

COMPREHENSIVE TECH OUTLOOK | BEL INTERVIEW

GEOSTRATEGY

VOL 1 ISSUE 3 AUGUST-SEPTEMBER 2022
FOR PRIVATE CIRCULATION

A NEW PERSPECTIVE ON GEOSTRATEGY & MORE



STRATEGIC BUSINESS SPECIAL

First news portal dedicated to the
Indian Defence Industry



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BUSINESS OF WEAPONS



ext week global defence industry honchos would land on the Gandhi Nagar, capital of Gujarat to participate in India's leading expo for land and naval forces DefExpo22, taking place after a hiatus of six month, in Gandhi Nagar, Gujarat. The ever roving expo is stationed this year in the Western India after last edition of Lucknow in the East. Eight years back the DefExpo moved out of Delhi (then permanent venue) to Goa and since then it's been on move across the four corners.

New cities bring new challenges. A permanent venue allows the city to develop infrastructure and human resources to facilitate comfortable execution. This also ensures there is no mad rush to exploit the participants. Besides, the city infrastructure needs to develop to cater to all needs of an expo of such magnitude.

While fixing the challenges of indigenization, India must also find a permanent venue for DefExpo.

In this edition, we are analyzing the Indian defence policies regarding procurement, manufacturing, import and joint ventures. It's an attempt to review how things have moved in last decades and a half and will they be able to deliver for the future requirements.

Lt Gen (Dr) Anil Kapoor proposes ideas and policy initiatives that can unleash the untapped potential of India in the field of defence technology and product development.

The ongoing Russia-Ukraine conflict witnessed the arrival of hypersonic weapons in combat. Rakesh Krishnan Simha is analysing the operational role of Hypersonic weapons and the efforts being made by major nations to acquire them.

This issue is a digression from the usual geopolitics, geoconomics and foreign affairs. As we say 'geopolitics and beyond' this issue is one in the zone of beyond.

In future we would come out with issues focused on various topics which shape the global politics. This time its defence business.

Hope this edition is a good read. ■

ROHIT SRIVASTAVA
Editor, **GeoStrategy**

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COVER STORY

UNLEASH THE POTENTIAL

In the last couple of years, the Government of India has initiated numerous military reforms. It has set an ambitious target of Self-Reliance in Defence. This government is backing its policies with supportive measures for the industry. But would these reforms arm India to fight the next war with homemade weapons?

by **ROHIT SRIVASTAVA**



COVER STORY

India's first Chief of Defence Staff General Bipin Rawat, while addressing an industry body meeting in 2019, said that India will fight the next war with Indian weapons. It was a very bold statement by the defence chief of a nation known to be the biggest defence market. This earmarks Narendra Modi's government's vision for Indian defence.

In September 2020, Minister of Defence Rajnath Singh unveiled Defence Acquisition Procedure (DAP) which replaced Defence Procurement Policy (DPP) launched in 2002 "to provide impetus to the growing domestic industry and achieve enhanced self-reliance in defence manufacturing."

Two decades have passed since the first DPP and the Indian defence private sector have barely taken off. Recently, private sector has some excellent achievements like artillery guns, armoured vehicles, UAVs, and littoral naval ships. There are some excellent efforts towards manufacturing sub-systems. This does not mean in near future they would be able to deliver a futuristic weapon system of global standard.

While addressing a seminar organised by Naval Innovation and Indigenisation Organisation, Prime Minister Narendra Modi called India's dependence for even small items for defence a "serious threat".

"After 2014, we started work on mission mode to get the country out of this situation. Learning from the approach of the past decades, today we are developing a new defence

Our defence exports have grown 7 times in the last eight years. We exported defence equipment worth Rs 13,000 crores last year. And importantly, the private sector's stake is 70 percent – PM Modi, 2022

ecosystem with the efforts of all. Today defence R&D has been opened to the private sector, academia, MSMEs and start-ups. We have strengthened our public sector defence companies by organizing them in different sectors. Today we are also ensuring how to link our premier institutions like IITs with defence research and innovation," the prime minister said.

POLICY NOT PROCEDURE

To understand where India stands today in global defence manufacturing, it is imperative to compare it with other emerging nations. In the ongoing Ukraine-Russia conflict, two adversaries Turkiye and Iran have emerged as drone powers. Turkiye astonished the world with how its UAVs helped Azerbaijan win against Armenia



India's Defence EXIM Data

EXPORT

The value of exports of defence items including major items in FY 2014-15 was Rs 1,940.64 crore.

	2018-19	2019-20	2020-21	2021-22	2022-23 (till June 2022)
Total Export Value	10746	9116	8435	12815	1387*

*provisional

Authorisations were issued for export of SCOMET Category-6 items to about 61 countries during the year 2021-22. However, names of countries cannot be divulged due to strategic reasons.

IMPORT

In 2018-19, the domestic procurement stood at 54 per cent of the total procurement, this figure jumped to 59 per cent in 2019-20 and to 64 per cent in 2020-21. It is targeted to further increase the share of domestic procurement to 68 per cent.

Indian defence import during 2012-17 and 2017-21 was around USD 19 billion and USD 15.5 billion respectively. (All data pib)

(backed by Russia) in 2020. Similarly, the Turkish drone TB2 supplied by Qatar to the Government of National Accord (GNA) in the Libyan civil war was the deciding factor against the Libyan National Army (LNA).

Similarly, Turkiye's main adversary in the region Iran has also emerged as an effective UAV power. Russia which has demonstrated its UAV, UCAV and anti-UAV capabilities against Ukraine, is using Iranian drones in large numbers. Russia has ordered 2400 Shahed-136 loitering munitions and 40 Geran-2.

India with its industrial base, big economy, abundant mineral resource and a large number of qualified engineers have failed to achieve what nations like Israel, South Korea, and Turkiye have.

After two decades of DPP why things didn't pan out as planned? There are around 30 different DPP documents listed on the ministry's website. Every amendment was made out as the final solution to the industry's woes but they ended up creating more confusion.

Within two years of DAP, it has been amended three times. One can argue that this proves the government is open to course correction but it also means that due diligence was not done in the first place. Industry requires a well-deliberated and comprehensive policy to which they can align their long-term business plan.

There is a fundamental problem. India never had a defence

procurement policy but only procedure. Now with 'Self-Reliance' in defence, there is a definite objective for which a policy can be formulated. It seems the government has cracked the code. But a lot is missing.

OLD WINE IN NEW BOTTLE

How is 'Make in India' with 50 per cent Indian content any different from what India has been doing under license production of Russian weapons? A case in point is T-90 MBT which is almost 90 per cent indigenised. Today, the private sector demands strategic partnerships with Original Equipment Manufacturers (OEM) facilitated by the government, whereas they have been objecting to similar arrangements for DPSUs. The idea behind opening the private sector was that the DPSUs are merely license-producing and not developing new products. But in the last twenty years how many major systems private sector has manufactured? Except for one or two exceptions, like L&T and Bharat Forge, none can claim to have any serious in-house capability.

Is there enough space for multiple OEMs in the Indian market? Can there be enough orders for both the private and public sectors? One question arises, logically, the private sector, given its flexibility, should focus on acquiring capabilities and emerging as subsystem manufacturers but this is not happening. The reason being subsystems require complete command over technology in a particular area, like jet engines or missiles.

SP MODEL - NONSTARTER

The much-celebrated Strategic Partnership (SPs) Model, launched in 2017, failed to take off. It was fundamentally flawed. It was a glorified cartelization of the top projects among the selected private business houses that neither had the required manufacturing nor technical capability. One can't build a fighter jet company with such shortcuts. The whole model was based on the premise that SPs would develop the next-generation platforms on their own. If this was so easy our car companies would have conquered the global market and not lost the Indian market to Toyota and Suzuki. What Apple does Microsoft can't. Just to drive the point home, our famed software giants are no way closer to the top 5 tech giants.

It is time the policymakers should create a field for organic growth in the sector. DPSUs should lead the way. The Indian market is big but not big enough to support multiple competitive OEMs. There is a need for a structured subsystem manufacturing framework which facilitates long-term strategic partnerships between DPSUs and the private sector.

The OEMs would be entrusted with coming up with next-generation systems and platforms in consultation with services and fund research and development of required subsystems through tier-II partners. This would integrate both the private and public sectors. And if any private sector has the ambition to become OEM

From 2001 to 2014 in 14 years, FDI flow was reported worth Rs 1,382 crore. In last 7 years (2014-15 till date), the FDI inflow has increased by almost 2.5 times, which in absolute terms is Rs 3,378 crore.



then they must compete on their own. India can't afford to degrade decades of investment in DPSUs. Defence is a strategic business it needs a government framework.

SCIENCE OVER TECHNOLOGY

One of the main concerns of our service has been long delays in the completion of the indigenous projects. The Light Combat Aircraft (LCA) took over three decades (the 80s - 2016) to join Indian Air Force (IAF) fleet. During these three decades, IAF demanded multiple upgrades to the original staff requirements. This is a perfect case to understand everything that is wrong in the system.

One can't blame services who would like to have the latest capabilities but defence projects have a long gestation period. One can't blame DRDO as it is not possible to start from scratch and deliver top-of-the-line fighters. Defence technologies are not available in the open market and platforms are developed by manufacturers who develop technologies and systems within their closed ecosystem.

All fighters are developed by a manufacturer, not by a development agency where most engineers lack any experience in manufacturing, maintenance or operating fighters. Like all fighters, LCA should have been given to HAL to develop. The success of HAL in developing helicopters like ALH, LCH and LUH is the testament. There is a fundamental flaw in the system.

Indian defence procurement system is product-driven. Services express interest in a system which sets the ball rolling. When a system is already in the market, even the best effort would make the system at least 15 years late. Any Indian system would be at least one generation behind the systems of the developed world. One can't blame developers.

The only way to break this cycle is to focus on future technology. China has a well-developed defence industrial ecosystem yet it imports fighter jets while developing stealth fighters, why? The answer is simple it makes business sense. Why develop something available in the market? Developing technology is cheap but once it becomes a product it becomes costly.

The only way to break this construct is to focus on future technology skipping the current lot. China has done this in many fields wherever possible like focusing on android smart phones and 6 G.

The path to this goes through pure science, not technology. One can't master future technology without command over basic science. Unfortunately, basic science in India lacks serious funding.

India is obsessed with engineering yet India has not developed any technology. This is because the country is poor in basic science. India needs to delineate products that can be developed within a stipulated time, products that need to be imported and technology for the future.

PRODUCT FOR WINNING WARS

For a successful defence industry, a nation needs to crack a very complex equation which does not have a perfect answer. The equation is selecting the right design for a weapon system within the technological, industrial, and economic limitations of a nation and the weapon must perform well in the known, emerging and future operational environment. Finding the perfect design is not an easy task. The most crucial aspect is which technology will provide the capability to deal with the operational requirements of the future.

Developing weapons for the future requirement is very difficult in comparison to developing a modern artillery gun or tank or frigate where there no unknowns to deal with. While developing weapons of tomorrow, defence manufacturers and military leaders would have to analyse the future from strategic, operational, tactical, industrial and economic perspectives.

This is where engineers from the military can play a significant role. All three services have engineers and engineering colleges who are most underutilized assets. They can be roped in to technically evaluate ideas within the military before pitching them to developers as they are better trained to understand military's operational requirements. Engineering colleges of services, as part of academic research, can identify emerging technologies and areas in science which may have military applications in future. They can play a crucial role in developing war-winning products by becoming a bridge between operators and developers.

FINALLY

Defence is a distorted business. Products can't be sold merely on their merit. Indian companies would face serious challenges in selling weapons in the already fractured global market. India would need a partnership, something akin to Europe and the USA, to capture a big chunk of the global market to have an export-driven defence manufacturing. As the world is becoming multi-polar, leaders of poles would have to ensure they dominate the strategic business in their area of influence. India has a successful BrahMos model- develop a world-beating product with a strategic partner - then marketing it using shared goodwill. ■

'MADE IN INDIA'

CARL GUSTAF – SAAB

by ROHIT SRIVASTAVA

Swedish defence major Saab plans to manufacture the latest version of its shoulder fired weapons system Carl-Gustaf® in India from 2024. The company is setting up a fully-owned Indian subsidiary Saab FFV India for this purpose.

Saab will also be partnering with Indian sub-suppliers and the systems manufactured in the facility will fully meet the requirements of "Make in India". Saab FFV India will deploy complex technologies including the latest sighting technology and apply advanced manufacturing techniques like carbon fibre winding for the Carl-Gustaf system including the latest M4 weapon.

"It is a natural step to set up a production facility for Carl-Gustaf M4 in India given the long and close association we have with the Indian Army as one of the foremost users of the system. We are glad to be able to contribute to the Government of India's goals of developing a world class defence industry and proud to offer the Indian Armed Forces our Carl-Gustaf M4 made in India," says Görgen Johansson, head of Saab's business area Dynamics.

The Carl-Gustaf system has been in service with the Indian Army since the first cooperation agreement for production in India was signed 1976. Indian army currently uses M2 and M3 versions and those are manufactured by Indian defence public sector companies. Considered as one of the most reliable infantry support weapon at the battalion level, Carl Gustaf can fire variety of ammunition to



neutralise armoured vehicles, posts and fortified positions.

Indian army has ordered undisclosed number M4 systems to Saab.

To manufacture M4 at Indian facility, Saab will move key technologies here. The company is yet to finalise the location of the facility. The plant would be part of the Saab global supply chain and would contribute to Saab export orders.

Speaking on the export to non-friendly nations, Johansson said that the company will follow the export laws of India and Sweden would provide the end user certificate.

The investment proposal of the company is yet to get government's approval. The company would like to have 100 per cent FDI for the project.

As continuation of Saab's commitment to 'Make in India', the company will continue its partnership with Munitions India Limited (MIL) and Advanced Weapons and Equipment India Limited (AWEIL) to manufacture the Carl-Gustaf weapon and its ammunition.

CARL GUSTAF – M4

The Carl-Gustaf® M4 represents an evolution in the capabilities of infantrymen. A marked evolution in the history of the system, the M4 model meets the needs of modern conflict environments, while offering compatibility with future innovations.

- shorter length and a weight of less than 7 kilos.
- Compatible with a broad range of sight options, greatly increases the likelihood of a first-round hit.
- Improved ergonomics
- 1500 m range of ammunition
- Two man team
- Safe to carry loaded weapon ■



IAF NOT AGAINST THEATRE COMMAND- AIR CHIEF

Indian Chief of Air Staff **Air Chief Marshal Vivek Ram Chaudhari**, during Air Force Day annual press conference, spoke at length answering questions on a variety of subjects including military strategy, national security, threats from adversaries, defence reforms and procurement. Some excerpts

by **IDI**

Clearing air about the Indian Air Force's reservation on theaterisation of military commands, Air Chief Marshal VR Chaudhari, at the annual Press conference ahead of Air Force Day, said that the Indian Air Force is not against it.

"We are not opposing any process of integration and any process of theatre commands. We have certain reservations in respect to the structures. We are fully supporting the integration process, it is only the methodology and the kind of structures that need to be future-ready, is that we are insisting on. Each service has a doctrine. The doctrinal aspects of the IAF should not be compromised in any way by the new structures," the air chief said on October 5.

Speaking further ACM Chaudhari said, "We understand the imperativeness of joint planning and execution in future wars and are keen on integrating the efforts of the three services. We believe that the model of integration that we adopt must be future-ready, it must reduce levels of decision-making and capitalise on the strength of all three services. We need an organisational structure that is best suited for Indian conditions and our geopolitical imperatives."

Explaining the doctrinal issues among the forces, the air chief said, "The next step would be to use our doctrines and well-trained manpower to evolve employment philosophies and concepts of operations. This would require joint planning and joint execution of plans,"

On the space warfare capabilities of IAF ACM Chaudhari opined that the IAF looks at "space as a natural extension of the air medium" and "Space-based assets significantly enhance the potency of air power." The force has a strategy "to fully integrate our air and space capabilities to have a common picture of the aerospace medium



and to enable optimum force application," he added.

"Traditionally, wars were fought on the land, sea and in the air. Today, newer domains like cyber and space are increasingly affecting the conduct of operations even in the traditional realms," he said. "To absorb these changes, the IAF is on the path of transformation so that we can fight and win tomorrow's wars."

In reply to a question on the recent disengagement along the LAC, he said, "We are keeping an eye on Chinese Air Force activities. We have increased the presence of radars and air defence networks. Appropriate non-escalatory measures have been taken in time"

Regarding the planned procurement of the six mid-air-refueller

Exclusive Interview with IDI

IDI- In the ongoing Russia-Ukraine War, both sides are reluctant in using fighter jets as they are vulnerable to Air Defence. What lessons have been drawn by IAF given the fact that multiple fighter procurement programs are on?

ACM Chaudhari - In wars, whenever setbacks and losses are experienced, tactics and patterns of attack are changed. We saw that in Kargil, both on the ground and in the air. We are seeing that in Ukraine as well. The usage of tanks in built-up areas, the role of IFVs, the employment of ships in the littoral, as well as conventional modes of attack by fighters and helicopters, have all come in for a rethink. In all domains and across platforms, we have & will continue to see changes in modes of employment. But fighters are still being used, both in standoff attack mode, as well as close-range engagements. The requirement of survivability in the modern battlespace is already a part of the future-ready service requirements on which our ongoing fighter procurement is based. It is also important to understand that each conflict has its dynamics and the reasons for Russia and Ukraine not to use fighters may not be applicable in our context.

IDI - UAVs are taking centre stage in ongoing conflicts and they are taking over the SEAD role in warfare. This has raised new requirements in air defence assets and training. How does IAF plan to counter UAVs in full-fledged war?

ACM Chaudhari - There is no denying the fact that the employment of UAVs in recent conflicts has enhanced their sphere of influence in aerial warfare. They are being employed not only for SEAD but also for a variety of other tasks like ISR and precision strikes. Over the years, the size and capability of UAVs have seen tremendous development, and technologically they have become much more advanced. There, however, is a need to analyse and understand the capability of UAVs, and their likely employment in contested airspace during a full-fledged conflict between two militarily-capable countries. Some examples of UAV employment in recent conflicts were more or less in uncontested airspace, where they proved to be extremely potent. However, whenever employed in contested airspace, they faced significant attrition. Given the current capability of our adversaries, the employment of UAVs, to engage targets deep inside our territory, is assessed to be limited/unlikely. With its current capability, the IAF will be able to engage the UAVs before they engage targets.

Notwithstanding this, the IAF has taken serious note of the threat and is taking steps to address it. The main challenge in countering UAVs is their detection. While the large-size UAVs (HALE & MALE class) do get detected with the current AD radar network, it would be difficult to detect the small-size and slow-speed UAVs. Towards addressing this, efforts are being undertaken to develop radars capable of detecting this class of UAVs, at a larger distance. Counter UAV systems, which are capable of engaging them before they deliver their weapon load, are being procured and positioned at IAF bases.



IDI - Do you see any relevance of LCA Mk1A in emerging and future warfare? Will they be a good investment?

ACM Chaudhari - Absolutely, the LCA Mk 1A will be contemporary in many respects and would prove to be a capable aircraft for the IAF. Countries are still developing the next generation of manned aircraft while exploring new concepts of manned-unmanned teaming. Future variants of the LCA will also be capable of such operations.

IDI - World over militaries are shifting the deep strike responsibility from the air force to rocket artillery. How do you see the relevance of IAF fighters in this area, given the amount of time and assets employed for the Balakot Strike?

ACM Chaudhari - The question is based on sentiment, rather than fact. While standoff weapons have indeed become increasingly important, this has not been in lieu of a reduction in other platforms in any air force. It is just an internal rebalancing from manpower centric to firepower-centric approaches. In fact, the world over, investment in long ranged air-launched strike weapons and even long ranged strike platforms (manned and unmanned) is significantly high. Russia, US and China have ongoing stealth bomber programs that will give them global reach. While long-range rockets can be used to address and degrade a target, the effects could be transient and maybe not scalable. Further, the targets that can be addressed from one deployment location are limited to a small area. There are clear advantages of revisits, costs, the flexibility of application at points far apart, and precise calibration of effects that air platforms enjoy over surface-based vectors which have not changed.

IDI - What is IAF's plan for upgrading the Su-30 MKI?

ACM Chaudhari - IAF is progressing with the case for enhancing the capability of the Su-30MKI aircraft through the indigenous route. Post upgrade, the operational capability of the Su-30 MKI will be enhanced with the incorporation of new weapons, upgraded avionics architecture and EW suite.



for which RFI has been issued, ACM Chaudhary informed that "It may take some time for the entire procurement process to fructify. Since we have enhanced the scope we have increased the scope to use aircraft modified for refuellers."

IAF is shortly issuing RFP for wet leasing of the refueller.

The LCA Mk 1A will be contemporary in many respects and would prove to be a capable aircraft for the IAF. Countries are still developing the next generation of manned aircraft while exploring new concepts of manned-unmanned teaming. Future variants of the LCA will also be capable of such operations

On the IAF's support to indigenisation, he informed that around 62,000 components are being procured from Indian industry and the ongoing conflict between Russia and Ukraine has not affected any shortage of spares or supplies.

"In the next few years, we are looking forward to inducting LCA Mk 1A, HTT-40 trainers, indigenous weapons, and different radars. The LCH has been inducted into the Air Force yesterday and I am confident that the helicopter will add teeth to the IAF's strike capability. We are fully committed to the development of LCA Mk 2 and AMCA. The induction of C-295 aircraft is a step in the right direction and will boost the Indian aerospace manufacturing ecosystem," he added.

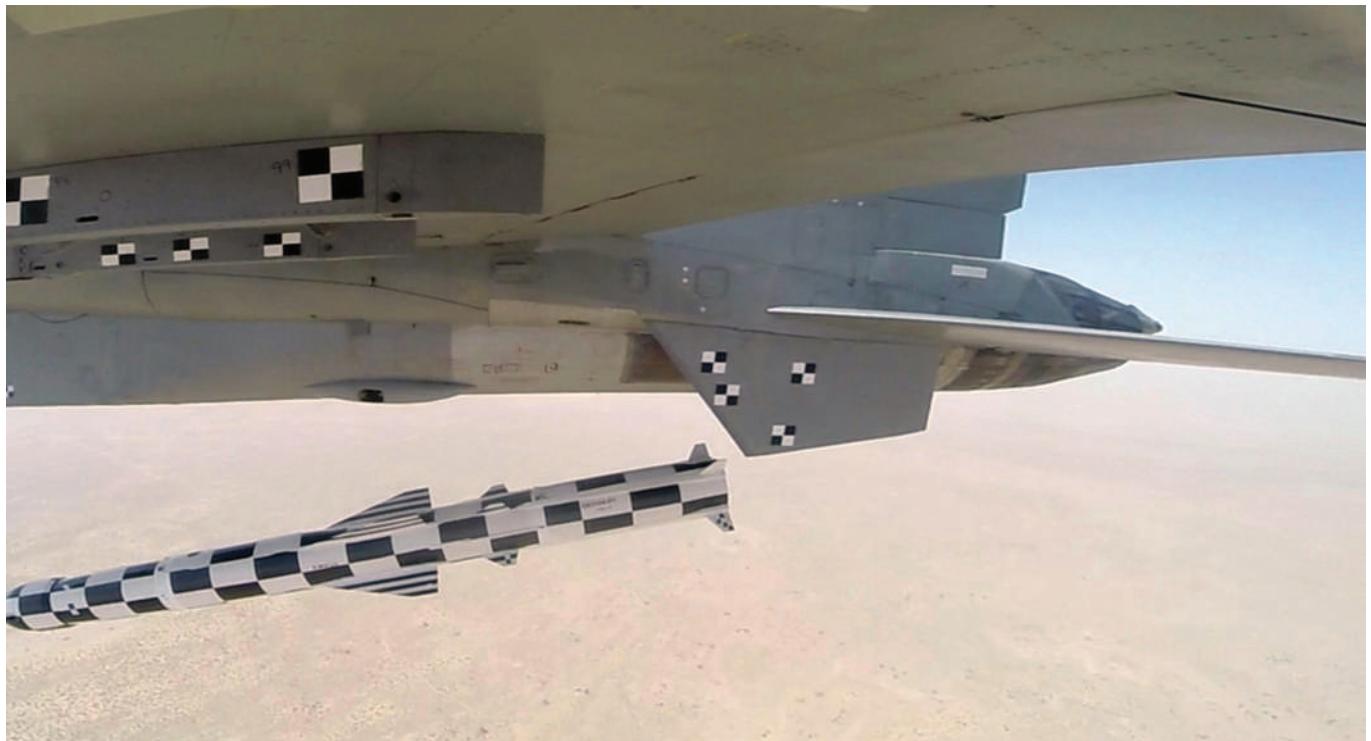
Adding to it, Vice Chief Air Marshal Sandeep Singh discussed the need for acquiring the sanctioned strength of 42 squadrons of fighters as the security environment of India is and will remain hostile. According to him, the current strength of the fighter squadron has fallen to 30 and IAF at best can achieve 35 squadrons by 2035-36.

He also informed that IAF is upgrading "the Su-30 with indigenous weapons like the Astra air-to-air missile and the BrahMos missiles. The sensors are also indigenous and we have been doing it indigenously." ■

HYPersonic WEAPONS – HYPE VERSUS REALITY

With hypersonic weapons having the potential to upend the existing system of nuclear deterrence, a number of leading industrialised countries are sinking billions into R&D. India must get its act together to thwart any potential sanctions or cartels, while being realistic about this very difficult to master technology.

by **RAKESH KRISHNAN SIMHA**



Hypersonic missiles are capable of travelling over 5,000 kph, which gives them tremendous kinetic energy. To illustrate, a 500 kg projectile travelling at Mach 2 (twice the speed of sound) will have an explosive power less than half a ton of TNT, but the same missile with an impact speed of Mach 8 will deliver a TNT equivalent of 3.5 tons. Also, unlike ballistic missiles, hypersonic projectiles are capable of manoeuvring multiple times in their trajectory. These features enable such missiles to penetrate most missile defences and to considerably reduce the response time for a nation under attack. (For comparison, the Brahmos cruise missile flies at 3,000 kph; the American Tomahawk has a speed of around 900 kph.)

There are two primary types of hypersonic weapons. The first, hypersonic glide vehicles (HGVs), are launched by rockets into the upper atmosphere. Unlike ballistic missiles that travel in a parabolic – and predictable – path to the target, HGVs glide through the stratosphere after they are released from their missile boosters. The glide phase allows HGVs to accelerate to hypersonic speeds and manoeuvre aerodynamically to evade interception. HGVs are unpowered vehicles that are designed to produce lift that is equal to their weight to keep them aloft at hypersonic speeds. They travel outside the altitude and speed envelopes of most modern air and missile defence systems. HGVs pose a challenge to terminal air defence systems because these vehicles can vary their impact point and associated trajectory throughout their flight time. HGVs also fly at lower altitudes compared with ballistic missiles.

The second type of weapon is the hypersonic cruise missile (HCM), which is powered all the way to its target by rockets or high-speed jet engines. Basically, an HCM is a cruise missile that operates at hypersonic speeds.

Cruise missiles are already difficult to counter because of their unpredictable trajectories, low profiles and below the radar flight. Even the slower, subsonic ones such as the Tomahawk are deadly. For instance, in the 1991 Gulf War, it took 80-odd Tomahawks just four hours to destroy Iraq's C3 (command, control and communications) systems that had been built over several years and at considerable cost. The additional speed provided by an HCM will only shorten response times.

HYPersonic VS BALLISTIC

For more than half a century, the world has lived with the doctrine of Mutually Assured Destruction or MAD. The trajectory of most

While Russia has got a head start by deploying the first generation of hypersonic missiles, the US programme is more ambitious. Its hypersonic glide programme is intended as a key component of its Conventional Prompt Global Strike system, which aims to hit any target on Earth in less than 60 minutes



ballistic missiles gives early warning systems a window of 15-30 minutes to verify if it's a massive missile launch or a false alarm due to a meteor shower, an unusual cloud formation or a computer glitch. If it's indeed a doomsday scenario, you say your prayers and launch a counter strike, and pretty much everyone ends up dead. Bizarre as this strategy sounds, it is MAD that has prevented the outbreak of World War III.

Hypersonic technology is disruptive because it could upset this balance. Because hypersonic vehicles could do the rendezvous in a fraction of the time taken by ballistic missiles, they give the other side little warning time. One is faced with the dilemma of launch or die. In the coming years, hypersonic technology could become a scare word like atomic bombs were during the Cold War.

HOW DISRUPTIVE?

While Russia has got a head start by deploying the first generation of hypersonic missiles, the US programme is more ambitious. Its hypersonic glide programme is intended as a key component of its Conventional Prompt Global Strike system, which aims to hit any target on Earth in less than 60 minutes.

American strategists have proposed that hypersonic weapons could be used for "conventional prompt global strike" without the risk of being mistaken for a nuclear attack. For instance, armed with conventional warheads, hypersonic missiles could destroy the enemy's critical C3 (command, control and communication) nerve centres, airfields, aircraft carrier battle groups, armour concentrations, missile launchers and other strategic assets.

But that's probably not where the conflict would end. For, the temptation to escalate would be too great. Before the enemy knows what hit him, a second volley of nuclear-armed HGVs could fly in under the radar – that are only equipped to detect ballistic missiles – and deliver the death blow.

The acquisition of such missiles by the United States, Russia and China could result in other powers compressing their response timelines in ways that set their strategic forces on hair-trigger states of readiness — such as a strategy of launch-on-warning. At the same time, the proliferation of hypersonic weapons beyond the big three could enable other countries to more credibly threaten attacks on major powers.

The Rand report says: "We believe that the unpredictable trajectories, resulting in target ambiguity, and the ability to penetrate most defences, will affect some nations' defence postures and increase instability in some regions. We note that these new missiles will almost exclusively affect nations that are otherwise

a massive multi-disciplinary effort is required to ensure that India does not lag behind in this critical sector. Hypersonic weapons can be a useful bargaining tool to prevent Beijing from exporting such destabilising weapons to Pakistan

equipped with effective defences against ballistic missiles. This may be a substantial number of nations over the coming decades.”

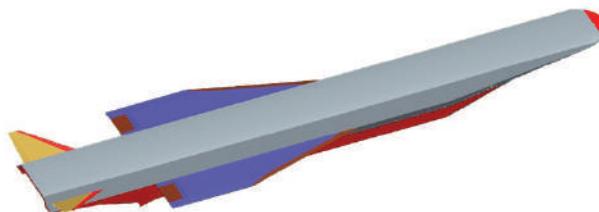
IS THE PHYSICS IMPOSSIBLE?

Even as countries pour billions into hypersonic research and development, there are voices in the scientific community that argue the entire industry is running on hype. According to scientists David Wright (a research affiliate at the Laboratory for Nuclear Security and Policy at the Massachusetts Institute of Technology) and Cameron Tracy (a Global Security Fellow at the Union of Concerned Scientists), hypersonic gliders encounter severe challenges because physics gets in the way.

“Designers of hypersonic vehicles face a daunting adversary: drag, the resistance a fluid offers to anything moving through it. The drag on a flying object increases in proportion to the square of its velocity, making it particularly debilitating at hypersonic speeds. A glider at Mach 5 is subjected to 25 times the drag force than when it flies at Mach 1, for example, and one at Mach 20 faces 400 times the drag of when it is at Mach 1.”

“Even more severe is the energy drain from an aircraft as it pushes the molecules of air forward and aside: it increases as the cube of the velocity. So a glider flying at Mach 5 will lose energy 125 times faster than at Mach 1; one flying at Mach 20 will lose energy 8,000 times faster. Just as problematic, the kinetic energy flowing from the glider to the surrounding air transforms to thermal energy and shock waves. Some of that energy transfers back to the vehicle as heat: leading edges of boost-glide weapons flying at Mach 10 or above can reach temperatures above 2,000 kelvins for sustained periods. Protecting a vehicle from this intense heat is one of the biggest problems facing engineers.”

The two scientists argue that existing missiles can already perform the tasks that hypersonic weapons may be able to do in the future. “The ability to penetrate defensive shields is not unique to hypersonic gliders. Interceptors that operate outside the atmosphere are particularly vulnerable to being fooled by decoys and other countermeasures, which Russia and China have developed and likely deployed. Ballistic missiles of short and medium range, launched from an aircraft, could fly at altitudes low enough to avoid such “exo-atmospheric” defences. Similarly, equipping ballistic missiles, including missiles of short and medium range, with MaRVs could allow them to outmanoeuvre and penetrate defences that operate within the atmosphere.”



HSTDV Cruise Vehicle

Recent Developments

2017: California-based Rand Corporation proposes that the world's leading powers should create a cartel to prevent the proliferation of hypersonic missiles. With India, Europe, Japan and Australia beginning to explore hypersonic technology, the report says there is probably less than a decade available to substantially hinder its potential proliferation. The think tank recommends that (1) the United States, Russia and China should agree not to export complete hypersonic missile systems or their major components and (2) the broader international community should establish controls on a wider range of hypersonic missile hardware and technology.

2019: Russia deploys its first regiment of Avangard hypersonic missiles. According to President Vladimir Putin, the nuclear-capable missiles can travel more than 20 times the speed of sound, and have a “glide system” that affords great manoeuvrability and could make them impossible to defend against. Putin said the Avangard system could penetrate current and future missile defence systems, adding: “Not

a single country possesses hypersonic weapons, let alone continental-range hypersonic weapons.”

2022: BrahMos Aerospace announces that the company will be able to test hypersonic missiles in five to six years. Considering that from testing to deployment will take a few more years, it can be safely assumed that the Brahmos II will be ready to be deployed by India's military forces by the end of this decade. BrahMos Aerospace, which makes the world's fastest cruise missile, will develop the hypersonic missile jointly with Russia.

The call for a ban is a reprise of the Nuclear Suppliers Group (NSG) which was established shortly after India's atomic test in 1974 and was specifically aimed at denying nuclear fuel and reactor technology to India. The equally devious Missile Technology Control Regime (MTCR), which was set up in 1987, successfully delayed India's cryogenic rocket programme by at least 15 years.

COUNTERING HYPERSONIC MISSILES

Due to their blistering speed, hypersonic missiles are hard to track by radar. Plus, a hypersonic glide vehicle (HGV) can evade radar that are only equipped to detect ballistic missiles. But that doesn't mean they are super stealthy. Their very speed can be used against them. Because the surface of a hypersonic weapon gets heated to thousands of degrees, it produces a bright infrared signal that satellites can see from space.

By 2025, the US intends to launch 28 satellites into orbit from where they will detect and track hypersonic missile threats emanating from China and Russia. Contracts have been handed out to teams led by L3Harris Technologies and Northrop Grumman Strategic Space Systems for a total of \$2.5 billion that includes launches, ground control and support.

The new advanced satellite system will equip the US to detect the launch of a hypersonic missile, as well as

follow it as the missile changes course, calculating the direction it is headed to and provide that data to forces who can launch interceptors. The first batch of 14 satellites would be at a lower orbit of about 1,000 km, and the second would be at a medium orbit of about 10,000-20,000 km for a more resilient presence. The Pentagon says the 28 satellites will likely be followed by another batch of about 54 satellites.

Derek Tournear, director of the US Space Development Agency, says: "These satellites are specifically designed to go after that next generation version of threats out there so that we can detect and track these hypersonic manoeuvring vehicles and predict their impact point."

However, the head of the US Missile Defence Agency recently said that its Glide Phase Interceptor programme, designed to eliminate hypersonic missiles, may not be ready even in the next decade.

Referring to American R&D, the scientists conclude: "It looks to us like the Pentagon is using the hype about hypersonic weapons to secure funding from Congress."

INDIA'S POSITION

Despite a late start, India has made tremendous progress in hypersonic missile technology. While India remains behind the United States, Russia, and China in their development, close cooperation with Russia has made India a leader among the second tier of states pursuing hypersonic technologies.

India and Russia are currently working together on the hypersonic

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Brahmos II - the new improved version of the already successful Brahmos cruise missile. The Brahmos II is likely to achieve speeds greater than Mach 7, or seven times the speed of sound.

For all practical purposes Brahmos II is an unstoppable project. One, after India's entry into the MTCR, all caps are gone. There are no restrictions on the range or speed of any missile that India can jointly produce with any country. Secondly, BrahMos Aerospace is an India-Russia joint venture, with top Russian and Indian aerospace scientists working together in India. It has set an established pattern of Russian intellectual capital flowing into India's aerospace sector. If Moscow places curbs on this technology flow, it will create considerable bad press in India and loss of income for Russia's cash-starved enterprises.

Brahmos II is reportedly an adaption of Russia's Zirkon hypersonic missile while the first generation Brahmos is an adaptation of Russia's Oniks missile. Further, a technology sharing agreement with Belarus (a close Russian ally) may further spread the diffusion of hypersonic technology.

A parallel effort is taking place at the Defence Research and Development Organisation (DRDO). The Hyper-Sonic Technology Demonstrator Vehicle (HSTDV) is India's indigenous effort at building a hypersonic cruise missile using scramjet technology. It is separately researched and funded from Brahmos II and entirely indigenous. The programme's goal is to develop a scramjet capable of speeds of up to Mach 7 and a hypersonic cruise missile altitude of 32 km.

The programme's first wind tunnel test was conducted in 2007 in Israel and the second in Russia in 2009, as India lacked a testing facility with a sufficient cross section. India completed construction of a hypersonic wind tunnel, inaugurated in April 2014, which has filled some gaps in its testing capabilities.



As well as the HSTDV, the DRDO is developing the Shaurya ballistic missile, a two-stage, solid fuel, surface-to-surface missile. The missile is known to have attained a speed of Mach 7.5 during tests.

The seriousness with which India is pursuing this technology can be assessed by the fact that India has built at least 12 hypersonic wind tunnels across the country.

CHALLENGES FOR INDIA

While developments in the US do not directly impact India, it must factor in Chinese hypersonic research as well as the very real possibility of Russia passing on the crown jewels of its weapons industry to Beijing. Russia's primary motive would be to ensure cash flowing to its sanctions-hit defence sector.

In July 2021 China tested its HGV which travelled 39,911 km in space before reentering the atmosphere and striking the ground target, according to a report by US Defense Intelligence Agency (DIA). The flight test lasted more than 100 minutes, making it "the greatest distance flew and longest flight time of any Chinese land-attack weapons system to date".

China is known to have a medium-range ballistic missile, known as Dong Feng-17 (DF-17) which is capable of carrying the DF-ZF HGV. The missile itself can travel at a speed of Mach 5-10 and carry conventional or nuclear weapons. It has a range of 1,800-2,500 km and a launch weight of 15,000 kg.

The DF-ZF HGV can travel at speeds between Mach 5-10 and is

said to be capable of performing evasive maneuvers to tackle the enemy defenses. The DF-17 is a ground-launched missile; an air-launched version may be developed that can be deployed on the Xian H-6N bomber.

China has supplied Pakistan with CM-400AKG high-supersonic (Mach 4) rocket-powered cruise missiles. While one can speculate that this is an attempt to balance the Russian-Indian cooperation on the Brahmos family of missiles, it potentially suggests a future in which supplier states compete in offering hypersonic missiles to their friends and allies.

In this backdrop, a massive multi-disciplinary effort is required to ensure that India does not lag behind in this critical sector. Hypersonic weapons can be a useful bargaining tool to prevent Beijing from exporting such destabilising weapons to Pakistan.

India's traditional reticence towards arms exports is hopefully a thing of the past. Since New Delhi has tentatively offered the Brahmos for export, it is possible the Brahmos II will also be put on the market. In a Naval Forces article titled 'Analysis and Localisation of Communications Emitters in Strategic and Tactical Scenarios', Ulla Uebler writes: "Thus far, both Russian and Indian officials have said that they do not intend to export Brahmos II, but it is reasonable to expect that the decision is subject to change."

Simply by threatening to supply these missiles to Vietnam, Indonesia, the Philippines, Malaysia and Japan – countries that are feeling the Dragon's pressure – India can stop the Chinese from running amok in its neighbourhood. ■

NEED FOR COMPREHENSIVE TECH OUTLOOK

As India is making massive efforts towards self-reliance in defence, Lt Gen Anil Kapoor suggests a comprehensive national technology policy towards this end.

by **LT GEN (DR) ANIL KAPOOR, AVSM,VSM (RETD)**



The New Tech World Order is defined by Four Ds – Data, Digitisation, Digitalisation and Disruption. While these have fuelled digital transformation globally giving rise to a large number of dual-use technologies which are drivers of automation and autonomous applications, it is disruption which is not only transforming technologies at an unprecedented pace but also transforming business concepts, models, processes and practices.

A resurgent India on the move has embarked on a two-and-a-half front technology sojourn. The First Front is 'Make in India', as a precursor to 'Made in India', the second front is 'Aatmanirbhar Bharat' as a call for self-reliance and the half front is 'Start-Up India' to champion the agile ignited young minds into entrepreneur ventures.

All these coming up concurrently have created an enormous technology and innovation bandwidth, and excitement in India which has tech reverberations worldwide. A nation known for technical prowess comprising strategic thinkers and technology wizards, the white-collared enabler professionals and skilled innovative tech workforce at the grassroots, has ushered an era in technology development by giving the world two major game-changing concepts - 'Jugaad' which means a resourceful approach to problem-solving and 'Aatmamirbharta' which means self-reliance. These initiatives and more, visibly seen in the Defence

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Expos and Aero India Shows epitomize that India has created a mark in the technology world.

What has been seen over the past few years of *Aatmanirbharta* and Make in India (MII) drive is that consciousness for self-reliance has been generated. A lot has happened –Gati Shakti multifaceted National Master Plan, roll out of 5G,eGovernance initiatives under Digital India, UDAN-RCS, BharatNet, BHIM UPI, Ayushman Bharat



POLICY

and of course UIDAI Aadhar are some big ticket programs which has given a technological dominance globally and promoted ease of living in India. These Local for global outreach programs and many more have created ripples globally but the impact has yet to be felt in the Armed Forces Information and Decision Support System. Some dots need to be connected to create a net-centric enabled Armed Forces.

The moot question - As one of the Emerging Global Power Centre of Technology how does India attain Technology Sovereignty? We are ranked the 17th most technological advanced nation and third largest military expending nation globally. How do we leverage our technological might to reverse the rankings, as a first step? How have the USA, China, France, Japan, Germany, Russia, Israel, South Korea, and Singapore, to name the top few, attained technological advancement? These are case studies on National Vision, Mission, Methods, strong political will, the whole of Nation approach and Consistent Responsible Behavior, driven by purpose and a well-articulated Technology Strategy to create homegrown solutions and recipes.

The challenges and opportunities met by each have been enmeshed constructively in legislations and governance models to exploit research and development and empower the Nations. To name some USPs, the USA has the Defence Production Act of 1950, China went into the 100 years marathon starting in 1949, and Israel stood out innovatively as the Startup Nation but all created an ESG ecosystem to gain a technological edge as a key determinant of their capacity building and capability development for macroeconomic dividends.

Defence Expo Oct 2022 is a good time to think through and tighten the right nuts and bolts and articulate a focused Technology Strategy for Technological Sovereignty. Globally, it is acknowledged that management art, science and best practices emanated from the defence - so did the internet the World Wide Web and so does NextGen technologies. The reason is simple. Armed Forces have a wide threat spectrum comprising internal security, low-intensity conflict, terrorism, out-of-area contingencies and a limited to full-scale war - all governed by VUCA- volatility, uncertainty, complexity and ambiguity. Add to these disruptions and we have the contours of a grey zone/ hybrid/ invisible war which transcends time and space.

The best model for self-reliance is the creation of our unique model which gives homegrown indigenous solutions. This requires a well-articulated National Technology Strategy (NTS).

NATIONAL TECHNOLOGY FRAMEWORK

First Pillar, several initiatives have been taken under the National

Local for global outreach programs and many more have created ripples globally but the impact has yet to be felt in the Armed Forces Information and Decision Support System. Some dots need to be connected to create a net-centric enabled Armed Forces

Technology Development Board to create technology innovation hubs and centres of excellence (CoE) in identified technologies. Each Ministry has a few CoEs. These efforts need to be vectored and drawn into a cogent National Technology Framework to articulate a strategy with a clear technology forecast, technology development work time action plan with clearly articulated deliverable milestones and end state of each technology vertical.

MINISTRY OF TECHNOLOGY & INNOVATION

Second Pillar, DST needs to be upgraded to a Ministry of Technology and Innovation. Science and basic research could form part of the Ministry. Today, several R&D Organisations within the Government and private sector exist, employing subject matter experts (SMEs) and deploying huge amounts of funds on research. These resources can be optimized through a three-pronged strategy.

One, National Technology Act (NTA). Create a legislation and control regime to synergize the efforts of these research synergies with the concept of One technology One team (OTOT). These efforts must become a meaningful engagement through agencies complementing and not competing with each other. As an example, all agencies dealing with quantum computing (QC) need to register with an appropriate vertical under the Technology Development Board for creating synergies and jointness among SMEs based on the areas of research and development.

Two, Government, Academia, Public, and Private Partnership (GAPPP). Build synergies between academia, public sector, private industry, startups, R and D organisations and Government Institutions like CoE, technology parks etc., dealing with technology development where technologies are incubated and churned out as prototype use cases.

Three, National Technology Broadcasting into the National budget broadcast every year in February. We need to have a technology forecast and development strategy in May every year before National Technology Day on 11 May.

INTER-MINISTERIAL TECHNOLOGY SYNERGIES

Third Pillar, obviously the above actions need agile structures and policies to enable and implement a tight-knit Technology Strategy in India. Some structures in various Ministries could be revamped to create a focused technology landscape of OTOT. Further, India has a healthy mix of skilled qualified youth and an extremely experienced retired fraternity. The youth bulge which is a demographic dividend and appropriately qualified retired fraternity can be harnessed through multi-layered initiatives of taming skill development and technologies. These tech-focused start-ups with amoeba organizational structures would help bring in technology development and proliferate niche technologies, in the continuum of time. An inter-ministerial structure or Niti Aayog could articulate and drive the Technology Strategy of India.

CORPORATE PROFESSIONAL RESPONSIBILITY (CPR)

Fourth Pillar, R&D and technology development is a painstaking exercise of design and redesign. In any case, this is the need of the disruptive times - think big, start small, fail fast, recover faster - be first, be agile. This an exercise requiring huge funds to go through iterations of trials and errors bereft with failure cycles in an arduous journey to fruition. There is, therefore, a requirement of large funds to develop and sustain niche disruptive technologies. Govt would do well, in the interest of the *Aatmanirbharta*, to institutionalize a fund titled Corporate Professional Responsibility (CPR) Technology



Development Fund under the Companies Act 2013 for technology development as a National initiative. This fund, in effect, would be akin to Corporate Social Responsibility (CSR) fund- two per cent which Companies deploy based on turnovers and profit margins. The Technology Incubation Centres, Technology hubs, and start-ups need to be funded by CSR based on industrial houses and guided by identified sub-matter experts. How else do Nations build their technology muscles – let us evolve our model. Let us take a peek into the development of niche technologies through a budget and business lens.

CONSOLIDATION OF DEMOGRAPHIC DIVIDEND

Fifth Pillar, *Aatmanirbharta* and Make in India must transcend to Made in India and lead to meaningful value addition to the technology might, sub-assemblies - assemblies - products and production line, exports and economy by dealing with the complete life cycle. Towards this end, the industrial corridors pan India and two defence industrial corridors need to be developed with the thought of Made in India. This calls for redesigning the higher

Defence Expo Oct 2022 is a good time to think through and tighten the right nuts and bolts and articulate a focused Technology Strategy for Technological Sovereignty

education sector by revamping technology institutions to harness skill development and produce job-ready engineers. Job readiness would also imply training on project management, quality control, IPR and patents, positive responsible attitudes an addition to aptitudes to compete with global standards by producing quality products.

SURPASSING GLOBAL STANDARDS

Sixth Pillar is defining and surpassing global manufacturing standards. Japanese embraced the 5S manufacturing principles to define global benchmarks Seiri (Sort), Seiso (Shine), Seiton (Set), Seiketsu (Standardise), Shitsuki (Sustain). America adopted these and went beyond to create a formidable brand value in defence equipment and others. India needs to adopt a strict quality regime driven by technology, and innovation to create and surpass global best standards and create best practices. This calls for legislation through National Technology Act, National Production Act and stringent project management standards to meet global competitiveness.

Indian defence forces are always in combat thanks to external and internal security commitments. Hence, indigenous defence equipment is tried and tested under trying operational conditions. Akash Weapon System and Brahmos are the vanguards of Indian export. To be a global first choice in defence equipment exports, high technology standards, life cycle support and stringent global compliances will be a compulsion and not a choice as we embark on Made in India journey. India has created a COVID vaccine pull globally – we need to repeat the dose in other technologies, as well.

The Low-Hanging Technology Fruits

Seventh Pillar, What if we took lead in low-hanging fruits in drones which has a global market of over 50 Bn USD in the next five years, renewable energies, EV, ICT hardware and software, software-defined networks and allied equipment, emerging technology stacks AI, AR, VR, meta, IoT, Big Data Analytics, Blockchain and chip manufacturing to name a few megatrends. To that extent, a user-friendly export policy both for local producers including MSMEs and global recipients would need to be redrawn. Industrial corridors must become the key determinants of the capability development and capacity building of India. Global competition must look towards the Indian manufacturing industry as high-quality entity.

INDIA A WOMB TO TOMB TECHNOLOGY HUB

Eighth Pillar, the womb-to-tomb life cycle of equipment is a resource-intensive journey requiring maintenance, repair, overhaul (MRO) of equipment, technology upgrades to beat obsolescence, and end-of-life management. This is a cost and effort-prohibitive exercise.

Indian Armed Forces are past masters at MRO activities of three generations of equipment - legacy Gen X&Y, Contemporary Gen Z and state-of-the-art Gen Alpha. Given the youth bulge and the export potential of the MII defence equipment, an established MRO life cycle support is a huge opportunity to be harnessed and exploited globally. India is the land of technology, innovation, and *jugaad*- a potential MRO hub.

Aatmanirbharta and MII is a great strategic intent. Against the backdrop of a strong tech base provided by ISRO, DRDO, industries & PSUs, and Startups the time is ripe to strengthen the Industrial Fabric of India, with global ambitions, through a well-thought-through technology strategy. The tech sojourn must become an illustrious acting tech journey. Let us do it! ■

CO-DEVELOP FUTURE TECHNOLOGIES

India and Russia share five decades-long military and strategic relationships and India has been Russia's biggest weapons market. As India moves towards self-reliance in defence, the two nations can develop futuristic systems leveraging their mutual strengths, write experts from Hindex Solutions, Russia.

by **IGNATOV V., MAKHLAIUK A., HINDEX SOLUTIONS, RUSSIA**



BILATERAL COOPERATIONS

The Russian Federation and the Republic of India have a successful history of military-technical cooperation. In this long history, the two sides have executed contracts pertaining to all kinds of weapons including nuclear submarines and a large number of joint developments have also been carried out. Russia holds a huge share of Indian arms imports. India has also been one of the largest importers of Russian weapons. Thus, at one time, Russia provided almost two-thirds of all Indian arms imports. Between 2016 and 2020, India accounted for almost a quarter of all Russian arms exports, and Russia for almost half of Indian imports.

We believe that despite the current global difficulties and the conduct of a special military operation in Ukraine, it is necessary to think about new opportunities for cooperation between India and Russia. Moreover, at the moment, military experts have the opportunity to verify the effectiveness of modern Russian weapons.

We see the use of the most modern missiles (Kinjal and Kalibr), which have the highest level of accuracy and efficiency; we also see the effectiveness of various unique types of weapons, such as the TOS-1 Solntsepek (Heavy Flamethrower System).

Considering the fact that Russia and India are known for their success in military-technical cooperation, we believe that Russia has futuristic weapons technologies that can be shared with India. Moreover, given the current trends in the production of weapons in India, huge opportunities are opening up for Russia to investments and form joint ventures. Currently, India has a huge potential in the development of new types of weapons and is right, to focus on research and development. This is evident from the numerous memorandums of understanding signed between defence enterprises and universities.

In this article, we want to recall some aspects of cooperation between Russia and India, as well as discuss the new opportunities that open up for countries, including the development of future technologies. We will try to look deeper with the perspective of the coming decades. And also, we will consider what potential both countries have outside in the context of the sanctions imposed by the West.

LOOKING BACK

Let us remember one of the great examples of Russian-Indian military cooperation in the defence sector, which for some reason has faded into the background, although the product itself is the mainstay of the Indian Air Force. We are talking about the multi-role heavy fighter Su-30MKI. This epoch-making project for Russian-Indian relations was covered in detail in the Moscow Center for Analysis of Strategies and Technologies' book 'Defense Industry

one of the great examples of Russian-Indian military cooperation in the defence sector, which for some reason has faded into the background, although the product itself is the mainstay of the Indian Air Force. We are talking about the multi-role heavy fighter Su-30MKI

and Military-Technical Cooperation of India with Foreign States, however, we note some aspects that seem to us the most important in the context of current prospects of bilateral ties and projects.

Among the prerequisites for launching a joint project were the traditional connections of the Irkutsk plant with the Indian Air Force and the Indian aviation industry, which developed during the implementation of the licensed production of the MiG-27ML at HAL, as well as the completion of the program for the production of the aforementioned MiGs in India. The Russian side has taken an active position, offering a completely new product. The Indian side rejected the originally proposed version of the Su-30K, after which comprehensive improvements began, to which Indian engineers made a huge contribution. Reportedly, negotiations and specifications development were carried out with exceptional intensity.

The speed was amazing; from the initiative proposal at the end of 1993 to the signing of the contract in November 1996. Given the speed with which other tenders are being executed this project was completed in a really short time frame.

Of course, this is not the only example of fruitful cooperation between the Russian and Indian companies in the defence sector. There are many more such examples, including even more advanced technologies. In our opinion, one of the most promising Indo-Russian projects is the BrahMos supersonic missile, which is produced jointly by NPO Mashinostroeniya and the Defense Research and Development Organization (DRDO) of the Ministry of Defense of India. The missile was based on the Russian prototype - the Yakhont missile. It has significant potential both in terms of exports and in terms of development in an even more advanced system.

INVESTMENT OPPORTUNITIES

Here we come to one of the keys point of our article: reflections on what forms of cooperation are the most promising, and where Indo-Russian ties can reach new heights. New heights can and will soon be reached by BrahMos Joint Venture(JV). it was reported that an improved BrahMos-II missile is under development, which would have unique characteristics including a speed of Mach 8. In addition to BrahMos, there are several other Indo-Russian JVs, including Indo-Russian Aviation Ltd., Indo-Russian Riffles Ltd. etc.

From the point of view of future technologies and bilateral cooperation, we see that one of the most promising options is co-development projects.

In the year 2021, a contract was signed that provides for the joint production of more than 500,000 AK-203 assault rifles. The Kalashnikov Concern JSC has a huge number of developments (not only assault rifles but also UAVs, shipbuilding etc.) that can be potentially produced in India under the 'Make in India' initiative. Thus, cooperation in the production of AK-203 is an excellent impetus for finding new approaches in the production of guns and other partnerships between the Indian side and Kalashnikov Concern JSC.

Within the framework of these JVs, it is possible to create completely new weapon systems that can serve in the Indian and Russian armed forces and will also be able to have great export prospects. Besides developing new systems, this may include those based on existing Russian systems.

Let us go back to the BrahMos enterprise again because this venture shows new prospects not only in the missile industry but also in the field of possible foreign investment and joint ventures.

BILATERAL COOPERATIONS

As is known, it is planned to open the BrahMos factory in the Uttar Pradesh defence industrial corridor (DIC).

Defence industrial corridors are a new concept for India, which is now being actively developed). In our opinion, industry clustering is attractive not only for various manufacturers but also for investment. One of the most famous non-defence projects of this kind in India is the Delhi-Mumbai industrial corridor. The Russian Federation has previously expressed interest in investing in this corridor.

We think that the DICs, especially in Uttar Pradesh, could be an attractive place for Russian-Indian joint ventures. In this corridor, a lot of attention is given to the aviation industry. Russia and India, as we have shown above, have long-standing relations in this sphere. Considering India's desire to indigenize the military-industrial complex, joint development (scientific organizations are planned within the defence-industrial corridor) and subsequent testing and production of new systems in one place, provided with the necessary logistics and other infrastructure, is an extremely promising option for cooperation.

There are risks and problems for foreign enterprises that want to become part of the DICs. However, we believe that BrahMos can become a conduit for other Russian companies. If we take a closer look at the aviation industry, then Russia has a huge potential that can be productively developed together with Indian colleagues.

SOME POSSIBILITIES

We also have identified several key areas of technology that are developed in Russia and that may be in high demand in India. We want to emphasize that information about the performance characteristics and other information about the systems is completely taken from official open sources.

New heights can and will soon be reached by BrahMos Joint Venture(JV). it was reported that an improved BrahMos-II missile is under development, which would have unique characteristics including a speed of Mach 8. In addition to BrahMos, there are several other Indo-Russian JVs, including Indo-Russian Aviation Ltd., Indo-Russian Riffles Ltd. etc

First of all, we believe that one of the possible areas of Indian-Russian cooperation in the field of future technologies can be systems for network-centric warfare. We see a deep need for unified tactical command and control systems.

Another reason why we see the possibility of cooperation in this particular area is the aspirations of modern armed forces to strengthen inter-services synergies. Moreover, a large-scale reform is being carried out in India to reorganize the Armed Forces with the allocation of integrated theatre commands. This once again emphasizes the need for the implementation of systems for the most effective control of the actions of units on the battlefield.



BILATERAL COOPERATIONS

In the Russian Federation, such systems have long been developed and tested. They showed high efficiency on the battlefield. The Russian Sozvezdie concern developed the ESU TZ system. As reported by Russia Today, the Command of the Western Military District of the Russian Armed Forces in the year 2021 conducted the first network-centric exercises with the participation of self-propelled artillery installations Msta-S-M2. The system coordinates intelligence, navigation and communications data, allowing three times faster decision-making and actions of troops in combat conditions.

Given the specifics of the north-western region of India, where in conditions of difficult terrain, the need to patrol the borders, as well as the prospects for the reorganization of the armed forces, such a system can be an extremely useful innovation. In India, there are a large number of IT-sector specialists who can contribute significantly to the development of such a system.

Another area of joint work could be missile systems. There is also a need for surface-to-air missile systems. During a special military operation in Ukraine and an operation in Syria, the Tor- 2 air defence system showed its high effectiveness against UAVs and other air targets. JSC Rosoboronexport, which is part of the Rostec State Corporation, has begun promoting the latest Tor-2E air defence system, developed and manufactured by the Almaz-Antey concern in 2018.

According to Rostec Corporation, battery of the four-channel Tor-E2 SAM systems, consisting of four combat vehicles, can simultaneously engage up to 16 targets flying from any direction at a range of at least 15 km and an altitude of up to 12 km. Each vehicle carries 16 missiles, twice as many as the previous version of the Tor system. One combat vehicle incorporates everything necessary for

it is possible to create completely new weapon systems that can serve in the Indian and Russian armed forces and will also be able to have great export prospects. Besides developing new systems, this may include those based on existing Russian systems

anti-air warfare, from target detection to destruction. The system far exceeds its counterparts in combat survivability: to knock out a Tor battery, you need to destroy all of its combat vehicles. For most of its counterparts, disabling a command post or a battery radar would be sufficient for that.

Given the successful India and Russia partnership with the S-400 Triumph complexes, cooperation within the framework of the Tor project may also be an interesting area of cooperation.

We doubt that the production of such a complex is possible within the Make in India program, but this is a technology that can be improved in various aspects. It can be assumed that India's high demand for air defence systems may be the reason for a new round of cooperation in this area. Russian and Indian enterprises may follow the example of BrahMos missiles and create an even more modern air defence system based on the existing complex.

The situation that we described with the Tor complex can also be





applied to another promising system - Pantsir-S1. As it is known, it has a high export potential and is operated by several countries, including Algeria, Myanmar and others. Joint improvement and adoption by the Indian Armed Forces may also be considered.

Such systems, which are highly mobile, especially the Tor-E2, should be considered by India for acquisition. They perform well in difficult conditions, which is especially important for the various landscapes of India, from snow to desert.

One more time, missiles also remain one of the promising areas. Russia is the most advanced developer of such systems in the world. As another example, in addition to what was described above, it is worth noting another development that may be of interest to the Indian armed forces. This is the 305 Light Multi-Purpose Guided Missile or Izdeliye 305, a Russian high-precision weapon belonging to the class of air-to-surface guided missiles. Izdeliye 305-E is an export version of this missile. Izdeliye 305 is very similar to the earlier Izdeliye 79 but has an additional two-way data transmission channel which allows controlling of the rocket literally in 'online' mode.

That in the current conditions and for long-term requirements, it is important for the two nations to create joint ventures with a focus on developing new products that are necessary to satisfy India's need for indigenization, and developing advanced versions of existing Russian systems

In Russia, it was put into service in 2022, which speaks of its modernity and high technology. It is known that India also does a lot of research in the field of guided missiles, but the ToT and the joint development of the most promising types of weapons can accelerate this process in India, as well as equip the Indian Armed Forces with the most relevant types of them.

We consider the technologies mentioned above to be the most promising for joint development. We believe that there is a huge potential in the development of anti-aircraft missile systems, the development of the latest missiles, as well as in the field of network-centric wars.

India has significant scientific and technical potential, which can harmoniously complement the unique Russian developments and increase output. Many Russian enterprises are cautious about the Make in India program. This will especially apply to future technologies and other unique technologies, including the system of the Sovezdzie concern that we have described before. Therefore, we expect a more considerate approach from Indian partners towards Russia, which, unlike many Western countries, is much more willing to offer deep technologies.

India is a unique country where unique Russian technologies can be tested in the most difficult and varied geographical conditions. Russia and India can together create weapons for unique and varied Indian requirements. Hence, the two sides need to strengthen bilateral military-technical cooperation.

Summing up, we would like to emphasize that in the current conditions and for long-term requirements, it is important for the two nations to create joint ventures with a focus on developing new products that are necessary to satisfy India's need for indigenization, and developing advanced versions of existing Russian systems.

Western sanctions and the United States are persuading India to reduce cooperation with Russia. We hope that friendly relations, proven over the years, will be able to outweigh them and we can create new weapons with no analogues in the world. ■

T-90 COMPLETES 30 YEARS

THE MAIN BATTLE TANK of Russia, T-90 is celebrating its three decades of service. On October 5, 1992, it joined the Russian army. Its export version, the T-90S, is operational in several countries around the world. India is one of its largest operators. Its producer Uralvagonzavod calls the T-90S the most commercially successful tank of the 21st century.

"Interest from customers to this product is observed even today. They are attracted by the exceptional reliability, maintainability and durability of the machine, as well as the optimal ratio of price and quality," says the producer.

In 1997, the military delegation of India acquainted with the export version of the T-90S. India operates over 1600 T-90S and ordered 464 MS version in November 2019. Indian government's armoured vehicle factory at Avadi license produces these tanks. The T-90 production is 90 per cent indigenised.



"It is unlikely that any other tank would have withstood the test of strength that the Indian military subjected the T-90S to. In the Thar Desert, with almost no roads, each tank covered more than 2,000 kilometres, overcoming sand dunes 10-15 meters high. All this - at a daytime air temperature of up to 53 degrees and a night temperature of about 30, when the engine simply did not have time to cool down. Impressed by the tests, then military attaché at the Indian Embassy in Moscow, Brigadier D. Singh, said: "In terms of the effectiveness of the T-90S, it can be called the second deterrent after nuclear weapons."

On February 15, 2001, a contract was signed for the supply of 310 T-90S tanks to India. On January 7, 2004, the first T-90S of the Indian assembly rolled off in Avadi. This was followed by other contracts, not only with India. In total, more than a thousand tanks went abroad over the years, says the Uralvagonzavod.

The 1999 model T-90S created an unthinkable precedent in the national tank building: the export vehicle became the basis of a tank for the Russian army. In 2004, the Ural Design Bureau of Transport

Engineering (UKBTM) and Uralvagonzavod again received a state defence order. On April 15, 2005, by decree of the President of the Russian Federation, the T-90A tank was adopted - with a welded turret, a 1000-horsepower engine, and starting from 2006 - with a thermal imaging sight".

The Uralvagonzavod specifies, that all its tanks have a huge modernization potential.

"The T-90 tank was no exception. As a result of development work, a unified combat module was created, equally suitable for installation on both newly built combat vehicles and older versions. In 2011, it was combined with the chassis of the T-90S tank, thus creating a new tank - the T-90MS. In 2021, the first batch of T-90M Proryv (Breakthrough) tanks went to the Russian troops".

The producer points out, that the modernization of the T-90 turned out to be so multi-level that the T-90M can be considered

a new combat vehicle. The export version of the latest T-90M MBT is the T-90MS. It is said to offer comprehensive protection against conventional ammunition, precision-guided weapons (guided artillery projectiles, ATGMs) and anti-tank rockets.

During the ARMY-2022 expo, Rosoboronexport JSC and Uralvagonzavod Concern JSC signed a joint action program to promote products and services abroad from 2022 through 2025. The program is aimed at coordinating the marketing efforts by both companies in external markets to promote modern Russian armoured vehicles, missile, rocket and artillery weapons and interact with foreign customers on modernization and maintenance of the earlier supplied weaponry and military equipment.

"Rosoboronexport has exported 200+ tanks manufactured by Uralvagonzavod Concern over the last 5 years. Today, Rosoboronexport's order book includes the Concern's products worth about 50 billion rubles," said Alexander Mikheev, Rosoboronexport's CEO. "In close cooperation

with the world's largest manufacturer of Russian armoured vehicles, we hope to promote new products in the external market which will take the lead in their segments. Our partners in the Middle East, Africa, Asia-Pacific region, and the former Soviet states are interested in Uralvagonzavod's products".

Rosoboronexport: "Rosoboronexport and its parent company, Rostec State Corporation, are open to any formats of cooperation with India. We are currently pursuing over 100 joint research and development projects, thus laying a foundation for the future evolution of both countries' hi-tech industrial sectors.

"We avail of the unique level of bilateral cooperation in working on joint projects in the interest of the Indian armed forces. Rosoboronexport maintains its long-standing partnership with HAL Corporation involving licence production of Sukhoi Su-30MKI fighter jets, the mainstay of the Indian Air Force. The HVF factory manufactures T-90 tanks for the Indian Army, while the Indian Defence Ministry's artillery plants are involved in the manufacture of associated Mango anti-tank shells". ■

KALASHNIKOV INCREASES SMALL ARMS PRODUCTION



A SIGNIFICANT INCREASE IN the production of small arms in 2022 was achieved through export contracts for the supply of military products and an increase in the export of civilian weapons, reported the Kalashnikov Group.

"We strive to fulfill our obligations to our external customers in a quality and timely manner, and this year we are seeing an increase in demand in the civilian small arms market compared to last year. Thus, our production capacities are loaded quite intensively this year. The high pace of work can be maintained thanks to the responsibility of the team and the effective organization of processes at all levels," said the President of the Kalashnikov Group Alan Lushnikov.

The Groups most famous AK series of assault rifles still maintain popularity across the world. The series is witnessing rapid evolution and has expanded in number of rifles designed for evolving infantry requirements.

According to the Rosoboronexport, the AK200 series rifles have retained all the advantages of the traditional AK pattern: reliability, durability and ease of maintenance. The rifle is equipped with integral Picatinny rail and can be fitted with necessary detachable equipment for the effective use of the weapon in various conditions, including in reduced visibility. The butt plate and a number of ergonomic solutions for optimizing controls enable the users to fully realize their shooting skills, regardless of their anthropometric indicators and the availability of a variety of personal clothing, gear and equipment.



In July last year, Indian and Russia signed the contract for the indigenous production of the AK-203 assault rifle. In 2018, India and Russia agreed to establish a joint venture firm between Indian public sector OFB and Russian entities for local manufacturing of the gun. The AK203 is part of the larger AK200 assault rifle family.

In March 2019, Prime Minister Narendra Modi inaugurated the manufacturing unit of the Indo-Russian Rifles Pvt Ltd, an Indo-Russian joint venture, at Korba, Amethi. The Russian side owns 49.5 per cent of shares, with the Kalashnikov Concern holding 42 per cent and Rosoboronexport 7.5 per cent, the rest are owned by India.

The joint venture, as part of the UP defence corridor, is expected to give a boost to the corridor and self-reliance in defence.

"This is indeed a very significant event for both countries and the bilateral military-technical cooperation," said Alexander Mikheev, Director General, Rosoboronexport, while speaking to media after the signing of the contract.

"An international technology cooperative chain has been set up. With up to 100% localization, the joint venture will manufacture more than 600,000 Kalashnikov assault rifles and meet the needs of the country's security agencies in a least-cost manner," Mikheev added.

As per the agreement, localization of the gun manufacturing will be done in phased reaching complete localization by the end of the contract.

Coming from the home of the legendary AK-47, AK-203 is an improved version of the AK series, which fires 7.62x39 mm bullets and allows all modern add-ons, including a variety of sight systems, to target designators and under-barrel grenades. Despite evolving into a modern firearm, the gun has retained all the advantages of the traditional AK classics: reliability, durability and ease of maintenance.

Compared to earlier Kalashnikov rifles, AK203 has better ergonomics, accuracy and density of fire. Robust mechanics and simplicity of operation are other strong points. The gun has been tested under the conditions of extreme heat and cold.

Since 2019 Russia has started marketing of the AK200, AK203, AK204 and AK205 rifles. ■



RUSSIA'S NEW ARMOUR

THE LARGEST OF RUSSIA'S defence exhibition ARMY-2022 featured not only the latest armoured vehicles but also – the modern systems for its protection. The key Russian developer in this field is the Moscow-based Research Institute of Steel (NII Stali). The company has created several generations of well-known dynamic protection systems, including the latest universal modular complex Relikt, which provides T-72 and T-90 MBTs with protection against HEAT tandem ammunition and armour-piercing sub-calibre projectiles.

At the expo, the Research Institute of Steel, in addition to the Relikt complex, showcased several other products, including a hinged dynamic protection system for lightly armoured vehicles, an electromagnetic mine protection system and a system, which reduces visibility thus protecting against high-precision weapons.

The system of dynamic protection for light armoured vehicles created by the Research Institute of Steel, according to the company, is the first such serially produced product in the world. Initially, the system was developed to increase the protection of the BMP-3 IFV against RPGs, small-calibre guns and small arms, but can also be used to increase the protection of various types of lightly armoured wheeled and tracked vehicles of Russian and foreign production. The basis of the system is the 4S24 new element of dynamic protection, which has given the required level of protection and survivability.

To protect against modern anti-tank mines, the Research Institute of Steel has developed and presented at the expo the electronic mine protection system SPMZ-2E, which is capable of changing the magnetic signature of a tank, or shifting it forward so that the mine's magnetic sensor either does not react to a passing tank or causes a mine to explode in front of it. The system can be installed not only



on tanks but also on any other vehicles (infantry fighting vehicles, armoured personnel carriers, cars). Structurally, the SPMZ-2E is an electrical cable laid along the perimeter of the vehicle hull and connected to an electronic unit - an inverter installed in the combat compartment. The inverter, in line with a preset program, generates electrical impulses in the cable, which change the magnetic image of the tank, misleading even the smartest magnetic fuses.

Another solution is the RPM Cape set of optical signature reduction means, designed to significantly reduce the visibility of combat assets, including tanks, in those spectra of electromagnetic radiation in which most reconnaissance and weapon guidance systems operate. Special veils made of radio-absorbing material almost completely hide the tank from reconnaissance radars, significantly reduce its visibility in the infrared range, and make it difficult to detect and recognize the tank. A tank covered with such material becomes invisible to many reconnaissance and weapon guidance devices, the developer claims. ■

BEL TO ACHIEVE 15 % GROWTH IN FY22-23 – CMD

India's defence major Bharat Electronics Ltd is at the forefront of the national goal of Self-reliance in defence. On the eve of DefExpo, GeoStrategy caught up with Dinesh Batra, CMD, BEL, to discuss his company's performance and vision.

by **ROHIT SRIVASTAVA**



ON RECOGNITION THAT BEL IS RECEIVING

CMD - BEL is India's pioneer in Defence electronics. Today, there's not an area in Defence which is untouched by BEL — Radars, Missile Systems, Military Communications, Naval Systems, Electronic Warfare & Avionics and other areas, you name it, the company has made some of the most iconic products in all these areas. It is also a recognition of the complete trust that customers have reposed in BEL. And like all good brands, BEL has been constantly evolving over the last seven decades and has been diversifying into allied areas of non-defence to keep pace with the changing times.

ON FY2021-22

CMD - In the Last financial we saw an impressive performance by BEL with the company registering a record turnover of Rs. 15,044 Cr, and turnover and profit witnessing strong Year-on-Year growth of 9per cent and 14per cent, respectively. This is despite challenges posed by the pandemic, global chip shortage and stiff competition. This has instilled confidence among stakeholders, resulting in the highest PE ratio of 29 of BEL's share price among all manufacturing PSUs. The Company recorded an Export turnover of 33.30 Million USD and become the first Defence PSU to cross the landmark market capitalisation figure of Rs. 80,000 Crores and declared the highest-ever dividend of 450 per cent. On my part, I have steered the Board, Administrative Ministry and Shareholders' approval to increase the authorised capital three-fold to Rs.750 Cr and issue bonus shares in the ratio of 2:1.

ON KEY CONTRIBUTORS

CMD - The growth in turnover during FY22 was mainly on account of the timely execution of the existing order book as well as the new products introduced in the current financial year. The major orders executed during last year were Long Range Surface-to-Air Missile (LRSAM), Air Defence Weapon System, Integrated Air Command and Control System, AFNET, Coastal Surveillance System Phase II, Integrated Perimeter Security Solution, Smart City projects, Oxygen Concentrators and Ventilators. New products introduced include Laser Fence System, IR Jammer for Active Tank Protection System, Solid State Power Controller Cards for Akash NG/QRSAM, S-Band 150 W Power Amplifier, GNSS Receiver and IP EPABX System. As far as profitability growth in the current year is concerned, the increase in turnover as compared to the previous year was to the tune of more than Rs. 1,200 Cr, which has brought in economies of scale and a corresponding increase in profit.

ON PROJECTION FOR FY 2022-23

CMD - We are midway into meeting our targets for this financial year and I am confident that we will achieve around 15 per cent growth in our turnover and an increase in EBIDTA (as a per cent of turnover) from the present 22per cent to 23per cent by the end of March 2023. BEL's order book as on April 1, 2022, stood at Rs. 57,000 Cr. This year, we are expecting around 15,000-20,000 crore worth of orders.

ON STRATEGIC PRIORITIES

CMD - BEL's investment in research currently is to the tune of over Rs. 1,000 crore (7per cent of its turnover). We have also been investing every year more than Rs. 500 crore in capital. We would like to maintain the same level of investment which will help us develop new products, indigenise and achieve cost reduction.



ON EXPORT POTENTIAL

CMD - We are seeing a very good opportunity in Exports. Our present export order book is more than USD 265 Million. During the current FY, as part of its Offset commitments, under the prestigious C295 aircraft programme, Airbus Defence and Space has signed a contract with BEL for the manufacture and supply of Radar Warning Receiver and Missile Approach Warning System. To enhance its geostrategic reach, BEL has strategically opened overseas marketing offices in the Indian Ocean Region, South East Asia, Middle East Region and the USA. BEL has six overseas marketing offices in Vietnam, Myanmar, Sri Lanka, Oman, Singapore and New York, and is planning to further expand its global footprints.

Tell us about your initiatives to diversify into the civilian business...

Defence, being the mainstay of BEL, has traditionally been contributing to around 80 per cent on average of the Company's annual sales revenue. BEL, however, has been continuously exploring diversification into allied Defence and non-defence areas. The total opportunity available in the non-defence business segment, being pursued by BEL in the next 8-10 years, is more than Rs. 2 Lakh crore. The Company aims to increase its non-defence share in the overall business in the coming years.

Some of the areas BEL is focussing on in non-defence include solutions for the civil aviation sector including air traffic controller radars, anti-drone systems, space, solar, railway, energy storage etc.

ON SUPPORT TO SMALL ENTERPRISES

CMD - Company has been putting in to engage in collaborative research. With its recent attempts to outsource work to Indian private industries and MSMEs, or the path-breaking decision to go in for Public-Private partnerships to execute turnkey projects, BEL is leaving no stone unturned to ensure that it is in sync with the Government's larger goal of indigenisation and self-reliance.

BEL has an Outsourcing and Vendor Development Policy and is implementing online vendor registration and e-procurement processes including using the GeM portal. This is in line with the 'Make in India' initiative. BEL is pursuing Long Term Agreements (LTAs) with reputed vendors to secure the supply of items or services over a specified period. BEL has identified several areas for partnership with start-ups in new emerging technology areas in both Defence and non-defence businesses through various engagement models.

Defence Innovation Organisation (DIO) is a Section-8 company, created jointly by BEL and HAL to support the country in building an ecosystem of entrepreneurship and innovation in Defence in India by implementing the iDEX framework. We are also working on emerging technologies such as Artificial Intelligence, Big Data Analytics, the Internet of Things, 5G Quantum Cryptography, etc., in collaboration with Industry, Academia and Startups. ■



U.S. ARMY ORDERS ENHANCED CH-47F BLOCK II

THE U.S. ARMY IS continuing to modernize its heavy-lift helicopter fleet with an order for two more Boeing [NYSE: BA] CH-47F Block II Chinooks and long lead funding for additional aircraft.

"Modernizing the Chinook for our Army customer is a priority," said Ken Eland, Boeing vice president and H-47 program manager. "CH-47F Block II improves readiness, limits future sustainment costs and provides commonality across the fleet. We're dedicated to making CH-47F Block II the best option for the Army's heavy lift mission, now and well into the future." The CH-47F Block II Chinook is powered by cutting-edge technologies — including redesigned fuel tanks, a strengthened fuselage and an enhanced drivetrain.

Last year, the Army awarded Boeing a \$136 million contract for the first four CH-47F Block II aircraft, which began production in April 2022. The Lot 2 order valued at \$63 million brings the total number of aircraft under contract to six. The separate Lot 3 advance procurement contract is valued at \$29 million.

Boeing's H-47 Chinook Block II expands upon 60 years of partnership with the U.S. Army. During that time, Boeing has delivered over 1,000 Chinooks to the U.S. Army, continuously modernizing the helicopter to meet evolving needs. The U.S. Army and 19 allied countries around the globe rely on the Chinook for its multi-mission capabilities including equipment and troop transport, humanitarian assistance and disaster relief.

DPSU INDIGENISE 72 ITEMS

PUTTING ATMANIRBHAR BHARAT on fast track, 72 items out of total of 214 items mentioned in 1st and 2nd Positive Indigenisation List (PIL) have been indigenised by Defence Public Sector Undertakings (DPSUs) well before their original indigenisation timelines of December 2023, December 2024 and December 2025. The remaining 142 items are being indigenised within the timeline of December 2022. Some of the main Sub-systems/ Line Replacement Units (LRUs) indigenised include Magazine Fire Fighting System for Ships, Steering Gear System and Fin Stabilisers with Control for Frigates, Pressurised containers for Akash Missiles, KOE charge for Konkurs Missiles and Electric Motor, Decontamination set and Prism optical instrument for Battle Tanks.

Beside these items, some critical components include Intermediate Castings for Helicopter, Polychropene Rubber Band for Submarines and High Pressure Regulating Valves for Ships. Details of all the indigenised items are available on "SRIJAN Portal (srijandefence.gov.in)".

It is notable that in pursuit of self-reliance in defence manufacturing and to minimise imports by DPSUs under 'Atmanirbhav Bharat Abhiyan', Department of Defence Production (DDP), Ministry of Defence had notified three Positive Indigenisation Lists of LRUs/ Sub-systems/ Assemblies/ Sub-assemblies/ Components in December 2021, March 2022 and August 2022 respectively with an indicative timeline for their indigenisation. The 1st PIL contains 351 items, 2nd PIL has 107 items and 3rd PIL has 780 items for indigenisation.

Subsequently, DDP has notified the revised timeline of the 72 indigenised items (PIL-1: 67 & PIL-2: 5). Now, these items will be procured only from the Indian Industry thereby giving a boost to the domestic industry including MSMEs and will save foreign exchange. This also reinforces the growing confidence of the Government in the capabilities of domestic industry for supplying items of international standards to meet the demand of the Armed Forces.



IAF INDUCTS LIGHT COMBAT HELICOPTER

IN A BIG BOOST TO Aatmanirbharata in Defence, Defence Minister Rajnath Singh today presided over the formal induction of Light Combat Helicopter (LCH), designed and developed by Hindustan Aeronautics Limited (HAL), into the Indian Air Force (IAF) in Jodhpur. Naming LCH as "Prachanda", Raksha Mantri said that its induction comes during the Amrit kal when the Nation is celebrating Azadi ka Amrit Mahostav and a pointer to the future when IAF will be the top most force in the world, as also making the country fully AtmaNirbhar in Defence production requirements. Raksha Mantri also took a sortie onboard the LCH shortly after its induction into IAF.

Chief of Defence Staff (CDS) General Anil Chauhan, Chief of Air Staff Air Chief Marshal V.R. Chaudhary, Air Marshal Vikram Singh Air Officer Commanding-in-Chief, South Western Air Command, Chairman and Managing Director of HAL Shri C.B. Ananthakrishnan, senior officials of Ministry of Defence, IAF and local dignitaries were present on the occasion.

In his address, Rajnath Singh praised role of IAF in meeting internal as well as external threats to the country since independence. He added that the induction of LCH, with its tremendous power and versatility, not only enhances the combat capabilities of IAF but is also a big step towards self-reliance in defense production, as envisioned by Prime Minister Narendra Modi. The trust reposed and support extended by the IAF towards indigenous design & development is evident through the examples such as Marut, Light Combat Aircraft, Akash missile system, Advanced Light Helicopter and the Light Combat Helicopter. "The induction of LCH underlines the fact that just as the country trusts the Indian Air Force, the IAF equally trusts the indigenous equipment," he added.

Defence Minister said that adequate attention was not paid to the development of indigenous attack helicopters for a long time after independence. However, since the Kargil War in 1999, the need for LCH was felt more and today's LCH was a result of two decades of R&D and indigenous efforts in that direction. He added that LCH was flying not only on the strength of its rotors, engines and blades, but also on the strength of penance, patience, dedication and patriotism of many scientists, engineers and others.

Rajnath noted that the LCH meets the requirements of modern warfare and necessary quality parameters under varied conditions of operations. It is capable of self-protection, of carrying a wide variety of ammunition, and delivering it to the field quickly. This versatile helicopter perfectly meets the needs of our armed forces in various terrains and as such LCH is an ideal platform for both our Army and Air Force, he added.

He said that the recent conflicts in Ukraine and elsewhere showed us that heavy weapon systems and platforms, which do not allow for rapid movement in the battlefield, are sometimes vulnerable and become easy targets for the enemy. Therefore, the need of the hour is to move towards the development of those equipment and platforms, which are mobile, have ease of movement, are more flexible, and at the same time meet the requirements of the armed forces. In this context, LCH has been developed with an unprecedented balance of all these features and HAL should be congratulated for this, Raksha Mantri said.

Air Chief Marshall V.R. Chaudhary, Chief of Air Staff said on the occasion that induction of LCH adds unique capability to the IAF's combat potential. Versatility and offensive potential of the LCH is at par or better than most attack helicopters operating globally. Selection of the personnel in the 143-helicopter unit which will man the LCH have been made based on professional competence so as to ensure operationalisation of the unit at the earliest, he added.

The LCH is the first indigenous Multi-Role Combat Helicopter designed and manufactured by HAL. It has potent ground attack and aerial combat capability. Inducted in IAF's newly raised No. 143 Helicopter Unit, it is a testimony to India's growing prowess in indigenous design, development & manufacturing and a significant milestone in the path towards 'Atmanirbharta' in Defence. The helicopter possesses modern stealth characteristics, robust armour protection and formidable night attack capability. Onboard advanced navigation system, guns tailored for close combat and potent air to air missiles make the LCH especially suited for the modern battlefield. Capable of operating from high altitude terrain and carrying out precision strike at high altitude targets, the helicopter is a formidable addition to IAF's arsenal.



REVIEWS OF WORKING OF OFB OFFSHOOTS

DEFENCE MINISTER RAJNATH SINGH reviewed the working of the seven defence companies, carved out of erstwhile Ordnance Factory Board (OFB), at a meeting organised in New Delhi on September 30, 2022 to mark the completion of one year of their operations. The companies had commenced operations from October 01, 2021 before they were dedicated to the nation by Prime Minister Narendra Modi on the occasion of 'Vijayadashami' on October 15, 2021.

An amount of Rs 2,953 crore has been released to these companies in the form of equity, during the Financial Years 2021-22 and 2022-23 for modernisation and further amount of Rs 6,270 crore is planned to be released to these companies up to 2026-27 for capital expenditure. In addition, an amount of Rs 3,750 crore has been released to these companies in form of Emergency Authorisation Fund.

The functional and financial autonomy provided to these new corporate entities, coupled with handholding by the Government, has started reflecting in their performance. Within a short span of six months i.e., October 01, 2021 to March 31, 2022, these new companies have achieved the turnover of more than Rs 8,400 crore, which is significant considering the Value of Issue of erstwhile OFB during the previous financial years. For the Financial year 2022-23 also, the seven new DPSUs have projected cumulative sales target of approx. Rs 17,000 crore, which is significantly higher as compared to previous achievements of erstwhile OFB.

Against the production achievement of approx. Rs 5,028 crore for the period April 01, 2021 to September 30, 2021, the new DPSUs have reported production achievement of more than Rs 6,500 crore in first six months of financial year 2022-23. Post corporatisation, the new entities have shown marked improvement in productivity and quality in the changed corporate set up. In the Financial Year 2021-22, out of seven companies, six have indicated profits based on the provisional financial statements.

Highlighting the emphasis being laid by Ministry of Defence to reduce import dependency to realise Prime Minister Narendra Modi's vision of 'Aatmanirbhar Bharat', the minister said it should be the aim of the DPSUs to contribute towards increasing exports. "Defence manufacturing is an important sector to achieve the goal of self-reliance. Ministry of Defence has set a target of achieving a turnover of Rs 1.75 lakh crore in aerospace and defence goods and services by 2025, which includes exports of Rs 35,000 crore. The DPSUs must strive to achieve the goal and take the country to newer heights," he said.

"India is emerging as a global defence manufacturing hub. With active participation of the private sector, our aim is to bring India among the top countries in the world in the fields of design, production, exports. Today, as our country is moving fast towards becoming a 5 trillion dollar economy. Our defence exports have increased 5-6 times to Rs 13,000 crore as compared to the last 7-8 years. The new management must explore new opportunities abroad along with meeting the domestic needs," said Singh. He expressed hope that the new companies will play an important role

in the strengthening the defence manufacturing ecosystem, but also contribute significantly to the overall development of the economy.

Since their inception, these DPSUs have started exploring avenues to expand their business and had adopted an aggressive approach towards diversifying their customer base and product profile. During the last one year, the new companies have obtained domestic orders of more than Rs. 7,200 crore value. Some of the significant achievements of the new companies are enlisted below:

Munitions India Limited (MIL) has obtained export orders worth more than Rs 1,500 crore for various types of ammunition in last one year. Gliders India Limited (GIL) has also obtained orders for export of Parachutes.



Yantra India Limited (YIL) has made significant progress in product and customer diversification. This has helped them to get orders worth more than Rs. 300 Crores from non-defence market like Indian Railways.

Troop Comforts Limited (TCL) has developed items like Bullet Proof Jacket, Ballistic Helmets, ECWCS etc to enter a niche market and sustain its business in long run.

Armoured Vehicles Nigam Limited (AVNL) has developed a new variant of Mine Protected Vehicle designed for CRPF, which may be useful for other Armed Forces also.

Advanced Weapons & Equipment India Limited (AWEIL) has received an order for supply of JVPC carbines to Delhi Police.

Munitions India Limited (MIL) has been able to successfully proof fire new variants of Pinaka Rocket i.e., Pinaka Mk-I (Extended Range) and DPICM.

MIL has also successfully developed 40 mm UBGL ammunition, 500 Kg General Purpose Bomb and 76/62 SRGM HEDA Ammunition.

India Optel Limited (IOL) has developed Driver Night Sights for Tanks which is a first in terms of technology of Fusion Imaging.

These new entities have initiated various measures towards optimal utilisation of their resources and cost reduction. They have also taken various cost saving measures like reduction in expenditure towards overtime and non-production activities and measures like use of solar power, water recycling, switch over to LED etc.

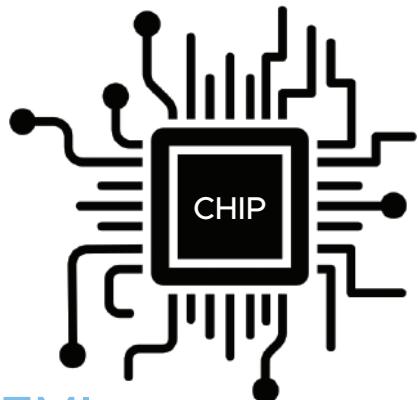


SUCCESSFUL TEST OF VSHORADS

DRDO CONDUCTED TWO SUCCESSFUL test flight of Very Short Range Air Defence System (VSHORADS) missile on 27 Sep 2022 from a ground based portable launcher at the Integrated Test Range, Chandipur, off the coast of Odisha. VSHORADS is a Man Portable Air Defence System (MANPAD) designed and developed indigenously by DRDO's Research Centre Imarat (RCI), Hyderabad in collaboration with other DRDO laboratories and Indian Industry Partners.

VSHORADS missile incorporates many novel technologies including miniaturized Reaction Control System (RCS) and integrated avionics, which have been successfully proven during the tests. The missile, meant for neutralizing low altitude aerial threats at short ranges is propelled by a dual thrust solid motor. The design of the missile including launcher has been highly optimized to ensure easy portability. Both the flight tests have completely met the mission objectives.

Defence Minister Rajnath Singh complimented and appreciated the efforts of DRDO and industry partners and said that this new missile equipped with modern technologies will give further technological boost to the Armed Forces. Secretary DDR&D and Chairman DRDO congratulated the entire VSHORADS team for this tremendous success.



50,000 SEMI-CONDUCTOR CHIPS FOR DEFENCE SERVICES

INDIAN MINISTRY OF ELECTRONICS and Information Technology in association with Ministry of Defence, on Friday, released a tender for locally designed half a million secure system on chips (SoC) out of which 10 per cent chips are for defence systems in military role.

"With a view to facilitate indigenous design and manufacture of secure semiconductor devices, took up an initiative (hereinafter called Project) to provide 'Deployment Linked Incentive (DLI)' against deployment of designated number of SoCs to enable availability of secure semiconductor devices from indigenous sources," the request for proposal (RFP) said.

The document "seeks participation of Indian companies working in the area of design and manufacture of Semiconductor devices to "Indigenously Design, Develop, Manufacture, Validate and Deploy Secure Systems on Chips using Indian Owned Processors based on Open Source ISA(Instruction Set Architecture)."

"The major design IPs ie Processor, Secure Boot and Security IPs of such processors are to be owned by Indian entities. This is expected to yield at least 50 per cent of indigenous content by value and ownership of all security related and unhindered utility of SoCs by Indian companies," it added.

According to the RFP, a family of four such SoCs, named Bharat Secure Chips (BSC-1, BSC-2, BSC-3 & BSC-4), developed in two phases of the project, would cover the defence requirements to large extent. The SoC requirement of defence ranges from "low-end embedded system to server class computing systems."

The family of SoCs is expected to be fullfil the requirements of semiconductors in various commercial products. "The combined volume is being considered for economic viability of the project and also to extend the gains from this initiative to the commercial segment," the RFP said.

From the signing of the contract, the contractor is expected to take three and half (31 /2) years for BSC-1 and Four years for BSC- 2. "Two years from successful development and validation of production grade BSC-1 and BSC-2 SoCs each. Further, deployment of designated number of each SoCs in next two years @ 25% every 6 months commencing latest from the 24th month after the date of contract for BSC-1 and 30th month for BSC-2. Early completion of Deployment will carry defined incentives," it explained.

The IP for the SoCs would rest with the contractor. The bids are to be submitted by November 23.

PRESIDENT INAUGURATES HAL'S CRYOGENIC ENGINE FACILITY

THE PRESIDENT OF INDIA, Droupadi Murmu inaugurated HAL's Integrated Cryogenic Engine Manufacturing Facility (ICMF) here today and said it is not only a historic moment for HAL and ISRO but for the whole of India. "India is the sixth country in the world to have Cryogenic Engine Manufacturing capabilities. The glorious past of HAL and ISRO gives us an assurance that they will play a crucial role in the future", she said.

The President also went around the HAL facility. She virtually laid the foundation stone for Zonal Institute of Virology (South Zone) of NIV, Bengaluru. The Governor of Karnataka Mr. Thaawarchand Gehlot, the Chief Minister of Karnataka, Mr Basavaraj Bommai and others were present on the occasion.

Referring to Bengaluru as Space City, Mr. Bommai said the state contributed most of the space and defence related manufacturing activities in the country and Karnataka will continue to support the development of science and technology projects in the state to realise the 'Aatmanirbhar Bharat' vision.

Dr. Bharati Pravin Pawar, Union Minister of State for Health and Family Welfare also spoke on the occasion. Dr. Sudhakar K, the Minister for Health, Family Welfare and Medical Education (Govt of Karnataka) was present.

Somanath S, Secretary, Dept of Space and Chairman of ISRO said India can emerge as a superpower in rocket technology only with the help of HAL which has shown ability to absorb complicated space technology with perfection. ISRO therefore is confident that the entire rocket manufacturing will happen at HAL's facility, he added.

C. B. Ananthakrishnan, CMD, HAL welcomed the gathering.

ABOUT ICMF:

HAL's ICMF will cater to the entire Rocket Manufacturing and

assembly under one roof for ISRO. The facility will boost self-reliance in manufacturing of High-thrust Rocket engines.

The facility is set up over an area of 4500 sqmts housing over 70 hi-tech equipment and testing facilities for manufacturing Cryogenic (CE20) and Semi-cryogenic Engines (SE2000) of Indian Space Launch Vehicles.

In 2013, an MOU was signed with ISRO for establishing the facility for manufacturing of Cryogenic Engine modules at HAL, Aerospace Division. The MOU for the Cryogenic Engine facility was subsequently amended in the year 2016 with an investment of Rs. 208 crores towards setting up of Integrated Cryogenic Engine Manufacturing Facility (ICMF).

The commissioning of all the critical equipment for the manufacturing and assembly requirement is completed. The pre-production activities which involves preparation of the process plans, drawings, quality plan etc. has also commenced. HAL will start realising the modules by March 2023.

HAL Aerospace Division manufactures liquid propellant tanks and launch vehicle structures of PSLV, GSLV MK-II, GSLV Mk-III and also stage integration for GSLV Mk-II. The Aerospace Division entering into manufacture of Cryogenic Engines is a major step in technology up-gradation cum modernization.

Cryogenic Engines are the most widely used engines world over in the launch vehicles. Due to the complex nature of the cryogenic engine, till date only few countries USA, France, Japan, China & Russia have mastered the cryogenic technology. On January 5, 2014 India successfully flew GSLV-D5 with a cryogenic engine (made by ISRO through private industries) and became the sixth country in developing cryogenic engines. Space exploration in the future is mostly dependent upon cryogenic technology.



INDIA LAUNCHES TWO DIVING SUPPORT VESSELS



TWO DIVING SUPPORT VESSELS (Nistar & Nipun) being built by Hindustan Shipyard Ltd, Visakhapatnam were launched on 22 Sep 22 by Mrs Kala Hari Kumar, in presence of Adm R Hari Kumar, Chief of the Naval Staff who presided the ceremony as Chief Guest. VAdm RB Pandit CinC SFC, VAdm Dasgupta, FOCinC Eastern Naval

Command, VAdm Kiran Deshmukh, Controller Warship Production & Acquisition and other senior officers from the Indian Navy & Ministry of Defence were amongst the dignitaries who attended the launching ceremony.

Indigenously designed and built at HSL, these ships are a true testimonial to 'Atmanirbharta'. They are self-sustaining platforms which can operate at sea for prolonged durations.

DSVs equipped with an array of complex Diving Support systems and Deep Submergence Rescue Vessel (DSRV) will be deployed for deep sea diving and submarine rescue operations. Furthermore, the ships will be capable of conducting Search and Rescue operations and carrying out Helicopter Operations at sea.

This project is being executed with support from Indian industry primarily MSME firms who have supplied Yard material, equipment and services. Shipyard is extensively using the GeM portal for procuring material and services for the project. More than 120 MSME vendors across India have actively participated in the Project.

"Nistar" and "Nipun" were launched by achieving approx 80% indigenous content, a major step towards 'Self Reliance'. DSV project has generated local employment opportunities and promoted indigenisation which will boost India's economy.

Mrs Kala Hari Kumar, President Navy Wellness and Welfare Association (NWWA) performed the traditional honour and named these ships. These ships received a thunderous cheer from jubilant gathering as they embraced the welcoming waters of the Bay of Bengal.

GENERAL ANIL CHAUHAN TAKES OVER AS CDS

GENERAL ANIL CHAUHAN, PVSM, UYSM, AVSM, SM, VSM assumed office as the Chief of Defence Staff(CDS)on September 30, 2022. General Chauhan will also be the Principal Military Advisor to the Raksha Mantri on all Tri-Service matters as well as head Department of Military Affairs as Secretary. He will also be Permanent Chairman, Chiefs of Staff Committee (COSC).



5TH P17A 'NILGIRI' CLASS FRIGATE 'TARAGIRI' LAUNCHED

THE FIFTH STEALTH FRIGATE of P17A 'Taragiri' being built at MDL was launched, on Sunday. In compliance with the notification issued by the Ministry of Home Affairs, Government of India declaring a state-mourning on September 11, the event was limited to a Technical Launch as the event is tide dependent, any change in the schedule was not possible.

Vice Admiral Ajendra Bahadur Singh, Flag Officer Commanding-in-Chief, Western Naval Command was the Chief Guest, VAdm Kiran Deshmukh Controller Warship Production and Acquisition other senior officers from the Indian Navy and MoD were amongst the dignitaries who witnessed the launch ceremony.

The Warship Design Bureau (WDB) and the MDL teams having demonstrated multiple successful conventional launches in the past, have honed their expertise further and performed yet another pontoon assisted launch with panache. Following the launch, 'Taragiri' will join its two sister ships at MDL for outfitting activities towards the run up for their delivery to Indian Navy.

Seven P17A Frigates are under various stages of construction at MDL and GRSE. Indigenous construction of complex frontline ships such as Stealth Frigates has catapulted the nation to a higher pedestal in the arena of shipbuilding. It provides additional benefits such as economic development, employment generation for Indian Shipyards, their sub-contractors and ancillary industry.



Speaking on the occasion, Vice Admiral Ajendra Bahadur Singh, FOC-IN-C, Western Naval Command praised the efforts of Mazagon Dock Shipbuilders Limited, Warship Design Bureau and other Naval Teams in realizing the nation's quest for self-reliance with regard to warship building. He added that 'Taragiri' will surely add to IN's forte as and when it makes its way into the blue waters.

'Taragiri', named after a hill range in Himalayas located at Garhwal, is the fifth ship of Project 17A Frigates. These ships are advanced version of the P17 Frigates (Shivalik Class) with improved stealth features, state of the art weapons and sensors and platform management systems. 'Taragiri' is the reincarnation of erstwhile 'Taragiri', the Leander Class Anti-Submarine Warfare Frigate, which saw numerous challenging operations in its illustrious service to the nation spanning over three decades from 16 May 1980 to 27 Jun 2013. Under the P17A program, a total of seven ships, with 04 at MDL and 03 at GRSE are under construction. Four P17A Project ships (two each at MDL and GRSE) have been launched so far between 2019 and 2022.

P17A ships have been designed in-house by Indian Navy's Warship Design Bureau which is the pioneer organization for all warship design activities of the Nation. Towing the line of the country's unwavering efforts towards 'AatmaNirbharata', 75 per cent of the orders for equipment & system of Project 17A ships are being placed on indigenous firms including MSMEs.

BEL REACHES TO INVESTORS IN MIDDLE EAST

NAVRATNA DEFENCE PSU BHARAT Electronics Limited (BEL) is participating in the Investors Outreach Program in the Middle East (Dubai & Abu Dhabi) under the aegis of the Department of Investment and Public Asset Management (DIPAM) and the Ministry of Defence (MoD), from September 12-15. Dinesh Kumar Batra, CMD, Director (Finance) & CFO, has been making presentations to potential investors in Dubai and Abu Dhabi on why they should invest in BEL.

He shared with investors that BEL has a strong Order Book and has been showing consistent growth in Profit over the last 3 years; has been active in various Government of India indigenisation initiatives like Atmanirbhar Bharat and Make in India, which have good business potential; is a R&D and technology driven company manufacturing key defence systems, products / solutions; and has world-class manufacturing infrastructure.

He pointed out that BEL has an ICRA Credit Rating of AAA (Stable - Long Term) and A1+ (Short Term); has consistent performance in terms of Revenue and Profitability, a robust Balance Sheet, Zero Debt, Positive Cash Flow and rewards shareholders with high dividends every year. Bonus Shares in 2:1 ratio were announced by BEL in August 2022. BEL's market cap has increased from USD 6,050 million to USD 10,100 million in the last year, Mr Batra highlighted to investors.

BEL has diversified into Arms & Ammunitions, Seekers & Missiles, Network & Cyber Security and Unmanned Systems, Medical Electronics, Railway / Metro / Airport Solutions, Space Electronics and systems, Electric Vehicle charging infrastructure, Alternate Energy solutions, Secure Communication solutions and Software.

This Investors Outreach Program is aimed at familiarising them with the overall India growth story and the attractiveness of Defence PSUs to potential institutional and high value investors. The various government initiatives to give a boost to the defence sector has created vibrancy and helped BEL not only to meet domestic requirements but increase its offerings to international markets.





INDIA CONDUCTS SIX TESTS OF QRSAM

DEFENCE RESEARCH AND DEVELOPMENT Organisation (DRDO) and Indian Army have successfully completed six flight-tests of Quick Reaction Surface to Air Missile (QRSAM) system from Integrated Test Range (ITR) Chandipur off the Odisha coast. The flight tests were conducted as part of evaluation trials by the Indian Army.

The flight-tests were carried out against high-speed aerial targets mimicking various types of threats to evaluate the capability of the weapon systems under different scenarios, including long range medium altitude, short range, high altitude manoeuvring target, low radar signature with receding & crossing target and salvo launch with two missiles fired in quick succession. The system performance was also evaluated under day and night operation scenarios.

During these tests, all the mission objectives were met establishing pin-point accuracy of the weapon system with state-of-the-art guidance and control algorithms including warhead chain. The performance of the system has been confirmed from the data captured by a number of Range instruments like Telemetry, Radar

and Electro Optical Tracking Systems (EOTS) deployed by ITR. Senior officials from DRDO and the Indian Army participated in the launches.

These tests were conducted in the final deployment configuration consisting of all indigenously-developed sub-systems, including the missile with indigenous Radio Frequency (RF) seeker, mobile launcher, fully automated command and control system, surveillance and multi-function Radars. The uniqueness of the QRSAM weapon system is that it can operate on the move with search and track capability & fire on short halt. This has been proven during the mobility trials conducted earlier.

Raksha Mantri Shri Rajnath Singh has complimented DRDO and Indian Army on the successful flight trials. He exuded confidence that the QRSAM weapon system will be an excellent force multiplier for the Armed Forces.

Secretary, Department of Defence R&D and Chairman DRDO has congratulated the teams associated with the successful series of trials and said that the system is now ready for induction into the Indian Army.



CONTRACT FOR DUAL USE BRAHMOS

PROVIDING FURTHER IMPETUS to Aatmanirbharta in defence production, the Ministry of Defence (MOD) signed a contract today with M/s BrahMos Aerospace Pvt. Ltd. (BAPL) for acquisition of additional dual-role capable Surface to Surface BrahMos missiles at an overall approximate cost of 1700 Crore under "Buy-Indian" Category. Induction of these dual-role capable Missiles is going to significantly enhance the operational capability of Indian Navy (IN) fleet assets.

It is notable that BAPL is a Joint Venture (JV) between India and Russia making crucial contribution to augment the new generation Surface-to-Surface Missiles (SSMs) with enhanced range and dual role capability for land as well as anti-ship attacks. This contract is going to give further boost to indigenous production of critical weapon system and ammunition with active participation of indigenous industry.

BEL IS ET ICONIC BRAND OF INDIA



THE ICONIC BRAND VALUE of Navratna Defence PSU Bharat Electronics Limited (BEL), which shaped the growth of Defence electronics in India, has been celebrated by the country's premium media house as "The Economic Times - Iconic Brand of India Award - 2022". Dinesh Kumar Batra, CMD, BEL, received the award on behalf of the company at the awards ceremony, organised recently in Mumbai.

Today, there's not an area in Defence which is untouched by BEL — Radars, Missile Systems, Military Communications, Naval Systems, Electronic Warfare & Avionics, C4I Systems, Electro Optics, Tank Electronics & Gun/Weapon System Upgrades, Electronic Fuze, you name it, the company has made some of the most iconic products in all these areas.

But though Defence is its mainstay, BEL has touched a chord

with the common man through civilian products like solar traffic signals and Electronic Voting Machines (EVMs). When the country wanted its services most, BEL successfully completed manufacturing of 30,000 ICU Ventilators in a record time to help the Government of India in its efforts to combat the COVID-19 pandemic.

All good brands not just grow. They evolve. BEL, too, has been constantly evolving over the last seven decades and to keep pace with the changing times, exploring diversification into allied non-defence areas. Some of the areas BEL is focussing on in non-defence include solutions for Civil Aviation sector, Anti Drone systems, Unmanned Systems, Satellite Assembly & Integration, Solar Business, Railway and Metro solutions, Software as a Service, Network & Cyber Security, Energy Storage products for Electric Vehicles (Li-ion & Fuel Cells, Charging Stations, etc), Homeland Security & Smart City businesses, a range of Medical Electronic and health care solutions, Artificial Intelligence, Composite Shelters & Masts, etc.

BEL is pursuing the cherished dream of self-reliance by espousing the Government of India's 'Make in India' initiative. Be it the efforts that the company has been putting in to engage in collaborative R&D — in addition to augmenting its own R&D set up — attempts to outsource work from Indian private industries and MSMEs, or the path breaking decision to go in for Public-Private partnerships to execute huge missile programmes, BEL is leaving no stone unturned to ensure that it is in sync with the Government's larger goal of indigenisation and Atmanirbharta (self-reliance). BEL is also fast expanding its global presence, putting its best foot forward to give a thrust to exports worldwide.

The Government of India's new policies for Defence aims at providing a level playground for both public and private sector. But despite the opening up of Defence to private companies, BEL has been growing at around 15% rate, courtesy the progressive policies that it has put in place to maintain competitive edge in the changing business scenario.

IAF TO GET SEPARATE WEAPONS BRANCH

IN A HISTORIC STEP for the Indian Air Force (IAF), Government has approved the creation of a new branch, called the Weapon Systems (WS) branch. The creation of WS branch would entail unification of all weapon system operators under one entity dedicated to the operational employment of all ground-based and specialist airborne weapon systems.

The branch would encompass operators in four specialised streams of Surface-to-Surface missiles, Surface-to-Air missiles, Remotely Piloted Aircraft and Weapon System Operators in twin/multi-crew aircraft. The branch will contribute immensely by enhancing the war fighting capability of the Indian Air Force. ■



ALL ERAS ARE ERA OF WAR

As the Russo-Ukrainian conflict continues, the narrative that Europe has gone beyond the wars is collapsing. Peaceniks across the western world are blaming the Russian President for bringing the war back to Europe. NATO is the testimony of the ever-existing possibility of War.

by ROHIT SRIVASTAVA

Ieaders and commentators of the western world were rejoicing when Indian Prime Minister Narendra Modi, during his meeting with Russian President Vladimir Putin in Samarkand, said, "I know that today's era is not an era of war." They were meeting on the sidelines of the SCO Summit last month.

One can understand the elation displayed by the western leaders as they saw this as an endorsement of their stand by Russia's closest friend. But, beyond public niceties of diplomacy, does the Prime Minister of India really believe that? Is the era of wars over?

The answer is No and No.

Human civilization is a product of our collective endeavours around love, wars and inquisitiveness. The first two are uniquely human traits. Chimpanzees have been recorded as displaying behaviour akin to war. Fighting war for collective welfare is the single most important factor which propelled humans to this dominating position. We have been constantly at war against nature, fellow humans and other living beings. It is at the very core of human civilization. War was and will always be the most powerful phenomenon of civilization.

The most advanced civilization also happens to be most effective in violence. Whenever advanced civilizations have disregarded this fact they have fallen at the hands of primitive societies.

This has been very well described by medieval Tunisian political philosopher Ibn Khaldun.

As India is making efforts to become self-reliant in defence, Indian leadership needs to keep this in mind that defence is business like all other businesses but it is different. Every business has an essential role and

beyond that, it serves the aspirations of consumers. For instance food, cloth and housing are essential but the large parts of these businesses are not about consumer requirements but aspirations, dreams and splurges. Defence is exactly the opposite of this.

Government must ensure a large share of defence expenses should be focused on what is essential to winning wars against the major adversary and allows starting war at will within the shortest possible time frame.

The glamorous and prestigious procurements should be a bare minimum. Defending a nation is not a glamorous but ugly and dirty business.

India needs to get over the idea that there will be no long war. One of the lessons of the Ukraine-Russia conflict is that wars in modern times would still be stretched and need depth in the magazine.

The American concept of winning wars swiftly through advanced weaponry has been smashed to smithereens.

India needs to develop a new concept of war for its two neighbours.

A nation which cannot launch a war against a lesser adversary exploiting a window of opportunity then is not a credible power. If a nation is required to rush for emergency purchases in anticipation of conflict then it is not a credible power.

Power should be at your disposal.

The world is transitioning and relationships can change in no time. One needs to be prepared for all eventualities. Self-reliance is good but India needs to ensure that under no circumstances this should restrict our warfighting capabilities.

India must carefully choose weapons to win a quick war against our adversaries and ensure their availability in the required numbers. India's defence partnership should give the bandwidth to fight wars, not restrict options. ■



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