation, due to the pandemic and the Russian action in Ukraine, there is a possibility that China, known for its foxiness, may play some mischievous games in the Taiwan Straits and the South China Sea.

To stop them from becoming a bigger crisis that could hit the stability of the world, the US will have to provide critical technology to India as only a stronger India can tackle China's belligerent moves across the Indo-Pacific region.

In his first-ever face-to-face meeting with Prime Minister Narendra Modi at the White House on September 24, 2021, US President Joe Biden reaffirmed the strength of the defence relationship between India and the US. In particular, the US President was of high praise of India for its "unwavering commitment" as a Major Defense Partner.

This was a reflection of the high degree of understanding that has developed between the two countries on the defence and strategic fronts in the recent past. India has joined the group of countries like Israel and South Korea, which enjoy increased US cooperation in the areas of humanitarian assistance, counter-terrorism, counter-piracy and maritime security.

Driven by mutual concern for the security of the Indo-Pacific region, they are part of the Malabar naval exercise and the Quad, which is by all accounts an informal group that aims to checkmate the aggressive design of China. Rather, in the words of US President Joe Biden, there is an attempt "to shape the strategic environment in which China operates" in the Indo-Pacific region.

But the question is that of Russia, India's closest friend, and a major source of the country's more than 60 per cent of military hardware supplies, including the S-400 ground-to-air missile defence system. Overlooking the US warning of imposing CAATSA (Countering America's Adversaries Through Sanctions Act), India has gone ahead with the purchase of S-400 missile system which is considered as a game changer, possessing the capability to take down multiple aerial targets including stealth fighter jets,

bombers, cruise and ballistic missiles and even unmanned aerial vehicles.

Will the US slap the draconian CAATSA against India for purchasing defence platforms from Russia? What will happen to the US' designation of India as a Major Defense Partner and the slew of defence and security pacts signed amid fanfare with India over the past few years? These are questions prominently hitting every defence and strategic affairs experts' mind. Political willpower of the US will be tested if it imposes sanctions on its "natural" ally, India, say some experts.

In the backdrop of the Ukraine crisis and strengthening of the bond between Russia and China and fear of sharp changes in the geopolitical situation in the Indo-Pacific region, there is a possibility the US will avoid straining its relations with India. Rather, there is a feeling within the strategic community that the US will try to further strengthen its defence and strategic ties with India.

A hint to this regard can be seen in the deepening of advanced industrial cooperation between the two countries. India and the US are co-developing air-launched unmanned aerial vehicles (UAVs) under the Defence Technology and Trade Initiative (DTTI). They are encouraging defence industries and private players to use the existing ecosystems of innovation and entrepreneurship in defence industries for co-development and co-production of weapons.

A further thrust to this initiative was imparted when India and the US held the first Industrial Security Agreement (ISA) from September 27 to October 1, 2021 in New Delhi. The summit was organized to develop protocol for the exchange of classified information between the defence industries of both the countries.

During the summit, an in-principle agreement was also taken for the establishment of the Indo-US Industrial Security Joint Working Group. Also, both sides agreed to meet regularly to align policies for the defence industries in order to collaborate on critical defence technologies. This will help in remedying the challenges faced by India in relation to transfer of technology which will help in unleashing several untapped opportunities in the defence sector. In particular, it will happen at the time when India is expected to spend US $ 130 billion on capital acquisitions in the next five to six years.

Nevertheless, the underlying message of the setting up of the

WHAT WILL HAPPEN TO THE US' DESIGNATION OF INDIA AS A MAJOR DEFENSE PARTNER AND THE SLEW OF DEFENCE AND SECURITY PACTS SIGNED AMID FANFARE WITH INDIA?

DEFENCE COOPERATION

BOTH CONDUCT MORE BILATERAL MILITARY EXERCISES WITH EACH OTHER THAN WITH ANY OTHER COUNTRY AND HAVE SIGNED ALMOST ALL FOUNDATIONAL AGREEMENTS FROM GSMOIA TO LEMOA TO COMCASA TO BECA

Indo-US Industrial Security Joint Working Group is that India and the US are ready to walk together extra miles in deepening their relationship in defence, an area which saw an envious jump in trade from zero in 2000 to US $20 billion in 2020. Most of the military trade is through the Foreign Military Sales (FMS) route and direct commercial sale.

Today, both conduct more bilateral military exercises with each other than with any other country and have signed almost all foundational agreements from GSMOIA to LEMOA to COMCASA to BECA. India is already one of the top countries which have been identified by the US to get license free exports, re-exports and transfers under License Exception Strategic Trade Authorization.

According to Hudson Institute, a top US top think-tank, America should invest in defence partnership with India to counter China's militaristic aggression. On the other hand, Walter Anderson of Johns Hopkins University says: "At the end of the day, a strong united India is to the advantage of the US."

Indeed, with the US not powerful enough to tackle the brinkmanship of China in Asia and also in the Pacific region, India can be a dependable ally with a capacity to stop Beijing from riding roughshod over the international community's interest in the region. Some experts say that with Russia engaging in war with Ukraine, China may feel emboldened to create trouble in the Taiwan Straits.

Already, China's aggressive approach in the South China Sea, through which the world's 60 per cent trade passes annually, has become a headache for India, US, Japan, South Korea, Australia and others. In this backdrop, increased defence and security cooperation between New Delhi and Washington DC is the need of hour. More so to ensure that sea lanes are no longer under any threat, they have to translate their vision of free and open Indo-Pacific into a reality.

Yet again, the taste of the pudding is in the eating. The US will have to mend its 'My Way or the Highway' attitude. India is no more a country of the 1970s or the 80s, it is a nation which is the 5th economic and the 4th military power of the world. The US will have to invest in India's vision of making the world a happy place for humanity, which is at the moment passing through a huge crisis, triggered by the Covid-19 pandemic and geopolitical rivalry between the US-led NATO and Russia on the one hand, and US and China on the other hand.

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

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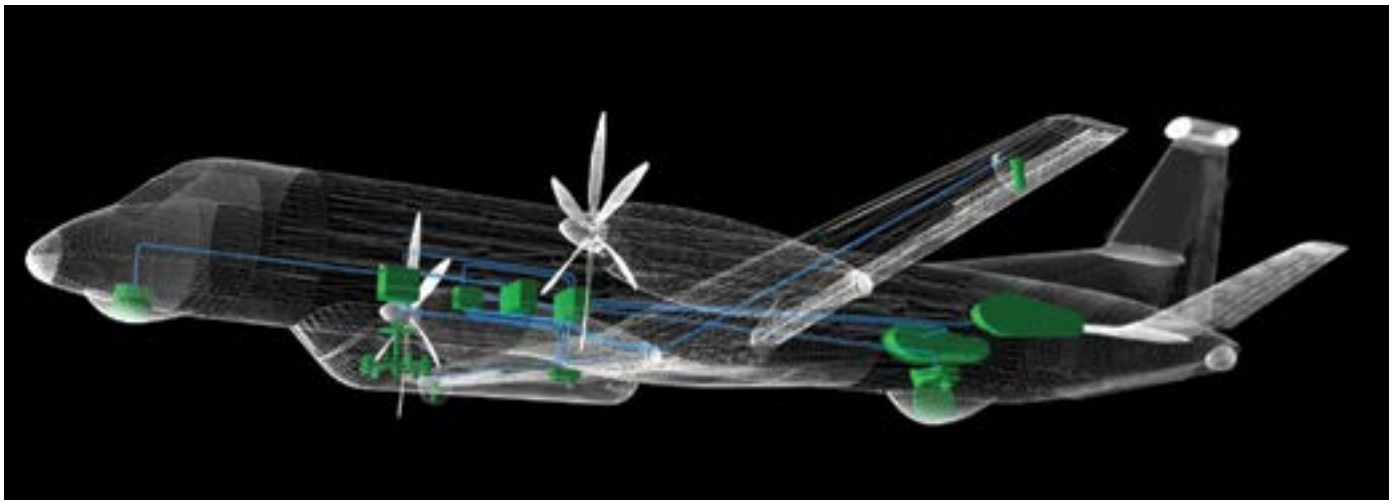

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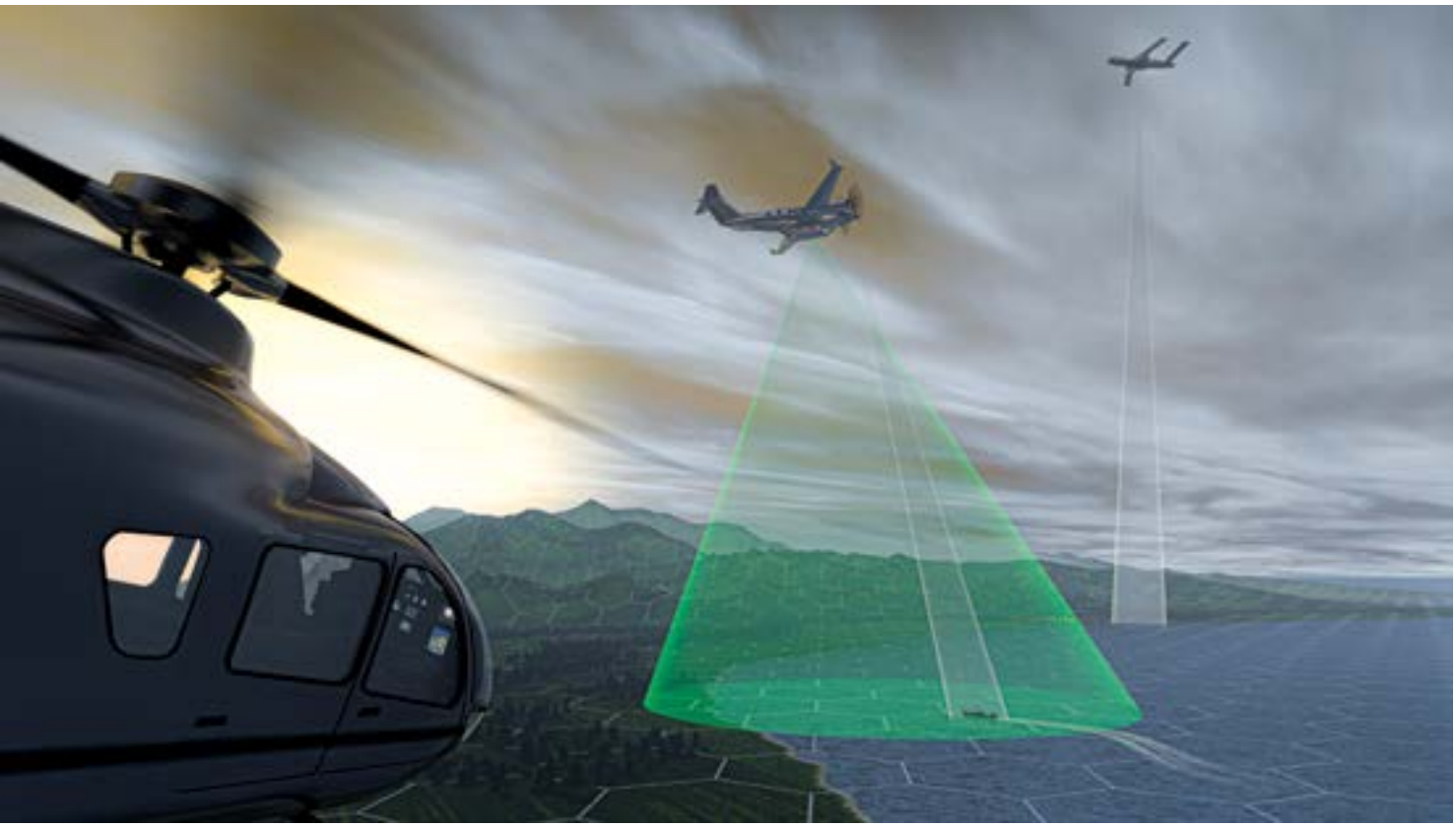


to market, risk and cost

- ✓ One interface to the operator, improved ergonomics, harmonized HMI
- ✓ Reduction of operator workload
- ✓ Interoperability during Joint / Combined Operations
- ✓ Endurance of operational continuity 24/7
- ✓ Improved Situational Awareness in real-time
- ✓ Continuous ISTAR SRV/ RECCE product delivery during all mission phases
- ✓ Extensive communication performance (Intra/Extra up to Joint/Combined, MUMT)
- ✓ Highly optimized presentation of information with GIS tool and the use of HMD
- ✓ Simplified and easy-to-use system design
- ✓ Ensuring enhanced ISTAR capability (on-/off-board)
- ✓ Considerable increase of ISTAR products and its distribution in a netted (non-) hostile environment (COMINT, ELINT, SIGINT, Radar images) Platform self-protection by missile/ IR sensors and counter action

HENSOLDT GROUP REAFFIRMS ITS COMMITMENT TO SUPPORT THE INDIAN ARMED FORCES BY OFFERING A STATE-OF-THE-ART 'MAKE-IN-INDIA' DETECT AND PROTECT SENSORS SUITE TO IMPROVE ISR AS WELL AS THE SAFETY AND OPERATIONAL EFFECTIVENESS OF INDIAN HELICOPTER PLATFORMS

Innovation is an essential part of our company DNA; for the benefit of our customers!

HENSOLDT is a German defence industry champion with a leading market position in Europe and global reach. Headquartered in Taufkirchen near Munich, the company develops sensor solutions for defence and security applications. As a technology leader, HENSOLDT is also continuously expanding its portfolio. It develops new products to combat a wide range of threats based on innovative approaches to data management, robotics and cyber security. With more than 5,600 employees, HENSOLDT achieved a turnover of 1.2 billion euros in 2020. HENSOLDT is listed on the Frankfurt Stock Exchange.

https://www.hensoldt.net/

ANALYSIS

FOSTERING A VIBRANT R&D CULTURE

Instead of a standalone monetary allocation for research and development, the Indian government will do well to nurture an independent R&D institution for defence capability enhancement with a futuristic focus. This establishment can be steered by private sector in concert with start-ups and the academia to create a competitive edge globally and an innovation ecosystem domestically

By **MAJ GEN G SHANKARNARAYANAN**

In a big push to defence manufacturing in India, the Union Minister of Finance Nirmala Sitharaman announced in her budget speech on 01 February this year that 25 per cent of the research and development (R&D) budget of the defence ministry would be earmarked for private industry, start-ups and academia in the country. In addition, one of the most significant announcements was the setting up of an independent nodal umbrella body to meet the wide-ranging testing and certification requirements of defence equipment.

The specific allocation for research and development fund out of the budget allocation for the ministry of defence is aimed at opening Defence research and development for participation of Indian private industry, start-ups and academia in design and development of military platforms and equipment in collaboration with the Defence Research and Development Organisation (DRDO) and other organisations by strategic partnership through a Special Purpose Vehicle (SPV) financing model.

HISTORY OF DEFENCE R&D IN INDIA

Research and Defence in the Indian context has been evolutionary in nature since independence. Its formal contours were drawn by the merger of the Technical Development Establishment and the Directorate of Technical Development and Production of the Indian Ordnance Factories with Defence Science Organisation in 1958. Subsequently, Defence Research & Development Service (DRDS) was constituted in 1979 as a service of Group 'A' Officers/ Scientists directly under the administrative control of Ministry of Defence. In 1980, a separate Department of Defence Research and Development was formed which later on administered DRDO and its almost 50 laboratories/establishments.

Over the years, indigenous defence research organisation was given a fillip and today DRDO is the R&D wing of Ministry of Defence, Govt of India, with a vision to empower India with cutting-edge defence technologies and a mission to achieve self-reliance in critical defence technologies and systems, while equipping our armed forces with state-of-the-art weapon systems and equipment.

DRDO has successfully pursued self-reliance and indigenous development and production of strategic systems and platforms such as Agni and Prithvi series of missiles; light combat aircraft, Tejas; multi-barrel rocket launcher, Pinaka; air defence system, Akash, and a wide range of radars and electronic warfare systems. All this has given a quantum jump to India's military might, generating effective deterrence and providing crucial leverage at the global level.

Today, DRDO is a network of more than 50 laboratories which are intensely engaged in developing defence technologies covering various disciplines such as aeronautics, armaments, electronics,

UNLIKE GLOBAL PLAYERS NAMELY THE UNITED STATES OR CHINA WHERE DEFENCE RESEARCH IS DRIVEN BY CAPABILITY ENHANCEMENT, INDIAN DEFENCE REQUIREMENTS ARE NEED BASED, TO MAINTAIN STRATEGIC EQUILIBRIUM IN THE SUBCONTINENT ESCHEWING FOREIGN DEPENDENCE FOR MILITARY HARDWARE

combat vehicles, engineering systems, instrumentation, missiles, advanced computing and simulation, special materials, naval systems, life sciences, training, information systems and agriculture. Several major projects for the development of missiles, armaments, light combat aircraft, radars, and electronic warfare systems are under progress and significant achievements have already been made in several such technologies.

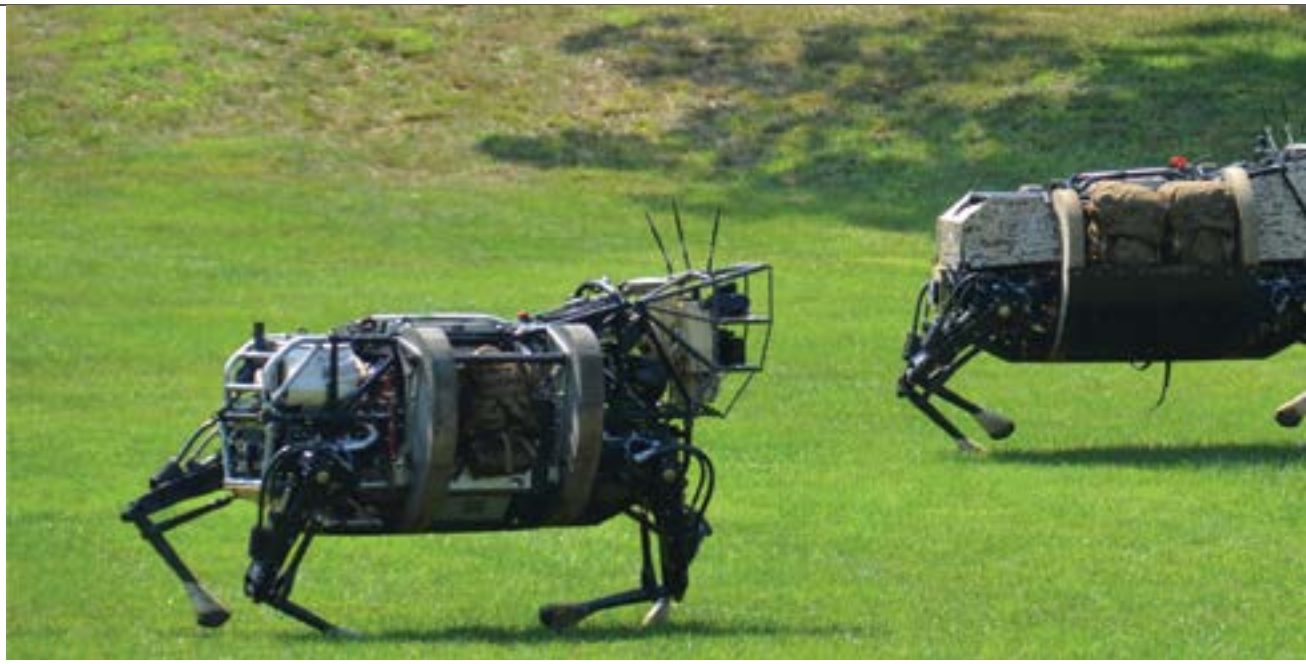
In 2010, a major restructuring of the DRDO was undertaken to give a significant boost to defence research in the country and to ensure effective participation of the private sector in defence technology. The key measures to make DRDO effective in its functioning included the establishment of a Defence Technology Commission with the defence minister as its chairman.

R&D BUDGETARY ALLOCATION FOR PRIVATE INDUSTRY, START-UPS AND ACADEMIA

The integration of private industry with DRDO is already explicit in the charter of DRDO while reaching out to the industry for critical technology infusion required for development of military hardware. Therefore, specific budgetary provision for research and development for the industry, start up and academia in a standalone mode will require acceptance of the research necessity before formal allocation of funds. The edifice of the Indian defence industry is entirely based on manufacture, consequent to the acceptance of necessity. Hence there is very little scope for independent research.

Unlike global players namely the United States or China where defence research is driven by capability enhancement, Indian defence requirements are need based, to maintain strategic equilibrium in the subcontinent eschewing foreign dependence for military hardware. So, instead of a standalone allocation of monetary resource, it would auger well to set up an independent R&D institution exclusively for capability enhancement with a futuristic focus and steered by the private sector in concert with the academia to create a competitive edge globally and a collaborative R&D environment domestically. This could also cater

ANALYSIS



UNDER BEIJING'S MILITARY CIVIL FUSION (MCF) STRATEGY, THE PLA SEEKS TO EXPLOIT CHINA'S PRIVATE SECTOR ACHIEVEMENTS TO FURTHER ITS FORCE MODERNISATION PLANS. FOR INSTANCE THE PRC HAS DESIGNATED 15 COMPANIES AS THE COUNTRY'S OFFICIAL "AI CHAMPIONS," WHICH INCLUDE ALIBABA, BAIDU, HUAWEI, SENSETIME, AND TENCENT

to the setting up of an independent requirement of testing and certification requirements of defence equipment.

DEFENCE RESEARCH IN THE UNITED STATES

In the United States for sixty years, Defence Advance Research Project Agency (DARPA) has handled a singular and enduring mission to make pivotal investments in breakthrough technologies for national security.The genesis of DARPA itself lies on the premise that it would be the initiator and not the victim of strategic technological surprises.

DARPA has been relentlessly working with innovators inside and outside of government, transforming revolutionary concepts and even seeming impossibilities into practical capabilities. The ultimate results have included not only game-changing military capabilities such as precision weapons and stealth technology, but also such icons of modern civilian society as the Internet, automated voice recognition and language translation, and Global Positioning System receivers small enough to be embedded in myriad consumer devices. DARPA explicitly reaches for transformational change instead of incremental advances. But it does not perform its engineering alchemy in isolation. It works within an innovation ecosystem that includes academic, corporate and governmental partners, with a constant focus on the nation's military services, which work with DARPA to create new strategic opportunities and novel tactical options. For decades, this vibrant, interlocking ecosystem of diverse collaborators has proven to be a nurturing environment for the intense creativity that DARPA is designed to cultivate.

As regards the intellectual pool and the organisational setup of DARPA, it goes to great lengths to identify, recruit and support cutting-edge programmes with extraordinary individuals who are at the top of their fields and are hungry for the opportunity to push the limits of their disciplines. These individuals, who are at the very heart of DARPA's history of success, come from academia, industry and government agencies for limited stints, generally three to five years. That deadline fuels the signature DARPA urgency to achieve success in less time than might be considered reasonable in a conventional setting. Given this research ecosystem, DARPA addresses challenges broadly, spanning the entire scientific spectrum from deep science to systems to capabilities, constantly probing for the next big thing in their fields, to identify new challenges and their potential solutions.

DEFENCE RESEARCH IN CHINA

In People's Republic of China (PRC), the Academy of Military Science (AMS) is the highest-level research institute of the People's Liberation Army (PLA) of China, headquartered in Beijing. The AMS researches issues related to "national defence, armed forces development and military operations." It works in consultation with the Central Military Commission and the Joint Staff Department. More broadly, it coordinates research conducted by various PLA institutions.

The PRC pursues its aggressive, top-level push to master advanced technologies and become a global innovation superpower. It seeks to dominate technologies associated

with the Fourth Industrial Revolution; this push directly supports the PLA's ambitious modernisation efforts and its goal of becoming a "world-class" military, capable of "intelligentised" warfare. The PRC continues its pursuit of leadership in key technologies with significant military potential, such as AI, autonomous systems, advanced computing, quantum information sciences, biotechnology, and advanced materials and manufacturing. As evidenced by the country's recent accomplishments in space exploration and other fields, China stands at, or near, the frontier of numerous advanced technologies.

In China, the commercial sector drives breakthroughs in advanced dual-use technologies. Thus, major PRC companies make significant research efforts aimed at generating breakthroughs in key fields. PRC state investment funds, established to support priority industries, have marshalled enormous capital. Under Beijing's Military Civil Fusion (MCF) strategy, the PLA seeks to exploit China's private sector achievements to further its force modernisation plans. For instance, the PRC has designated 15 companies as the country's official "AI Champions," which include Alibaba, Baidu, Huawei, SenseTime, and Tencent. This designation tasks these companies to facilitate industry-wide coordination with the PRC government. Each champion is responsible for a specific AI focus area, including autonomous vehicles, smart cities, and cybersecurity.

Tech giants Alibaba, Baidu, and Tencent have been researching quantum computing since 2018, with Alibaba offering one of the world's few quantum computing clouds services. The PRC has two leading quantum communications start-up companies, Quantum CTek and Anhui Qasky. Quantum CTek is becoming one of the largest manufacturers in the commercial quantum-communications technology sector. The Chinese model is reflective of state sponsored research in specific areas allocated to the private sector but on the areas a specified by the PRC.

DEFENCE RESEARCH IN RUSSIA

Russian Foundation for Advanced Research Projects, set up in 2012, is an advanced military research agency tasked with informing the country's leadership on projects that can ensure Russian superiority in defence technology. It also analyses the risks of any Russian technological backwardness and technological dependence on other powers. The sole purpose of this foundation is to close a gap in advanced research with their Western partners after 20 years of stagnation in the Russian military science and defence industry. This aggressive military technology innovation enables Russia's way of war as well as develops new concepts of operation and military thought around future warfare, especially asymmetric advantages against more powerful competitors. The focus seems to be on new weapons systems, dubbed Putin's superoruzhie ('super weapons') first unveiled in 2018, which signal Russia's intent to innovate in the defence-industrial field to counter the perceived conventional military superiority of great power competitors such as the US and its NATO allies.

DEFENCE R&D IN THE INDIAN CONTEXT

In the Indian context, the Institute of Defence Studies and Research (IDSR) has been established jointly by the Gujarat University and Institute of Infrastructure Technology Research and Management (IITRAM), Ahmedabad, with the patronage and support of Government of Gujarat. IDSR is an autonomous institute dedicated to conduct academic and research activities with a mission to pave the way for quality human resources in the defence sector, while functioning as an organisation working towards augmenting the defence policy and research. The Institute promotes national and international security through the generation and dissemination of knowledge on defence and homeland security-related issues. The Institute is supported by the Gujarat government, DRDO, and the Institute of Defence Scientists and Technologists (IDST), Pune.

It may augur well to strengthen IDSR at the national level as an institute of national importance and have all the IITs, IISc co-panelled with a view to enhance the scope and research ambit of the institution for the greater goal of achieving national security concerns across the spectrum. Herein lies an opportunity to judiciously deploy the funds for the intended purpose.

–The writer is a former GOC-Indian Army and presently a Strategic Consultant & Principal Advisor. Views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

IN INDIA, THE INSTITUTE OF DEFENCE STUDIES AND RESEARCH (IDSR) IS AN AUTONOMOUS INSTITUTE DEDICATED TO CONDUCT ACADEMIC AND RESEARCH ACTIVITIES WITH A MISSION TO PAVE THE WAY FOR QUALITY HUMAN RESOURCES IN INDIA'S DEFENCE SECTOR, WHILE FUNCTIONING AS AN ORGANISATION WORKING TOWARDS AUGMENTING THE DEFENCE POLICY AND RESEARCH

ABSOLUTE POWER

ILLUSTRATION: BUDHA CHANDRA SINGH

FIGHTING THE 2.5-FRONT WAR: INNOVATION IS THE KEY

As well as facing the possibility of a collusive two-front attack by China and Pakistan, the Indian armed forces have to deal with the 0.5 front of internal terrorists, saboteurs and collaborators

By **RAKESH KRISHNAN SIMHA**

The term "two and a half front war" pertains to the Indian armed forces preparing to simultaneously fight conventional wars to the North and West, while also battling any insurgency that might be ongoing at that time in the hinterland. The late Chief of Defence Staff General Bipin Rawat was the first person to coin the phrase. He talked about facing Pakistan and China on two fronts while having to battle internal enemies masquerading as imminent intellectuals.

General Rawat offered an example of how the '0.5 front' was being developed: "Pakistan is spreading disinformation among the youth of Kashmir with doctored videos and messages. This is further supported by some of the people in the Valley who spread it and glamorise the young boys who have joined terrorist organisations."

According to a report by the Manohar Parrikar Institute for Defence Studies and Analyses, a two and a half front war is "the worst case scenario which the military could be faced with, and would come about only if there is a total breakdown of political, diplomatic, economic and other efforts (including international) to resolve the situation, considering that it is not in any nation's interest in today's connected age to choose to go to war". It also points towards a "breakdown of various administrative and other processes in the concerned state/states of the union, consequent to which insurgency has taken root therein".

NATURE OF THE THREAT

Since the sixties, the prospect of the dragon intervening to bail out Pakistan has been a constant factor in India's war planning. In the 1965 War, the Indian Army moved its Mountain Divisions to the Lahore front only after it was convinced the remaining forces could undertake a holding operation if the Chinese opened a second front. Again, in the 1971 War, the Indian Army waited until the Himalayan passes were snowed under – effectively blocking out the PLA – before launching its blitzkrieg into Pakistan.

Writing in the backdrop of the Indian victory in the 1971 War, K. Subrahmanyam, the doyen of Indian strategic analysts, stated: "India will have to develop and keep at readiness adequate forces to deter China and Pakistan from launching an attack either jointly or individually and in case deterrence fails to repel aggression effectively… faced with the possibility of two adversaries, our aim must be to hold one and reach a quick military decision with the other. It is obvious that the latter can only be Pakistan. Consequently, our force requirements must be planned to achieve this aim.

After India went nuclear, Subrahmanyam wrote that "the international situation has radically changed with the end of the Cold War" and that "most strategic opinions today discount the possibility of a war among major powers with nuclear weapons". Therefore, he argued, the choice of the term 'two-front war' was inappropriate. His view was: "In such circumstances, what should be planned for is exercise of deterrence and dissuasion in each case using the most modern technology available."

General Sidney Giffin of the US Air Force, who in 1965 wargamed a joint China-Pakistan attack on India, concluded that China's constant gambit is to "shift the military balance so as to assure Indian inability to crush Pakistan". India must expose the fallacy of this calculus. India's objective, in case of a collusive attack, should be to take away this prized Chinese pawn by using the opportunity to finish the Pakistan problem once and for all.

India's primary goal if confronted by a collusive attack should be to destroy Pakistan as a viable entity and hold China to a draw through an offensive-defence strategy. No matter what the outcome of the war, Pakistan should never ever have the capacity to conduct war against India. Minus its vassal, China's ability to target India would also diminish considerably.

THE 0.5 FRONT

Given the significant costs of engaging India in combat, and the growing range of indirect and non-military tools at their disposal, both Pakistan and China are seeking ways to achieve relative gains without triggering escalation. From fake news and online troll farms to terrorist financing and paramilitary provocations, these approaches often lie in the contested arena somewhere between routine statecraft and open warfare – the "grey zone".

According to the Center for Strategic & International Studies,

INDIA'S PRIMARY GOAL IF CONFRONTED BY A CHINA-PAK COLLUSIVE ATTACK SHOULD BE TO DESTROY PAKISTAN AS A VIABLE ENTITY AND HOLD CHINA TO A DRAW THROUGH AN OFFENSIVE-DEFENCE STRATEGY. NO MATTER WHAT THE OUTCOME OF THE WAR, PAKISTAN SHOULD NEVER EVER HAVE THE CAPACITY TO CONDUCT WAR AGAINST INDIA

ABSOLUTE POWER

"The grey zone phenomenon is also referred to as hybrid threats, sharp power, political warfare, malign influence, irregular warfare, and modern deterrence. Although it reflects an age-old approach, it is newly broad in its application. Today, the toolkit for coercion below the level of direct warfare includes information operations, political coercion, economic coercion, cyber operations, proxy support, and provocation by state-controlled Forces."

Peter Layton of the Lowy Institute writes that grey zone actions don't just happen. "China, for example, has implemented a well orchestrated campaign approved and controlled by the highest levels of the Chinese Communist Party and the People's Liberation Army. Grey zone actions are not those of tactical commanders freelancing. They are purposefully constructed to side-step military escalation – crafted as a form of carefully scripted brinkmanship."

Layton identified China as the "largest country undertaking grey zone actions". Whether in the South China Sea, the East China Sea or on its border with India, China has employed innovative and imaginative grey zone tactics in its quest for a persistent strategic advantage over others, he writes.

Pakistan has learned well from its evil guru. Pakistani author and columnist F.S. Aijazuddin reveals that in the early 1960s Chinese Premier Zhou-Enlai had travelled to Pakistan and suggested to President Ayub Khan that Islamabad should prepare for a prolonged conflict with India instead of short-term wars, and raise a militia force to act behind Indian lines. Heeding China's advice, the Pakistanis went on to create terrorist groups like the Lashkar to wage an undeclared war against India. Today, the fingerprints of Pakistan's secret service ISI are found at every terror attack in India.

"TODAY, THE TOOLKIT FOR COERCION BELOW THE LEVEL OF DIRECT WARFARE INCLUDES INFORMATION OPERATIONS, POLITICAL COERCION, ECONOMIC COERCION, CYBER OPERATIONS, PROXY SUPPORT, AND PROVOCATION BY STATE-CONTROLLED FORCES"

INDIA'S OPTIONS

An American author once wrote: "A nation can survive its fools, and even the ambitious. But it cannot survive treason from within. An enemy at the gates is less formidable, for he is known and carries his banner openly. But the traitor moves amongst those within the gate freely, his sly whispers rustling through all the alleys, heard in the very halls of government itself. For the traitor appears not a traitor; he speaks in accents familiar to his victims, and he wears their face and their arguments, he appeals to the baseness that lies deep in the hearts of all men. He rots the soul of a nation, he works secretly and unknown in the night to undermine the pillars of the city, he infects the body politic so that it can no longer resist. A murderer is less to fear."

Modern India has two choices. It can stumble and plodder towards chaos, with numerous enemies such as communists, Maoists, radical Islamists, fundamentalist Christians, seculars, liberals and urban Naxals working tirelessly to pull it down. These traitors were leading the nationwide riots against the Citizenship Amendment Bill; they backed the radicalised criminals setting up Shaheen Baghs on public roads; they are the ones secretly working for China, Pakistan and other powers.

Senior journalist Pushpendra Kulshrestha has narrated a chilling incident about the 1965 War. An entire Indian Army division that was heading towards the western border was stopped in its tracks while passing through Uttar Pradesh because some radicalised

Muslims had dug up the highway. The identity of these traitors was known to the authorities as these saboteurs lived and worked alongside the highway, but in the name of secularism they were not prosecuted.

It is time to drop this soft approach. India must accept the truth that the country' self-interests and security are above all else. Eliminating internal enemies should be a primary task. This will involve tracking down suspected treasonable individuals and groups, infiltrating and manipulating them. This strategy is especially necessary against the urban Naxals who have grown deep roots in India's colleges and universities and are poisoning young minds against the nation and its values. Indian journalists in the pay of foreign intelligence agencies can be easily ferreted out using technology and humint – human intelligence or spies.

More dangerous individuals –

LAYTON IDENTIFIED CHINA AS THE "LARGEST COUNTRY UNDERTAKING GREY ZONE ACTIONS". WHETHER IN THE SOUTH CHINA SEA, THE EAST CHINA SEA OR ON ITS BORDER WITH INDIA, CHINA HAS EMPLOYED INNOVATIVE AND IMAGINATIVE GREY ZONE TACTICS IN ITS QUEST FOR A PERSISTENT STRATEGIC ADVANTAGE OVER OTHERS

such as terrorists and those who encouraged, trained and supported them in any way – should be eliminated by extra-judicial means.

BREAK FROM THE PAST

Despite the prevalence of the secular shadow, there has been a sea change in the way the Indian armed forces have started dealing with hybrid war. Talking about the terrorists infiltrating the borders, the late CDS had famously remarked, "Infiltrations will continue to occur. The terrorists across the border are ready and so are we. They will cross but we are here receiving them. After receiving them, we will continue to bury them 2.5 feet deep into the ground."

It was under General Rawat's tenure that the Indian Army conducted a surgical strike across Pakistan, destroying hundreds of terrorist launch pads. Earlier, he had planned the surgical strike over Myanmar where NSCN-K terrorists were killed, while the Indian forces did not suffer any casualty.

In 2017, India awarded a medal to an army officer who had tied a civilian protestor to the front of his jeep to save the lives of his jawans from a lynch mob of angry stone-pelters in Kashmir. General Rawat defended the move, describing the officer's actions as an "innovation" in a "dirty war".

"People are throwing stones at us; people are throwing petrol bombs at us. If my men ask me what do we do, should I say, just wait and die? I will come with a nice coffin with a national flag and I will send your body home with honour. Is it what I am supposed to tell them as chief? I have to maintain the morale of my troops who are operating there," he said.

General Rawat's leadership of the successful 2015 cross-border military operation in Myanmar to flush out Naga militants also remained one of the high points of his career. In a way, it was a sign of his later advocacy of the dogged pursuit of militants across the Line of Control in Pakistan-occupied Kashmir. This was evident in how he was part of the core team monitoring and strategising the surgical strikes across the LoC in 2016 and 2019, better known as the Uri and Balakot strikes, respectively.

Referring to the enemy's grey zone warfare, General Rawat said, "This is a proxy war and proxy war is a dirty war. It is played in a dirty way. The rules of engagement are there when the adversary comes face to face and fights with you. It is a dirty war....That is where innovation comes in. You fight a dirty war with innovations."

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

HAPS: INDIA'S STRATOSPHERIC FORAY

Hindustan Aeronautics Limited (HAL) and Newspace Research & Technolgies (NRT) are designing a 50 meter plus wing span 'High Altitude Pseudo Satellite' (HAPS) solar powered air vehicle to fly at stratospheric altitudes of over 65,000 feet for months at a stretch. This is one of the most cutting edge aerospace design emerging out of India and is part of HAL's futuristic Combat Air Teaming System (CATS)

By **AJIT KUMAR THAKUR**

Hindustan Aeronautics Limited (HAL) has teamed up with a next generation missions and technologies (NGM&T) start-up NewSpace Research & Technologies Pvt Ltd (NRT) to begin work on a massive solar powered unmanned aircraft designed to stay aloft in the stratosphere for months. The 50m plus span High Altitude Pseudo Satellite (HAPS) UAV is part of a new genre of solar powered platforms being designed across the world for persistent surveillance, communications and specialist science missions. Dubbed as 'CATS-Infinity', this air vehicle will be developed under a joint development partnership model between the two companies and will be India's maiden foray to target the largely unexploited stratosphere for military and civilian applications.

The HAL Board has cleared this ambitious program with the Indian Air Force and the Indian Navy as its targeted customers. This augurs a new era for captive indigenous aerospace R&D happening in the private ecosystem in India, where the norm has been to develop products through transfer of technology (ToT) & licensing. Here NewSpace Research & Technologies, a deep tech aerospace & defence start-up company based out of Bengaluru with its core aerospace engineering design strengths wants to make a difference. This is also a first for HAL, where it has engaged with a start-up company for a joint design & development project.

NewSpace will be displaying an engineering model of its iDEX HAPS solution in the DefExpo22

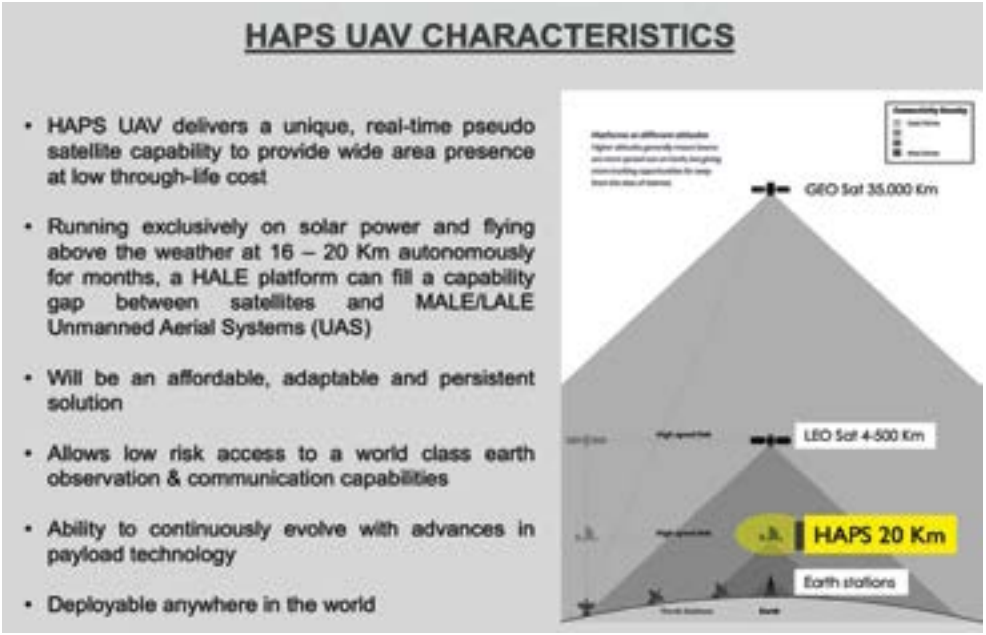
Ironically the HAPS in India has been unlocked as a R&D program through the Ministry of Defence's Innovation for Defence Excellence (iDEX) initiative, where NewSpace Research & Technologies Pvt Ltd has signed a contract with the MOD for an initial proof of concept demonstrator which targets a solar powered flight for greater than 48 hours. Beyond this, HAL as per understanding with the MOD and the Indian Air Force, as well as a business collaborative agreement with NewSpace, will develop HAPS prototypes for the Indian Air Force & the Indian Navy each. As per news reports, the Indian govt will be investing an estimated INR 700 crores to take these prototypes to a IOC status. With HAL as

the lead, NewSpace Research & Technologies will be a prime R&D and commercial partner in this effort. NewSpace has completed the initial feasibility design of the HAPS and has been supported by Boeing Phantom Works on validating the same. NewSpace Research is one of the first private sector aerospace companies in India, which has extensively used advanced design philosophies like multi-disciplinary optimisation (MDO) to design the HAPS air vehicle.

So what exactly is a High Altitude Pseudo Satellite? The HAPS is a new genre of unmanned air vehicles designed to stay aloft in the very thin air of the stratosphere. Operating at 65,000 feet, high above the air traffic and weather activity for months altogether, the HAPS can be utilised for persistent loiter needs towards military & civilian applications.

These are mostly powered by solar power, where solar energy is utilised to run the vehicle systems and charge the onboard batteries during the day, and run on the batteries at night. The cycle is repeated continuously. The number of charge and discharge cycle limit of the batteries determines the endurance of the air vehicle. The existing commercially available high density light weight lithium based battery chemistries provide an endurance of upto 90 days. Using customised electric propulsion optimised for low density air operations, the CATS-Infinity is being designed as a system to operate for over a year in the stratosphere. Advances in battery tech in the coming years will easily be incorporated to give such an endurance beyond the targeted 3 months.

However batteries along with the airframe, have the maximum mass amongst the various sub systems on the platform, which reduces the mass fraction of the useful operational payload carried down to tens of kilograms.



This is further governed by the location on the planet where the HAPS will fly, with duration of the day and the angle of sunrays falling on the solar panels making a huge difference in the sizing of the HAPS.

The wing span of the HAPS will be the lowest if designed to operate near the equator because of the near vertical sunrays falling on the panels for a longer duration, providing optimal energy balance for aircraft flight functions and charging the batteries. With increase of latitude, the duration of the day and angle of incidence of the sunrays will reduce, decreasing the optimal energy balance needed for the solar power train to fly all seasons.

This will entail increase in the solar panel area, thus increasing the wingspan and driving up design complexity and cost of the vehicle. Some amount of wind at stratospheric altitudes in certain regions will also demand more energy from the powertrain, drawing more power from the batteries, hence a need to carry more of same.

The worst case scenario for any HAPS class of vehicle is the ability to fly on the winter solstice in the northern latitudes, thus increasing the wing span to its structural limits for a 365 day operations. This is the design challenge which aerospace engineers need to address by intermatching a highly flexible and ultra-lightweight airframe, with maximum allowance for solar panels, batteries, payloads and other sub-systems. With availability of double/ triple junction GA/GaN solar cells and ultra-lightweight high density batteries > 500WH/Kg, as well as low SWAP operational payloads; the HAPS is well on its way to be a cost effective augmentation/ replacement for satellites in having the focus of an aircraft, and endurance of a satellite. The

THE HAPS IN INDIA HAS BEEN UNLOCKED AS A R&D PROGRAM THROUGH THE MINISTRY OF DEFENCE'S INNOVATION FOR DEFENCE EXCELLENCE (IDEX) INITIATIVE, WHERE NEWSPACE RESEARCH & TECHNOLOGIES PVT LTD HAS SIGNED A CONTRACT WITH THE MOD FOR AN INITIAL PROOF OF CONCEPT DEMONSTRATOR WHICH TARGETS A SOLAR POWERED FLIGHT FOR GREATER THAN 48 HOURS.

COVER STORY: THE LONG SHOT

THE INCLUSION OF THE CATS-INFINITY BY HAL AS PART OF ITS NEXT GENERATION COMBAT AIR TEAMING SYSTEM (CATS), WILL BE A GAMECHANGER FOR C4ISR FUNCTIONS WHEN OPERATING ALONG WITH AI POWERED UNMANNED WINGMAN AND SWARM UAV ASSETS IN DEPTH, IN A HIGHLY CONTESTED AIRSPACE

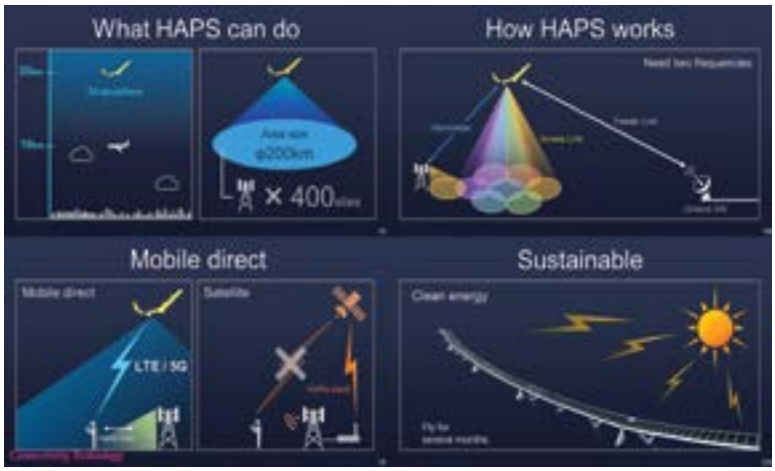
HAPS can undertake 70-80% of satellite's persistent surveillance and communication tasks at one fourth the cost and up to three times the life cycle viability. In addition, the payloads can be dynamically swapped as per requirement unlike a satellite where the payload is lost forever.

Flying at 65,000 feet, the HAPS gets a commanding view of the landmass. In theory, one could see as far as 500 km away. At these altitude, it would also be able to reasonably listen out to 800-1000 km. Designed to fly at low speeds, these platforms will be able to persist over a point of interest endlessly, making them ideal satellite augmentation/ replacement solutions. A HAPS air vehicle operating at 65,000 feet with an endurance of 24 hours, will need to fly only 250 sorties compared to MALE UAVs operating at 25,000 feet with an endurance of 25 hours, which need to fly over 5000 sorties to have the same impact over the region of interest. This results in fewer missions and air vehicles, as well as simplified and cheaper cost of operations. The operational cost per hour of a HAPS class of vehicle is less than $500 per hour as compared to an approx. $3500 per hour for a Reaper class drone of the USAF.

The surveillance payloads for HAPS include electro optical/ infra-red (EO/IR) solutions, synthetic aperture radars (SAR) with GMTI function; communication payloads including range extenders, 4/5G/ WiFi networks and backhaul data carriage, electronic intelligence (ELINT) and electronic warfare (EW). The existing technology limits of the ISR payloads for HAPS allows observations of up to 80-100 km from stratospheric altitudes, which is 2-3 more as offered by MALE UAVs. For the Indian Armed forces the HAPS will offer a hitherto unknown capability for ISR, the lack of which has been critically exposed during the Doklam crisis, the Balakot incident and the ongoing crisis in Ladakh. The Indian Navy with its vast boundary to manage across the Indian Ocean Region (IOR) will be an immediate beneficiary. Embedded with the Indian MALE UAVs and recce satellites, the HAPS will help close the huge gap in demand and supply of ISR data.

While HAPS offers endless possibilities towards military applications, its civilian applications will be even more beneficial for India in the decades to come. Here advanced use cases for a persistent eye in the sky include smart city management, natural disasters, management of logistics nodes and highways etc. Imagine how a swarm of HAPS operating on the disaster prone belts in India persistently can offer real time pre warning of a natural disaster unfolding, helping a much faster response. This will save countless lives and loss of property.

One of the most disruptive use case for the HAPS in the days ahead will be beaming down



A comparative coverage analysis of a HAPS vs a MALE UAV

The Airbus Zephyr-S is the first HAPS platform in the world to have been flown non-stop for 36 days in 2021

communication networks from the sky. The HAPS can provide telecommunication connectivity all over India, especially areas with patchy terrestrial networks due issues with terrain and costs involved. The world is seeing the transition of internet to LEO satellite based constellations from OneWeb, Startlink, etc.; here HAPS will be able to do the same job at a far lesser capital investment, whilst offering faster connectivity and data rates due lower latency involved for these networks. Softbank's 'HAPS Mobile' is carrying out 5G internet delivery trials from the skies over Japan in one such initiative.

The Airbus Zephyr is the global leader in the HAPS vertical, with AeroVironment Sunglider and the British Aerospace Phase 35 also being test flown. While all these are private initiatives, with the Zephyr being procured for experimental use by the British MOD; the HAL's HAPS will be the first such initiative which is backed by a government in the world. This will convert into an assured order for the HAL-NewSpace partnership in the days ahead. What is crucial to note is that the development of an Indian region specific HAPS is in sync with similar efforts happening across the world, a sign that the Indian end user realises the need to adopt advanced platforms for its future concept of operations (CONOPS) in a timely manner.

The CATS-Infinity HAPS is a vital component in HAL's CATS program

The inclusion of the CATS-INFINITY by HAL as part of its next generation Combat Air Teaming System (CATS), will be a gamechanger for C4ISR functions when operating along with Ai powered unmanned wingman and swarm UAV assets in depth, in a highly contested airspace. This will be an essential tenet for command of air in the coming decades. What however shines through the HAL-NewSpace collaboration on the HAPS is that the Indian government's Atmanirbhar & Make in India efforts to develop advanced aerospace and defence technologies at a global level, are finally getting the right winds beneath their wings.

INDIA NEEDS TO IMPROVE SHIPBUILDING CAPACITY FOR NATIONAL SECURITY

Contrary to the need to augment its force levels to meet the emerging threats, the Indian Navy is forced to revise its force-level projection downwards. The lack of adequate shipbuilding capacity is a major reason for this. Building the capacity to secure India's maritime interests is a national security imperative. India, as the leading Indian Ocean power, cannot remain a bystander

By **COMMODORE ANIL JAI SINGH**

The Indian Navy is faced with a strange dilemma. While it needs to augment its force levels to meet the emerging threats to India's maritime security over the next decade, it is actually being forced to revise its force-level projection downwards. There are many reasons behind this. The lack of adequate shipbuilding capacity in the country is a major reason, besides the usual budgetary constraints, but it is rarely highlighted.

Warship construction has been one of the notable success stories in the country's efforts to enhance indigenisation in defence manufacturing. The Navy's emphasis on indigenous design and construction of its warships predates the current government's buzzwords of 'Make in India' and 'Aatmnirbharta' (self-reliance) by many decades. In the last two decades or so, all warships and submarines have been built in Indian shipyards, except for a few exceptions. Presently too, other than two warships likely to be procured from abroad, all the remaining 39 vessels or so are being built in Indian shipyards. An additional 40 odd platforms, for which the Acceptance of Necessity (AoN) has already been accorded, will also be built in the country.

HALF STORY

Impressive as these figures may seem, they do not tell the whole story. The Indian Navy has projected a force level of 170 ships and submarines by 2027, a figure that was quoted by the previous Chief of the Naval Staff during his annual Press Conference on the eve of Navy Day in December 2020 and reiterated by the present Vice Chief of the Naval Staff at an interaction with the media in November 2021. This is considerably less than the 200 ship navy that was being spoken about as recently as 2018 and will lead to a widening capacity deficit in certain important


Integrated Shipbuilding Facility GRSE

capabilities in the Indian Navy's current and future force levels.

Warship construction in India is mainly undertaken by five public sector shipyards. Four of these (Mazagon Docks Ltd Mumbai, Goa Shipyard Ltd, Hindustan Shipyard Ltd Visakhapatnam and Garden Reach Shipbuilders and Engineers Kolkatta) are under the Ministry of Defence (hence referred to as DPSUs) and the fifth, Cochin Shipyard Ltd is under the Ministry of Shipping. MDL is presently building the four Project 15B destroyers, four Project 17A stealth frigates and six Project 75 submarines and is in the fry as one of the two potential Strategic Partners for the six Project 75(I) submarines. GSL, which mainly builds Offshore Patrol Vessels (OPV) and survey vessels, was earmarked for the two-decade-old MCMV programme, which remains a non-starter to this day and has also been designated to build two Type 1135.6 stealth frigates. HSL Vizag, which was taken over by the MoD a few years ago, has been nominated to build five Fleet Support Ships in collaboration with a Turkish design house and is building the navy's Diving Support Vessels. The fourth, GRSE Kolkata, which has built the Fleet Underway Replenishment Ship INS Aditya, three Brahmaputra class frigates and four Kamorta class ASW Corvettes besides numerous other small craft including fast patrol boats and LACs, is contracted to build three of the seven P17A stealth frigates and eight ASW Shallow Water Craft. CSL, which is building India's first indigenous aircraft carrier Vikrant, has also got an order to build eight ASW Shallow Water Craft, similar to the ones being built at GRSE.

The message that emanates from this is that the Navy's requirement is being primarily met by these five public sector shipyards who have their hands full with existing orders but are continuing to get more orders as the approved projects get underway. However, this rosy picture tells only half the story.

CURRENT CAPACITY

These five shipyards presently have a confirmed order book in excess of Rs 150,000 crore and an annual turnover of less than Rs 10000 crore. Hence, with their current capacity and pace of shipbuilding, it could take well over a decade for them to deliver on their current orders while the Navy continues to wait.

Delays in either placing orders or delivering ships due to limited shipbuilding capacity are detrimental to the nation's maritime security. It is evident that the Indian Ocean is going to witness future great power rivalry as China challenges the USA for domination of the Indo-Pacific. The PLA Navy is rapidly expanding its presence and maritime footprint westwards and will have a formidable presence in the Indian Ocean by the end of this decade. With the help of its proxies in the region, it will attempt to contain India in the maritime domain.

LACK OF URGENCY

India, as the leading Indian Ocean power, cannot remain a bystander. Will require a full spectrum blue water capability to counter this threat and retain both, the combat edge and its primacy in the Indian Ocean. It is therefore imperative that it bridges the capacity and capability deficits that are becoming increasingly evident. To do so, it will require a

THE INDIAN NAVY HAS PROJECTED A FORCE LEVEL OF 170 SHIPS AND SUBMARINES BY 2027. THIS IS CONSIDERABLY LESS THAN THE 200 SHIP NAVY THAT WAS BEING SPOKEN ABOUT AS RECENTLY AS 2018


INS Vikrant

OPINION


L&T Shipbuilding: Floating Dock Navy -2 Launch

higher percentage of major surface combatants than at present, which will require additional shipbuilding capacity. However, given the present pace of shipbuilding in the country and the seeming lack of urgency to address the deficits, this seems unlikely in the near term.

Recognising the need for additional capacity and the MoD's willingness to allow warship construction in the private sector, four private sector shipyards took a leap of faith into warship construction. These were Bharti Shipyard, ABG Shipyard, Pipavav Shipyard and Larsen and Toubro's shipyard at Katupalli near Chennai. Of these, only the L&T shipyard remains active and has delivered a range of vessels but is still awaiting a large order and is in the fray for the Project 75(I) submarines. The rest have been declared insolvent and are deep in debt. While they are largely to blame themselves for the mess they find themselves in, the MoD too cannot be absolved for not providing an enabling environment or the encouragement for these shipyards to develop the skills, expertise and experience as part of an effort to augment the national shipbuilding capacity. It often seemed that the department of defence production in the MoD was more concerned about protecting its own shipyards from private-sector competition rather than creating a level playing field for them to also improve their own efficiency. In the initial stages, it took a great deal of convincing by the Navy and the HQ IDS to include the private sector in warship building in the Defence Procurement Procedure itself. As a consequence, and to pay lip service to the private sector, a few contracts were concluded with the private sector shipyards but at such competitive prices that these were economically unviable from the very beginning. However, being desperate for orders, these yards grabbed whatever was on offer and it was not surprising that they crumbled under their own debt burden and were unable to deliver.

It is indeed ironic that while these yards were expected to deliver results at extremely competitive prices despite being new at the business and were penalized for not being able to do so, the public sector shipyards despite MoD's support and being in this business for decades have rarely if at all, delivered any major programme either on time or within cost.

The consequence is that the country has been unable to augment its warship building capacity, the Navy has lost out on getting the ships that were being built at these yards and shipbuilding skills developed at considerable cost at these yards have gone to waste.

Delays in warship construction are not unique to India. Most major programmes all over the world experience delays for a


Project P-75I submarine

THE NAVY'S REQUIREMENT IS BEING PRIMARILY MET BY FIVE PUBLIC SECTOR SHIPYARDS THAT HAVE THEIR HANDS FULL WITH EXISTING ORDERS BUT ARE CONTINUING TO GET MORE ORDERS AS THE APPROVED PROJECTS GET UNDERWAY

OPINION

Nilgiri Class: First Ship of P17A Frigates

THE INDIAN OCEAN IS GOING TO WITNESS FUTURE GREAT POWER RIVALRY AS CHINA CHALLENGES THE USA FOR DOMINATION OF THE INDO-PACIFIC

multitude of reasons associated with the complexities of warship and submarine construction. At a time when India should have been strengthening its warship building industry towards promoting self-reliance, indigenization and the capacity to build and export to friendly foreign countries in our maritime sphere of influence, we have ended up with the inadequate capacity to even build enough platforms for our own Navy's future requirements. This has left room for our principal adversary to increase its military leverage in our immediate neighbourhood by exporting ships and submarines to Thailand, Sri Lanka, Myanmar, Bangladesh and Pakistan.

COMPLEX PROCESS

Warship construction is a complex process and cannot be done in fits and starts. It takes time to build the infrastructure and skilled human resources and the need thereafter should be to consolidate this by ensuring a series production of specialized platforms. India built two submarines in the early 90s with technical assistance from HDW Germany. This should have been the springboard to becoming a submarine-building nation. However, for reasons that are well known, this line was discontinued after building just two submarines and over a period of time, the skills were lost. The country again started from scratch with Project 75, which is also nearing completion but the next programme is still some distance away.

The 30 Year Plan for indigenous submarine construction was developed and approved way back in 1999 with the aim of ensuring a sustained submarine-building capability in the country. That plan has been followed more in the breach and instead of the envisaged 20 odd submarines by 2030, the Indian Navy would have got only six.

AIRCRAFT CARRIER

A similar fate is likely to befall the aircraft carrier programme. Vikrant, the country's first indigenously built aircraft carrier, is at an advanced stage of sea trials and is likely to get commissioned by the middle of this year. However, the plans for a new aircraft carrier are stagnating with little or no inclination on the part of the government to accord approval. It will be a shame if this complex skill of building aircraft carriers is also allowed to go to waste.

One of the hallmarks of a powerful navy is its ability to project power in its primary area of responsibility and protect the country's interest anywhere across the globe. As India grows to a $5 trillion economy by 2025-26 and a $10 trillion economy by 2032, its trade and energy requirements, most of which transit over the sea will increase exponentially in volume and value. Protecting its Sea Lines of Communication (SLOC) as well as its economic interests in the maritime domain as humankind turns increasingly to the sea for its future sustenance will require the Indian Navy to be structured accordingly. Critical capability gaps across the surface, subsurface and in the air will need to be addressed with the urgency they deserve.

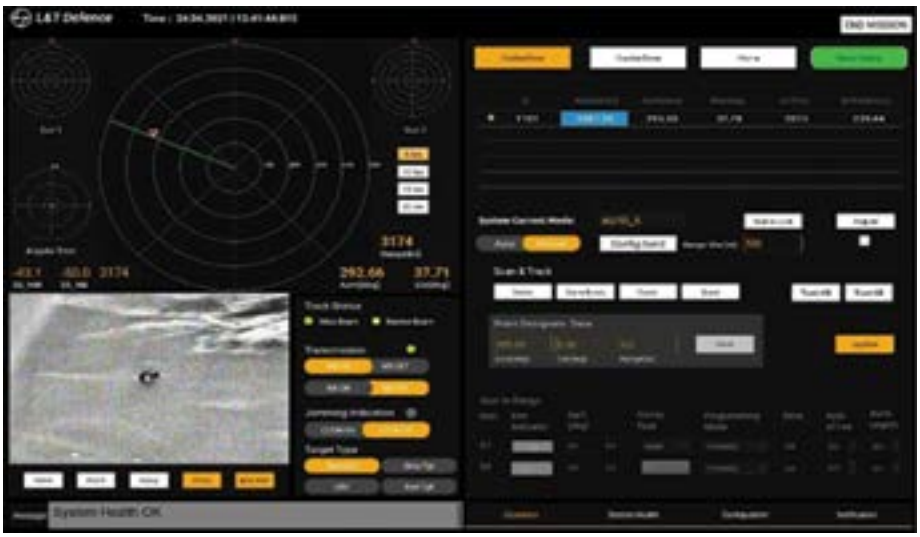
Navies do not get built in a day. Maritime warfare is as much about platforms as it is about their optimal exploitation. This includes a thorough understanding of the platform, gaining operational experience, validating operational concepts, working up of the crews onboard and creating a robust support and maintenance infrastructure. Delays in inducting platforms compromises all these and has a cascading effect on a navy's operational capability.

India is poised on a transformational cusp in the maritime domain. The prime minister has repeatedly highlighted the centrality of the maritime sector in India's future growth trajectory. Building the capacity to secure India's maritime interests as it reaches out across the globe is therefore a national security imperative that can neither be ignored nor delayed.

–The writer is the Vice President of the Indian Maritime Foundation and a naval veteran. He has been closely associated with the defence procurement process in various capacities. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

DUAL BAND FIRE CONTROL RADAR (LT ADR-DB) BY LARSEN & TOUBRO

Larsen & Toubro is a multi-billion-dollar Indian multinational engaged in technology, engineering, construction, manufacturing and financial services. It is India's leading private sector company for the development and supply of Defence Equipment and Systems - with over 30 years of experience in the field.



Fire Control Radar tracking aerial targets

Fire Control Radar at DefExpo 2020

L&T has developed multiple Fire Control Systems as well as Radar Systems specifically targeting Air Defence Applications, besides L&T's track records of development & supply of Precision Monopulse Tracking Radars for tracking satellite launch vehicle and Dual Band ship borne tracking & telemetry system for strategic application.

With its Dual Band Fire Control Radar, L&T has successfully developed an indigenous solution for short range air defence which works in a highly hostile Electronic Counter Measure (ECM) environment. It is the only dual-band Fire Control Radar of its kind developed in India and has significant advantages over the available solutions.

L&T's high precision Fire Control Radar would provide timely warnings and fire control solutions against drone attacks that have been seen by the world in recent times. L&T's FCR has the capability to accurately track small drones, UAVs, fighter planes, helicopters, para mortars, paragliders and missiles and helps generate a precision fire control solution to enable the Air Defence Guns and Missiles to engage targets with the highest hit probability thus safeguarding National and critical Assets.

L&T's Dual Band FCR offers advantage of fast acquisition of targets with a broader beam and precise tracking with a narrower beam. Extremely narrow tracking beam helps FCR to track targets at very low altitude.

FCR can track targets moving at a speed of up to 1000 meters per second during day and night conditions. The FCR can be offered in multiple configurations with ranges from 20 Kms to 70 Kms for an airborne target. Product variants with longer ranges can also be offered.

The FCR can be offered in both land and naval variants which are suitable for installation on multiple platforms including 4x4 vehicles and ships.

There is a significant requirement for such dual band FCRs as the Make-II program for Air Defence Fire Control Radar is on. There is a long standing need to upgrade the legacy air defence systems of Indian Army. A Naval variant of the FCR would serve the needs of Indian Navy to upgrade multiple platforms. On the Export front, South-East Asian and Gulf Nations have requirements for both land and naval application.

In a complete conformance to Make-in-India and Design-in-India, all critical technologies in the FCR are owned by L&T and realized indigenously. Uninterrupted and efficient product support is therefore assured for the lifetime of the equipment. On par with range of L&Ts indigenously developed products, systems and solutions, L&T offers better obsolescence management and future upgrades since the IP is held by L&T.

IN CONVERSATION

SUPPORTIVE OF INDIGENOUS MANUFACTURING, CARACAL IS COMMITTED TO ENHANCING INDIA'S DEFENCE PREPAREDNESS THROUGH THE 'MAKE IN INDIA' INITIATIVES: CEO

*CARACAL's operational and business growth story has been spectacular under the leadership of its Chief Executive Officer Hamad Alameri. He brings in two decades of experience and expertise in the defence industry. He has served as a Special Forces Officer in the UAE Presidential Guard. He holds a Master of Science in Project Management from George Washington University, US, and a Diploma in Commissioning Military and Academic Training from the Royal Military Academy Sandhurst, UK. In an interview with Editor - **Raksha Anirveda**, **Hamad Alameri** explains in detail about the company's present business activities, its plan for Indian market foray among others.*

Hamad Alameri, Chief Executive Officer, Caracal

What are your prime offerings for the India market? In what ways are you trying to make your product range different from others?

HA CARACAL is a leading small arms manufacturer that designs, tests, validates, constructs and assembles high-performance products. With over 15 years of experience, we have established ourselves as pioneers in building high-precision weapons. Our field-tested firearms combine accuracy and reliability for law enforcement, security, and military forces. We have a portfolio of 17 products of various calibres, covering the full-range of small arms from latest-technology combat pistols to submachine guns, tactical and sniper rifles (from 9mm to 12.7mm calibre). It is our impression that possessing this comprehensive range of performance weapons is a key differentiator as many of our competitors specialise in more narrowly defined segments of the small arms sector and do not offer a range as complete as ours.

Another key differentiator for CARACAL as a company is the fact that we are part of EDGE Group, an advanced technology innovator for defence and beyond and one of the top 25 defence contractors globally. It comprises over 22 operating companies that span the entire range of military hardware, software, and solutions, making CARACAL a part of a formidable global defence entity.

Do you have any plans for joint manufacturing in India? In which products?

HA We do. Localising defence manufacturing is a big step towards self-reliance. Speed-to-market and access to technology expertise are fundamental, and joint ventures and partnerships with international companies will help catalyse these efforts.

We will announce details regarding a local partner in India at the appropriate time. CARACAL has always been supportive of indigenous manufacturing and is committed to enhancing India's defence preparedness through the 'Make in India' initiatives and we are ready to manufacture any of our products in the country. As I am sure you are already aware, CARACAL was selected to supply close-quarter carbines to the Indian Army in 2018, following a rigorous selection process. We went on to fulfil all necessary requirements and procedures set out in the Defence Procurement Procedure (DPP), with our CAR

816 having undergone extensive trials across different terrains both inside and outside of India. This weapon would obviously be the first candidate to be manufactured in India should we receive the official mandate to do so, with others to follow as the circumstances dictated. We are deeply committed to the small arms industry and the defence sector in general in India.

What is the potential of collaboration in India and how far would you go?

HA As I mentioned earlier, we are extremely open to collaboration in instances where it is beneficial to all parties involved, and such joint ventures and partnerships with international companies can help catalyse localisation and indigenisation efforts. As part of EDGE Group, which has as its corporate values as being bold, agile, and disruptive, CARACAL is open to business models that create value and suit the circumstances. We embrace collaborations and partnerships with entities large and small.

Is there any misgiving over the 93,000 close quarter battle rifles issue despite being the L1 bidder? Are you discouraged?

HA Not at all. We surpassed global competitors in terms of performance and technicalities to win the bid in 2018. CARACAL was selected to supply the Indian Army with CAR 816 on a fast track mode, after having undergone a rigorous selection process. We have maintained our commitment to the 'Make in India' initiative and we remain on standby to supply the product to the Indian Armed Forces. India is a strategically important defence market globally, and we have a long-term vision, commitment and intention to be successful in it.

On your company aims, is the plan to be confined largely to the small arms market?

CSR 308 Snipper Rifle, CARACAL

HA CARACAL specialises in the manufacture of small arms and our wide portfolio of products gives us major competitive advantages, so our intention is to remain focused on this area of operation. We also are part of EDGE Group, and through our parent company we are able to bring to bear enormous capabilities, products, and solutions to help support the further advancement of the defence sector in India.

What is the implication of the India-UAE FTA on trade of military equipment and services in general? How do you see it in your company's perspective?

HA The UAE and India already enjoy extremely strong bilateral trade relations, with UAE being India's second largest export destination with exports valued at approximately USD 29 billion in 2019-20. We believe this strengthening of the relationship between the two countries through the signing of the comprehensive economic partnership agreement, will further boost trade and investment between both countries.

From CARACAL's perspective, we believe this agreement helps confirm the company's position as a strong ally to India's defence sector, and we possess the proven ability and have shown the willingness to contribute to the development of India's sovereign capabilities. We therefore look forward to greater engagement and interaction with defence stakeholders in India with us supplying our highly rated products to the market.

CAR 816 Assault Rifles, CARACAL

What to your mind are the greatest challenges of the Indian market?

HA India is one of the top-3 defence industries globally from an annual defence budget perspective. It is a vibrant and complex market and we believe we possess numerous key advantages to successfully participating in it. Bilateral diplomatic and economic relations between the UAE and India are extremely close, with the two countries having just signed a further trade agreement.

The two countries are also near each other geographically, helping with logistical and transportation considerations. The UAE itself remains a politically neutral country internationally, and taken together, we believe these factors can be utilised to enhance and strengthen the two countries' existing ties to include the defence sector.

ReDrone Family of Anti-Drone systems

ISRAEL DEVELOPING ANTI-DRONE SYSTEMS TO COUNTER IRAN DRONE THREAT

Israel has begun the development of new anti-drone systems because Iran is planning to increase drone strikes in the region. Iran's Revolution Guard Corps has been increasing the delivery of drones to its proxies. Iranian armed drones pose a real danger to the American forces in the Middle East and the Gulf

By **ARIE EGOZI**

What was considered a marginal threat until recently has become a major one. It brought Israel into the development of the new generation of anti-drone systems. Israel cautioned the US in recent weeks that Iranian proxies in the Middle East and the Gulf are about to increase 'dramatically' the number of attacks on American targets using new designs of Iranian-made armed drones.

The proxies, mainly the Houthi rebels in Yemen and cells of Hezbollah in Syria, have recently received new Iranian-made attack drones. This happened in spite of the continued aggressive Israeli campaign aimed at destroying the shipments of Iranian-made advanced weapons including armed drones.

An Israeli source told Iran International that Iran plans to make drone strikes the focus of its offensive activities across the region soon. The source, who did not want to be named, said that Iran's Revolution Guard Corps (IRGC) has been increasing the delivery of drones to its proxies in the region and beyond in recent months.

DRONE MODELS

According to the Israeli defence sources, almost all of IRGC's different types of drones were reverse-engineered and assembled from downed US-made drones in Afghanistan, Iran and Iraq as well

as from Israeli-made models. For example, Iran's Shahed 129 drone is modelled after an Israeli Hermes drone that Iran shot down near the Natanz nuclear enrichment facility. Iran also has Shahed drones, including the 191 and 171, which are copies of the US RQ-170, a flying wing design, or the Shahed 125, which is a copy of the US Shadow. Iran has armed the 123, 129, and 191 with missiles.

REAL DANGER

The drones are trafficked by Unit 190 of the IRGC's Qods (Quds) force under the direct supervision of Amirali Hajizadeh, the commander of the air unit.

An Israeli expert on drones Tal Inbar told Raksha Anirveda that the Iranian armed drones pose a real danger to the American forces in the Middle East and the Gulf. "These armed drones are very accurate and carry relatively heavy warheads," Inbar said. The Iranians have developed ways to launch salvos of armed drones that pose challenges to air defence systems, Inbar added. So, the threat is real and growing, and it has pushed a host of Israeli companies into the development of defence systems that can detect, neutralise or destroy the incoming UAVs and drones.

UAVs and especially drones, present unique challenges that set them apart from traditional airborne threats, such as missiles or warplanes.

DRONE GUARD

IAI electronics group ELTA has developed the Drone Guard that addresses this threat. It detects and blocks the communication capability without compromising the communication capabilities of nearby civilian infrastructures. In this way, the operation of the hostile UAV or drone is disrupted and neutralised. The Drone Guard is based on a combination of 3D radars that trace the air targets, electro-optical and COMINT means, and a dedicated UAV flight disruption system. The Drone Guard is used successfully against a range of UAV and drones and in other scenarios including forays or multiple targets.

The Drone Guard system features an integrated multi-layered sensor system that includes: 3D X-band radar that detects and tracks all types of drones; a dedicated COMINT system that classifies the drone by its transmission (using the information to verify the target and reduce false detection rates); an EO/IR camera used to classify the detected object; and a jammer that neutralises and intercepts the object.

ELTA says that all the sensors are managed by a unified command and control unit. The key advantage of the layered configuration is that it provides added protection should one layer fail.

According to ELTA, the system is capable of 'closing the cycle' quickly to neutralise a threat. This by using a variety of sensors that supply accurate detection, identification and precise location for the different active systems that are used to neutralise the threat.

DRONE DOME

Rafael Advanced Defence Systems, one of Israel's major defence companies, has joined the effort and developed the Drone Dome - a radar and laser-beam system for detecting and destroying drones. Once the system's radar identifies targets, its laser system destroys them. Drone Dome also features a jamming system for disrupting communications between the drone and its operator. Drone Dome's range reaches several miles, but causes minimal interruptions to other systems in nearby urban areas.

THE IRGC DRONES ARE ASSEMBLED FROM DOWNED US-MADE DRONES AS WELL AS FROM ISRAELI-MADE MODELS. THESE ARMED DRONES ARE VERY ACCURATE AND CARRY RELATIVELY HEAVY WARHEADS

Drone Guard

ISRAEL DIARY

Drone Dome System

REDRONE IS DESIGNED TO DETECT, IDENTIFY, TRACK AND NEUTRALISE DIFFERENT TYPES OF DRONES THAT ARE FLOWN WITHIN A RANGE OF RADIOFREQUENCY COMMUNICATION PROTOCOLS

The drone threat is neutralised by activation of directional GPS/GNSS and radio-frequency inhibitor/jammer devices. A laser weapon is optional.

In a recent demo conducted in Israel, Rafael's Drone Dome system performed interceptions of multiple drones, including manoeuvring targets, using its hard-kill Laser beam. The company says this version achieved 100 per cent success in all tests. The stages of the interceptions included target detection, identification, and interception with a high-power laser beam.

REDRONE SYSTEM

Elbit Systems also developed an anti-drone system, the Redrone. According to the company, this system can detect, identify, locate and neutralise commercial drone threats in real-time, delivering exceptionally effective countermeasures for civilian, HLS, military and paramilitary defence.

The company says that the ReDrone system has been developed using sophisticated, field-proven SIGINT and EW technologies to create a two-level solution that provides options for both short and long-range protection, making it ideal for use in multiple scenarios, including the defence of borders, airports, strategic facilities, public events, convoys and VIPs.

The ReDrone has a 360° coverage and can detect and defeat single or multiple drones simultaneously. As a passive system with reactive jamming, the system transmits only when a drone is detected. Once detected, an automatic alert is sent, and the process begins to neutralise the drone's navigation and communication capabilities.

According to Elbit, ReDrone is designed to detect, identify, track and neutralise different types of drones that are flown within a range of radio frequency communication protocols.

POWERFUL LASERS

The evolution of the anti-UAV/drone systems will be affected directly by the power of laser systems. The currently used laser systems can kill a drone as well as a small UAV from a relatively short range and altitude.

The effort now is to find ways to integrate more powerful lasers into these systems. The detection and verification phases are performed now almost flawlessly by many sensors, in most cases, by integrating their capabilities. The aim now is to achieve the positive kill of drones and relatively big UAVs.

In a video recently released by Elbit, the company presented the concept of the system: installing a powerful laser on the fore section of a UAV. According to Elbit, the company was selected by the ministry of defence to provide a laser-based solution that will protect Israel from missiles and rockets. This is in addition to the operational Iron Dome systems manufactured by Rafael.

Elbit estimates that this technology is expected to be one of its growth engines in the coming years. An Elbit source said that the company has achieved a technological breakthrough that enables it to build an operating system if the defence ministry funds the project..

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

MUSINGS FROM RUSSIA

Experience shows India-Russia defence and economic ties have flourished whenever the west sanctions Russia. Under pressure to critique Russia, India is positioning itself well and fine by taking recourse to its cherished ideal of strategic autonomy

INDIA-RUSSIA DEFENCE COOPERATION FACES BIG CHALLENGES NOW

By **VINAY SHUKLA**

President Vladimir Putin by ordering Russian armed forces to launch special military operations to 'demilitarise' and for 'de-nazification' of Ukraine after almost a three-month-long process to amass at least 140 thousand highly capable troops, has overnight changed the security calculus not only in Europe, but also de facto by ending the unipolar world order.

Ignoring the US-led NATO alliance's warnings of 'crippling', 'out of hell' sanctions, thousands of combat ready troops—many of whom have seen action in Syria—entered Ukraine from three directions. This was after receiving Washington's "No" to Moscow's demand to stop the eastward expansion of the western alliance or to give written guarantees to not admit former Soviet republics of Ukraine and Georgia (homeland of former Soviet dictator Josef Stalin).

This led to imposition of a wide range of sanctions against major Russian banks, a number of Kremlin officials and entities including many defence suppliers. Local experts say some of them were already under various US and EU sanctions for the Russian annexation of Crimea in 2014 and the West's various sanctions. According to British Prime Minister Boris Johnson, the new sanctions are aimed to destroy the Russian economy. But the matter of concern for India is that these sanctions create geopolitical risks for Russia's defence cooperation with India. With the Damocles' sword of US CAATSA sanctions hanging over India over the purchase of the S-400 anti-missile system from Russia, the chances of seeking a waiver from Washington in the current scenario looks very problematic.

New Delhi is already under intense pressure to sever cooperation with Moscow, which is not following rules set by the West—Quod licet Jovi, non licet bovi (what is permissible for Jupiter may not be permissible for a bull). So far Prime Minister Narendra Modi's government is pursuing a very fine balance on the Russia-NATO standoff over Ukraine. Frankly speaking, India has friendly relations with all the parties involved in the geostrategic chutzpah and is hence retaining its own strategic autonomy. Many analysts here see this as President Putin's response

to the greater American plan to formalise US-China "G-2" by making Russia a junior partner. Putin got this impression after the Geneva summit with President Biden last year. The Russian President with ambitions of restoring Russia's imperial glory is not inclined to be anybody's junior partner. In a tit-for-tat, he is playing the China card against the US who played it for destroying its military-ideological foe Soviet Union.

Russia sees India as a pole in a multi-polar world order and in this context it is noteworthy that Putin flew to New Delhi just for a six-hour visit for a summit with Prime Minister Modi by travelling more than 12 hours to-and-fro journey from Russia—his first bilateral foreign visit since the pandemic, not counting the Geneva summit with President Biden. Putin's New Delhi summit was preceded by the maiden India-Russia 2+2 meeting of defence and foreign ministers, so that they could report to their principals for taking final decisions on sensitive and sticky security and defence issues.

Agreement on Programme of Military-Technical Cooperation from 2021-2031 was one of the key documents signed during President Putin's blitz visit. This 10-year defence cooperation programme outlines the ongoing defence cooperation and defines future cooperation between the two countries. India—the first and perhaps the only country with which post-Soviet Russia signed the Indo-Russian Long Term Programme for Military-Technical Cooperation (ILTP-MTC) in 1994—synchronises Indian armed forces' development programme with the Russian defence industry's R&D for India-specific weapon systems and platforms.

BrahMos cruise missiles, Sukhoi Su-30, Talwar class frigates, T-90 main battle tanks and Arihant nuclear-powered submarines and Vikrant aircraft carrier are some of the projects in public domain which

were materialised due to ILTP-MTC.

According to a former ambassador to Moscow, the defence cooperation with Russia which is in public domain is the tip of the iceberg and transforming from a buyer-seller relationship to a joint R&D effort.

However, all this is at stake due to western sanctions across the board and it depends on how the leadership views the global implications of continuing ties with Russia. For India, this is a challenging moment similar to the Soviet invasion of Afghanistan. But this is a moment of global geostrategic turmoil fraught with perils and opportunities for emerging as an influential power in the new world order.

The policy of "Atmamirbhar Bharat" was adopted timely and has scared arms exporters, but Russia seems to be keen to go ahead with the transfer of technologies and would be more willing in the new scenario after the Ukraine action.

A former diplomat had told me several years back that Indo-Russian trade and defence cooperation robustly developed whenever Russia was under western sanctions and curbs. It is time now to urgently go back to the Rupee-Rouble system for bilateral trade and defence, albeit in a new avatar. According to earlier reports, the RBI and Bank of Russia have been testing direct transactions through the Russian system of electronic funds transfer. There have been talks about mutual

PUTIN HAS OVERNIGHT CHANGED THE SECURITY CALCULUS NOT ONLY IN EUROPE, BUT ALSO DE FACTO BY ENDING THE UNIPOLAR WORLD ORDER

acceptance of India's Rupay and Russia's rouble denominated Mir cards without going through dollar conversion.

Past experience shows that the rival superpowers ultimately come to some understanding but smaller and middle powers fall victim to the policy of taking sides. India is a great power in its right and should independently chalk its strategic course because in the present scenario, only China seems to be emerging stronger and a weak Russia, which has inherent differences with China, is not in India's interest when there is always a possibility of Washington and Beijing joining hands due to vast economic interests.

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

MARITIME EDGE

INDIAN NAVY IS ON THE CUSP OF TRANSFORMATION

Admiral R. Hari Kumar takes over as the 25th Chief of Naval Staff as the Indian Navy transforms with technology

By **CMDE RANJIT B RAI**

On November 30, Admiral R. Hari Kumar, a Gunnery Missile specialist and an alumina of RCDS 2009, took over as the 25th Chief of Naval Staff from Admiral Karambir Singh. The Navy has 135 ships, which includes the 45,000 ton aircraft carrier INS Vikramaditya (formerly the Gorshkov) with Mig-29K fighters and KA-31 AEW helicopters, 16 conventional (8 Kilos, 4 HDW-1500 and 4 Scorpenes) submarines and two home-built nuclear SSBN submarines with 750-Km K-15 and 2,000-Km K-4 nuclear-tipped missiles, and a fleet of over 200 helicopters and aircraft, which includes 17 Hawks for lead in fighter training and 5 IL-38s with Sea Dragon suites and five squadrons of Dorniers-224 and 8 Antisu/SW P8I Boeing-737 for Maritime Reconnaissance (MR) operating from the INS Rajali in the East, and 4 from INS Hansa at Goa.

The P8I's are armed with MK 84L Harpoons and MK 54 torpedoes and sonobuoys. The Navy operates a small number of Sea Searchers, Herons and two Sea Guardian drones on lease from General Atomics USA.

On November 21 last year, Defence Minister Rajnath Singh commissioned the INS Visakhapatnam, the first of four Type 15B 7,300 ton destroyers with 8 supersonic Advanced extended land and ship attack BRAHMOS (range increased to 500 km), and 32 Barak-8 missiles. Both missiles are manufactured in India with Russian and Israeli collaboration and the ship is fitted with the EL/M 2248 M/F Star all-purpose radar and improved EW and Indian Combat Information Systems with Orbit supplied satellite Links.

On December 25, Admiral Karambir Singh commissioned the INS Vela, the fourth of six Scorpene submarines with the French Subtics system, AM-39 Exocet missiles and SUT B German torpedoes, till a final selection is made. Both

BrahMos Supersonic Cruise Missile, as it is successfully Test Fired from Indian Navy's Stealth Destroyer, INS Chennai

platforms are built by Mazagon Dock & Shipbuilders Ltd (MDSL) at Mumbai. The Navy has been practical and pruned its 2027 plan from 200 ships and submarines to 170. Vice Chief of Navy Vice Admiral Satish Ghormade said, "In pursuance of our national foreign policy initiatives, the Navy's plan to become a 170-ship force (by 2027) is on track but some changes in the timelines for it are being made in view of certain delays."

India celebrated the 50th anniversary of the 1971 Indo-Pak war in end-December as Swarnim Vijay Varsh (Golden Victory Year). The nation recalled the role played by the Armed Forces in the 14-day blitzkrieg war that was waged from December 3, 1971 to give birth to Bangladesh. The war was forced on India as the East Pakistani military repressed thousands of Bengali intelligentsia, academics and Hindus with killings and rapes in East Pakistan from 1971 March in 'Operation Search Light', chronicled by Gary J Bass in The Blood Telegram. Eight million refugees fled across to India's West Bengal, straining India's economy. The role of the Indian Navy in its first war set the pace for its growth with confidence.

FIVE DECADES OF NAVY'S PROGRESS

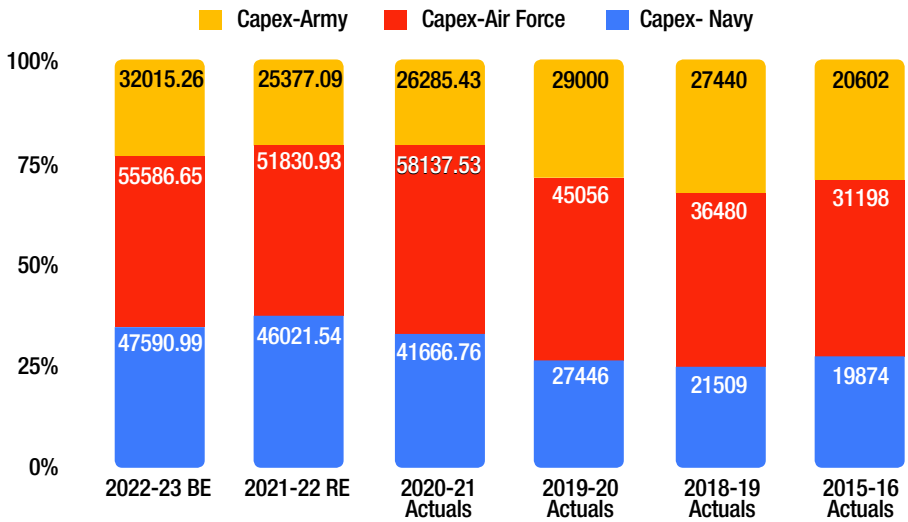
In the last 50 years, India's Navy has grown despite waxing and waning budgets. Creditably, Navy planners, engineers and constructors trained in India and abroad at the Krylov Research Institute in the Soviet Union, created a ship building ecosystem to make the Indian Navy a Builder's Navy with ship, and now nuclear submarine, building capabilities in four large government and two private shipyards. The Navy's Weapons & Electronics System Engineering Establishment (WESEE) has provided state-of-the-art technologies for ships and Command centres ashore, by cooperating with private software and technology savvy firms, on the principle that warfare and technology are almost synonymous, as one drives the other.

As of now, the Navy has 21 large platforms on order. These include three 7,300 tonne Type 15B destroyers like the INS Visakhapatnam and seven 6,200 tonne Type 17A Shivalik frigates, four Krivacks, two being built at the Yantar Shipyard Ltd in Russia and two at Goa Shipyard Ltd (with Russian consultancy), all with BRAHMOS and Barak missiles and Tata-Terma Scanter-6000 radars replacing the Garpun–B. Two Scorpene submarines and four survey ships are in advanced state of construction, and the 40,000 ton Indian designed and built aircraft carrier Vikrant is set to be commissioned on August 15 (India's Independence Day). Besides, 21 smaller ships that include 12 Shallow Water ASW Vessels designed by Sandvik Asia Ltd are under construction at the Garden Reach Shipbuilders and Engineers Ltd (GRSE) at Kolkata and the Cochin Shipyard Ltd (CSL) at Cochin. Five small torpedo recovery ships are being built at the Titaghar Wagon Factory at Kolkata.

Project Varsha, a greenfield strategic deep water protected submarine base is coming up at Ramboli South of Visakhapatnam to berth and support nuclear submarines and a carrier battle group in the long term,

ON NOVEMBER 21 LAST YEAR, DEFENCE MINISTER RAJNATH SINGH COMMISSIONED THE INS VISAKHAPATNAM, THE FIRST OF FOUR TYPE 15B 7,300 TON DESTROYERS WITH 8 SUPERSONIC ADVANCED EXTENDED LAND AND SHIP ATTACK BRAHMOS (RANGE INCREASED TO 500 KM), AND 32 BARAK-8 MISSILES

Capital Outlay Composition



MARITIME EDGE

The stealth guided-missile destroyer INS Visakhapatnam was delivered to Indian Navy. (Credit: Ministry of Defence)

Vikrant in Cochin Channel

INDIA'S MARITIME GEOGRAPHY IS INDIA'S ASSET TO MEET THE CHALLENGE POSED BY THE PAKISTAN-CHINA NEXUS IN THE INDIAN OCEAN REGION (IOR). THE INDIAN NAVY HAS BEEN GIVEN $7 BILLION FOR CAPITAL SPENDING IN 2022-23 AND IS TASKED TO BE THE NET SECURITY PROVIDER IN THE IOR

with underground pens and nuclear training, safety and support facilities set up by the Bhabha Atomic Research Centre (BARC). Ramboli will relieve the congestion at Visakhapatnam where two nuclear submarines INS Arihant (S2) and Arighat (S3) awaiting commissioning are based. Moreover, a larger S4 SSBN with K-4 long-range nuclear missiles was launched in November at the Ship Building Centre (SBC). Construction of the Navy's nuclear boats is being executed in a Private-Public Partnership (PPP) by Larsen & Toubro Ltd and supervised by the Navy's Project Advanced Technology Vessel (ATV) and the Defence Research and Development Organisation (DRDO). Russia provides consultancy for safety.

ON THE CUSP OF TRANSFORMATION

The Indian Navy had always aspired to become a Builder's Navy and towards that goal it received a boost in what Prime Minister Narendra Modi termed as Atmanirbharta (self-reliance). Today, the Navy is on the cusp of a transformation to become a capability-driven service, not quantity driven. It has employed the Navy Schedule of Financial Powers—2021 issued by the Ministry of Defence (MOD), which permits the Vice Chief of Naval Staff through the Navy's Internal Financial Adviser (IFA) to order systems, each up to Rs 500 crores for operational needs and upgrades. On January 12, Simon Pryce, Ultra UK's Chief Executive, announced the award of the Integrated Anti-Submarine Warfare Defence Suite (IADS) programme for the Navy's frontline warships under construction worth approximately £60 million to Mahindra Defence Systems Ltd to supply the systems. Deliveries are due to commence in 2024 and to be completed by 2030, for ships under construction. The IADS includes low frequency towed sonars and provides a powerful multi-sensor ASW capability using an in-line active and passive towed Low Frequency Variable Depth Sonar (VDS) as well as Torpedo Decoys.

On June 3, 2021 the MOD had signed a contract with Mahindra Telephonics Integrated Systems Ltd, Mumbai, that supports P8i Telephonics APS-143C(V)3 radars, for procurement of 11 Airport Surveillance Radars with Monopulse Secondary Surveillance Radar for Indian Navy and Coast Guard. The procurement worth $85 million will be made under the 'Buy & Make' category. The installation of these radars will increase the air domain awareness around airfields and enhance safety and efficiency in flying operations of the Indian Navy and the Coast Guard.

From 2022 the Navy will induct 24 MH60R Sikorsky multi-role helicopters with the Telephonics AN/APS-147 multi-mode (ISAR) radar, AGM-114 Hellfire and 120-km range Konsberg missiles, and light torpedoes, to replace the ageing Sea Kings on ships. In the New Year the Navy tested the Rafale-M (Marine) for use on INS Vikramaditya as well as the indigenous aircraft carrier Vikrant undergoing trials at Navy's shore-based test facility (SBTF) at Goa, which has a 14 degree ramp for take offs, and arrestor wires for Short Take off and Arrested Recovery (STOBAR). The F-18s will be tested later for a final decision.

TASKS AND CHALLENGES

The realisation has come that India's maritime geography is India's asset to meet the challenge posed by the Pakistan-China nexus in the Indian Ocean Region (IOR). The Indian Navy has been given Rs 47,590.99 crore ($7 billion) for capital spending in 2022-23 and is tasked to be the net security provider in the IOR, described by Prime Minister Narendra Modi through the acronym SAGAR (Security and Growth for All in the Region), well aware that China's 360-ship PLA

(Navy) is collaborating with Pakistan with its 61 ships and five submarines for a footprint in the IOR. The Pakistan Navy received its first of four Chinese 054 Frigates, INS Tughril, in December 2021, equipped with supersonic CM-501(YJ-12) anti-ship and LY-80N anti-air missiles and Z-9E helicopters that could be fitted with anti-ship missiles. Four 034 Yuan submarines will be supplied by China and first of four Yuan hulls, has commenced construction at Karachi's Shipbuilding and Engineering Ltd yard. Pakistan's naval plan includes two OPVs from Damien Shipyard in Romania and four Milgem corvettes from Turkey. The PLA (Navy) has established a base in Djibouti with a jetty and has maintained an uninterrupted three-ship anti-piracy patrol off the Gulf of Aden since 2008.

In 2021 PLA (Navy) commissioned 18 large platforms and the list includes, one 094A SSBN, two large Type 75 LPDs, 10 Type 055 and 052 destroyers and seven other platforms, including frigates, and has a third aircraft carrier 03 under construction. In this backdrop, CNS Hari Kumar in his Navy Day briefing said, "We are aware of the developments in the PLA (N). They have built over 138 ships in the last 10 years, which roughly translates into 13-14 combat platforms every year", and added, "It is not all about (warship) numbers. It is also about how you exploit the weapons that you have, your strategies, operational plans, and all the effort that we can bring to bear at a point." He tabled an assurance that the Indian Navy remained a well-balanced Combat Ready Credible Overseas Force".

Redressing the power imbalance with China is India's most important uphill security task in 2022. The Navy supports India's projects like Chabahar in Iran, Agalega in Mauritius, and to develop and maintain Uthuru Thila Falhu (UTF) port and a Dornier base in the Maldives with a $50 million line of credit. The Indian Navy provides hydrographical support to IOR nations, but like Banquo's ghost in Macbeth, the aggressive actions of China the world over, including the Indo-Pacific and South China Seas, hangs like a shadow over the current state of bilateral ties between India and China.

–The writer is an alumina of RNSC and the author of A Nation and Its War At Sea (Lancers ISBN). He curates a Maritime Museum and Library at C 443 Defence Colony, New Delhi. The views expressed are personal and do not necessarily reflect the views of

Raksha Anirveda

BUSINESS INITIATIVE

TAKING AERIAL SURVEILLANCE AND

Schiebel has built an international reputation for producing the revolutionary CAMCOPTER® S-100 unmanned aerial aircraft, which has a proven capability for military and civilian applications. The world's leading rotary UAS manufacturer is now working to develop larger copters weighing 500 kgs to 600 kgs called the CAMCOPTER® S-300

By **SRI KRISHNA**

The globally operating company Schiebel Group focuses on the development, testing and production of the revolutionary CAMCOPTER® S-100 Unmanned Air System (UAS). The company has ended 2021 on a satisfactory note, as its Chairman and owner Hans-Georg Schiebel said, "there were several challenges, however though it is not business as usual it has sort of become the new normal."

Founded in 1951 in Vienna, Schiebel has built an international reputation for producing high-tech military, commercial and humanitarian products. According to Michael Schiller, Schiebel's head of programmes, the company dealt with the Covid-19 pandemic by "putting vigorous safety measures in place ranging from hygienic measures to wearing masks and partitions." Due to these measures, the company does not encounter any delays in any of its production or delivery units.

The company has customers in five continents with a team of 300 dedicated professionals working across the globe in Austria, US, UAE and Australia.

The company follows a customer-centric approach, and offers various services to customers such as (a) customer support (b) technical support, and (c) quality support.

With the customer base of the company growing worldwide, it has plans to provide documentation service or the extended knowledge base free of cost to customers in the near future.

The company's base in Wiener Neustadt was selected for its vicinity to the public airfield. Its building with a widely acclaimed design comprises both functional and spacious production facilities as well as ample office space for the growing number of staff members. Thus, the original concept of a high-tech setting for the series production of the design-awarded CAMCOPTER® S-100 has been perfectly implemented 50 km south of Vienna.

The highly visible landmark at the eastern edge of the Wiener Neustadt airfield epitomises the dual purpose of the building at first glance: varying façade material and structure composition clearly articulate the combination of a production hall and an office building.

The reflecting glass façade optically hides the ground floor as continuation of the surroundings in a mirror image. The protruding office wing behind a black basalt concrete façade seems to hover over the landscape. Expanding façade facilitates CAMCOPTER® air vents and deeply framed windows create clear perspectives.

With more than 2000 sq. metres floor space and its metal façade, the production hall underlines the technical aspect of the building project. Just like in a hangar, the hall can be opened through a wide door towards the airfield to support daily flight operations and

COMBAT TO THE NEXT LEVEL

training. Around the spacious hall, a training area, special workshops and a soundproof test room for the engine development are located. An elongated ramp leads to the main entrance of the office wing on the first floor provided with spacious offices and staff lounges. The adjacent conference room generously opens to a terrace used for receptions and as viewpoint for the nearby CAMCOPTER® presentations.

Schiebel's CAMCOPTER® S-100 UAS has a proven usefulness for military and civilian applications. The Vertical Takeoff and Landing (VTOL) UAS needs no prepared area or supporting launch or recovery equipment. It operates day and night, under adverse weather conditions, with a range out to 200 km, both on land and at sea. The S-100 navigates automatically via pre-programmed GPS waypoints or can be operated directly with a pilot control unit.

Missions are planned and controlled via a simple point-and-click graphical user interface. High-definition payload imagery is transmitted to the control station in real time. Using "fly-by-wire" technology controlled by redundant flight computers, the UAV can complete its mission automatically in the most complex of electromagnetic environments. Its carbon fibre and titanium fuselage provides capacity for a wide range of payload / endurance combinations.

The S-100 has two different engines of 40 kgs and 44 kgs respectively and as company officials said in a recently-organised webinar offering a tour of the production line, "We develop them regularly and our teams work meticulously on them to test their capability in all conditions ranging from cold to hot temperatures. We also work very closely with our suppliers. The company is also working on further improving the supply chain."

SCHIEBEL'S CAMCOPTER® S-100 UAS HAS PROVEN CAPABILITIES FOR MILITARY AND CIVILIAN APPLICATIONS. THE VERTICAL TAKEOFF AND LANDING (VTOL) UAS NEEDS NO PREPARED AREA OR SUPPORTING LAUNCH OR RECOVERY EQUIPMENT

The company has also been working on providing UAVs for maritime reconnaissance considering that the Offshore Patrol Vessels (OPVs) are the fastest growing segment of the naval vessels with the total number of such vessels being used in 87 countries totalling 839.

Another area of focus of these S-100s is underwater surveillance in the maritime sector with the increasing number of submarines. The use of these unmanned aerial aircraft would enable nations to keep track of submarine movement as the S-100 has the capability to monitor underwater vessels.

The company is now working to develop larger copters weighing 500 kgs to 600 kgs called S-300. "We want to get the S-300 completely right before we enter the market," officials said.

The company also provides a state-of-the-art Remotely Piloted Aircraft Systems (RPAS) that are fully certifiable in order to maintain technological advantage. It is partnering with the best technological providers and partners as and when needed for global, industrial and humanitarian use.

According to available figures, the VTOL UAS market continues to grow with reports suggesting it to have risen from US$408 million in 2019 to US$2.6 billion by 2030 at a CAGR of 19.7 per cent.

The company has been in business for almost 70 years. It has a very versatile range of products with multirole capability ranging from stationary deployment, mobile deployment, maritime operations and interoperatability.

Every year, Schiebel puts in more than 20 per cent of its revenue into R&D to stay on top and get even better. As the company Chairman said, "We are dedicated to the production of the unmanned helicopter CAMCOPTER® S-100. The journey has been tough and challenging with multiple ups and downs, and it has taken many years of hard work to achieve our goals."

ANALYSIS

SPECTRE OF THE COLD WAR PAST

The increasing defence cooperation between Japan and Australia points to a new imperative for New Delhi – shedding its non-alignment mentality

By **PRANAV K SHOME**

Diplomacy is said to be a dynamic phenomenon that changes almost daily depending on internal and external contexts and circumstances. But in some cases the policies of the past that have become a relic at present continue to dictate contemporary actions. And this seems to be exactly the case with India. Recently Japan and Australia, members of the Quadrilateral Security grouping-cum-dialogue, have signed a 'historic' pact between the respective armed forces of both the countries with an eye on China, which has become increasingly assertive regarding its strategic and territorial claims not only in the Indo-Pacific region but also in its backyard – the South China Sea region.

This defence cooperation has prompted an angry response from Beijing, which dismissed this pact as an egregious attempt to disturb regional peace and security. However, one important question that looms large is for the third member of the grouping – India. Is New Delhi ready to continue with its old stand of not entangling military alliances that can upend the already fraught ties with the dragon and can undermine its long stated non-aligned diplomacy?

CHANGING STANCE

Times have changed, but the adversaries remain the same and are more powerful. For New Delhi, currently China, Pakistan and Turkey are the principal threats on its diplomatic and military radar. In such a context, it is high time that India takes a game changing decision – shedding its reticence on entangling in alliances that are militaristic in nature and that can promote an arms race of sorts. Japan, which has a pacifist constitution that renounces war as a means of conducting statecraft has been forced because of the burgeoning Chinese threat to increase its defence budget to its highest ever. Australia with which China has robust trade ties has not shied away from forging the AUKUS pact again due to the same belligerent threat from the dragon.

So what is stopping India, which has been locked in a bitter armed standoff with China at its northern border, from changing its military-diplomatic policy? It should have been changed when China brought in its new land border law and changed the names of several villages in Arunachal Pradesh, which China claims as a part of South Tibet. Hence the time is ripe. India should strike the rod when it's hot. Therefore shedding the non-alignment baggage by declaring explicitly that India seeks to militarise the Quad is the

first logical step that the mandarins of Indian diplomacy and foreign policy should do.

CASTING THE NET FURTHER

However, merely changing its stand on militarising an alliance won't help. India should demonstrate some hard actions to signal the decisive shift in its diplomatic-military alliance. The first thing that India can actively consider is joining the AUKUS pact by developing new nuclear submarines using American and British technology and logistics. This may be tricky because the French are still miffed at the other partners of the Quad grouping because of keeping the latter in the dark while they signed the agreement, but for the broader objective of 'containing' China, to use George Kennan's words, New Delhi should play the role of a mediator among the allies.

This will help in improving New Delhi's standing as a reliable partner and trustworthy ally. Further, India should actively consider bringing in Israel under the security ambit of this grouping. Israel is a battle hardened country with a state of the art armed force that can easily instill fear in the minds of enemies, so adding Israel can be a very good idea to bolster the security strength of the Quad. One step that can really alienate the Chinese is if the Quad countries engage like Lithuania did by recognising Taiwan and improving their ties. The Quad should actively consider roping in Taiwan as their new partner and cultivating ties with it.

Secondly, New Delhi should push for expanding the ambit of the Quad grouping so that it becomes the 'next big thing'. By expansion it means not only giving it a strong military look but also to increase its economic heft.

India should actively consider persuading its allies to ensure the merger of the Build Back a Better World (B3W) – the US sponsored G7 infrastructure initiative to counter China with the Global Gateway – with the European Infrastructure Initiative to take on China's Belt and Road Initiative (BRI). Further, the Quad countries' joint vaccine development initiatives should be expanded to include the European Union, and other countries for the production, procurement and dissemination of well known Quad vaccines because Chinese vaccines haven't really acquired a good reputation for themselves.

Thirdly, developing a new 'clash of civilisations' thesis to buttress the point that the Chinese have always been an expansionist civilisation and the West and Japan have genuinely learnt the lessons of their horrific colonial past and are ready to confront the bellicose new Chinese civilisation represented by Emperor Xi Jingping by means of brotherhood and friendship. While this approach may carry the risk of antagonising China with which the Quad countries have deep trade and economic ties, yet for the sake of a rules based fair multilateral liberal world order, it is imperative.

Lastly, the Quad countries should focus on not only strengthening their internal security but also promote social and ethnic harmony through constitutionalism and civic nationalism. The US, India, Australia, Israel etc. have seen a spurt in hate crimes lately against various sections of their society that can undermine cross-civilisational cooperation and coordination. The respective governments of the Quad and Quad+ should emphasise on promoting the spirit of harmony, amity and universal brotherhood for the purpose of maintaining internal societal cohesion and promoting patriotism, not nationalism because nationalism is 'a Frankenstein that eats into the moral vitals of humankind'.

CONCLUSION

While China has suffered a lot at the hands of imperialist powers in the past it should not be used as a template by Beijing for demonstrating its aggressive behaviour against other countries. Therefore if India wants to realise its dream of establishing a rules-based liberal world order then it should consider taking hard timely steps to contain China because any more delay will result in India losing the great game competition.

IF INDIA WANTS TO REALISE ITS DREAM OF ESTABLISHING A RULES-BASED LIBERAL WORLD ORDER THEN IT SHOULD CONSIDER TAKING HARD TIMELY STEPS TO CONTAIN CHINA BECAUSE ANY MORE DELAY WILL RESULT IN INDIA LOSING THE GREAT GAME COMPETITION

INSIGHT

BULLET POINTS FOR MILITARY TRANSFORMATION

With the ongoing geopolitical situation – an unstable Pakistan and Afghanistan, and China flexing its muscles – the transformation should have come yesterday

By **RONNIE SINGH**

The Indian soldier has proved himself time and again from historical times to World Wars I & II and the post-Independence wars fought both on the northern and the western fronts, and most victories have been on the shoulders of gallant and brave young soldiers and leadership of Junior Officers. Future conflicts are going to be much more demanding in terms of strategic leadership, the soldier and the technology with which you go to the battle. A simple analysis indicates that we are badly in need of a transformation to meet the threats of the future from a position of strength. Major issues that need to be understood and addressed are Bulleted further.

GIVEN THE CHANGING WAY CONFLICTS ARE GOING TO BE CONDUCTED BASED ON HIGH-TECH RESOURCES AND A MUCH BETTER LOGISTICS SUPPORT AVAILABLE WITHIN THE COUNTRY REORGANISATION IS NEEDED TO OPTIMISE THE AVAILABLE MANPOWER RIGHT FROM THE INFANTRY BATTALIONS TO THE LOGISTICS UNITS

- HR - Training, Organisation
- Higher Military Leadership
- Technology and Weapons
- Military Civil Relations
- HR - Specialisation, Organisation

The man behind the gun remains the most important element; we need to start with officers first – specialisation is a non-negotiable requirement; the Army needs to set up specialised verticals to address the technology space as well as logistic and administrative experts to deliver bang for the buck.

Given the changing way conflicts are going to be conducted based on high tech resources and a much better logistics support available within the country, reorganisation is needed to optimise the available manpower right from the Infantry Battalions to the logistic units; higher defence organisations for synergising the combat power of the three services need to be made effective operationally – this was achieved in the US by an act of the Congress and if required an act of the Parliament must be enacted to implement the reorganisation of higher defence institutions so as NOT to meet the aspirations of the Services, but to be operationally effective.

HIGHER MILITARY LEADERSHIP

Understanding and having the ability to manoeuvre in the BIG PICTURE space is a critical capability needed to be developed at the National level. Measures to develop a strong, ethical, and professional higher military leadership need to be put in place through training, HR policies, and organisational culture.

TECHNOLOGY AND WEAPONS

The most innovative and effective use of technology has been seen in the last 20-30 years of conflict over the world both by state and non-state players – to produce shock and awe and achieve military objectives most efficiently.

In our context the use of technology in conflicts and absorption of technology in operational processes, weaponry, and decision making has been achieved to the levels of having a façade – No Further. This major void needs to be addressed by

the way of procurement and training at all levels.

Procurement of weapons is best conveyed through the media as DAC decisions – FULL STOP. Basic weapons such as the personal weapons of a soldier are no match for what is easily even available to an insurgent in the NE. A Mind-shift towards defence expenditure is necessary; combined with a drive towards indigenous manufacturing capability – the contribution of defence expenditure to the economy must be understood – it would create jobs, rev up the economy, etc. The military-industrial complex in the US would be a good model to understand the methodology of development, yet an INDIAN Methodology would need to be evolved as currently none of the policies/initiatives has fructified anything worthwhile on the ground.

MILITARY-CIVIL RELATIONS

Civilian supremacy has been a given in our context but functional issues such as parity of ranks, pay & allowances, functional working with the bureaucracy etc have been strong irritants affecting the growth of the military power of the country. Also importantly, while the major decisions (or the lack of it) come from the bureaucracy there is no responsibility attached – necessitating a relook at the way the defence of the country is administered.

IMPORTANTLY, WHILE THE MAJOR DECISIONS (OR THE LACK OF IT) COME FROM THE BUREAUCRACY, THERE IS NO RESPONSIBILITY ATTACHED – NECESSITATING A RELOOK AT THE WAY THE DEFENCE OF THE COUNTRY IS ADMINISTERED

With the ongoing geopolitical situation – an unstable Pakistan and Afghanistan, and China flexing its muscles – the transformation should have come yesterday.

While the article has just BULLETED the issues, it would require a team with a very professional approach led by a capable leadership to manifest the contours of the transformation.

– The author is an analyst with interest in matters related to military and military space domain

GUEST COLUMN

AMIT COWSHISH

INDIA'S DEFENCE EXPORTS REQUIRE A MORE NUANCED STRATEGY

India will have to embark on a long term strategy focussed on export of indigenous and major defence equipment if it is to achieve its aim of realising its export target of Rs 35,000 crore by 2025

On what may possibly be among the first major defence export contract in recent times, BrahMos Aerospace Private Ltd signed an agreement for $374 million on December 31, 2021, for the sale of eponymous supersonic cruise missile to Philippines.

Alongside, there are reports of India being in talks with Sri Lanka for supplying two Dornier military aircraft and making efforts to secure a deal worth about $900 million from Malaysia for the sale of Light Combat Aircraft (LCA) Tejas. These developments are heartening, coming, as they do, in the wake of a remarkable, albeit somewhat erratic, upswing in India's defence exports.

In 2014-15, the value of export authorisations issued by the Department of Defence Production (DDP) stood at Rs 1,940.64 crore but declined to Rs 1,520.91 crores in 2016-17 before climbing up dramatically to Rs 10,745.77 crores in 2018-19. According to the latest tally, the figure for 2020-21 stood at Rs 8,434.84 crore. It is not known, though, if the actual value of exports coincides with the value of export authorisations.

Be that as it may, considering this inconsistent growth trajectory, it will take a lot of doing to achieve the export target of Rs 35,000 crore by 2025 as envisioned in the Draft Defence Production and Export Promotion Policy (DPEPP) issued by the DDP in 2020. This policy also lays down a 10-point strategy MoD intends to adopt to promote defence export. While it is too early to assess the efficacy of this strategy, it would be instructive to have a look at the steps taken so far to implement it.

The 23rd report of the Standing Committee on Defence (SCoD), submitted to the parliament last December, lists out nine specific steps by the DDP—some of them before promulgation of DPEPP 2020—to boost exports.

These steps include online issuance of export authorisation to prospective exporters and introduction of Open General Export Licence (OGEL) System for intra company transfer of technology and export of parts and components. The OGEL will enable the Indian companies to export specified items to specified destinations without seeking export authorization from DDP during the two-year validity of the license.

A Standard Operating Procedure (SOP) has also been issued to ensure expeditious authorisation for export of munitions covered by the Special Chemicals, Organisms, Materials, Equipment and Technologies (SCOMET) list.

An export Promotion Cell has also been set up to coordinate export-related activities including enquiries received from various countries, and a scheme has been introduced to fund marketing activities by the Defence Attaches posted in India's foreign missions.

THERE ARE REPORTS OF INDIA BEING IN TALKS WITH SRI LANKA FOR SUPPLYING TWO DORNIER MILITARY AIRCRAFT AND MAKING EFFORTS TO SECURE A DEAL WORTH ABOUT $900 MILLION FROM MALAYSIA FOR THE SALE OF LIGHT COMBAT AIRCRAFT (LCA) TEJAS

Other steps include setting up of a fully automated export portal and electronic sharing of export leads with the industry, webinars with friendly foreign countries and establishment of offices by Defence Public Sector Undertakings (DPSUs) in various countries to promote export of indigenous defence equipment, parts, assemblies, and components, Above all, a High-Level Committee (HLC) comprising the Defence Minister, External Affairs Minister and the National Security Advisor has been constituted to facilitate faster clearance for export of major indigenous defence platforms. These measures are significant, but the formidable challenges India faces in becoming a major exporter of arms requires a much more nuanced approach.

According to the March 2021 report of the Swedish Think Tank, Stockholm International Peace Research Institute (SIPRI), 95.2% of the global arms export market was controlled by 15 countries at the end of 2020. More than half of this trade was in the hands of USA (37%) and Russia (20%), with each of the last three countries in this list—Turkey, Switzerland and Sweden—accounting for 0.7% of

the market share.

With a share of 0.2%, India is 24th in the list. The competition to garner a slice of the shrinking defence budget across the globe is so intense that 13 of the 25 largest exporters witnessed a decline in their share of global arms trade between 2011-15 and 2016-20.

In some cases, countries with established military industrial complex saw a sharp decline in their share. The share of Russia, for example, declined by 22% and that of the United Kingdom by 27% during the aforesaid period. Ukraine's share dropped by a whopping 68% and that of Sweden by 54%. Even China—the newest global manufacturing powerhouse—saw its share drop by 7.8%.

The opportunity offered by the decline in the share of some of these countries with large manufacturing base, however, was not seized by India, whose share went up only by 0.1% during the aforesaid period.

The defence establishment will have to develop the ability to foresee such opportunities and formulate suitable strategies to exploit them if it is to increase its share in the global arms trade. This is not going to be easy.

It is equally important for India to have indigenously designed and developed equipment and platforms that can compete with the best in the world if serious inroads are to be made into global market.

Presently, there are only a few platforms that would fit that bill. One such platform is the Light Combat Aircraft (LCA) Tejas, but it too uses engines made by USA's GE Aviation. Similarly, Brahmos supersonic cruise missile is developed jointly with Russia and the indigenous content therein continues to be quite high. The fact is that many items are manufactured in India using technologies transferred by foreign original equipment manufacturers.

THE DEFENCE ESTABLISHMENT WILL HAVE TO DEVELOP THE ABILITY TO FORESEE SUCH OPPORTUNITIES AND FORMULATE SUITABLE STRATEGIES TO EXPLOIT THEM IF IT IS TO INCREASE ITS SHARE IN THE GLOBAL ARMS TRADE

Replying to a parliament question in the Lok Sabha on the August 4, 2021, Minister of State for Defence Ajay Bhatt stated that 'major defence items' exported by India to 75 odd countries included weapon simulators, tear gas launchers, torpedo loading mechanisms, alarm monitoring & control systems, night vision monocular & binoculars, light weight torpedo & fire control systems, armoured protection vehicles, weapons locating radars, HF radio, and coastal radar systems.

These items cannot be classified as 'major defence items'. In fact, the minister himself mentioned in his reply that the majority of defence exports included parts and components. This is not going to take the Indian industry too far.

What is required for a sustained growth in India's share in the global defence market is a long term strategy that focuses on export of 'major defence items' in the real sense of the term that are indigenously designed and developed. Winning the trust of the potential buyers in the Indian products is an associated challenge.

In 2015, Ecuador had terminated its contract with the Hindustan Aeronautics Limited after four of the seven Dhruv Advanced Landing Helicopters it has acquired from the latter crashed. Such incidents, coupled with the reservation openly, or covertly, expressed by the Indian armed forces themselves about some of the indigenously developed defence items, can damage India's pitch for defence exports. While it is important to have indigenously designed products that could be pitched in the global market, in the end, geopolitics plays an important role in international arms trade. Presently, the ten largest importers of arms are: Saudi Arabia, India, Egypt, Australia, China, Algeria, South Korea, Qatar, UAE, and Pakistan. This list comprises two sets of countries: one set comprising the countries that India will not sell arms to, even if they are willing to buy, and the other comprising countries which are unlikely to abandon the influential allies from which they buy the equipment. With the spheres of influence thus already carved out among the major arms exporting countries, India will have to look for potential buyers outside those spheres.

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

IN AUDIENCE

AIRBUS WILL CONTINUE TO FOSTER INNOVATION, ENCOURAGE PROMISING STARTUPS AND CONTRIBUTE TOWARDS SHAPING THE FUTURE OF A&D IN INDIA

Airbus Group has a special connect with India. The group has been actively supporting India's military modernisation as well as furthering India's efforts to build a robust indigenous military-industrial complex through the transfer of technology and joint development and production with local partners.

***Venkat Katkuri, Head of Defence & Space, Airbus India & South Asia** spoke at length to Editor, **Raksha Anirveda** about Airbus Group's wide ranging engagements in India, support to Startup India and Make in India initiatives, anchoring role play to promote indigenous tech prowess to realise Aatmanirbhar Bharat and its plan for India in near future. Edited Excerpts:*

Venkat Katkuri, Head of Defence & Space, Airbus India & South Asia

What are Airbus' defence innovation and development priorities for the coming years and how important are collaborative Indian projects in your planning?

VK Airbus is actively supporting India's military modernisation as well as the nation's endeavours to develop the defence manufacturing ecosystem. In this backdrop, India has recently formalised the acquisition of 56 Airbus C295 aircraft to replace the Indian Air Force (IAF) legacy AVRO fleet, opening the doors for the first 'Make in India' aerospace programme with the private sector. Furthermore, Airbus has also offered the proven force multiplier A330 Multi-Role Tanker Transport (MRTT) aircraft to the IAF to meet its long-term strategic requirements.

Moving beyond a traditional buyer-seller relationship, Airbus is furthering India's efforts to build a robust indigenous military-industrial complex through the transfer of technology and joint development and production with local partners. This is demonstrated by the collaborative projects Airbus has successfully delivered with Indian defence R&D bodies such as the Defence Research & Development Organisation (DRDO) and the private industry. Airbus and DRDO have jointly developed an Airborne Early Warning & Control System (AEW&C) solution that has been certified as 'indigenous' by Indian authorities.

It was a long wait for Airbus to secure the C295 aircraft contract. Aligned with 'Make in India' and 'Aatmanirbhar Bharat', will the Indian assembly of C295s help India move closer to meaningful self-reliance and enable it to indigenously manufacture aircraft. Your insights?

VK The C295 deal has opened the doors for the first 'Make in India' aerospace programme for the private sector and involves the full development of a complete industrial ecosystem, right from the manufacture to assembly, test, and qualification, to delivery and maintenance of the complete lifecycle of the aircraft. This contract will catalyse further development of India's aerospace ecosystem, bringing investment and job creation over the coming 10 years. Airbus will bring its complete bouquet of world-class aircraft manufacturing and servicing to India in collaboration with our industrial partners, including Tata Advanced Systems Limited (TASL) and leading defence

public sector units (DPSUs) such as Bharat Electronics Ltd. and Bharat Dynamics Ltd, as well as private Micro, Small and Medium Enterprises (MSMEs).

Indian defence programmes have been challenging, at times problematic yet rewarding. Having experienced it closely with decade's long presence in India, what are the major reasons / factors that makes Airbus optimistic about its future engagement with Indian defence industrial projects?

VK India has a promising defence market. We have a wide range of cutting-edge technologies and products to offer and are ready to do business in the country. With the Indian government taking rapid strides towards defence modernisation, Airbus is fully committed to serving the nation by demonstrating its capabilities and diverse range of cutting-edge products suited to all its military requirements.

Airbus, starting with HAL has expanded its military industrial collaboration with the Indian industry. It has offered to set up the final assembly line for aircraft (C295) and helicopters (Panther). How has been the progress and what's the expected timeline to get it materialised?

VK Airbus is already working with a range of private companies and PSUs, to procure aerospace manufacturing and engineering services from India on the civil side. We would be keen to engage with a broad spectrum of companies for the C295 offset discharge.

The first 16 aircraft, assembled in Seville (Spain), will be delivered between 24 and 48 months after the contract signature. The remaining 40 aircraft, to be assembled in India, will be delivered between 60 and 120 months after the contract signature.

Aiming at the Indian Air Force's requirement for Multi-Role Tanker Transport (MRTT) aircraft, how well positioned Airbus finds itself to emerge winner?

VK Airbus stands ready to support all the requirements of the Indian armed forces with the best of its products. India has already formalised the acquisition of 56 Airbus C295MW aircraft to replace the Indian Air Force (IAF) legacy AVRO fleet, last year. In addition, Airbus will also be offering the proven force multiplier A330 Multi-Role Tanker Transport (MRTT) aircraft to the IAF to meet its long-term strategic requirements. This new-generation tanker is combat-proven and comes with unique multi-role capabilities for refuelling, transport and deployment missions, based on the successful A330-200.

It is an ideal aircraft for refuelling missions as it can carry 111 tonnes of fuel. The MRTT can carry a maximum payload of up to 45 tonnes, combining the passenger cabin and the lower deck: up to 300 passengers. With lower operating cost and the capability to carry any kind of military or humanitarian payload on strategic missions, the A330 MRTT is a perfect replacement for older aircraft under fleet replacement programmes.

What contribution Airbus is making to promote indigenous innovation, research and development and strengthen the evolving start-ups ecosystem to meet India's defence and space missions' requirement?

VK The startup ecosystem in India is one of the fastest growing ecosystems in the world. Many start-ups in the defence-tech space are leveraging new-age technologies to help the country boost its defence capabilities. The tech prowess of these startups is furthering the government's vision for an Aatmanirbhar Bharat, along with supporting the 'Startup India' and 'Make in India' initiatives. As a long-standing partner to India,

AIRBUS WILL BRING ITS COMPLETE BOUQUET OF WORLD-CLASS AIRCRAFT MANUFACTURING AND SERVICING TO INDIA IN COLLABORATION WITH OUR INDUSTRIAL PARTNERS, INCLUDING TASL AND LEADING DPSUS SUCH AS BEL AND BDL, AS WELL AS MSMES

IN AUDIENCE

AIRBUS HAS SIGNED 11 PARTNERSHIPS WITH INDIAN STARTUPS ACROSS AVIATION, DEFENCE AND AEROSPACE AND IS CURRENTLY SUPPORTING MULTIPLE PROOFS OF CONCEPT AROUND ELECTRIFICATION, SUSTAINABILITY, ARTIFICIAL INTELLIGENCE, GEO-SPATIAL INTELLIGENCE, AMONG OTHERS FROM A COMMUNITY OF OVER 2000 B2B STARTUPS IN SOUTH-EAST ASIA AND INDIA

Airbus has been contributing to these flagship programmes by industrialising startup solutions in the aerospace and defence sectors.

Airbus' global innovation strategy is to bring together start-ups (entrepreneurs) and Airbus "intrapreneurs" (internal entrepreneurs) to work and speed up the transformation of their innovative ideas into valuable businesses. For over five years, this initiative has been boosting innovation and entrepreneurship in the Indian aerospace and defence sectors. As testimony to this, Airbus has signed 11 partnerships with Indian startups across aviation, defence and aerospace and is currently supporting multiple proofs of concept around electrification, sustainability, Artificial Intelligence, geo-spatial intelligence, among others from a community of over 2000 B2B startups in South-East Asia and India. In early 2020, Airbus Defence and Space India signed a commercial partnership with an Indian startup, Hyperverge, to provide real-time change detection analytics using satellite imagery.

We will continue to foster innovation and encourage entrepreneurial ambitions of promising startups to contribute towards shaping the future of aerospace and defence in India.

DefExpo 2022 is happening amid pandemic challenges. What to expect from Airbus at the show and what are its expectations?

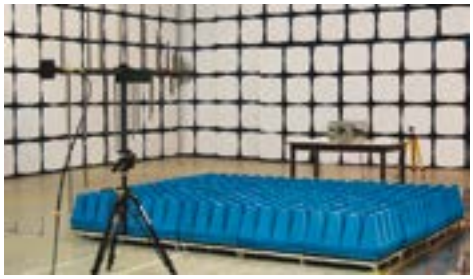
VK Airbus will display its comprehensive range of defence and space capabilities at DefExpo 2022. On display will be the scale model of the versatile A330 Multi Role Tanker Transport aircraft - the only new-generation aerial refueller in full service today, and the most capable new-generation tanker, combat-proven and with unique multi-role capabilities.

Also on display will be the multi-role AS565 MBe (Panther) and H225M helicopters. The H225M is a multi-purpose and versatile military asset that enables military forces to deploy wherever and whenever needed, and the AS565 MBe naval version of Airbus' Panther family of helicopters, is an all-weather, multi-role medium rotorcraft, designed for operation from ship decks, offshore locations and land-based sites.

There will also be a scale model of the Airbus Eurostar E3000 and an interactive digital presentation of the S950 optical and S850 radar at the Airbus' stand. The Eurostar E3000 boasts the highest flexibility and enhanced payload accommodation for challenging high-power missions. The S950 optical is a high-end optical satellite that is also the base for Airbus' own Pléiades Neo four-satellite constellation (starting in 2020). The S850 radar is a highly sophisticated radar system whose technological capabilities enable advanced applications both in the observation domain and in scientific contexts. We are very excited about the 2022 edition and are looking forward to collaborating with our partners and other stakeholders from the industry.

EMI / EMC TEST FACILITY
FOR DEFENCE VENDORS

To enable the industry to have their electrical / electronic products meet EMI-EMC compliance as per MIL Test Plan, ERDA has set up a sophisticated state-of-the-art 10 meter semi-anechoic chamber and tests facilities as per IS, CISPR, IEC and MIL-STD-461 E/F at its Vadodara, Gujarat premises.



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- 10 meter semi-anechoic chamber
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TALKING POINT

CBRN INDUSTRY NEEDS GROWTH FOR OPTIMAL NATIONAL SECURITY

The corona pandemic has brought sanitisers to the breakfast table. The shortage of detection and testing systems for bio-threats caught us unawares. We need to review our capability to rapidly deploy Chemical, Biological, Radiological and Nuclear equipment across the country in a crisis situation. Defence Expo Feb 2020 saw merely three Indian CBRN participants

By **COL RAM ATHAVALE**

The two-year-long Covid-19 pandemic and the urgent need for testing kits, PPE, masks, sanitisers has led to serious thought about Indian capability to rapidly deploy Chemical, Biological, Radiological and Nuclear (CBRN) equipment across the country. In addition, a rise in levels of civic awareness for protective measures has also created a need to enhance local industry for protective means. Sanitisers have brought the subject of decontamination to the breakfast table. It is the dearth of detection and testing systems for bio-threats that has caught the industry unawares.

In this rise of panic in social and civic awareness, is there a concerted and focussed effort to develop in-house capability in terms of detection, protection, decontamination and medical management of CBRN incidents? Has 'Make in India' reached the CBRN frontiers? Defence Expo Feb 2020 saw merely three Indian CBRN participants. What will the scenario be in 2022 and beyond?

BACKGROUND

The Indian Nuclear Biological and Chemical (NBC) defence programme began in the late eighties as a core training facility at the College of Military Engineering (CME), Pune, in collaboration with the Defence Research and Development Organisation (DRDO). The term NBC was revised to CBRN in view of the emerging Radiological threat. In 2010, the government approved a consolidated CBRN Defence Technology Programme covering 36 key CBRN projects. Today, there are ten laboratories of the DRDO engaged in developing various categories of CBRN equipment based on current and emerging technologies. Since 2010, the DRDO also started looking at non-military clients (NDRF, SDRF, NSG and other state-level counter-terrorist units) for their CBRN equipment. Detection equipment, forensic capabilities, protective suits, masks and decontamination equipment is also needed by civil-first responders, border/port-control agencies and incident-management agencies.

The Covid-19 crisis has highlighted gross deficiencies in many such systems with these agencies. The CBRN being a sensitive matter, R&D has remained with

CBRN suite integrated on a Reconnaissance vehicle

the DRDO. This led to a lack of competition and technological growth. However, developments in the last few years have led to some positive outcomes. The recent opening of the defence sector to private players and the 'Make in India' push by Prime Minister Narendra Modi has led to positive outlooks. Technology transfers and sharing R&D with private players has led to the emergence of the state of the art equipment within the Indian private sector.

EXISTING INDIAN CBRN INDUSTRY

There are a few Indian firms engaged in the production of high-quality CBRN equipment such as suits, masks and respiratory devices, collective protection shelters, radiological sensors and medical equipment. A lot of expertise (and in a few cases even sound R&D) has been instituted and a stable base is well in place. Most of these industries also have a ToT agreement with the DRDO.

However, the CBRN is a low-demand (less probability of occurrence compared to other crisis situations), low-technology, but high-impact industry. Therefore, any private industry entering the CBRN market needs to have another sustainable business avenue for survival. This has been one of the major factors for the lack of private CBRN industry in India. The second main issue is that there is minimal government support for R&D or assurance of orders of approved and passed products. This also applies to critical hazardous material (Hazmat) equipment in the civil arena like PPE, masks, special detection and testing kits, analysers, mass sanitisers and decontamination equipment.

Notwithstanding the above, there has been a spurt of 'Covid-19 compliant PPE Manufacturers' for the last two years. Garment, IT and even plastic industries have begun making PPE. Most of these 'fly-by-night' operators are not sustainable in the long run and are trying their luck of a fast buck in a crisis situation. At the same time, there are some startups and diversified industries that have developed excellent equipment and systems mostly with Covid-19 in view. These can be adapted with some modifications to many CBRN threats. These industries need to be encouraged to expand their range of products for wider CBRN threat mitigation.

Mock Drill by NDRF before CWG 2010

CBRN UGV at Defexpo 2014

THE CBRN IS AN UNCERTAIN-DEMAND, LOW-TECHNOLOGY BUT HIGH-IMPACT INDUSTRY. ANY PRIVATE INDUSTRY ENTERING THE CBRN MARKET NEEDS TO HAVE ANOTHER SUSTAINABLE BUSINESS AVENUE FOR SURVIVAL

AVENUES FOR COLLABORATION

While the subject of CBRN Defence has largely been a closed-door one, a recent change of stand indicates that foreign collaboration for CBRN equipment is feasible. The focus of future R&D, especially by private industry, is required in the following areas:

- Detection Equipment. India has a good Radiological & Nuclear

TALKING POINT

IITs are stepping in to develop PPEs

devices (detectors, sensors and survey meters) industry. While a humble start has been made with support from the DRDO, chemical detectors are still imported and we need robust Indian manufacturers. More private involvement is desired. There is an urgent need for the state of the art biological detection equipment for field use for military, paramilitary, civil defence and health services.

- Integrated compact detectors for Drones or UGVs. As the future lies in robotics and automation, there is a need to develop small reliable sensors which can be integrated with drones and Unmanned Ground Vehicles (UGVs).
- **Automated CBRN Sentries.** These robust stand-alone fixed or robotic devices are conceptualised to have a networked CBRN sensor suite, which can transfer data automatically to an integrated Situation Awareness and Hazard Mapping system for optimal response. Deployed in a grid to give real-time CBRN threat inputs, these are ideal for civilian use (critical infrastructure, municipal or district hazard mapping) or military use in field locations.
- **Protection Equipment**
  - **Individual Protection Equipment (IPE).** Suit technology is changing. CBRN proof and self-decontaminating fabrics with negligible physiological stress are being developed. Masks and breathing apparatus are getting sleeker and lighter with longer operational capabilities. Hazmat suits are mostly imported. These technologies need to be incorporated into Indian products.
  - **Collective Protection.** Fixed Underground Fallout shelters are passé. ColPro type flexible, modular, inflatable, quick deploy shelters are becoming the norm. Similarly, containerised CBRN proof shelters with compact CBRN filtration units, integrated detection and hazard mapping systems are also favoured for mechanised operations and deployment by civil agencies and response forces.
  - **Armoured Vehicle and Shipboard Protection.** The CBRN protection for armoured vehicles and ships is normally in-built by the manufacturer. Some Indian manufacturers are already producing and integrating the detection, filtration and actuating devices on these platforms. However, the latest advancements and new technologies for enhancing such protection (especially filtration) are always being sought.
- **Decontamination Systems.** Decontamination is an often-overlooked area. Most of the available equipment is outdated and of obsolete technology. Advancements in self-decontaminating suits and paints, lighter and more effective decontamination systems and greater efficiency decontamination agents are being sought. Sadly, as yet there are no Indian firms engaged in the manufacture of decontamination equipment.
- **Medical Management.** This is a field where India has made good progress. The DRDO and other agencies have developed excellent drugs, antidotes and casualty-management apparatus. There is still a need for better drugs, vaccines, antidotes, advanced triage kits and casualty-management

FOR THE LAST TWO YEARS, THE GARMENT, IT AND EVEN PLASTIC INDUSTRIES HAVE BEGUN MAKING PPE. MOST OF THESE 'FLY-BY-NIGHT' OPERATORS ARE NOT SUSTAINABLE IN THE LONG RUN. THEY TRY THEIR LUCK OF MAKING A FAST BUCK IN A CRISIS SITUATION

equipment. Casualty isolation pods and CBRN/Isolation ambulances are areas of interest.

● **CBRN Software.** Hazard mapping, situational awareness and decision support are critical areas of CBRN incident management. Already the world is looking for use of AI and robotics-based systems to aid these areas. India has great potential for developing such software systems. Already some private players are working on Integrated CBRN Control systems that can be effectively used.

● **Research.** There is a huge scope for growth of private R&D. This will help in developing the state of art equipment, enhance healthy competition and garner greater synergy between DRDO/CSIR and private vendors for enhanced technological advancement.

● **Training & Simulation.** The Armed Forces have a very advanced training protocol for CBRN Training. Civil Defence and Private CBRN response training have yet to take off in India. Some other areas of interest are automated training aids and simulators based on in-service equipment.

● **Testing Facilities.** While testing facilities for various CBRN equipment exist with DRDO/CSIR, there is a dire need to upgrade these. Approved private testing facilities are few. Internationally-acclaimed and accredited research laboratories, in partnership with Indian companies, can engage the DGQA and DRDO for setting up the state of the art testing facilities.

● **The Emergency Management Market.** The Emergency Management market in India is huge and just beginning to show its head. The Indian government has instituted a string of measures to promote these. However, execution demands adequate training and capacity building. The foreign CBRN Industry (especially Europe, USA and Israel) have a lot to offer in these areas, and there is no dearth of Indian clients (governmental, quasi-governmental and private).

CONCLUSION

The need for the Indian CBRN industry has already begun to be felt by government agencies and the Armed Forces. A great avenue of CBRN equipment usage is the civil Emergency Management apparatus. Covid-19 has shocked us all with the emergent need for testing and protective equipment in huge quantities. Rising terrorist incidents and frequent industrial accidents are already making the authorities think of CBRN Incident Management. It is time India takes note and encourages CBRN industry growth for optimal national security.

THE FOCUS OF FUTURE R&D, ESPECIALLY THE PRIVATE INDUSTRY, IS REQUIRED ON DETECTION EQUIPMENT, INTEGRATED COMPACT DETECTORS FOR DRONES OR UGVS, AUTOMATED CBRN SENTRIES AND PROTECTION EQUIPMENT

–The author is a veteran tankman and a CBRN Security professional has been a Key Adviser to the Government of India on National CBRN Security. He has also served as a Key CBRN Expert for the EU CBRN Risk Mitigation Centres of Excellence initiative for the Eastern and Central Africa region. A Visiting/adjunct Faculty at select universities, prolific writer and a CBRN subject speaker in international seminars and conferences, he holds a PhD in CBRN Counter Terrorism. Presently he is a freelance CBRN Security and Risk Mitigation Professor, and Consultant based at Pune, Indi.. The views expressed are personal and do not necessarily reflect the views of ***Raksha Anirveda***

SPOTLIGHT

NEAR EARTH AUTONOMY—SITUATIONAL AWARENESS FOR COMPLEX OPERATIONS

Near Earth Autonomy, founded in 2012 has wide range of experience in autonomous ground and air vehicles operating in challenging environments, having worked on a wide range of projects in association with NASA and the US Armed Forces. Its Co-Founder and CEO Sanjiv Singh says his company is open to collaborations in India once there is clarity on the requirements here

Sanjiv Singh, CEO, and Co-Founder of Near Earth Autonomy leads the technical and business strategy for the company. He brings 35 years of experience in autonomous ground and air vehicles operating in challenging environments. Key areas of his expertise include perception and planning for air and ground vehicles. In addition, he specialises in the coordination of teams of (human and robotic) agents performing complex tasks. Sanjiv obtained his Ph.D. in Robotics at Carnegie Mellon University in 1995 and has since been on the faculty at the Robotics Institute. Sanjiv is the founding Editor-in-Chief of Field Robotics, a new open-access journal. He has also co-founded four technology companies.

Sanjiv Singh, CEO, and Co-Founder of Near Earth Autonomy

Singh grew up in India finishing his ICSE at the Cathedral School in Mumbai. He was subsequently educated in the US at the University of Denver, Lehigh University, and Carnegie Mellon University. As is common in Punjabi families, many of his relatives were associated with the Armed Forces. Going back to pre-independence times, family members served in Iraq, Burma and had fought in the wars with Pakistan and China. Singh recalls that his family surname is "Talwar" and that the military mission is definitely in his blood.

During a wide-ranging conversation with ***Raksha Anirveda Editor Ajit Thakur***, Singh expressed his readiness to collaborate with Indian companies. His company works with customers to provide flight-proven core technologies to achieve their inspection and mobility needs. Applications include enabling aircraft to navigate safely without crew and inspecting high-value assets autonomously.

The story behind the inception of Near Earth Autonomy and its journey till now is quite interesting. Singh says there was an opportunity in the early 2000s to take technology that they had been using for autonomous ground vehicles to enable aircraft flying at low altitudes. In particular, there

were some US Department of Defence programs looking at new applications of low-flying aircraft. Few people were working in this area at that time so this provided the opportunity to get started.

While he was at Carnegie Mellon, a large program came up that couldn't be done at the University due to its difficulty and scale. It involved the full-scale automation of a helicopter operating in austere conditions such as might be found in rugged mountainous areas of Afghanistan, without any human interaction. The initial motivation was to replace convoys that resupplied troops because the ground routes can be treacherous.

Singh and three of his colleagues

"GENERALLY, FOR A TECHNOLOGY TO BE ADOPTED, IT HAS TO BE DESIRABLE, TECHNICALLY FEASIBLE, AND ECONOMICALLY VIABLE. THERE IS CLEARLY AN INTEREST IN FLYING IN A STRAIGHT LINE FROM POINT TO POINT. TECHNICAL FEASIBILITY IS BEING PROVEN. GETTING THESE SOLUTIONS TO BE ECONOMICALLY VIABLE WILL TAKE SOME TIME..."

decided to start a company that would address the problem and over the next five years managed to get a large military helicopter to fly autonomously. Since its inception, the company has received consistently increasing commercial and government support as Autonomous Air Mobility (AAM) has grown in importance. Now, Singh is looking at various applications across scale, aircraft from one metre to ten metres can be turned into autonomous aircraft for applications ranging from defence to commercial.

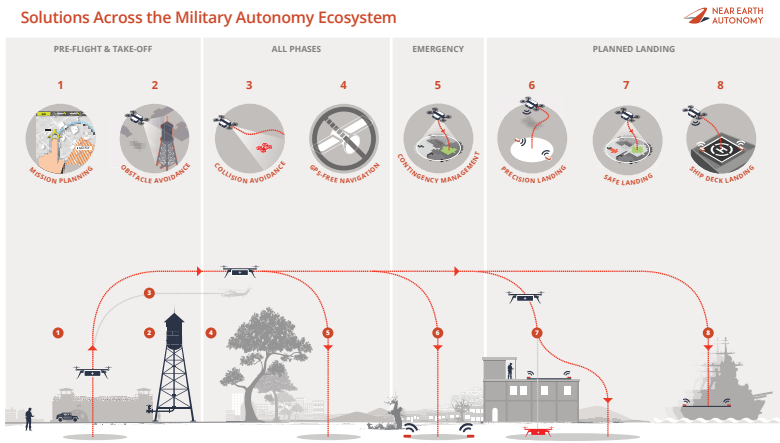
Autonomous Air Mobility is close to Singh's heart and has been Near Earth's focus area too. But the company's progress in the field has not been without the hurdles associated with futuristic technology. According to Singh, it is a challenging area because the development of a new generation of aircraft will take some time. "Generally, for a technology to be adopted, it has to be desirable, technically feasible, and economically viable. There is clearly an interest in flying in a straight line from point to point. Technical feasibility is being proven. Getting these solutions to be economically viable will take some time. The early adoption will come in the areas where cost is not the driver. Generally, we see this happening in applications that involve hazards."

Near Earth Autonomy has worked on a wide range of projects in association with NASA and the US Armed Forces. Singh shared his experience and the lessons learned from these projects. "We think of the autonomous aircraft for logistics broadly in terms of commercial and military use cases. On the military side, the aircraft must operate in unstructured environments where it is not possible to rely on infrastructure because the aircraft are required to fly to a completely different location at any time including to sites that are unprepared. In the commercial use case, it is the opposite, and it makes sense to use the infrastructure to reduce risk and cost. The aircraft is always flying between fixed points much in the way that commercial aviation operates today with air traffic control. The reliability standards are about the same but on the commercial side, the regulations are significant especially when operating in densely populated areas."

Elaborating on the success of his projects on military platforms, Singh says they have been able to implement autonomy on aircraft that can carry anywhere from 5 kg to 2,000 kg payload. "On the small side, there is a need to carry small payloads (such as blood and medicines) over long distances. We use hybrid VTOL aircraft with wings and rotors to enable long-endurance (500 km) and precise landing. We have worked on multirotor aircraft that can carry anywhere from 40-200kg. At the lower end, electric VTOL seems to have the reliability for regular use. On the higher end of that range, we are

SPOTLIGHT

"WE HAVE WORKED ON MULTIROTOR AIRCRAFT THAT CAN CARRY ANYWHERE FROM 40-200KG. AT THE LOWER END, ELECTRIC VTOL SEEMS TO HAVE THE RELIABILITY FOR REGULAR USE. ON THE HIGHER END OF THAT RANGE, WE ARE WORKING WITH TURBINE-POWERED AIRCRAFT BECAUSE THE COMPONENTS TO CREATE ELECTRIC AIRCRAFT AT THAT SCALE ARE STILL NOT READY"



Logistics Use Cases

working with turbine-powered aircraft because the components to create electric aircraft at that scale are still not ready. We have also been working on autonomy for large helicopters that can carry over 2,000 kg payload."

The forward-thinking nature of Near Earth Autonomy's work has been acknowledged and it reflects in its partnership with large OEMs such as Kaman, L3Harris, Volocopter, Boeing, Airbus. Singh gave insights into his business growth story, technology development roadmap along with the wider range of ongoing and future-oriented work being done at Near Earth. "The OEMs mentioned typically have a good handle on what we call intrinsic autonomy, which is the automation that proceeds with awareness of the internal state of the aircraft. At Near Earth, we have a lead on what we call "extrinsic" autonomy, which is autonomy that operates with situational awareness for complex operations. We think that this kind of autonomy is essential for building the safety case for the next generation of aircraft that must operate in complex, low altitude settings."

Singh attended the Dubai Air Show 2021 as a guest speaker at the Boeing Applied Innovation booth, where he elaborated on what Near Earth Autonomy does and where its value proposition lies, and how large the market is for its products.

India is considered to be a lucrative yet challenging aerospace and defence market that is also keeping track of the global development in areas of autonomous air mobility / urban air mobility. On the scope for India in this area, Singh accepts that while he has made several trips to India recently for personal reasons, he is not familiar with the aviation ecosystem and players here. "Obviously, India has a large defence market. I have been trying to determine what are the requirements and what are the key applications. Generally, we see three primary applications for autonomous aircraft:

1. Aircraft that can conduct information gathering. On the military side, it is surveillance and on the commercial side, it is some sort of a survey.
2. Aircraft that carry cargo to places where the land route is long or difficult. Mountainous areas that need to be resupplied for military operations are a good example. Another example is to deliver small, essential supplies to ships without requiring them to come into a port.
3. Strike aircraft that carry weapons.

The general trend is to start with the first use case because this can be conducted with smaller, less expensive drones and we see this happening in India.

We have specialised in the second category of cargo transport. It is not clear what are the Indian requirements for autonomous logistics missions . In the US there are guiding requirements for the three categories on the military side: small (carrying 50 kg), medium (carrying 100 kg), and large (carrying > 1,000 kg). This differentiation is important because they correspond to different use cases each of which is best served by a different kind of aircraft . It is possible the requirements are there, but we have not been able to find them."

Singh added that once there is clarity on the Indian side, his company could collaborate with Indian companies as long as they have enough resources and traction to serve clients and grow with Near Earth Autonomy.

NAVAL GROUP

Drone Systems, a Very Cost Effective Force Multiplier

Drones are the new on-board operational capabilities and challenge, being addressed by the Naval Group's experts in close collaboration with the French Ministry of Defence and the French Navy. Several design, development and deployment activities are centered around the integration of drones on-board any vessel. The challenge is a stimulating one and our dedicated teams are seeing the projects advancing quickly and new opportunities opening up in the international markets.

AN AREA THAT IS YOUNG AND PROGRESSING RAPIDLY

The adventure started in 2016 as a result of successful experiments on-board the offshore patrol vessel L'Adroit. Naval Group had thereafter installed drone system on the Landing Platform Dock (LPD) ship Dixmude. Until 2019, Naval Group has conducted trials during operational missions in all conditions. Lessons learned then have been implemented. By now, all French navy LPD class Mistral ships are fitted with S100. The drone system will comprise a new Naval Group's console & a mobile maintenance shelter, a more extensive communication system and an additional airborne vehicle.

WITH INDIAN NAVY REQUIRING THE INDUCTION OF MORE DRONES IN THE SHORT, MEDIUM AND LONG TERM, WE SEE TREMENDOUS OPPORTUNITIES TO SHARE WITH DRDO AND INDUSTRIAL STAKEHOLDERS OUR EXPERTISE TO PROVIDE CUSTOM MADE SOLUTIONS

Owing to a state of the art physical integration the system outperforms initial settings, such as communication range, information broadcast and robustness of the hardware.

NAVAL GROUP'S FAST-GROWING EXPERTISE

This was a first step. Naval Group is expending its experience fast. In 2019, it has been awarded by the Belgium and Netherlands navies the RMCM contract. This program implements the Mine Counter Measures "Stand Off Concept". This revolutionary concept keeps the crew safely out of the danger area thanks to an extensive use of all kinds of unmanned systems -the toolbox- seamlessly integrated in a dedicated Mine Counter Measure Vessel (MCMV). The first MCMV and her toolbox will be delivered in 2024.

Naval Group has also delivered, through its subsidiary Sirehna, an oil rig protection USV. And there is a lot more to come in the next years, regarding UUV in the first place.

NAVAL GROUP'S EXPERTISE IN WARSHIP DESIGN AND INTEGRATION

This know-how accumulated over decades of developing modern and increasingly automated warships is a rare competence which can be used to integrate any type of drones on warships. With Indian Navy requiring the induction of more drones in the short, medium and long term, we see tremendous opportunities to share with DRDO and industrial stakeholders our expertise to provide custom made solutions.

IN CONVERSATION

'COLLABORATION AND PARTNERSHIPS FORM PART OF EDGE GROUP'S DNA'

AL TARIQ is an EDGE Group entity and regional leader in aerial weaponry and a manufacturer of precision-guided munitions (PGMs). As a seasoned professional, backed with 35 years plus experience and various performance awards in his kitty, Theunis Botha – Chief Executive Officer, is spearheading AL TARIQ's journey in becoming a world class manufacturer of PGMs, and weaponry systems.

*In a freewheeling interview to **Ajit K Thakur**, Editor, **Raksha Anirveda**, Theunis Christoffel Botha talks at length about the company's future growth strategy, its planned foray into the Indian defence market aligned with 'Make in India' and more. Edited excerpts:*

From increased FDI limits to changes in defence procurement and other reforms, do you think the Indian market has enhanced its capability to absorb advanced military technology in recent years?

TCB The Indian government has and continues to make strides in ensuring indigenisation of advanced military technology entering the country, which is an initiative we fully support. In adding to its defence capabilities, India recognises that modern, advanced military technology needs to be at the forefront of developing sovereign defence capabilities. The Production Linked Incentive scheme for drones in India is a great example of this.

India is also one of the largest defence markets in the world from the perspective of annual budget, requiring an increasing amount of manufacturing and knowledge transfer to take place domestically.

The Indian military equipment and platforms is a mix of legacy Soviet/ Russian range and now new equipment from US and Europe. Don't you think it is increasingly competitive for a player like you to enter the market and create your own space?

TCB EDGE Group has emerged to become one of the 25 largest defence contractors in the world, and India is definitely a market we believe we could contribute significant value to. India and the UAE enjoy strong bi-lateral ties, based on trade and commerce. The UAE aligns with the "Make in India" government programme and seeks to be a trusted partner in helping India realise its defence ambitions, be it developing sovereign capabilities or integrating existing systems. India and the UAE have a shared interest in maintaining security across our

regions and as EDGE Group, and certainly as AL-TARIQ, I believe we could play an important role in this regards.

We focus on offering existing and emerging defence technologies to market with speed and efficiency, which reflects in the modularity of our AL-TARIQ family of precision-guided missiles, as an example.

What is your exact product range offering for the Indian market? Are there specific products that you want to especially focus upon?

TCB Our family of precision-guided munitions (PGM), designed for the MK 80 series aerial bombs are well suited for the defence market in India. Our high-precision, long-range, focused munitions use a variety of technologies, allowing superior mission flexibility to the war-fighter.

The AL TARIQ LR-PGM (long-range precision-guided munition) is a single modular kit for Mk 81, Mk 82 and Mk 83 munitions offering superior modular guidance options, with various stand-off ranges, depending on the mission requirements. The system has also been successfully integrated onto the 1,000 lb HSLD 450 bomb, specifically aimed at the Indian market. The system can be integrated on various fighter aircraft.

Our PGMs achieve enhanced targeting accuracy by using Imaging Infrared (IIR) technologies with Automatic Target Recognition (ATR) capabilities, or semi-active laser (SAL) seekers. We provide turnkey solutions to enable effective, autonomous deployments anywhere in the world.

Is there an Al Tariq plan to synergise with the Indian effort to indigenise military platforms and products?

TCB Currently, AL-TARIQ has been in discussions with the local Indian industry to synergise in indigenising military platforms and products. We believe our family of PGMs has the added appeal of its ability to be integrated onto platforms already in use by the Indian Air Force such as the Mirage 2000 and the Hawk fighter, permitting a swift and cost effective process to include our weapons on the Air Force's existing infrastructure.

Are you looking at an Indian partner which can be a replication of the successful Al Tariq-Denel Dynamics JV?

TCB EDGE Group is open to collaborating with businesses big and small, from across the private and public sector.

THE AL TARIQ LR-PGM (LONG-RANGE PRECISION-GUIDED MUNITION) IS A SINGLE MODULAR KIT FOR MK 81, MK 82 AND MK 83 MUNITIONS OFFERING SUPERIOR MODULAR GUIDANCE OPTIONS, WITH VARIOUS STAND-OFF RANGES, DEPENDING ON THE MISSION REQUIREMENTS

To your mind, what are the key challenges in the Indian market? In what ways is it different from other markets that you do business with?

TCB India has one of the highest defence budgets in the world and is set to be the third highest defence spender from 2022 onwards. Similar to the UAE, there is a strong drive to move away from importing key defence products and looking towards developing sovereign defence capabilities. Collaboration and partnerships form part of EDGE Group's DNA and we stand in support of India's effort to build out its defence competencies domestically.

QUANTUM-BASED COMMUNICATION SECURITY FOR THE ARMED FORCES: BREAKING THE DISTANCE BARRIER

Quantum Key Distribution (QKD) performance for 100 km plus range has been validated with successful trials. In an extremely significant achievement for the country, QNu Labs has now evolved a solution that no longer imposes restrictions on the distance over which the secure keys can be transmitted....

By **CAPT SUNIL SUD, IN**

Quantum based computers, over the past few years, have moved from the realm of fiction into the real world. A number of research institutions across the world, including the likes of IBM, Google and many Chinese agencies, are already testing and enhancing the capability of these superfast systems. These developments, in the very near future, are expected to be capable of breaking most of the data encryption algorithms, currently in use.

The advent of Quantum Computing will impact and have serious implications on all government agencies, private enterprises, security and defense organizations etc., where security of data during communication and at rest are crucial to operations and their survival. Hacking of systems that today seem improbable, will soon become a reality. Data used for controlling major systems like power generation and distribution, water supply, communication, railways, banking etc., shall be liable to be hacked or taken out, leading to unfathomable consequences. Indian Defense and security agencies make use of multiple forms of data communications (Terrestrial, Wireless, Satcom) for their day-to-day operations. Any disruption in these too would lead to catastrophic consequences.

The only way to counteract these challenges and ensure fail proof continuity of operations of such systems, will necessitate the use of Quantum based data communication and security systems. These systems would be required for providing security against eavesdropping, hacking and service denial, for the foreseeable future. The Quantum Random Number Generator (QRNG), Quantum Key Distribution (QKD) systems and Post Quantum Cryptography (PQC) are the key elements that can help achieve the above objectives, even when Quantum Computers are used for hacking.

China today has established a 4600 kms long communication backbone that uses QKDs which are both terrestrial as well as satellite borne. This is the longest known communication backbone in operation worldwide, as per the published media. This is a significant development, considering that the QKDs do present limitations in terms of the distance over which the physical Quantum particles can be transmitted. The quality of the fiber used, is another factor that impacts the distance over which the keys can be transmitted. It is believed that China has used special low loss fiber for implementing their complete network.

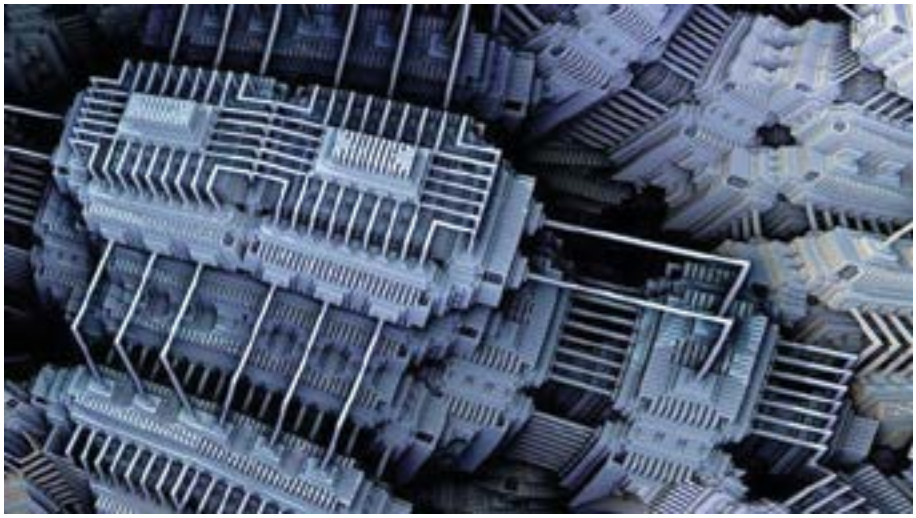
QuNu Labs (also referred to as

QNu Labs), as India's leading company in the Quantum-safe cryptography products and solutions domain, has indigenously developed QRNG, QKD and the PQC systems, over the past couple of years. This has resulted in a number of IPRs being filed and granted. The products and solutions developed make use of innovative solutions evolved, in-house.

The QKD and QRNG systems, not only meet all NIST specified tests, but also comply with other international standards. These systems have undergone extensive tests over the years, including third party and environmental testing, by reputed government agencies. Consequently, these products have matured to a level where they are today available to prospective customers through the GeM portal.

At QNu Labs, there is an ongoing endeavor to continuously enhance the performance of the systems developed. The innovative solutions deployed for achieving this goal, have led to several new use-cases being generated, that address requirements of both defence and enterprise customers. A number of these use-cases are currently undergoing testing by various agencies, including those within the government (defense and other agencies) and in the private sectors.

The QRNG and QKD systems, developed by QNu Labs have also been in use, both in the government and in the private sectors, for some time. QNu Labs helped Indian Army set up a state-of-the-art Quantum Lab at MCTE to train Army officers in this new technology. QNu Labs is also working with different defence entities to pilot and deploy secure communication solutions and advanced trials are on.



The QKD trials during 2020-21, were conducted using the existing Army infrastructure, deployed in the field. These had validated the QKD performance over 100+ Kms. Ongoing attempts since, have constantly aimed for further extending the distance, over which the Quantum secured keys could be distributed.

QNu Labs has now evolved a solution that no longer imposes restrictions on the distance over which the secure keys can be transmitted. The trials for the same are scheduled shortly. This is an extremely significant achievement for the country. This opens up unprecedented opportunities for deploying these systems with defence and other governmental agencies, over any distance that may be specified, by the end user.

A use case that can now be visualized, is that of using this solution for setting up the complete 'Defense Communication Backbone' for all the three services, for achieving un-hackable, Quantum safe communication and data security. While ensuring data security, this also helps optimize the costs involved in deploying these solutions.

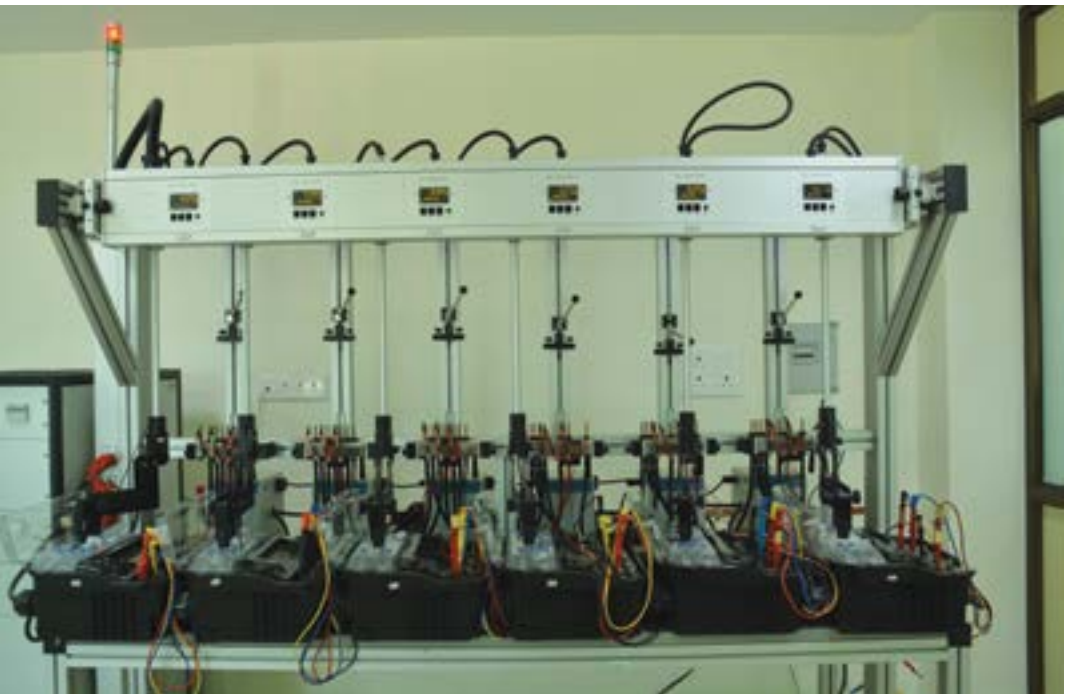
It is pertinent to mention that the above accomplishments could not have been possible without support from the Indian Army authorities including the ADB and the Corp of Signals and the Indian Navy. These agencies not only provided the live facilities for conducting trials, but also shared valuable feedback, that helped QNu Labs evolve multiple path-breaking solutions.

At QNu Labs, we are proud to be a partner to the government's Atmanirbhar initiative for developing and producing world class products and solutions, indigenously. This is a major step in India becoming self-reliant in the domain of Quantum cryptography. ■

–The writer is a veteran Electrical Officer, having served the Indian Navy for over 23 years. He has worked in the IT industry for 15 years, including heading operations for the company in Europe and as a Consultant guided the senior leadership of diverse companies. He currently heads the Defense Business Unit at QNu Labs

BUSINESS PITCH

ERDA RECEIVES SMART METERS EVALUATION CONTRACT FROM INTELLISMART



With focus on expediting the deployment of smart meters across the country and to ensure performance as well as quality, IntelliSmart has entered into a rate contract for testing of smart meters with Electrical Research and Development Association (ERDA).

IntelliSmart Infrastructure Private Limited or "IntelliSmart", established with the focus to implement, finance, and operate the smart meter roll-out program of power distribution companies is a joint venture (JV) company of EESL (Energy Efficiency Services Limited, a joint venture of PSUs of Ministry of Power, Government of India) along with NIIF (National Investment and Infrastructure Fund, a Government of India sovereign fund).

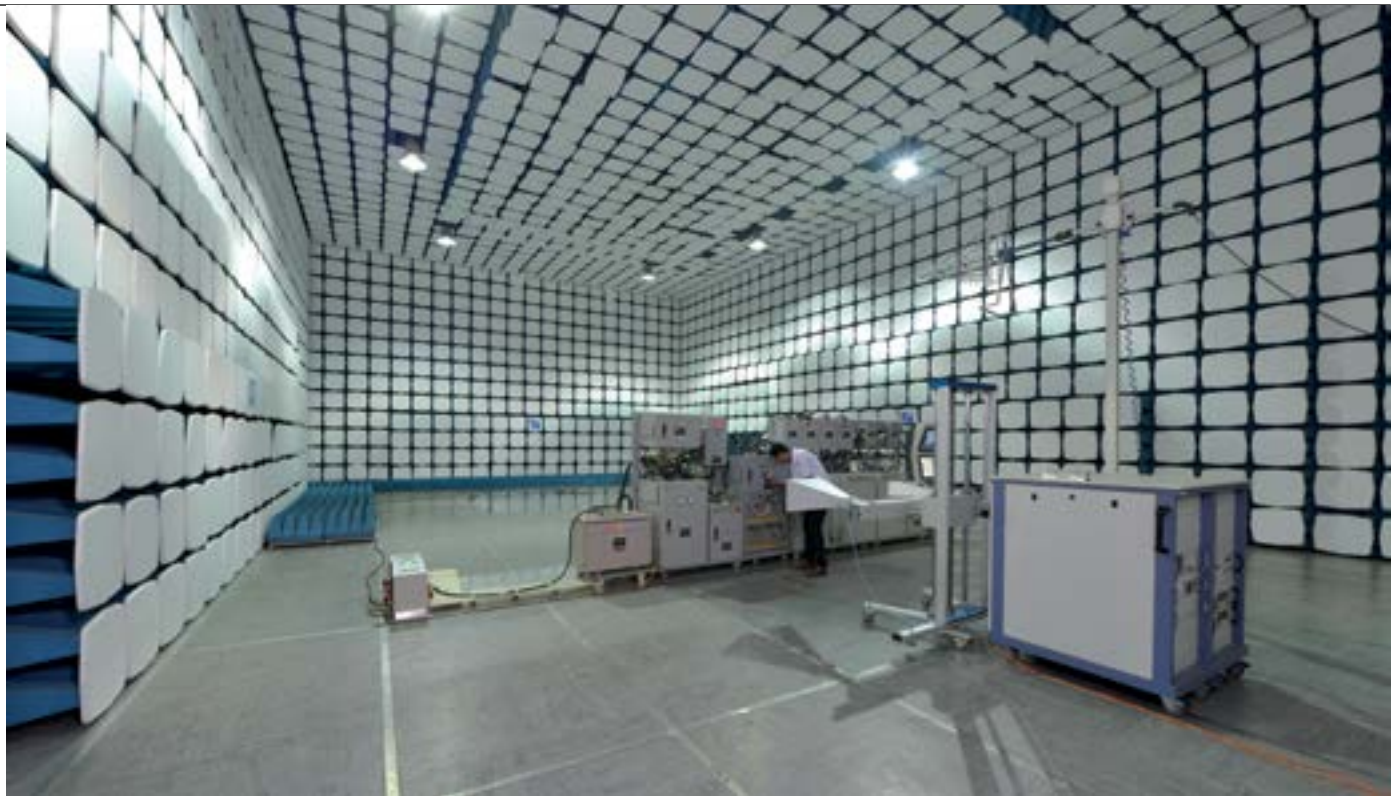
The Government of India plans to install 25 crore smart meters in the next few years. With the replacement of 25 crore conventional meters with smart meters, billing efficiency can improve from 80 percent to 100 percent, and has the potential to increase DISCOM revenues by INR 1,104 billion. ERDA's Smart Meter testing facility is accredited by NABL and BIS.

In fact, ERDA was the first laboratory in India to get Bureau of Indian Standard (BIS) accreditation for Smart Meter testing as per IS 16444: 2015. ERDA is having Communication Protocol verification facility as per IS 15959 using CTT 3.1 extended edition from DLMS user association and Meter explorer software tool.

ERDA is also recognized as one of the designated laboratories for testing of Smart meters with IEC 62056 communication protocols by Ministry of Power, Govt. of India. ERDA is having its own in-house EMI/EMC testing facility required for Smart Meter testing. ERDA presently meets around 50% of all India Smart Meter Testing requirement.

With this prestigious contract and other testing assignment from utilities across India, ERDA is committed to build trust of people of Indian electricity consumers by ensuring excellent quality Smart Meters in the Indian power distribution sector.

ERDA IS ALSO RECOGNIZED AS ONE OF THE DESIGNATED LABORATORIES FOR TESTING OF SMART METERS WITH IEC 62056 COMMUNICATION PROTOCOLS BY MINISTRY OF POWER, GOVT. OF INDIA. ERDA IS HAVING ITS OWN IN-HOUSE EMI/EMC TESTING FACILITY REQUIRED FOR SMART METER TESTING. ERDA PRESENTLY MEETS AROUND 50% OF ALL INDIA SMART METER TESTING REQUIREMENT.



EMI /EMC TESTING AS PER MIL-STD-461

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

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

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

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

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

INSIGHT

PROCEDURE FOR PREAPPROVED COTS PRODUCTS REQUIRED

The Chinese COTS drones have penetrated the Indian Defence ecosystem because they are easily available, relatively inexpensive and still provide the results desired by the users. But it is extremely critical that the adoption of COTS products be controlled from a Data Security perspective to ensure national security

By **SAI PATTABIRAM**

The COTS (Commercial Off The Shelf) drones have been a major source of embarrassment for the Indian Army since 2015 with Pakistan claiming to shoot down Indian drones on multiple occasions while in fact, the drones in question were all Chinese manufactured DJI COTS drones.

This clearly points to the fact that Defence units have been procuring the Chinese DJI COTS drones and have been using them in preference to a similar class of products being offered by the Indian manufacturers. In fact, the huge population of these COTS drones over their Indian counterparts by 100 times indicates a clear preference for them at the Unit level. The Indian armed forces are not the only ones facing such problems. The ease of availability of the Chinese COTS drones coupled with restrictions on local manufacturing enabled these low-cost Chinese COTS drones to circumvent the stringent defence procurement system and penetrate right down to the frontline Unit level. In fact, with active support from the Chinese government by way of funding these COTS drones have turned out to be a significant incursion by a country inimical to Indian defence.

While the Chinese COTS drones unintentionally or otherwise have penetrated the Indian Defence ecosystem, their doing so has uncovered some very interesting facts: First, there is a strong demand for relatively-inexpensive COTS drones and secondly, the COTS products can be marketed to Defence units provided they deliver the outcomes users seek.

BLUE sUAS

The Defence Innovation Unit (DIU), a Department of Defence (DOD) organisation that accelerates commercial technology for national defence has approved a list of five US-manufactured drone configurations to provide trusted, secure small Unmanned Aircraft Systems (sUAS) options to the US govt.

The list of products, referred to as 'Blue sUAS' come from five different manufacturers: Skydio, Parrot, Altavian, Teal Drones, and Vantage Robotics. The initiative is a follow-up of DIU's Short Range Reconnaissance (SRR) programme, which worked with manufacturers to supply inexpensive, portable, and rapidly deployable small drones for the US troops.

India's Army Design Bureau (ADB), the equivalent of the US DOD's DIU is the ideal organisation that should create a similar 'Blue sUAS' list for Indian Defence Units to buy either on a published online price basis or on negotiated bulk discounts basis. The ADB should identify specific-use cases as may be required by end-users and get the manufacturers to customise their COTS drones for the specific application. These drones should be available for purchase on the government portals like GEM or a dedicated portal created by Indian Defence. Alternatively, the ADB could create a dedicated login-only portal for Defence units from which COTS products could be listed by interested Indian manufacturers on which Units can directly procure COTS products.

FULLY ATMANIRBHAR

ZUPPA's Ajeet Mini is one such fully Atmanirbhar COTS drone that can be immediately adapted to meet the various specific requirements of the Indian Defence units.

ZUPPA's control of the technology from the system architecture stage to product manufacturing and delivery ensures that Ajeet Mini can be adapted to a wide range of applications like:

1. Training Drone without camera
2. Basic ISR : Single Day & Night Camera
3. Advance Camera Drone : with 4K Video Recording camera
4. Survey and Mapping Drone with RTK/PPK
5. Tethered Drone
6. Swarm Drones
7. Loitering munitions

The Importance of creating an approved list of COTS Drones that can be directly procured by Defense units under their local purchase budgets is critical to mitigate the huge National Security threat caused by the unaccounted Chinese DJI drones across critical Defense assets and installations.

The uncontrolled procurement of Chinese DJI Drones at the Unit level clearly points to a fact that an appropriately priced COTS product will be used if found suitable. The stringent & tedious capital purchase rules will and can be bypassed for reasonable priced COTS products. It has also demonstrated that Defence requirements need not necessarily be of MIL standards. Additionally, it has also demonstrated that when technology-centric COTS products solve the immediate problems for frontline units they will always find a way to procure them given their field requirements.

THE INDIAN DEFENCE UNITS HAVE BEEN PROCURING THE CHINESE DJI COTS DRONES AND HAVE BEEN USING THEM IN PREFERENCE TO A SIMILAR CLASS OF PRODUCTS BEING OFFERED BY THE INDIAN MANU-FACTURERS

CONCLUSION

The 5th Generation Technologies are an electronic layer on top of existing equipment and resources, hence as we go forward in the adoption of these technologies, especially in areas such as unmanned systems, connected mobility and IoT, the clear lines between Defence and civilian use cases will blur significantly.

The adoption of COTS products and technologies in Defence will increase, hence it is extremely critical that the adoption of products be controlled by way of monitoring to ensure that a crucial factor like Data Security is effectively channelised.

–The author is Director of Sree Sai Aerotech Innovations Pvt Ltd.

SPOTLIGHT

MWIVEN IS GEARED UP TO PLAY ITS ROLE IN INDIA'S ATMANIRBHARTA IN DEFENCE

The contribution of start-ups is continuously on the rise and now exceeds 30 percent of the Indian defence ecosystem, and with the government's recent policy initiatives more and more start-ups are joining the Atmanirbharta in defence campaign

New Delhi: In last few years, the government with its renewed intent, policy reforms and focus towards self-reliance in defence though the Make in India initiatives, has given much needed support to Start-ups along with Micro, Small and Medium Enterprises (MSMEs), considering their pivotal role in building a robust Indian Defence Ecosystem.

R Jayaraghavendhar, MD, Mwiven Infra Tech Pvt Ltd

In an interaction with defence and strategic affairs quarterly Raksha Anirveda, R. Jayaraghavendhar, Managing Director of Tamil Nadu-based start-up Mwiven Infra Tech Pvt Ltd, said, "We are happy that the Government of India has allowed start-ups to be a part of building the Indian defence ecosystem and also extended all round support. We have a passionate and emotional connection with this journey."

The contribution of start-ups is continuously on the rise and now exceeds 30 percent of the Indian defence ecosystem, and with the government's recent policy initiatives more and more start-ups are coming forward to contribute and play their role in the Atmanirbharta in defence campaign.

About the role of start-ups in the defence sector, there is always the question about why trust a small player when big companies with large resources and investment backing should be a logical choice because the defence sector is highly capital-intensive.

Jayaraghavendhar says, in general the defence industry is not about economics (i.e, reduction of cost, increasing profits, innovation, job creation, investment, etc.). "As a matter of fact defence as an industry is all about 'Humanomics' – an interdisciplinary approach of creating social value with economical value for the men and women who are willing to sacrifice their lives for this great nation where we give meaning to their life."

"You might be wondering why Mwiven, a technology-driven start-up, instead of talking about product development, easing of policy initiatives, significance of start-ups adopting the Indian defence market, etc., is talking about creating social values. That's because like any other civilian in this country, I also had the mindset that defence is a 'No Go Area' and that it is full of bureaucratic and procedural hassles. But that is not true."

"According to me, any company involved in defence is a tool maker where your end user is putting his life at risk, and not just the taxpayers' money, on your products or services. Of course a lot of government procedures will need to be followed to ensure that we as an organisation that is smaller in size and having limited resources are capable enough to deliver the requirements of the armed forces."

"Like a typical entrepreneur, I was also excited about our entry into the defence industry, but it was only later that I realised the gravity of the responsibility that the government is entrusting upon us."

"It has been a wonderful journey of being a defence start-up but with lots of hardships. But it is a matter of pride for us that Mwiven has been given an opportunity to build systems that can protect them in the forms of tools that we build as per their requirements."

"After interacting with several defence personnel who are in service or who have retired it is my strong opinion that they are all normal human beings having the same problems and hurdles that a common man like me is facing, complaining about the system at large."

"As a start-up, what drives us today, or as we call it "soldier-on", is serving the real Heroes and Heroines of Defence; they are soldiers whose father/mother in general come from a humble background; they have the courage to fight against the enemy, they

are willing to sacrifice their life and become a legend that we often forget."

"According to me, any company involved in defence manufacturing is a tool maker whose only duty is to make something that protects the soldier's life and nothing else matters."

"The interesting commonality between a start-up and a soldier is that we both are training ourselves to survive where failure is not an option or an economic proposition. That is why start-ups are an important factor to this ecosystem where we try to participate even if it does not materialise into a purchase. It is more of a moral obligation rather than the opportunity to do something for this country where our failure will only lead to economic loss and not human life."

"Mwiven is determined to be design specific. Being design specific is the only thing that we feel can keep them protected," observes Jayaraghavendhar. "We have restructured our thinking process to create our own indigenous tools and designs... We have redefined our approach in working with local vendors. This way we are trying to participate in humanomics and not economics alone."

According to Jay, the mantra for the start-ups is patience and perseverance, and there will be a time when start-ups will be the starting point because the burn rate for a start-up is much lower compared to an established organisation. This in turn reduces the turnaround time in developing new technology for which we are often dependent on foreign firms. This is the key for others to follow in the run up to building a robust self-reliant Indian defence ecosystem.

Today's battlefield scenario has changed altogether. It's not the time of manoeuvrable war machines. Urban areas are coming up, and therefore there is a need for urban platforms. Now the war scenario is changing from conventional to unconventional. There is a need for smaller, lighter platforms that are quick and intelligence loaded. The focus is more on defence rather than deterrence.

"Therefore our objective is to develop and design platforms that are smaller in size and easy to carry and quickly deployable," says Jayaraghavendhar.

"Now is the time of the ultra-light platform, and our 'COBOTIC' is developed with the philosophy of Intelligence driven by humans, that means having intelligence but is human controlled. COBOTIC is nothing but a collaborative robotic network," he adds.

"This is the time of collaborative environment, where progressive information sharing happens. So we are looking for a platform that is C4ISR based, which is an intelligence-driven mechanism. We are switching from bigger to smarter, and that's where COBOTIC's utility comes in," says Jayaraghavendhar.

"If we don't sweat, they will bleed. Mwiven's fundamental philosophy is to understand that your mistake will hurt someone. Therefore, we work to protect the person who is protecting us. This way we develop a culture of responsibility in our organisation."

Jay considers DPP-2020 as one of the best policies of the government. This policy basically provides an opportunity to start-ups apart from the bigger players. With this, start-ups are legally permitted to participate in the Make in India policy.

"Mwiven is a start-up of accountability. We inculcate accountability in our work. We are more specific to our credo. We develop a culture to be accountable to people's lives. Although it is a difficult job, we at Mwiven are inculcating a culture of responsibility and accountability."

"Defence needs a lot of contributors who are willing to spend some time if not money in terms of technology development that is widely popular in the field of computers. There is a need for humanistic thinking at large. Our company wants to be that change where we at least can create an ecosystem where human sentiments do matter more than economics," says Jayaraghavendhar. "Earlier there were problems; now EODB has been regularised and this is a sea change that is allowing start-ups to be partners in the process. Now I can proudly say I am a start-up and I am in defence. It is actually surprising to see that the Government is encouraging the younger generation in problem solving."

"It is indeed a big step, allowing start-ups to be a part of a robust and evolving domestic defence ecosystem. It is just a tip of the iceberg; more start-ups will join in the next 10 years, and will deliver state-of-the-art defence platforms. The stigma of Indian projects/ products in defence will undergo a sea change."

"The proof of a start-up becoming a significant player in this domain is going to take time; acceptance has started and our unconventional will to fight continues,"

BUSINESS PROFILE

A LEADER IN MANUFACTURING OF PRECISION-GUIDED SYSTEMS AND AERIAL COMBAT VEHICLES

HALCON is an EDGE Group company and a leader in the end-to-end manufacturing of precision-guided systems and aerial combat vehicles. Established in 2017, the company innovates and develops high-performance and cost-effective products that enable its customers to neutralise specific targets and avoid collateral damage. HALCON relies on an impressive in-house research and development process, supported by one of the region's most advanced testing facilities delivering high-tolerance, high-precision components and sub-systems, finished through the company's full assembly line services.

With 500+ employees, three laboratories and eight manufacturing facilities, HALCON counts the UAE Armed Forces among its key clients. Commencing with detailed research into customer requirements and an in-depth look at market trends, the company's teams ensure that its systems are tested and delivered in compliance with leading military standards to ensure safety, performance and compatibility.

HALCON's work is complemented by in-house advanced manufacturing capabilities that deliver high-tolerance, high-precision components and sub-systems, finished through its full assembly line services. The company also designs, manufactures, assembles and integrates components for precision-guided munitions that can be customised to meet client requirements. Through leveraging emerging technologies, world-class intellectual property assets and its expertise at all points of the manufacturing value chain, HALCON's systems are known for their reliability. The company is passionate about upskilling staff and UAE nationals, and runs dedicated programmes in this regards.

THE COMPANY IS AT THE CUTTING EDGE OF DEFENCE INNOVATION AND BEYOND, AND RECENTLY UNVEILED ITS SHADOW 25 AND SHADOW 50 UNMANNED AERIAL VEHICLES (UAV); THUNDER SERIES AND DESERT STING FAMILY OF PRECISION GUIDED MISSILES; AND NASEF MISSILE. WE ARE ACTIVELY CONTRIBUTING TO RAISING THE UAE'S MANUFACTURING CAPABILITIES DOMESTICALLY, WHILE HELPING TO BUILD THE COUNTRY'S SOVEREIGN CAPABILITIES

The company is at the cutting edge of defence innovation and beyond, and recently unveiled its Shadow 25 and Shadow 50 unmanned aerial vehicles (UAV); Thunder series and Desert Sting family of precision guided missiles; and Nasef missile. We are actively contributing to raising the UAE's manufacturing capabilities domestically, while helping to build the country's sovereign capabilities.

Through leveraging emerging technologies, world-class intellectual property assets and its expertise at all points of the manufacturing value chain, HALCON's solution provide reliability.

HALCON also provides advisory, design and procurement services to help customers solve complex challenges. By redefining the art of machining, the company's Special Manufacturing division serves clients with advanced capabilities to include CNC machining, coating and surface treatment, cable harnesses, and printed circuit boards. Offering turnkey solutions through a comprehensive range of advanced surface coating and painting solutions, HALCON boasts the UAE's only cathodic electrodeposition (CED) coating facility and is the leading expert in providing military-grade anti-corrosion protection that helps assure performance.

EDGE Group has an ambition to be an international exporter of products, services, and expertise from the UAE to vetted customers, and HALCON supports this vision with a product line that is of export quality. HALCON is a firm supporter of collaboration and cooperates with numerous companies around the world, with one such example being Rheinmetall, the German defence contractor with which HALCON is developing an advanced C-RAM system, Skynex, to which HALCON is contributing its SkyKnight missile defence system.

Development of the original SkyKnight system commenced in August 2020 with a full strength team. Key milestones achieved in the first 12 months of development include the first missile tests out of a canister; full system requirement reviews for user needs and system design; subsystem design; and wind tunnel test model design and manufacturing.

EDGE Group had been developing a short-range air defence system, as has Germany-based Rheinmetall AG, which was actively seeking a missile system to form part of its Skynex air defence system. The companies decided to jointly offer a solution, with HALCON providing SkyKnight, the missile system, to the highly regarded Oerlikon Skynex Air Defence System, which sets new standards with its unique open architecture.

HALCON IS A FIRM SUPPORTER OF COLLABORATION AND COOPERATES WITH NUMEROUS COMPANIES AROUND THE WORLD, WITH ONE SUCH EXAMPLE BEING RHEINMETALL, THE GERMAN DEFENCE CONTRACTOR WITH WHICH HALCON IS DEVELOPING AN ADVANCED C-RAM SYSTEM, SKYNEX, TO WHICH HALCON IS CONTRIBUTING ITS SKYKNIGHT MISSILE DEFENCE SYSTEM

SkyKnight was purposely designed to counter the full spectrum of modern threats, providing early warning signals and precise surface-to-air intercept capabilities targeting of rotary-wing aircraft, UAV rockets, artillery, mortar, and other fixed-wing aircraft at a range of up to 10km. While the UAE Defence Force stands as the initial customer for SkyKnight, the system's integration into Skynex, as well as its standalone capabilities, is likely to see it deployed globally.

BUSINESS INITIATIVE

BRAHMOS MISSILE: REDEFINING INDIA'S DEFENCE PROWESS

With its two decades of stellar trajectory, BRAHMOS – the supersonic cruise missile is the "unparalleled leader" among worldwide precision strike weapons and a highly sought-after asset for a nation aspiring to build up a powerful and formidable military force….

Military technologies have changed and evolved over the years, giving way to advanced weapons, strategies and technologies. The 21st century world is bracing up for unprecedented military purchases as more and more number of countries are willing to acquire the best of defence platforms, equipment and systems to strengthen their armed forces.

Atul Dinkar Rane, DG (BrahMos), DRDO and CEO & MD of BrahMos Aerospace

The development and evolution of modern precision-guided missile systems has completely revolutionised warfare strategies and tactics in the battlefields. Supersonic cruise missile BRAHMOS - the "unparalleled leader" among worldwide precision strike weapons – has the desired capability and lethality to undertake high-value combat missions with speed, precision, power, stealth and universality. Armed with such incredible features, BRAHMOS has carved a distinct niche for itself as a highly sought-after asset for a nation aspiring to build up a powerful and formidable military force.

BRAHMOS, with a conventional warhead weighing 200 to 300 kg, is a two-stage missile with a solid propellant booster engine as its first stage which brings it to supersonic speed and then gets separated. The liquid ramjet or the second stage then takes the missile to Mach 3 speed in cruise phase. The missile has flight range of up to 290-km with supersonic speed all through the flight, leading to shorter flight time, consequently ensuring lower dispersion of targets, quicker engagement time and non-interception by any known weapon system. It operates on 'Fire and Forget Principle', adopting varieties of flights on its way to the target. Stealth technology and guidance system with advanced embedded software provide the missile with special features. Compared to existing state-of-the-art subsonic cruise missiles, BRAHMOS has 3 times more velocity, 2.5 to 3 times more flight range, 3 to 4 times more seeker range & 9 times more kinetic energy.

Given India's volatile neighbourhood, the invincible BRAHMOS missile has given the Armed Forces the much needed capability and punch to undertake deep surgical strikes in both land and sea, thus protecting its borders and annihilating enemy assets and installations when required. Indian Army, which became the first land force in the world to deploy the deadly BRAHMOS in 2007, has raised several regiments of the formidable weapon in different configurations. Similarly, for many of the Navy's frontline surface ships, BRAHMOS has been

deployed as a prime strike weapon. In its sub-sea launch configuration, the supersonic cruise missile is set to increase the Navy's underwater weapons delivery capability manifold by being armed in the future submarines. The Indian Air Force's (IAF) frontline fighter aircraft Sukhoi-30MKI, after being modified to carry 2.5 tonne missile integrated with a tonne launcher, has successfully demonstrated BRAHMOS missile's firing capability. The successful induction of BRAHMOS in all the three services has made India the first and only country in the world to complete the "supersonic cruise missile triad".

According to Atul Dinkar Rane, DG (BrahMos), DRDO and CEO & MD of BrahMos Aerospace, "The most formidable deterrent weapon, BRAHMOS has completely redefined modern warfare strategies. The universal precision strike missile having excellent network centric operational capability has emerged as the ultimate game-changer for highly intense battlefields."

Initiated as a Joint Venture (JV) military programme between India's DRDO and Russia's NPO Mashinostroyenia (NPOM) on 12 February, 1998, the tactical missile, designed and developed by the Joint Venture entity BrahMos Aerospace, has come a long way, charting milestones after milestones. The company was established in India through an Inter-Governmental Agreement between The Republic of India and The Russian Federation.

BrahMos Aerospace, with active participation of a consortium of Indian and Russian industries, has become a role model by integrating public-private industries from India and Russia as a consortium of 'Missile Industry Complex'. BrahMos Aerospace possesses a full-fledged design centre, a Missile Industrial Consortium for producing different sub-systems,

a world-class integration, and check-out facilities with stringent quality control, which involves over 200 small and medium Indian public and private defence sector enterprises and institutions.

BRAHMOS has also achieved historic milestones in the flagship "Make in India" programme by successfully indigenising major sub-systems taking the Indian contribution to seventy percent. All launcher systems for the weapon are being manufactured domestically. 100% of ground support equipment for the weapon complex are also being made in India.

BRAHMOS has emerged as a potential weapon of choice with several countries across continents evincing strong desire in the versatile weapon. Philippines in January 2022 signed a multi-million dollar defence contract with BrahMos Aerospace for the supply of shore-based anti-ship variant of the BRAHMOS supersonic cruise missile for Philippine Navy. This is the first export order for the missile. The contract was signed by Delfin N. Lorenzana, Defence Secretary of Philippines, and Atul Dinkar Rane, Director General of BrahMos Aerospace.

BrahMos Aerospace has successfully penetrated the international market with the most potent weapon system for precision strike and a Force Multiplier in

Network Centric Warfare.

BrahMos Aerospace now aims to take it to the next level by designing and developing even more lethal and powerful variants of the existing weapon, including a smaller, smarter BRAHMOS-NG (Next-Gen) for arming a wide range of modern military platforms which promises to revolutionise future warfare in a significant way.

BRAHMOS today is the world's leading supersonic cruise missile, with flight results which has established accuracy, reliability, ease of operation, fastest reaction time and practically no maintenance during storage. The state-of-the-art BRAHMOS missile has completely redefined new-age technology involving missile science and aeronautics.

BRAHMOS AEROSPACE HAS SUCCESSFULLY PENETRATED THE INTERNATIONAL MARKET WITH THE MOST POTENT WEAPON SYSTEM FOR PRECISION STRIKE AND A FORCE MULTIPLIER IN NETWORK CENTRIC WARFARE

ISRAEL DIARY

ISRAEL OFFERS SPACE TECHNOLOGY FOR IMPROVED SECURITY SYSTEM

The Israeli air and space force is now operating in one of the most critical areas for the country's security. In the list of its most versatile space systems, Israel has added a new concept for a communication satellite by introducing the Mini Communication Satellite (MCS), which is highly advanced and cost-effective

Ofek 16 Satellite

By **ARIE EGOZI**

When the Israeli air force some years ago changed its name to the 'air and space force' many thought that this was just a semantic change that does not describe a real change. They were wrong. The Israeli air and space force is now operating in one of the most critical areas for the security of Israel.

Israel has been active in space mostly for defence for many years. Launchers, satellites and ground stations are developed and manufactured mostly for Israeli needs, but now this advanced technology is offered to other clients that see the importance of space for their security. The most recent addition to the versatile list of space systems, developed in Israel, is the new concept for a communication satellite by introducing the MCS – a Mini Communication Satellite.

According to Israel Aerospace Industries (IAI), the country's main space company, the MCS is an advanced communication satellite weighing roughly 700 kg upon its launch and includes a complete digital communication payload weighing up to 200 kg. A full-size communication satellite has an average weight of 5000 kg. IAI says that due to its lightweight, the satellite can be launched together in rideshare with other satellites, this lowers the launch costs.

The Israeli company says that the new satellite has a life expectancy of no less than 14 years and is specifically designed to provide multi-zone communication services to customers or countries with diverse communication needs. The MCS uses an electrical propulsion system, developed specifically for this low-weight satellite.

The MCS was developed based on 30 years of IAI experience with various satellites and on the capabilities developed initially for Dror 1, designed and built by IAI for Israel's national communication needs. As the Dror 1 is aimed to serve the Israeli defence requirements most of

its planned capabilities were developed in-house by IAI, including an advanced digital communication payload and 'space smartphone' capabilities that provide the operators with flexibility throughout the satellite's mission life. In addition, the command programme and development architecture allow applications loading from a ground station during the satellite's in-space operation to adjust and modify assignments in accordance with changing communication needs.

IAI says that the MCS is fully digital with a flexible communication payload & applications; has high performance; has multi-band capabilities, with up to four steerable antennas; and is cyber protected. The MCS enables scalability, modularity, redundancy, and a short-term response to traffic demand. These qualities are, according to Israeli defence sources, essential to the planned use of this 'national' satellite.

According to Shlomi Sudri, general manager of IAI's space division, the mini-satellite MCS offers a new concept to the communication satellite market, serving as a complementary or a focused regional system. "The MCS allows IAI to offer full satellite capabilities at a competitive price and expand into new satellite markets. IAI is in touch with a number of customers globally," Sudri said.

Every satellite, is connected to a ground station that turns the raw data into actionable one. After a very focused development effort, IAI has unveiled the Blue Sphere, a cloud-based ground station for satellites. The company says that it significantly increases information received from the satellite and allows the satellite to communicate with Earth at any given moment.

IAI's NanoSat- BGUSAT

The setup of a virtual ground station in the cloud enhances the availability of the satellite output, reducing the dependence on 'satellite passing time' above a specific ground station. Instead, the satellite is able to broadcast the information collected to any available ground station worldwide. From there, the information is transferred immediately to the cloud, allowing the data to be extracted on demand, leaving it for the ground station to transfer or withdraw the information immediately without dependency on reception towers located in different stations worldwide.

In recent months, the Israeli need for space assets brought other Israeli companies to offer their technologies, first to the Israeli ministry of defence but with an eye on the international market. Israel launched and operates a number of very advanced spy satellites. But these low orbit spy satellites from the Ofeq series, visit 'areas of interest' in big intervals. Their optical or radar payloads cannot keep a persistent watch over the 'areas of interest', and when it comes to the ballistic missiles threat, this is a major problem. The Israeli ministry of defence contracted Rafale to develop 'special' Nanosatellites that will operate in swarms to allow Israel to get real-time warnings on evolving threats. The type of these satellites is classified but without any doubt, they will enhance Israel's capability to counter an attack of a country that has long-range ballistic missiles, namely Iran.

THE MCS IS FULLY DIGITAL WITH A FLEXIBLE COMMUNICATION PAYLOAD & APPLICATIONS; HAS HIGH PERFORMANCE; HAS MULTI-BAND CAPABILITIES, WITH UP TO FOUR STEERABLE ANTENNAS; AND IS CYBER PROTECTED

And the Israeli space

ISRAEL DIARY

NANOSATELLITES WILL ENHANCE ISRAEL'S CAPABILITY TO COUNTER AN ATTACK OF A COUNTRY THAT HAS LONG-RANGE BALLISTIC MISSILES, NAMELY IRAN

initiatives are growing in number and technology. IAI has recently teamed with a startup company to make special satellites that can service other satellites in space. IAI signed an agreement for technological and financial cooperation with Israeli startup company Effective Space. Effective Space plans to order from IAI a fleet of 'maintenance satellites' each weighing not more than 880 pounds.

The average life span of a communication satellite is 15 years. It gets out of service when the Hydrazine gas it carries is fully used and cannot help keeping it in its high orbit. The startup company is developing a method that will enable such a 'maintenance satellite' to attach itself to an 'old' satellite and serve as an altitude keeper by using the gas it holds in its tanks.

Astroscale US Inc last year announced that it decided to acquire intellectual property and other assets of Effective Space Solutions R&D Ltd (ESS). This is the first acquisition of an Israeli space technology company by a foreign company. Another Israeli company is developing a jell-based propellant that will change the way rockets and satellites are being operated.

According to 'New Rocket', conventional rocket engine technology in either solid or liquid form has many risks, including high toxicity, transportation challenges and produces rockets that are difficult to control or extinguish. New Rocket is developing proprietary gel technology enabling a stable and non-toxic engine propellant, without sacrificing performance and control. According to the company, the 'green propulsion' technology combines all the advantages of both liquid and solid propellants. According to New Rocket, the new propellant is safe to use and transport. The company said that the propellant will improve rocket performance, offering a powerful thrust that can be controlled and extinguished when needed. "New Rocket's gel propulsion technology is designed to meet the strictest industry regulations," a company source said.

The company has successfully completed a proof of concept for the proprietary technology and identified key applications for the aviation, space and power generation markets. The company said that existing satellite propulsion systems are currently too expensive or toxic, and often limit the Nanosatellite's performance. These restrictions, according to New Rocket, lead to a dramatic reduction in satellite lifespan and make operating large constellations prohibitively difficult, especially in very low earth orbits (VLEO).

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

Unravelling CIVIL AVIATION

SPICEXPRESS AND NEWSPACE RESEARCH SIGN MOU FOR LONG-RANGE, HEAVY-LIFT UNMANNED CARGO DELIVERY PLATFORM

New Delhi: India's largest air logistics company, SpiceXpress have signed a collaborative memorandum of understanding (MoU) with NewSpace Research and Technologies Pvt Ltd (NRT), India's leading domestic provider of intelligent UAVs to the Indian Defence forces, to build a product line of next generation heavy lift, long range cargo UAVs.

The memorandum of understanding (MoU) was signed by Sanjiv Gupta, CEO, SpiceXpress and Julius Amrit, Co-Founder and Chief Operating Officer, NewSpace Research and Technologies Pvt Ltd in New Delhi.

The flagship UAV in the product line is a 150 Kg UAV (HL 150) being developed by NewSpace Research. These UAVs will carry a payload of 150 kg over a distance of 150 km in the Directorate General of Civil Aviation (DGCA) notified cargo lanes. The HL 150 will have multiplexing technologies that combine NRT's patent-pending swarming technologies with advanced hub & spoke sorting systems. This will shrink hours of transportation and handoff times associated with ground vehicles and reduce delivery times in the middle mile by over 50%.

SpiceXpress will also work towards integrating these capabilities with their widespread air cargo networks, which will make express delivery services accessible to their customers and businesses in Tier 2, 3 cities and rural India.

Geared mainly towards e-commerce logistics, express and reverse logistics, the efficiencies will benefit consumers and businesses in medical supplies, perishable goods, and others in manufacturing hubs and industrial zones.

The forward-looking drone policy of India's Ministry of Civil Aviation (MoCA) released on August 26, 2021, which is focused on making India a drone operations & manufacturing hub by the end of this decade and increasing use cases in improving middle mile productivity are the building blocks of this partnership.

NEWLY LAUNCHED ACJ TWOTWENTY COMPLETES FIRST FLIGHT

Mirabel. The ACJ TwoTwenty launched just over a year ago, completed its first flight from the Mirabel airport on 14 December 2021. The production test flight was performed by Christophe Marchand and Adam Mason as Test Pilots and supported by Romuald Scheling as Flight Test Engineer.

The aircraft will be delivered to Comlux in the coming weeks and then outfitted with a VVIP cabin by COMLUX in Indianapolis, USA after the delivery. Comlux has been selected as an exclusive outfitting partner for the first 15 ACJ TwoTwenty aircraft.

The ACJ TwoTwenty is a new value proposition to business aviation buyers. The innovative solution combines intercontinental range enabling the aircraft to fly up to 5,650 nm/10,500 km (over 12 flight hours), unmatched personal space providing comfort for each passenger with 73m2/785 ft2 of floor space.

The ACJ TwoTwenty is the only business jet featuring six wide VIP living areas, of around 12m2/130 ft2 each and is at a price point of a ULR bizjet. Equipped with a signature flexible cabin catalogue, this fully completed aircraft is ideal for private and business jet users.

Some 200 Airbus corporate jets are in service worldwide, flying on every continent, including Antarctica.

BUDGET 2022: NO SUPPORT FOR AVIATION SECTOR

New Delhi. The aviation industry which was expecting some support from the Budget 2022-23 in terms of reduction in excise duty and concessional finance, were left disappointed.

Struggling to overcome several disruptions caused due to Covid-19, their path to recovery remains distant as of now. A strong support from the government at this stage would have firmly supported the sector's early signs of recovery being witnessed for past two-three months.

IndiGo's CEO Ronojoy Dutta, after the Budget was quoted in a media statement, "We were expecting tax concession to Aviation industry in the forms of cut in ATF excise duty and allocation of concessional finance to airlines to help us come out of the pandemic."

In her budget speech, Finance Minister mentioned that airports would power the economic growth as a part of the PM Gati Shakti programme. But the details on how this would be achieved, or the timelines were missing. Similarly, there was no mention about aviation industry's key demands for cut in airport charges, customs duty and relook at IGST charged on parts sent abroad for repair and come back.

"India's Union Budget 2022 had nothing for aviation or tourism. This was highly disappointing & insensitive given the near-broken state of these sectors, although somewhat expected. Industry will be pinning its hopes – as in the past – on post-Budget redressal," Aviation consultancy firm Centre for Asia Pacific Aviation (CAPA) said in a statement.

Commenting on the Budget, Ashmita Sethi, President & Country Head, Pratt & Whitney said, "We congratulate the government on a strong, inclusive and growth focused budget in 2022. We believe that the far-sighted measures for energy transition, climate action, and advancing defence R&D with the private sector will be crucial towards securing India's bright future. We would have liked to see additional aviation specific reforms this year, as the sector battles the significant impact of the pandemic."

Ashmita Sethi

Ronojoy Dutta

The aviation industry is vital for the growth of the Indian economy and with government's failure to address their concerns, clearly indicates that it was a missed opportunity.

IMPORTED DRONES BANNED WITH EXCEPTIONS

New Delhi: The government February 9 banned the import of foreign drones with certain exceptions as part of efforts to promote the domestic manufacturing of drones. The import of drones for R&D, defence and security purposes have been exempted from the ban but such imports will require due clearances.

"Import of drone components, however, shall not require any approvals," the civil aviation ministry said in a release. The Directorate General of Foreign Trade (DGFT) under the commerce and industry ministry has issued a notification banning the import of foreign drones. "Import policy for drones in CBU (Completely Built Up)/ CKD (Completely Knocked Down)/ SKD (Semi Knocked Down) form... is prohibited with exceptions provided for R&D, defence and security purposes," DGFT said.

Import of drones by government entities, educational institutions recognised by central or state government, the government recognised R&D entities and drone manufacturers for R&D purposes will be allowed in CBU, SKD or CKD form. This will be subject to import authorisation issued by DGFT in consultation with concerned line ministries. The civil aviation ministry said that in order to promote Made in India drones, the import of foreign drones has been prohibited with effect from February 9, 2022. The ministry came out with liberalised drone rules in August 2021. After the rules, the ministry issued the drone airspace map and PLI scheme in September 2021, the UTM policy framework in October 2021. Besides, the drone certification scheme and single window DigitalSky Platform were put in place last month.

LAUNCH OF AIRBUS ATLANTIC, A NEW GLOBAL PLAYER FOR AEROSTRUCTURES

Toulouse. A wholly-owned Airbus subsidiary, Airbus Atlantic, a global player in the aerostructures field, was officially established on 1st January 2022. The new company groups the strengths, resources and skills of Airbus's sites in Nantes and Montoir-de-Bretagne, the central functions associated with their activities, as well as the STELIA Aerospace sites worldwide. This unification is part of the transformation project announced in April 2021, aimed at strengthening the value chain of aerostructure assembly within Airbus's industrial setup, this activity being considered as core business. It marks the intention to gain competitiveness, innovation and quality for the benefit of Airbus's programmes of today and tomorrow.

As such, Airbus Atlantic will be an essential element in the group's value chain and will play a key role with regard to the aerostructure supply chain, with more than 500 direct suppliers (flying products) and more than 2,000 indirect suppliers (general procurement products). With an estimated business volume of around 3.5 Bn euros, Airbus Atlantic is the world number two for aerostructures, world number one for pilot seats and ranks in the top three for Business Class and First Class passenger seats, which continue to be marketed under the STELIA Aerospace brand.

KUWAIT'S JAZEERA AIRWAYS CONFIRMS ORDER FOR 28 NEW A320NEO FAMILY AIRCRAFT

Singapore. Jazeera Airways, the Kuwaiti-based carrier, has firmed up an order with Airbus for 28 aircraft, including 20 A320neos and eight A321neos. The order confirms the Memorandum of Understanding announced in November 2021. The A320neo Family incorporates the very latest technologies including new generation engines, Sharklets and aerodynamics, which together deliver 20% in fuel savings and CO2 reduction compared to previous generation Airbus aircraft. The A320neo Family has received more than 7,400 orders from over 120 customers.

ASIA-PACIFIC REGION WILL NEED OVER 17,600 NEW AIRCRAFT BY 2040

Singapore. In the next 20 year passenger traffic growth of 5.3% per annum and accelerated retirement of older less fuel efficient aircraft will see the Asia-Pacific region require 17,620 new passenger and freighter aircraft. Nearly 30% of these will replace older less fuel efficient models. In a region which is home to 55% of the world's population, China, India and emerging economies such as Vietnam and Indonesia will be the principal drivers of growth in Asia-Pacific. GDP will grow at 3.6% per year compared to the world average 2.5% and double in value by 2040. The middle class, who are the likeliest to travel, will increase by 1.1 billion to 3.2 billion and the propensity for people to travel is set to almost triple by 2040. Of the demand for 17,620 aircraft, 13,660 are in the Small category like the A220 and A320 Family. In the medium and long range categories, Asia-Pacific will continue to drive demand with some 42% of global requirement. This translates to 2,470 Medium and 1,490 Large category aircraft. Cargo traffic in Asia-Pacific will also increase at 3.6% per annum, well above the global 3.1% average and will lead to a doubling in air freight in the region by 2040.

GE AVIATION TO PARTNER WITH BOEING ON HYBRID ELECTRIC FLIGHT TEST DEMONSTRATION PROGRAM

Evendale, Ohio. GE Aviation has selected Boeing to support flight tests of its hybrid electric propulsion system using a modified Saab 340B aircraft and CT7-9B turboprop engines. Boeing and its subsidiary Aurora Flight Sciences will provide GE Aviation with airplane modification, system integration and flight-testing services. That work includes nacelle manufacturing, flight deck interface design and software, aircraft-level performance analysis, and systems integration.

Previously, NASA and GE Aviation announced the launch of a new research partnership to mature a megawatt (MW) class hybrid electric propulsion system to demonstrate flight readiness for single-aisle aircraft. Plans are to conduct ground and flight tests in the mid-2020s. The program, part of NASA's Electrified Powertrain Flight Demonstration (EPFD) project, is a total $260 million effort including investments from NASA, GE Aviation, Boeing and other partners over five years. Aircraft systems engineering and testing work will be based at Aurora's headquarters in Manassas, Va., with nacelle manufacturing taking place in its facilities in Mississippi and West Virginia. GE Aviation has been maturing components of high-power hybrid electric systems for more than a decade, including motors, generators power convertors and power management systems. The electrification technologies GE Aviation is advancing are highly compatible with Sustainable Aviation Fuel and hydrogen, as well as advanced engine architectures such as the open fan and new compact engine core designs. Hybrid electric propulsion technologies can save fuel and optimize engine performance, helping the aviation industry reach its commitment of net-zero CO2 emissions from flight by 2050.

BOEING LAUNCHES 777-8 FREIGHTER TO SERVE GROWING DEMAND FOR CARGO, ENHANCED ENVIRONMENTAL PERFORMANCE

WASHINGTON. Boeing has launched the new 777-8 Freighter and expanded its market-leading 777X and freighter families of jetliners with an order for up to 50 aircraft from one of the world's largest cargo carriers, Qatar Airways. Qatar Airways will be the 777-8 Freighter launch customer with a firm order for 34 jets and options for 16 more, a total purchase that would be worth more than $20 billion at current list prices and the largest freighter commitment in Boeing history by value. The order also supports hundreds of U.S. suppliers from across 38 states, will sustain more than 35,000 U.S. jobs, and provide the American economy with an annual estimated economic impact of $2.6 billion during the contract's delivery period.

Featuring advanced technology from the new 777X family and the proven performance of the market-leading 777 Freighter, the 777-8 Freighter will be the largest, longest-range and most capable twin-engine freighter in the industry. With payload capacity nearly identical to the 747-400 Freighter and a 25% improvement in fuel efficiency, emissions and operating costs, the 777-8 Freighter will enable a more sustainable and profitable business for operators. First delivery of the new freighter is anticipated in 2027.

Boeing is designing the 777-8 Freighter, the newest member of the 777X family, to maximize efficiency and environmental performance. The widebody family features engineering design improvements and innovative technologies, including a new carbon-fiber composite wing and new fuel-efficient engines. With a range of 4,410 nautical miles (8,167 km), the 777-8 Freighter has a maximum structural payload of 118 tonnes, allowing customers to make fewer stops and reduce landing fees on long-haul routes.

Boeing will build the 777-8 Freighter in its Everett, Wash., factory. The company has invested more than $1 billion into the Everett site to support 777X production and sustain thousands of local jobs for decades to come.

As part of today's agreement, Qatar Airways will convert 20 of its 60 777X family orders to the 777-8 Freighter. Qatar Airways is also ordering two current 777 Freighters – Boeing's best-selling freighter of all time – to capitalize on the buoyant air cargo market. Customers from around the world have ordered more than 300 777 Freighters since the program began in 2005.

AKASA AIR TO START FLIGHTS IN LATE MAY

New Delhi: Akasa Air is aiming to start flights in late May or early June 2022 after getting its first Boeing 737 MAX aircraft in April. The airline seeks to further democratise air travel with dependable and affordable services.

Backed by ace investor Rakesh Jhunjhunwala- Akasa Air is looking to have 18 planes in its fleet by the end of March 2023 and is bullish on the long term growth potential of the country's civil aviation sector.

According to Akasa Air CEO Vinay Dube, the long term future of commercial aviation in India, is as exciting as anywhere in the world. Akasa Air, will take off as a low-cost carrier and has placed an order for 72 Boeing 737 MAX planes, which are fuel efficient. To begin with, Akasa Air will have services from metros to Tier II and III cities.

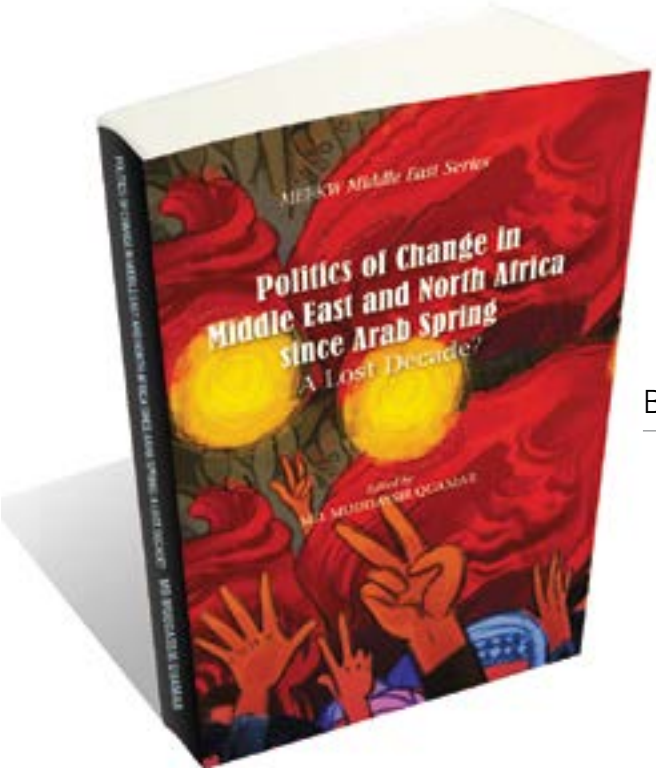
The civil aviation space, especially the airlines, has been significantly impacted by the pandemic and as the emergence of the Omicron variant has dealt another blow to the recovery path of the sector.

International services are very much part of Akasa Air's future plans and the airline targets to start overseas flights in the second half of calendar year 2023 once there are 20 planes in its fleet. Under Indian regulations, a domestic airline should have at least 20 aircraft in its fleet before it can commence international flights. Last year, Akasa Air, a brand of SNV Aviation, placed an order for 737 MAX planes with Boeing. The order was valued at nearly $9 billion at list prices and includes 737-8 and high-capacity 737-8-200 aircraft.

BOOK EXCERPT

ARAB SPRING: A LOST DECADE?

The historic Arab Spring uprisings generated hopes for democratic transformations in the MENA region. But the situation turned into despair, death and destruction. The powerful regimes found ways to cling to power, increasing the geopolitical tensions and rivalries. Still, some key trends are likely to define the politics and society of the region in the times to come.



By **MD MUDDASSIR QUAMAR**

Politics of Change in Middle East and North Africa since Arab Spring: A Lost Decade?
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The Arab Spring protests were historic in many ways. The uprisings that began in Tunisia were unprecedented because they affected the whole region and no country in the Middle East and North Africa (MENA) remained completely untouched by the protest movements. No aspects of life—political, economic, strategic, social and cultural—remained immune from its impact. The protests set off a series of events in the region and shook the foundations of many long-serving dictatorial regimes forcing leaders such as Zein El Abidine Ben Ali in Tunisia, Hosni Mubarak in Egypt, Ali Abdullah Saleh in Yemen and Muammar Gaddafi in Libya to either step down or flee. Syria's Bashar al-Assad faced mounting internal and external pressure to abdicate. He managed to survive but not without triggering a decade-long and ongoing civil war.

The early successes of the uprisings generated hopes for democratic transformations in the Arab world. However, ten years later, the hopes have given way to despair, death and destruction. The optimism of the early days of Arab Spring was crushed by the deep state's propensity to survive and reinvent accompanied by the vagaries of realpolitik and the rise of radical ideologies. Powerful regimes or their remnants found ways to fight back and cling to power enlisting support from their regional or external benefactors. This, nonetheless, sharpened the geopolitical tensions and rivalries.

IN SYRIA, DUE TO THE IRANIAN AND RUSSIAN MILITARY INTERVENTIONS, THE ASSAD REGIME SURVIVED BUT NOT BEFORE THE ENSUING CONFLICT RAVAGED THE COUNTRY

The limitations of the uprisings had become evident in the first two years (2011-2012). Except for Tunisia, wherein the local actors preferred to accommodate differences and committed to electoral politics, and for an interim period in Egypt, with its short-lived experiment with an elected government led by Mohammed Morsi (June 2012- July 2013), no country showed any promise for political change. The refusal of Assad and Gaddafi to heed the people's demand for political change, and the use of force to crush the budding opposition, led to bloody civil wars in Syria and Libya, causing unforeseen death and destruction. In Libya, an ill-conceived North Atlantic Treaty Organisation (NATO)-led military intervention forced Gaddafi to relinquish power and go into hiding, only to meet a violent death in October 2011. The vacuum fuelled the tribal infighting to control the vast mineral and hydrocarbon resources and proliferation of Islamist terrorists resulting in a prolonged civil war. In Syria, due to the Iranian and Russian military interventions, the Assad regime survived but not before the ensuing conflict ravaged the country.

In Yemen, despite early signs of a possible smooth transfer of power from Saleh to his deputy Abdrabbuh

Mansur Hadi due to the Gulf Cooperation Council (GCC) mediation, the situation deteriorated due to the Houthi rebellion in 2014-15 and the proxy war for regional influence between Iran and Saudi Arabia. In Bahrain, which also witnessed serious protests in early 2011, the monarchy survived due to the GCC's Peninsula Shield Force (PSF). The PSF led by Saudi forces proved instrumental in containing the protests. Nevertheless, the most serious reversal against the hope for democratic change came with the end of the democratic experiment in Egypt after the military takeover in July 2013.

The internal strife and violence faced by several countries after the uprisings raised questions about the future of the Arab Spring. Even as a bigger challenge emerged in the form of ad-Dawlah al-Islāmiyah fī'l-'Irāq wa-sh-Shām (the Islamic State in Iraq and Levant or ISIL), also known as Islamic State in Iraq and Syria (ISIS) or merely as ad-Dawlah al-Islāmiyah (Islamic State) and by its Arabic acronym Daesh. The terror spread by the breakaway group of Al-Qaeda in Iraq (AQI) and the pseudo-state it established in Iraq and Syria created havoc in the region, and its ripple effects were felt far and beyond. Temporarily, the international and regional powers came together to fight the challenge, and Daesh was militarily defeated in 2017 with the fall of Mosul and Raqqa. As a result, the threats from Daesh weakened, but the humanitarian crises in Syria, Libya and Yemen continue to pose a challenge for the region and international community.

Despite the failures of the protest movement to bring any significant positive change except in Tunisia, and the violent conflicts and terrorist threats it produced, the hope for a better future among the people, both men and women, especially among the youths, has not entirely diminished. If at all, those aspiring for participatory politics, a just society and economic prosperity continue to express their demands, grievances and disgruntlement against existing political and social structures as was witnessed in Algeria, Oman, Sudan, Lebanon, Iraq and other countries in 2018 and 2019.

THOSE ASPIRING FOR PARTICIPATORY POLITICS AND A JUST SOCIETY CONTINUE TO EXPRESS THEIR DEMANDS AGAINST THE EXISTING POLITICAL AND SOCIAL STRUCTURES AS WAS WITNESSED IN ALGERIA, OMAN, SUDAN, LEBANON, IRAQ AND OTHER COUNTRIES IN 2018 AND 2019

A decade since the eruption of Arab Spring protests in MENA, the region confronts popular disenchantment, protests and mass mobilisation. The larger challenges remain. Problems of a closed political system, economic struggles, poverty, unemployment, poor economic opportunities, crony capitalism and rampant corruption, lack of quality education and exclusion of women and minorities are visible throughout the region. On the other hand, every affected country faces a unique challenge that requires specific solutions. For example, Iraq needs to disarm various militias loyal to different tribal, ethnic and sectarian leaders either by disbanding them or bringing them within the fold of the Iraqi security forces. Likewise, Libya requires the exit of all foreign mercenaries to succeed in its national dialogue process to bring a durable political solution. On the other hand, Syria will have to find a way to deal with the Kurdish and Sunni opposition groups and accommodate its huge refugee population in neighbouring counties to end the civil war.

The hopes and despair generated by the Arab Spring protests and its aftermath have underlined some key trends that are likely to define the politics and society of the MENA region in the times to come. Some of these, including demands for democratisation, continuation of old elites, need for economic reorganisation, political Islam including its radical, extremist and jihadist manifestations, women's right and their increased role in public life, transformation of media and communication landscape, regional geopolitical competition and continued influence of external powers are discussed in this volume.

–This is an excerpt from the book Politics of Change in Middle East and North Africa since Arab Spring: A Lost Decade? (Knowledge World, 2022) and has been published with the permission of the author and publisher. Link: http://kwpub.in/Home/product/9789391490768/politics-of-change-in-middle-east-and-north-africa-since-arab-spring-a-lost-decade#-

APPOINTMENTS

LT GEN MANOJ PANDE TAKES CHARGE AS VICE CHIEF OF THE ARMY STAFF

New Delhi. Lt Gen Manoj Pande took charge as the new Vice Chief of the Indian Army on February 1, succeeding Lt Gen C P Mohanty.

Lt Gen Pande was serving as the Eastern Army Commander before assuming the new role. He has tenanted important staff assignments and was posted as Chief Engineer at the United Nations Mission in Ethiopia and Eritrea. He was Director-General at Army Headquarters dealing with subjects of discipline, ceremonial and welfare.

An alumnus of the National Defence Academy, he was commissioned into the Corps of Engineers (The Bombay Sappers) in December 1982. He is a graduate of Staff College, Camberley (United Kingdom) and attended the Higher Command Course at Army War College, Mhow at Indore in Madhya Pradesh and National Defence College (NDC) at Delhi.

During his 37 years of distinguished service, he took an active part in Operation Vijay and Operation Parakaram.

REAR ADMIRAL KP ARVINDAN TAKES OVER AS ADMIRAL SUPERINTENDENT OF NAVAL DOCKYARD (MUMBAI)

Mumbai: In an impressive ceremony, Rear Admiral KP Arvindan took charge as Admiral Superintendent of Naval Dockyard from Rear Admiral B Sivakumar, on January 14.

Rear Admiral Arvindan, an alumnus of Naval College of Engineering, INS Shivaji, Lonavla, is from the first batch of the Naval Engineering Course and was commissioned into the Indian Navy in November 1987. The Admiral holds a B-Tech degree in Marine Engineering and a M-Tech degree in Industrial Engineering from NITIE, Mumbai.

In a career spanning over 34 years of service, the Admiral served in various capacities, including at command headquarters, training establishments, the marine gas turbine overhaul centre, INS Eksila, and Naval Dockyard, Mumbai. He has served onboard a Petya class patrol vessel, the missile corvette Kirpan and guided missile destroyers Rajput and Ranjit. His recent appointments include being the Commanding Officer of the premier training establishment, INS Shivaji, and Commodore (Fleet Maintenance), an assignment he handled for a period of four years, handling issues related to maintenance and repair support for the aircraft carrier, Vikramaditya, and the submarine fleet of the Indian Navy.

On promotion to the flag rank, the officer was appointed as Admiral Superintendent, Naval Ship Repair Yard, Karwar. A recipient of the Vishisht Seva Medal, the Admiral was serving as Chief Staff Officer (Technical) at Headquarters, Western Naval Command, prior to taking over the present assignment.

VICE ADMIRAL PUNEET K BAHL TAKES OVER AS THE COMMANDANT, INDIAN NAVAL ACADEMY, EZHIMALA

New Delhi. Vice Admiral Puneet K Bahl took over as the Commandant, Indian Naval Academy, Ezhimala on December 26, 2021. The Flag Officer was commissioned into the Indian Navy on July 1, 1984. An alumnus of NDA Khadakvasla, he has undertaken the Staff Course at DSSC Wellington and the Naval Higher Command Course at College of Naval Warfare, Mumbai. An experienced Maritime Reconnaissance Pilot, he has flown six different types of aircraft. His operational experience includes active participation in flying operations in Op Tasha and Op Vijay. He is also a qualified Ship's diver. He has held a wide array of challenging operational, staff and training assignments.

He has had tenures at INS Garuda, INS Rajali, AFS Yelhanka and CGAS 700 whilst on flying duties and ship tenures onboard INS Vikrant, Betwa, Godavari, Sujata and Porbandar. His training and staff assignments include tenures as Directing Staff at DSSC Wellington and JDNAS (Aviation Plans) at Naval Headquarters, where he successfully steered cases for aircraft inductions and drafted the Naval Aviation Perspective and Infrastructure plans. His command tenures include the guided missile frigate INS Betwa, offshore patrol vessel, INS Sujata and INS Rajali, one of the premier strategic airbases of the country. Whilst in command of Rajali, he successfully oversaw the smooth induction and operationalization of the P8I aircraft from the base, which was awarded with the Unit Citation by the Chief of the Naval staff during his tenure.

He was also based at the Embassy of India at Tokyo from 2007–10 as the Defence Attache, Japan with concurrent accreditation to Republic of Korea, where he was instrumental in coordinating and facilitating a landmark Joint Declaration on Security Cooperation between India and Japan and also for drawing up an action plan for furthering defence and security Cooperation between the two countries.

VICE ADMIRAL TARUN SOBTI TAKES CHARGE AS DIRECTOR GENERAL, PROJECT SEABIRD

New Delhi. Vice Admiral Tarun Sobti assumed charge as Director General, Project Seabird/ IHQ MoD (Navy) from Vice Admiral Puneet K Bahl on December 24, 2021. Vice Admiral Tarun Sobti was Commanding Eastern Fleet prior assuming his present appointment and was commissioned into the Indian Navy on July 1, 1988. He is an alumnus of the 72nd Course, National Defence Academy, Khadakvasla, and was awarded the President's Gold Medal on passing out. He was the recipient of the 'Binoculars' during Sea Cadet Training, Sword of Honour during Midshipmen training and Adm RD Katari Trophy for standing first during Sub Lt Courses. The Flag Officer is a Navigation and Direction specialist, where he stood first in the Course and was adjudged the Best All-round Trainee.

He has undergone the Command and Staff Course from France during 2002-2003 and the Naval Higher Command Course in 2009-2010, where he has awarded the CNS Gold Medal for Best Op Paper. His afloat appointments include Navigating Officer of INS Kirpan, commissioning Navigating Officer of INS Mysore, Direction Officer, INS Viraat and Executive Officer, INS Delhi.

REAR ADMIRAL SANJAY BHALLA TAKES OVER COMMAND OF THE EASTERN FLEET

New Delhi: Rear Admiral Sanjay Bhalla took over the Command of the Eastern Fleet, the Sword Arm of the Eastern Naval Command, from Rear Admiral Tarun Sobti on December 20, 2021.

Rear Admiral Sanjay Bhalla was commissioned into the Indian Navy on January 1, 1989 and is a specialist in Communication and Electronic Warfare. The Flag Officer is an alumnus of the Defence Services Staff College, Wellington; College of Naval Warfare, Mumbai and Royal College of Defence Studies, London.

During his illustrious career spanning 33 years, he served onboard several capital ships as Signal Communication Officer. His sea commands include those of missile vessel INS Nishank, anti-submarine warfare frigate INS Taragiri and guided-missile frigate INS Beas.

His prestigious staff and operational appointments include those as Training Commander at the Indian Naval Academy, Director at Maritime Doctrine and Concepts Centre and Naval Assistant to the Chief of Naval Staff. He also served as the Naval Adviser at the High Commission of India, Islamabad. Prior to assuming command of the Eastern Fleet, the Flag Officer was Assistant Chief of Personnel (Human Resource Development) at Integrated Headquarters (Navy), New Delhi.

BOEING NAMES ALAIN GARCIA AS VICE PRESIDENT OF BUSINESS DEVELOPMENT FOR ITS DEFENCE AND SERVICES BUSINESS IN INDIA

NEW DELHI. Boeing announced January 11 the appointment of Alain Garcia as the vice president of business development for its defence and services business in India, effective immediately. Garcia will be based in New Delhi.

Garcia will build on Boeing's presence in the country, leading business growth, strengthening customer relationships and pursuing new defense and services opportunities. He will report to Maria Laine, vice president, international business development at Boeing Defense, Space & Security and Government Services. Garcia succeeds Michael Koch, who has moved to another role with Boeing Defense, Space and Security in the United States.

Garcia joined Boeing in 2008 and has held several leadership positions within the company across several functions and locations including Europe, United States, Asia and Middle East, Turkey and Africa. He began his career at Boeing as a pilot instructor and has held several pilot training specialist roles.

Before joining Boeing, Alain served in the US Navy as a naval aviator and instructor with over 2,000 flying hours on multiple aircraft, including the F/A-18. During his time in the Navy, he served four years as part of Forward Deployed Naval Forces in Japan as part of Carrier Air Wing 5, made seven deployments, two of which were combat deployments, and amassed over 75 combat missions at the start of both Operation Enduring Freedom and Operation Iraqi Freedom. Alain has over 450 carrier landings and has earned numerous awards and decorations.

PARAM VIR CHAKRA AWARDEE SUBEDAR MAJOR YOGENDRA YADAV (RETD) JOINS THE ADVISORY BOARD OF UDCHALO

Pune. udChalo, a leading consumer technology company that exclusively serves India's defence forces, veterans and their dependents, appointed Subedar Major Yogendra Yadav (Retd.) PVC – a celebrated Kargil war hero to its advisory board on army day. This appointment is aimed to further strengthen its consumer insight and personalise the offering for the discerning customer base. The war veteran brings with him in-depth knowledge of udChalo's customer base. His experience through various ranks in the army gives him an upper hand in understanding the pulse of the fraternity which will further catapult the growth of udChalo by rolling out relevant services for udChalo users. With its mission to

make lives simpler for soldiers, udChalo always needs an insider perspective of problems faced by army personnel and their families. Having a decorated army veteran in their advisory board will greatly help udChalo in pinpointing the pertinent and crucial issues faced by defence personnel and bring up ways to resolve those problems.

RAFAEL APPOINTS DR JUDITH HOCHERMAN-FROMMER AS EVP FOR RESEARCH AND DEVELOPMENT

Haifa: Rafael Advanced Defense Systems has appointed Dr Judith Hocherman-Frommer as its incoming Executive Vice President for Research and Development. Dr Hocherman-Frommer holds a Doctor of Science (Sc.D.) in Electrical Engineering from the Technion. Since joining Rafael nearly twenty years ago, Dr Hocherman-Frommer has held several senior engineering, and research and development positions within the company. Today, she is the Deputy Head of Research and Development in Rafael's Air and Intelligence Systems Division.

EDGE GROUP MAKES STRUCTURAL CHANGES TO ITS EXECUTIVE LEADERSHIP TEAM

Abu Dhabi – UAE: The UAE's EDGE Group has reorganised its Board of Directors, as it prepares for the next phase of growth as one of the world's leading advanced technology groups for defence and beyond.

His Excellency Faisal Al Bannai, who remains at the helm of EDGE, assumed the new role of Executive Chairman of the Board of Directors at the group.

Based at EDGE Group's headquarters in Abu Dhabi, Mansour Mohamed AlMulla joined EDGE as Managing Director and Chief Executive Officer.

AlMulla's professional career has spanned 22 years to date, with successful tenures in several leadership positions at major corporations in the UAE, including most recently as Group Chief Investment Officer at ADQ, and various senior management positions at Mubadala Investment Company, including Chief Financial Officer at Mubadala Petroleum. He is also a Board member of Abu Dhabi National Energy Company PJSC 'Taqa', Abu Dhabi Ports Company PJSC, Abu Dhabi Global Market, and Etihad Aviation Group PJSC. Other members of the new Board of Directors include Kamal Al Maazmi, Khalifa Al Suwaidi, Mohamed Saif Al Ariyani, Saeed Al Mazrouei, and Samer Saleh Abdulhaq.

LOCKHEED MARTIN NAMES JAY MALAVE AS CHIEF FINANCIAL OFFICER

BETHESDA, Md., Lockheed Martin announced the appointment of Jesus "Jay" Malave as the company's next chief financial officer, effective immediately. Malave most recently held the positions of senior vice president and CFO for L3Harris. Prior to that, he served as vice president and CFO of Carrier Corporation, an operating unit of United Technologies Corporation (UTC). During his more than 20 years at UTC, Jay also served as vice president and CFO of UTC Aerospace Systems and head of Investor Relations. "Lockheed Martin's strong balance sheet and enviable position as the aerospace and defence leader provides tremendous opportunities ahead to the benefit of our customers, shareholders, employees, and taxpayers," said Malave. "It is a privilege to lead such a highly regarded finance organization and advance the company's vision to deter the threats of the future and connect domains for a more secure world."

RAYTHEON TECHNOLOGIES APPOINTS CHRISTOPHER T. CALIO AS CHIEF OPERATING OFFICER AND SHANE G. EDDY AS PRESIDENT OF PRATT & WHITNEY

WALTHAM, Mass. Raytheon Technologies Corporation has appointed Christopher T. Calio as Chief Operating Officer and Shane G. Eddy as President of its Pratt & Whitney business unit, effective March 1, 2022. As Chief Operating Officer, Calio will oversee the company's four business units as well as its technology and engineering; enterprise services and digital; and operations, quality, environmental, health and safety and supply chain functions. Calio will continue to report directly to Chairman and CEO Greg Hayes. With over 20 years of executive leadership experience, Calio has spent the past decade in aerospace and defence. In his most recent position as President of Pratt & Whitney, he oversaw the significant ramp and introduction of numerous product enhancements, including the recent introduction of the GTF Advantage™ engine as well as the F135 program. Shane Eddy, who was SVP and Chief Operations Officer at Pratt & Whitney, replaced Calio as President of Pratt & Whitney. Eddy joined Pratt & Whitney in 2016, with prior experience at GE Aviation, Sikorsky Aircraft Corporation and Bell Textron.

UK AND FRANCE ADVANCE FUTURE CRUISE / ANTI-SHIP WEAPON PROJECT

The United Kingdom and France have confirmed the launch of the preparation works for the Future Cruise / Anti-Ship Weapon (FC/ASW) programme, after the signature today of a government agreement and associated contracts by the French Direction générale de l'armement (DGA) and the British Defence Equipment & Support (DE&S).

Eric Beranger, CEO of MBDA said: "The FC/ASW programme is an example of the value of the 'One MBDA' integrated model. By combining technology, industrial capacity and funding across borders, we can deliver unique and advanced sovereign capabilities. Following the conclusion of the FC/ASW Concept Phase, the confirmation of the launch of these preparation works testifies the renewed confidence of our two countries towards MBDA. The project will take advantage from our sustained French/UK Centres of Excellence. This reinforcement of MBDA's portfolio of deep strike and anti-ship systems will allow MBDA to offer to our armed forces, whose satisfaction is our priority, a cutting-edge solution fitted to their requirements and adapted to all existing or future operational needs."

These preparation works will focus on the co-ordinated development of a programme of next generation deep strike and heavy anti-ship weapons. It will assess two complementary missile concepts, expected to be fielded at the end of the decade: a subsonic low observable concept and a supersonic, highly manoeuvrable concept. These concepts are to meet the requirements of France and the UK and will provide a game changing capability to overcome land-based and maritime threats, hardened targets and air defence systems, at very long ranges and in increasingly contested battlespace environments. FC/ASW will complement MBDA's portfolio of existing products that continue to be evolved to adapt to new threats.

IN PLANS: ARMY TO BUY MEDIUM RANGE PRECISION KILL SYSTEM WITH 'LOITERING MUNITIONS'

New Delhi: In a move aimed at strengthening the nation's defences, the Indian Army is planning to buy 10 sets of Medium Range Precision Kill System (MRPKS), comprising 120 loitering munitions to destroy enemy targets with precision and minimum collateral damage. The 120 loitering munitions will help artillery units to detect, engage, strike and destroy static and moving targets with precision. MRPKS are unmanned combat aerial vehicles (UCAV), popularly known as drones, that can provide a breakthrough against dynamic and well protected static targets by real-time acquisition and precision strike. The munitions can loiter in air close to the designated target and provide real-time imagery to the operator on the ground. When directed, these loitering munitions can attack the designated target by self-destructing into it.

The Army has clearly stated that the weapon systems should be indigenously designed, developed and manufactured under the Defence Acquisition Procedure 2020. Those who qualify on the technical, commercial and project requirements of the EoI will be issued a project sanction order to develop a prototype of the system. The weapon systems will also come with 10 launchers, 30 forward observation stations. The munitions can 'loiter' in the air and provide real time imagery on the target to the operator on ground. On the detection of the target, the loitering munition should be able to strike it with precision.

The loitering munition will be carrying a warhead to strike with precision so as to reduce collateral damages. MRPKS should be able to hit targets with precision in day and night operations and in all-weather conditions. They should be also able to engage targets such as radar installations, including weapon locating radar. The Medium Range Precision Kill System (MRPKS) systems are required to have a range of 40 km. The loitering munitions should have an endurance of minimum two hours and hover in air at an altitude of minimum of 1 km. It should be able to carry out a damage assessment with the munition having the capability of aborting a target, re-attack and reuse. The control station will carry out mission planning, select target and simultaneously control two or more munitions if required.

THALES TO EQUIP FRENCH MILITARY TANKER AIRCRAFT WITH SECURE SATCOM SOLUTION

As part of France's SYRACUSE IV military satellite telecommunication programme, the French defence procurement agency (DGA) has awarded Thales and its partners the 17- year MELISSA contract for the development, integration and support of aircraft satcom stations.

To meet the connectivity needs of the French Air and Space Force as high-intensity conflict returns, Thales will provide a resilient, high-data-rate satellite station capable of connecting large military aircraft in all circumstances. The Thales terminal is derived from a proven satcom product that has accumulated over 30,000 flight hours on commercial airliners. The militarised version is specifically designed to maintain connectivity with command centres in jammed environments and severely degraded flight and weather conditions.

It operates with France's SYRACUSE IV sovereign satellite system and is also compatible with any allied military or commercial satellites. This ARINC standard satcom station uses the military and civilian Ka bands. It is installed on the fuselage of large aircraft, such as the MRTT tanker, A400M transport and AWACS surveillance planes.

The Thales teams and their partners successfully overcame a host of technical challenges to design a highly compact device, despite aeronautical and electromagnetic constraints, achieve extremely high-precision pointing to maintain a stable link with the satellite during aircraft manoeuvres, and manage cyber threats.

This first in aviation further consolidates Thales's leadership in the European market for secure, resilient military satellite communications. For over 10 years, Thales has provided critical STANAG 4606 compliant communications for NATO and the land and naval forces of 12 countries in Europe, the Middle East and Asia.

The industrial organisation put in place by Thales for the MELISSA contract includes partners recognised by the DGA, such as the French SME Eclipse4 as well as Thales's Gennevilliers and Cholet industrial competence centres and its Brive production facility. This organisation will guarantee timely delivery of the contract and the long-term sovereignty of the supply chain, and will consolidate the expertise of France's defence technological and industrial base in the area of satellite technology.

STEADICOPTER UNVEILS BLACK EAGLE 50H HYBRID-POWERED UNMANNED HELICOPTER

Tel Aviv: Israeli company Steadicopter, has unveiled the Black Eagle 50H – the first hybrid-powered unmanned helicopter and the newest model in its RUAV family – designed for a wide range of law enforcement, maritime, civilian and covert missions. With a maximum take-off weight of 50 kg, the Black Eagle 50H can carry multiple large payloads or relatively smaller payloads, and is capable of up to five hours of flight time – extremely high endurance when compared to other VTOL platforms in its class. This enables high performance and maximum operational flexibility for both security forces and civilian applications, such as search & rescue, cyber, intelligence, offshore rigs, and high-end naval missions.

Featuring a hybrid engine and propulsion system, the Black Eagle 50H combines the best of the electric 50E and the gas-powered 50 variants in a platform that is extremely cost-effective, simple to operate, easy to maintain, environmentally friendly, and safe. The helicopter has all the proven capabilities of the highly energy-efficient gasoline-powered Black Eagle 50, including vertical take-off and landing, long hover durations, and leading mission sensor suites for all mission scenarios, whether day or night. In addition, like the Black Eagle 50E, it offers excellent reliability and is extremely adaptive to high-altitude flights, thanks to the electric propulsion segment which is less affected by the ambient air pressure, making it deployable in many high-altitude operational scenarios.

NEWS ROUND UP

BAE SYSTEMS SECURES NEW SUPPORT AND SERVICES MODEL FOR NORWAY'S CV90 FLEET

ÖRNSKÖLDSVIK, Sweden. BAE Systems has signed a new support, sustainment, and readiness agreement with the Norwegian Army for its fleet of 144 CV90 Infantry Fighting Vehicles, securing a new contract model to support the availability and continuous modernization of the fleet.

The seven-year agreement with the Norwegian Defence Logistics Organisation governs the purchase of components and equipment, as well as management and engineering work. It includes maintenance of the System Integration Lab, which ensures that both the customer and BAE Systems can monitor vehicles' current conditions and state of readiness to optimize vehicle performance and capabilities across the fleet.

BAE Systems Hägglunds, based in Örnsköldsvik, Sweden, is currently working closely with its Norwegian industry hub, including small and medium-sized businesses, to deliver 20 additional new CV90s to the Norwegian Army. The order includes engineering and multi-carrier variants as part of its effort to grow and modernize in the face of evolving threats.

Norway is one of seven European users operating the CV90. The others are Denmark, Estonia, Finland, Switzerland, Sweden, and the Netherlands. With close to 1,300 vehicles in service in multiple variants, the vehicle is designed to accommodate future growth to meet evolving missions.

ELBIT SYSTEMS TO SUPPLY AIRCRAFT AND SELF-PROTECTION SYSTEMS TO UAE, ITS SUBSIDIARY SEALS $ 53 MILLION CONTRACT

Tel Aviv. Elbit Systems Ltd, Israel announced January 3 that its subsidiary in the United Arab Emirates ("UAE"), Elbit Systems Emirates Limited ("Elbit Systems Emirates"), was awarded an approximately $53 million contract to supply Direct Infrared Countermeasures ("DIRCM") and airborne Electronic Warfare ("EW") systems for the Airbus A330 Multi-Role Tanker Transport aircraft of the UAE Air Force. The contract will be performed over a five-year period. The interest in the Elbit's counter measures systems has been increased since the first indications pointed to the transfer of shoulder launched Houthis missiles from Iran to some of its proxies, mainly the Houthis in Yemen. Iran has developed a line of shoulder launched missiles (Misagh 1, 2, 3). Under the contract, Elbit Systems Emirates will deliver a multi-turret configuration of the J-MUSIC™ Self-Protection System together with the company's Infra-Red-based Passive Airborne Warning System (PAWS IR), providing high levels of protection and redundancy. Elbit's DIRCM systems have accumulated more than 350,000 operational flight hours to date, and are installed onboard more than 25 types of aircraft. Elbit Systems' J-MUSIC DIRCM and the integrated PAWS IR are designed with open architecture and integrate the latest laser technology along with a high frame-rate thermal camera and a small, dynamic high-speed sealed-mirror turret making it possible to defend against infra-red missile threats.

DRDO FLIGHT TESTS FINAL DELIVERABLE CONFIGURATION OF MPATGM

New Delhi: Defence Research and Development Organisation (DRDO) successfully flight tested the final deliverable configuration of Man Portable Anti-Tank Guided Missile (MPATGM) on January 11. The indigenously developed anti-tank missile is a low weight, fire and forget missile and is launched from a man portable launcher, integrated with thermal sight. The missile impacted the designated target and destroyed it. The final impact event was captured on camera and the test has validated the minimum range successfully. The present test was to prove the consistent performance for the minimum range. All the mission objectives were met. The missile has miniaturised infrared imaging seeker and advanced avionics for on-board control and guidance. The missile performance has been proven for the maximum range in earlier test trials.

HAL'S INDIGENOUS IJT COMPLETES SIX TURN SPIN

Bengaluru: The Intermediate Jet Trainer (IJT), designed and developed by Defence Public Sector Undertaking (PSU) HAL for stage –II training of IAF pilots has successfully demonstrated the capability to carry out six turn spins to the LH and RH sides. The aircraft was piloted by Gp. Capt H V Thakur (Retd) and Gp. Capt A Menon (Retd). With the right resources and backing, HAL is capable of designing products that can meet any requirement of Indian Armed Forces, said R. Madhavan, CMD. Arup Chatterjee, Director (Engineering and R&D) said by demonstrating its capability to have six turn spins on both sides, the IJT has achieved a major milestone. He attributed the success to the synergy between designers, flight operations and certifying agencies (RCMA and DGAQA). He further hoped that with the completion of spin certification of HTT-40 and the progress achieved in IJT, HAL will soon have the state-of-the-art trainers for stage I and II training of IAF pilots.

The IJT which was conceived by HAL as a replacement to the ageing Kirans of IAF fleet, had completed demonstration of its capabilities in terms of altitude and speed envelope, load factor, satisfactory stall characteristics and limited armament capability as required by IAF, much earlier. The only pending task was spin testing. During the course of spin testing, in 2016, the aircraft departed from controlled flight which brought the programme to a temporary halt. However, HAL decided to proceed further using its internal resources to complete the critical spin testing.

The capability to enter and recover from spin is a necessity for a trainer aircraft in order to familiarise the trainee pilot to recognise departure from controlled flight and the actions required to recover from such situations. Achieving satisfactory characteristics during spin and an assured recovery from spin form a part of very crucial flight tests due to its unpredictability.

The spin flight testing is inherently a high risk manoeuvre and therefore progresses incrementally turn by turn. Due to the complex interplay of aerodynamic and inertia forces, the motion of the aircraft in spin is unpredictable and flight testing is the only way to assess the acceptability or otherwise of its characteristics. The spin flights are carried out in good weather conditions with a team of designers, flight test engineers and safety pilot monitoring the various parameters during the flight and therefore time consuming. Several flight tests are required to be carried out before 6-turn spin flights are undertaken as well as a number of flights are further required before full spin certification is achieved. Subsequent to the temporary halting of flight tests in 2016, HAL undertook major modifications like shifting the vertical tail aft on the airframe and increasing the rudder area and flight testing resumed in April 2019. These modifications entailed the use of a new Anti-Spin Parachute system (ASPS) which is mandated for the safety of the aircraft and test crew during spin flight testing. The new ASPS was integrated into the aircraft in July 2020 and the successful streaming of the parachutes were demonstrated in September 2020. Despite the delays due to COVID-19 pandemic, HAL could commence the stall and spin testing of the IJT in its new modified configuration in November 2020. Wg. Cdr M Patel (Retd) was the test director and Gp. Capt. K K Venugopal (Retd) was the safety pilot in command at telemetry.

SMART SHOOTER UNVEILS ARMED DRONE SYSTEM SMASH DRAGON

Tel Aviv: Israeli company SMART SHOOTER, has unveiled the SMASH Dragon: an armed drone system incorporating Smart Shooter's combat-proven SMASH technology that ensures precise target elimination. Presented by the company for the first time, SMASH Dragon is an advanced robotic weaponry payload that can be mounted on different drones and other unmanned aerial platforms. It can incorporate various types of assault rifles, sniper rifles, 40mm, and other ammunition with great precision. Extremely lightweight and therefore allowing long mission endurance, SMASH Dragon integrates a unique stabilization concept with the SMASH technology that enables the system to accurately hit static and moving targets while flying.

Featuring SMASH's proprietary target acquisition and tracking algorithms as well as sophisticated computer vision capabilities, the remotely operated SMASH Dragon offers the SMASH technology's fast and precise hit capabilities and other exclusive benefits while engaging targets from the air. The system successfully completed live firing tests and is currently under advanced stages of development.

According to the company it has also signed a cooperative research & development agreement with US Naval Surface Warfare Centre, Crane Division (NSWC Crane). Under this agreement, the US Navy will evaluate the use of SMASH technology on ships and vessels for Counter-UAS purposes. The evaluation by the US Marines and Navy may be the beginning of a wider use by US forces.

NEWS ROUND UP

RAYTHEON DEMONSTRATES ITS CAPABILITIES IN MARITIME AND DRONE TECHNOLOGY

New Delhi: Raytheon Technologies Corporation, one of the largest aerospace, intelligence services providers, and defence manufacturers in the world which develops and manufactures advanced technology products in the aerospace and defence industry, is working on US Navy's Distributed Maritime Operations. This involves a network of sensors, riding aboard everything from drones and jets to ships and missiles dispersed across the globe, all taking in data and feeding it back to the fleet to help operators meet a mission anywhere.

The company which has four subsidiaries: Collins Aerospace, Pratt and Whitney, Raytheon Intelligence and Space and Raytheon Missiles and Defence, is combining new engineering methods The company's portfolio includes several of the US Navy's marquee systems like the SM-6 missile, Tomahawk cruise missile and SPY-6 radar, she said adding that it was in a unique position to rapidly and efficiently close the gap. Restarting something new will not get the capability there faster. Raytheon was working with Navy stakeholders to ensure the right design and development is paired up and scaled onto US fleets. It's an extremely versatile and scalable aperture and it's on the verge of changing how and where the Navy fights in a distributed manned and unmanned fleet. Recently, the Raytheon Intelligence & Space (RIS) demonstrated its swarm technology in the US Defence Advanced Research Projects Agency's (DARPA) fifth OFFensive Swarm-Enabled Tactics (OFFSET) programme field exercise.

RAFAEL'S RECCELITE XR COMPLETES DEVELOPMENT OF 3RD GENERATION MODEL & SUCCESSFUL LIVE TEST

Tel Aviv: Rafael Advanced Defense Systems Ltd has completed development of its RecceLite XR, the third and latest model of the advanced, state-of-the-art reconnaissance system. This newest version is supported by artificial intelligence (AI) and enhanced sensors which were put to the test in a live test in late 2021. Rafael demonstrated the third-generation model of the RecceLite XR and its new capabilities for the first time to an international delegation including over twenty industry partners and customers from several different countries. The simulation involved a series of operational tasks and successful execution by the third generation RecceLite XR which was supported by other Rafael systems.

Rafael's RecceLite provides multi-spectral, multi-role, real-time stand-off and stand-in reconnaissance, consisting of an airborne pod, a wide digital D/L, and a ground exploitation station. It is part of Rafael's family of advanced aerial and ground Electro-Optical (EO) systems that also includes the LITENING targeting pod, the Toplite EO/Infrared pod, the Sky Spotter ground early warning system, among others.

According to the company, the third generation RecceLite XR pod builds on its operational predecessor with extended ranges over 80 km, and stand-in and standoff operation. It has an enhanced sensor suite with four different wavelengths: VIS, Near Infrared (NIR), Medium Wavelength Infrared (MWIR), and Short Wavelength Infrared (SWIR). This latest RecceLite XR model also includes enhanced image resolution, real-time video, and advanced Line of Sight stabilization, with extended area coverage, advanced image algorithms, and AI, each enabling Wide Area Persistent Surveillance (WAPS).

Rafael says that during the live demonstration in northern Israel, the third generation RecceLite XR operated with Rafael's ImiLite Ground Exploitation Station (GES) to perform a full VISINT operational cycle, from live reconnaissance to target generation. At distances over 50 km, the latest version of RecceLite XR successfully identified four different targets and distinguished the hostile target from three nearby decoys. The collaboration of Rafael systems in real-time contributed to the success of the simulation as was seen with the successful operation of the ImiLite GES.

TO BOOST 'MAKE IN INDIA' GOVERNMENT CANCELS CHOPPER, MISSILE IMPORT DEALS

New Delhi: In keeping with Prime Minister Narendra Modi's 'Atmanirbhar' in defence initiative, the government has cancelled multiple deals for the purchase of short-range Surface-to-Air missiles and a tender for the purchase of 14 choppers for the Indian Coast Guard.

The move viewed as a boost to domestic defence sector was taken at a meeting of the Ministry of Defence (MoD) in New Delhi on January 14 which reviewed import deals with foreign vendors, media reports said quoting top government sources.

This was the first in a series of meetings of the Defence Ministry to push the prime minister's 'Make in India' initiative. A large number of defence import deals have already been reviewed, sources said, adding that they will not be allowed to progress any further. Many other deals are under review, including the purchase of six more P-8I surveillance aircraft and Klub anti-ship cruise missiles for the Navy and Russian VSHORAD (very short-range air defence) missile system for the Army. The initiative came after the Prime Minister chaired a review meeting with officials of the Ministry of Defence last year. The then Chief of Defence Staff (CDS) General Bipin Rawat, who died in a chopper crash on December 8, was also part of the meeting. Officials who attended the meeting last year felt that strong measures need to be taken to ensure that the country moves firmly towards Atmanirbhar Bharat in the defence sector.

After the meeting, an additional secretary-rank officer of the MoD wrote a note to three services stating that "all stakeholders may take an in-principle call that no import of defence items is going forward".

UDCHALO RECEIVES NATIONAL STARTUP AWARD 2021 BY PM NARENDRA MODI

New Delhi: udChalo, a leading consumer technology company that exclusively serves India's defense forces and their dependents was awarded as the most innovative and socially impactful startup in the travel planning and discovery segment. Prime Minister Narendra Modi held a virtual meeting with innovators and 150 startups from across India, and awarded the top 46 Indian startups during the meet. Only three startups were recognized in the travel segment. udChalo's hassle-free interface for travel bookings for the armed forces was the differentiator in the category. For 9 years, udChalo has built unique, convenient and effective platforms for soldiers to access consumer products and services. Today, about 16 lakhs armed personnel book tickets from udChalo every year. Ministry had received over 2,177 applications across 49 sub-sectors for the awards. A total of 175 startups reached the final round and these were judged on the basis of innovation, scalability, socio-economic and environmental impacts, inclusiveness and diversity.

FIRST ENGINE TEST COMPLETED BY FRANCE FOR ITS SIXTH GENERATION FCAS FIGHTER

Paris: In a major step forward in aerospace, French General Directorate of Armaments (DGA) completed a first test for the development of the engine that will power the Future Combat Air System aircraft for sixth generation fighter. The DGA announced on January 10, that a prototype derived from the M88, the engine of the Dassault Rafale fighter, was trialled on a test bench as part of the Turenne defence technology project. "This test is distinctive by the technique used, called Thermocolor, which requires heat-sensitive paint; applied to the blades of the engine's high-pressure turbine blades, it measures the temperature thanks to a colour change," the DGA explained. "This type of trial is very rare; the most recent at DGA Propellant Testing dates back to 2010." It took five years for the conditions to be ready for this experiment. Once the results of this first test are analysed, the project will move on towards an "endurance" test that should last several months. "Each of these advancements is a unique and necessary piece of a puzzle of technological innovation. Combined with a latest-generation engine, they will make it possible to achieve the level of performance expected from the SCAF program," the DGA concluded. According to the French Ministry of Armed Forces, the New Generation Fighter (NGF) sixth-generation fighter jet developed by France, Germany, and Spain in the framework of the Future Combat Air System (FCAS) will require more powerful engines than its predecessors. Higher thrust means higher temperatures. The conditions could reach 1826.85 degrees Celsius at the turbine inlet 250 degrees Celsius more than those of the M88.

NEWS ROUND UP

BIG WIN: DATA PATTERNS BAGS RS 27 CRORE DRDO ORDER FOR EW UNITS

New Delhi: In a boost to the industry, Chennai-based vertically integrated defence and aerospace electronics solutions provider Data Patterns (India) has got an order for Rs 27 crore from Defence Research and Development Organisation (DRDO) for the next generation wideband RF front end units for Electronic Warfare (EW) receivers.

The order is for a new programme that will allow next-generation wideband EW receivers to be configured for naval, land and aerial platforms. The wideband RF front ends allow faster scanning of enemy emitters to enable better electronic intelligence with enhanced detection and avoidance. The specifications not only allow faster scan rate but also better dynamic range providing better detection.

Data Patterns has developed a wide range EW receivers and Direction Finders including wideband Radar Warning Receivers, Electronic Intelligence (ELINT) Systems and Communication Intelligence (COMINT) Systems for air, land and sea platforms with DRDO. Data Patterns' core competencies include design and development across electronic hardware, software, firmware, mechanical, product prototype besides its testing, validation and verification. The company works closely with the defence PSUs such as Hindustan Aeronautics Ltd and Bharat Electronics Ltd as well as government organisations involved in defence and space research like DRDO and ISRO.

ANADRONE SYSTEMS BAGS DEFENCE CONTRACT UNDER

New Delhi: Achieving self-reliance in the defence sector took a significant step forward on January 18, as Indian Army signed its first contract worth Rs 96 crore with Anadrone Systems Pvt Ltd under Make-II for Manoeuvrable Expendable Aerial Target.

Under the industry-funded Make in India scheme (Make-II) of the defence ministry, Anadrone Systems Pvt Ltd signed a contract to supply expendable aerial targets to the Army and Air Force. The officials acknowledged it as a critical landmark that will pave the way for more such opportunities.

The Make-II category was introduced in 2016 as a major step towards engaging the industry. The contract to supply 125 of the Manoeuvrable Expendable Aerial Targets (MEAT) and associated equipment, under this category is meant for

HANWHA DEFENSE TO EXPORT MID-RANGE MISSILE SYSTEM TO UAE, DEAL WORTH $ 3.36

Seoul: Hanwha Defense announced January 18 that it will export the medium-range surface-to-air missile "Cheongung-II" or M-SAM2 launcher to the UAE.

The deal worth more than $ 3.36 billion is South Korea's largest arms export contract and was signed during President Moon Jae-in's visit to the UAE. Hanwha Defense set another export milestone in a month after exporting the K9 self-propelled artillery to Australia in December of last year.

Hanwha Defense will produce the launcher and load/transport vehicle, and Hanwha Systems will produce the radar systems. LIG Nex1, will take charge of synthesizing and delivering the whole missile system to the UAE Air Force.

The Cheongung-II is a medium-range and medium-high altitude surface-to-air intercept system that started

MAKE-II CATEGORY

research and development projects funded by the industry with an indigenous content of over 50%.

Though the contract value at Rs 96 crore is low when compared to other defence contracts, the competition saw the winning company pitching its product against defence giant Larsen and Toubro.

The Shikra MEAT system is a localised version of the Banshee Jet 40 system (imported by the armed forces earlier) and is being manufactured by the company. The Shikra is an aerial target designed to be used over land and sea for training of crew on air defence weapon systems. The expendable drone can be manoeuvred at subsonic speeds to simulate an incoming target for air defence weapons.

Over 600 aerial targets have been supplied till now by Anadrone Systems from its Odisha factory in partnership with QinetiQ Target Systems Ltd – a UK defence specialist firm.

BILLION SIGNED

development in 2012 under the supervision of the Defense Science Research Institute and started production in 2018 to simultaneously respond to ballistic missile and aircraft attacks. It consists of a fire control station, multi-function radar, and three launcher vehicles.

The missile system was first supplied to the South Korean military in 2020. It beat other bidders from the United States and Israel to win the UAE contract.

BELL BOEING IMPROVE MAINTAINABILITY OF V-22

AMARILLO, TX. Bell, a Textron Inc company, has completed the first Nacelle Improvements Modification on an Air Force CV-22 Osprey. The aircraft is part of an ongoing upgrade by Bell and Boeing to improve the wiring components within the nacelles and to change the structure in order to improve maintainability. The Osprey returned to the 20th Special Operations Squadron at Cannon Air Force Base on December 13, 2021. The V-22 nacelles house critical power components to the V-22's vertical take-off and landing capabilities and transition to forward flight. This program benefits the V-22 fleet maintainers and operators by reducing maintenance time and costs while simultaneously enhancing flying readiness rates.

Bell completed the modifications at the Amarillo Assembly Center (AAC), which actively produces new V-22s for the Department of Defense. The AAC employs more than 500 employees to manufacture new and modify existing military aircraft. Completing nacelle improvements at the AAC utilizes Bell artisans with the most experience removing and replacing nacelles. The V-22 Osprey regularly performs missions that would typically require both fixed-wing and rotary-wing, reducing the overall logistics and maintenance footprint for operations. The CV-22 is a special operation variant of the Osprey that regularly operates in high-demand environments, including long-range infiltration and exfiltration missions. The Marine Corps and Navy have also cited interest in nacelle improvements for the MV-22 and CMV-22B variants. Bell Boeing completed the first aircraft in December 2021 and is underway with the second CV-22.

FIRST UPGRADED CHINOOK HELICOPTER DELIVERED TO SPAIN

MADRID. The first remanufactured CH-47 Chinook helicopter was delivered to the Spanish Army at a ceremony held at the headquarters of the Spanish Army Airmobile Forces in Colmenar Viejo, Madrid. The aircraft is the first of 17 that will modernize the Spanish Chinook fleet, upgrading their existing CH-47D-model aircraft to the newer CH-47F model. The CH-47F features a digital automatic flight control system, common avionics architecture system and advanced cargo handling to meet the Spanish Army's modernization needs for increased operational capacity, while ensuring interoperability with allied nations.

The Spanish modernization effort coincides with its European counterparts across the region. The Netherlands recently retired its last CH-47D Chinook in favour of the F-model configuration, while the United Kingdom purchased additional aircraft to upgrade its fleet. With more than 950 aircraft in service with 20 international operators, including eight NATO nations, the Chinook brings the right mix of current and future capabilities to meet customers' needs, including a global supply base for around-the-clock part availability, immediate international interoperability and streamlined maintenance procedures.

PARAZERO DEVELOPS SAFETY SYSTEM-SAFEAIR FOR HEAVY DRONES

Tel Aviv: Israeli company ParaZero has developed a safety system that enables the safe operation of heavy drones over populated areas. This system will allow the use of different types of heavy drones for commercial and security missions over populated areas with a high level of security. The Israeli company's systems is based on a parachute that is activated, aided by a patented ballistic parachute launcher to fully open the canopy in a fraction of a second.

ParaZero has taken a leadership position in the global drone ecosystem, working with regulators, manufacturers, and operators to establish an effective framework for managing risk. They have developed a flexible suite of solutions that encompasses a wide range of unmanned aircraft: with different systems for each weight class.

These systems are designed to precisely monitor a wide variety of elements during every second of a flight. SafeAir can automatically identify a potential problem, and react instantly: arresting the flight, launching our patented parachute system to mitigate descent, and alerting the pilot and people on the ground.

ParaZero is the leading provider of drone safety systems for small drones, those that weigh less than 50 kg. Small drones are the most widely used platforms for commercial applications from law enforcement and public safety to mapping. Equipping small drones with safety systems, including parachutes, is proven to help make the safety case for flight over people and flight beyond visual line of sight (BVLOS).

Heavier drone platforms – those from 50 kg to 350 kg – open an entirely new field of applications. Heavier payloads can carry larger and more sophisticated sensors, enabling long range GIS applications, use in movie and film environments, and military applications. In the disaster response, firefighting, and security sectors, heavier platforms are performing critical operations from fire suppression to border patrol. And, as drone delivery takes flight across the globe, heavier drone platforms offer the opportunity to carry payloads of more than a few pounds, launching on-demand unmanned delivery of critical equipment for industrial applications. Cargo delivery, port logistics, and energy exploration are all among the fastest-growing sectors in the unmanned industry.

Many of these applications for large drones require BVLOS or flight over people to realize their full potential. Drone safety systems are even more critical to these larger platforms. Safety systems like SafeAir allow operators to make the regulatory safety case for long range flight and to reduce risks to expensive payloads, as well as assets and people on the ground.

ParaZero is known for its off-the-shelf products. At the same time, it also provide semi-off-the-shelf offerings, which require some modifications to accommodate new aircraft designs and frequently develops completely new, bespoke systems. Custom designed parachute launchers cater to the unique aerodynamic, weight, and operational requirements of newly developed unmanned systems.

According to the company, a new sector of larger commercial drone platforms is rapidly emerging. When these larger drone platforms are able to fly safely beyond visual line of sight and over people, entirely new fields of operations become possible. Unmanned aircraft are a force multiplier for communities around the world – saving lives and transforming industries.

IN NEWS

TEJAS-LSP4 COMPLETES FLIGHT WITH INDIGENOUS AIRCRAFT BEARINGS

New Delhi: Tejas-LSP4 completed the first one hour flight of indigenous aircraft bearings for the critical gearbox and all performance met the stringent parameters. Gearbox is developed from scratch by CVRDE, reports Twitter handle Alpha Defence. CVRDE is in the process of developing indigenous bearing materials for use in Light Combat Aircraft (LCA) applications. In this connection, static and fatigue studies were carried out on the material, to qualify the material for its use in Tejas. Tension, sharp-notch tension and uniaxial compression tests were carried out on the material at room, elevated (up to +300° C) and sub-zero (-75° C) temperatures. Plane-strain fracture toughness tests were carried as per ASTM E 399 – 09 employing compact tension specimens. Low cycle fatigue tests were carried out under four values of strain ranges, viz., 0.3%, 0.4%, 0.5% and 0.6%.

The tests were carried out under strain-control and the specimens were subjected to constant amplitude triangular cyclic loading. High cycle fatigue tests were carried out under four values of stress ranges, viz., 900 MPa, 1300 MPa, 1900 MPa and 2500 MPa. The tests were carried out under load-control and the specimens were subjected to constant amplitude sinusoidal cyclic loading. Corrosion fatigue tests were also carried out employing eccentrically-loaded single edge notch tension specimens.

PLASAN SASA TO PROVIDE ADVANCED ARMOUR PACKAGE FOR SPANISH VCR DRAGON COMBAT VEHICLE

Tel Aviv: Israeli company Plasan Sasa has signed a contract with TESS DEFENCE S.A., to provide its advanced armour package for the Spanish Army's VCR Dragon 8×8 wheeled combat vehicle. The contract that was signed by November 2021, covers the first 348 Dragon vehicles. Within the contract scope, Plasan will supply its innovative lightweight and modular RPG protection, branded as Hybrid Slat Fence (HSF), and its unique mine protection solution for under belly and IED side blast with its corresponding energy absorbing mine seats. Deliveries under this contract will start in January 2022 and will continue until 2026.

JAPAN DEFENSE ENHANCED WITH AEGIS AND SPY-7 SOFTWARE DEMONSTRATION1

MOORESTOWN, N.J. Lockheed Martin successfully demonstrated the integration of the AN/SPY-7(v)1 radar into the Aegis Weapon System, executing the processing required to detect, track and discriminate ballistic missile threats, and successfully guide interceptors to those threats. Lockheed Martin is modifying its production test center facility located at its Moorestown, N.J. site to prepare for the live SPY-7 radar integration and test for Japan's Aegis System Equipped Vessel (ASEV) program. Like other radar programs of this magnitude, this test facility will be used to validate end-item hardware and software performance prior to shipment to Japan, provide early lessons-learned to streamline equipment installation on the ASEV ship platform, and support maintenance and training efforts ahead of system deployment.

The successful demonstration of the complete ballistic missile defense fire control loop is a critical milestone in the development of the SPY-7 equipped Aegis Combat System. The demonstration was witnessed by both the US Missile Defense Agency and the US Navy Aegis Technical Representative.

SIKORSKY SECURES CONTRACT TO BUILD CH-53K™ HELICOPTERS FOR ISRAEL

STRATFORD, Conn. Lockheed Martin will produce 12 CH-53K heavy lift helicopters for Israel under a US Navy Foreign Military Sales (FMS) agreement. This production announcement is for the first four of 12 aircraft for Israel and is on the heels of a contract to produce nine more aircraft for the U.S. Marine Corps. The signed letter of offer and acceptance (LOA) between the U.S. Government and Israel states first deliveries of the baseline aircraft are planned for 2025.

The CH-53K helicopters will replace the Israeli Air Force (IAF) fleet of modified CH-53D Yasur helicopters, which have been in Israel's inventory for over 50 years. The all-new CH-53K delivers modern state-of-the-art capabilities that result in improved survivability, safety, and reduced aircrew workload over its predecessor, making it the perfect fit for the demanding IAF mission.

Also, with a reduction in support equipment footprint compared to the legacy fleet, the CH-53K will mean reduced operating costs. The aircraft will be manufactured at Sikorsky headquarters in Stratford, Connecticut, leveraging the company's digital build and advanced technology production processes.

SERBIAN AIR FORCE AND AIR DEFENCE BECOMES NEW C295 OPERATOR

Getafe. The Serbian Ministry of Defence has ordered two Airbus C295s and therefore the Serbian Air Force and Air Defence joins the family of C295 becoming the 36th operator worldwide. The contract was signed in Madrid in the presence of senior government members of the Republic of Serbia and Spain. This contract will be accompanied by a Government-to-Government supervision agreement between the Ministries of Defence of Spain and the Republic of Serbia, which aims to study the development of future defence programmes between both nations. Airbus is committed to maintain and foster its close collaboration with the Republic of Serbia, which already operates Airbus military solutions. The two aircraft, in transport configuration, will be equipped with the modern avionics suite Collins Aerospace Pro Line Fusion® and will contribute to enhance the air transport capabilities of the Republic of Serbia. Deliveries are expected to commence in late 2023. With this order 33 countries have already relied on the Airbus C295. With a total of 281 orders worldwide and more than half a million flight hours in operation, this aircraft is the undisputed leader in its segment.

BHEL SECURES ORDER FOR HEAT EXCHANGERS FOR LIGHT COMBAT AIRCRAFT – TEJAS

New Delhi. In a major boost to Defence Production under the 'Make in India' initiative and towards achieving self-reliance in the critical field of defence equipment, Bharat Heavy Electricals Limited (BHEL) has received a prestigious order for the supply of Compact Heat Exchanger sets for 83 LCA Tejas MK1A aircrafts, from Hindustan Aeronautics Limited (HAL). The order envisages manufacturing, assembly, testing and supply of Compact Heat Exchangers to be fitted in the LCA Tejas aircraft being manufactured by HAL. BHEL's Heavy Plates and Vessels Plant (HPVP), Visakhapatnam is the sole supplier of Heat Exchangers for LCA Tejas to HAL since 1996. BHEL-HPVP and Aeronautical Development Agency (ADA), Bangalore have jointly designed and developed 13 different types of Compact Heat Exchangers for Environmental Control System (ECS) and Secondary Power System (SPS) of LCA MK-1 programme. BHEL is also currently working with DRDO for the development of Air Cycle Machine based Liquid Cooling System (LCS) for Aircraft POD application for LCA Mk-2. BHEL-HPVP has dedicated, intricate manufacturing and inspection facilities for manufacturing of state-of-the-art Compact Heat Exchangers for different types of aircraft manufactured by HAL. The same are progressively being augmented to meet International Aero Standards (AS9100) and BHEL is ready to meet the requirements of future programs of LCA, ALH, Sukhoi and AMCA.

IN NEWS

BRAHMOS SUPERSONIC CRUISE MISSILE SUCCESSFULLY TEST-FIRED FROM ITR CHANDIPUR, INS VISAKHAPATNAM

New Delhi: BRAHMOS supersonic cruise missile, with increased indigenous content and improved performance, was successfully test-fired from Integrated Test Range, Chandipur off the coast of Odisha on January 20. The launch was conducted by BrahMos Aerospace in close coordination with the teams of Defence Research and Development Organisation (DRDO).

The missile followed the predicted trajectory meeting all mission objectives, a major milestone in the way forward for BRAHMOS programme. The highly manoeuvrable missile cruised at supersonic speed for its maximum range and all mission objectives were met. The missile was equipped with the advanced indigenous technologies and followed a modified optimal trajectory for enhanced efficiency and improved performance. The missile with the modified control system has been fine tuned to achieve an enhanced capability. This flight test was monitored by all the sensors of the range instrumentation including telemetry, radar and electro-optical tracking systems deployed across the eastern coast and the down range ships.

Teams from DRDO and NPOM, Russia participated in the test. BrahMos Aerospace, the joint venture between DRDO and NPOM, Russia, has been continuously upgrading the powerful, highly versatile BRAHMOS to increase its effectiveness and lethality against sea and land targets. BRAHMOS is the potent missile weapon system already inducted into the Armed Forces.

Subsequently, India conducted a successful test fire of BRAHMOS supersonic cruise missile from Indian Navy destroyer Indian Navy Ship (INS) Visakhapatnam on February 18. The sea to sea variant of the missile was test fired at the maximum range and hit the target ship with utmost accuracy, informed Indian Navy sources. The latest test fire of BRAHMOS supersonic cruise missile comes a month after the Defence Research and Development Organisation (DRDO) informed in December of successful testing of an air version of BRAHMOS supersonic cruise missile.

The BRAHMOS supersonic missile, jointly developed by the Defence Research and Development Organisation (DRDO) and NPOM of Russia under the joint venture BrahMos Aerospace has already been a major deterrent on modern-day battlefields. It is a multi-role and multi-platform weapons system and has already proven its mettle against a varying range of targets. It has been deployed in all three arms of the Indian armed forces. The BRAHMOS supersonic cruise missile can cover a range of 290 km reaching 2.8 to 3 Mach speed. Meanwhile, the BRAHMOS -II Hypersonic cruise missile can be deployed to hit the target within a range of 450 – 600 km in a Mach 7 velocity.

XTEND UNVEILS SECOND GENERATION INDOOR TACTICAL SUAS SYSTEM – XTENDER

Tel Aviv: Israeli company Xtend has unveiled the second generation of its indoor tactical sUAS system – the XTENDER. According to the company, the revolutionary micro-tactical ISR platform, with built-in resilient indoor-outdoor navigation and AI capabilities, enables remote completion of missions. Powered by "Skylord", XTEND's unique human-centric operating system, the XTENDER features complete localization and situational awareness, using the most advanced virtual and augmented reality (VR/AR) technologies, coupled with advanced AI and machine learning flight algorithms, bringing the metaverse to the modern battlefield. The new XTENDER boasts powerful edge computing capabilities, providing onboard sensor fusion and localization that enable the drone to easily fly in any environment. The new onboard mission computer also enables the drone to run AI-driven applications, providing the operator with real-life actionable intelligence, such as target classification, verification, and tracking. Using patented Drone-Teaming and Mark & Fly technologies, both integrated into the operating system, the new generation of the XTENDER enables multiple drones to enter a remote target site carrying various payloads, perform the required tasks with extreme precision, and seamlessly exit, regardless of any indoor-outdoor transition limitations or GNSS-denied locations. The company says that with the second-generation XTENDER, any operator – even with zero flight experience – can perform accurate recon and data collection tasks – such as close-quarters combat (CQB) clearance, IED and tripwire identification, and enemy detection – in complex urban environments, without any physical contact with hostile forces.

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