

## **ATTACHEMENT PAGES**

**A. THE 2015 DEFENSE FRAMEWORK AGREEMENT DOCUMENT**

**FRAMEWORK FOR THE U.S. - INDIA DEFENSE RELATIONSHIP**

1. Defense and security cooperation is a key component of the bilateral relationship between India and the United States, and has evolved to become a vital pillar of engagement between the two countries. The United States and India have created a wide-ranging, strategic partnership that reflects their common principles, democratic traditions, long-term strategic convergence, and shared national interests. These interests include:

- maintaining peace and security;
- defeating terrorism and violent extremism;
- preventing the proliferation of weapons of mass destruction and associated materials, data, and technologies;
- supporting a rule-based order, protecting the free flow of commerce.

2. In 1995, the *Agreed Minute on Defense Relations between the United States and India* was signed - beginning a new era in U.S.-India defense relations. In 2005, the two sides reflected the continued evolution of the relationship by signing the *New Framework for the U.S.-India Defense Relationship*, which charted an ambitious course for the future development of the India - U.S. partnership. In 2013, the *Joint Principles for Defense Cooperation* stated that India and the United States share common security interests and place each other at the same level as their closest partners - confirming that this would also apply with respect to defense technology transfers, licensing, trade, research, co-development, and co-production involving defense articles and services, including advanced and sophisticated technology.

3. The renewal of the 2005 Framework marks a new chapter in the relationship between two strategic partners. The renewal builds upon the shared understandings and successes of the past, and charts a path-forward for the next ten years. Through defense dialogue mechanisms, military-to-military interactions and exercises, and

increased opportunities in defense technology collaboration, the United States and India have expanded the potential of the partnership and bilateral collaboration.

4. In pursuit of a shared vision for an expanded defense partnership, both sides determined that their defense establishments are to:

- A. Conduct regular service-specific, joint, and combined exercises and exchanges;
- B. Collaborate in multinational operations whenever it is in their common interest to do so;
- C. Enhance cooperation in military training and education, including instructor and student exchanges and collaboration between national defense universities;
- D. Strengthen the capabilities of their defence establishments to promote security and defeat terrorism;
- E. Expand interaction with other nations in ways that promote regional and global peace and stability;
- F. Enhance capabilities to prevent the proliferation of weapons of mass destruction;
- G. Increase exchanges of intelligence;
- H. In the context of this strategic relationship, continue to strengthen two-way U.S.-India defense trade. The United States and India commit to work to conclude defense transactions, not as ends in and of themselves, but as means to strengthen both countries' security, to reinforce the strategic partnership, to achieve greater interaction and cooperation between their armed forces, and to build greater understanding between defense establishments;
- I. Exchange experiences and practices in operating common defense platforms; and increase capacity to use such platforms optimally;

- J. Explore collaboration relating to missile defense;
- K. Strengthen the abilities of their militaries to respond quickly to disaster situations, including in combined operations;
- L. Assist in building worldwide capacity to conduct successful peacekeeping operations, with a focus on enabling other countries to field trained, capable forces for these operations;
- M. Conduct routine exchanges on defense strategy and defense transformation;
- N. Continue strategic-level discussions by senior leadership from the U.S. Department of Defense and India's Ministry of Defence, in which the two sides exchange perspectives on international security issues of common interest, with the goal of increasing mutual understanding, promoting shared objectives, and developing common approaches; and
- O. Enhance cooperation toward maritime security and to increase each other's capability to secure the free movement of lawful commerce and freedom of navigation across sea lines of communication, in accordance with the principles of international law.

5. The Defense Policy Group (DPG) is to continue serving as the primary mechanism to guide the U.S.-India strategic defense partnership, recognizing the significant contributions the meetings have made to the overall defense relationship. The Defense Policy Group is to make appropriate adjustments to the structure and frequency of its meetings and of its subgroups, as determined jointly by the Defense Policy Group co-chairs, so that it remains an effective mechanism to advance U.S.-India defense cooperation.

6. The sub-groups of the DPG are to continue to meet regularly and to report to the DPG. These sub-groups and their objectives are as follows:

A. The Defence Procurement and Production Group (DPPG), co-chaired by the Director General (Acquisition) and the Director, Defence Security Cooperation Agency (DSCA), is to review government-to-government defense acquisitions (including hybrid programs) and other defense trade issues.

B. Senior Technology Security Group (STSG): The objective of the STSG is to develop understanding of export licensing and technology security processes and practices and to establish a technology security dialogue for adequate protection for advanced defense technologies.

C. Joint Technical Group (JTG): The JTG provides a forum for discussion and coordination of defense research and production matters.

D. Military Cooperation Group (MCG): The MCG serves as the primary forum to guide cooperation between the armed forces of both sides.

E. Executive Steering Groups (ESGs): In conjunction with the MCG, the ESGs function as the primary mechanisms to develop military service-related cooperation.

7. Recognizing the transformative effect that the Defense Technology and Trade Initiative (DTTI) can have, the two sides have established a DTTI Group, - which is to work towards resolving process issues impeding cooperation and the alignment of systems; increasing the flow of technology and investment; developing capabilities and partnership in co- development and co-production; and intensifying cooperation in research and development. The progress made by the DTTI Group is to be presented to the DPG.

8. The initiatives and activities described above are to proceed in reliance upon this Framework for guidance on the principles and objectives of the U.S.-India strategic relationship, and are to strive to achieve those objectives.

8. The initiatives and activities described above are to proceed in reliance upon this Framework for guidance on the principles and objectives of the India - U.S. strategic relationship, and are to strive to achieve those objectives.

9. This Framework is to be effective from the date of its signature and is to continue in effect for 10 years unless it is revised or terminated in writing. Disagreement, if any, regarding Framework matters is to be resolved through mutual consultations.

10. This Framework is to guide the two sides in further developing bilateral defense ties.

Signed in **New Delhi** on **03<sup>rd</sup> June, 2015** in two originals in English.

Secretary of Defence



(Ashton Carter)  
For and on behalf of the  
Government of the United  
States of America

Minister of Defence



(Manohar Parrikar)  
For and on behalf of the  
Government of the Republic of  
India

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**B. LEGAL AND REGULATORY FRAMEWORK IN INDIAN DEFENSE INDUSTRY**

<b>Policy</b>	<b>Ministry Of Defence</b>	<b>All defence and security related matters</b>
<b>Legislations and Procedures</b>	<ul style="list-style-type: none"> <li>• INDUSTRIES (DEVELOPMENT AND REGULATION) ACT, 1951</li> <li>• DEFENCE PROCUREMENT PROCEDURE, 2016</li> <li>• FOREIGN DIRECT INVESTMENT POLICY &amp; REGULATIONS UNDER FOREIGN EXCHANGE MANAGEMENT ACT,1999 (FEMA)</li> <li>• OTHER ACTS Indian Army Act, 1950; Indian Air Force Act, 1950; Indian Navy Act, 1957</li> </ul>	<ul style="list-style-type: none"> <li>• Governs industrial licensing for manufacture of defence items</li> <li>• Governs procedure for capital acquisitions in the defence sector</li> <li>• Governs policy on foreign direct investment and regulations on foreign exchange</li> <li>• Statutory provisions and supplementary rules concerning government, regulation, administration, enrolment and discipline of the Army, Air Force and Navy.</li> </ul>



<p><b>Regulators and Agencies</b></p>	<ul style="list-style-type: none"> <li>• DEPARTMENT OF INDUSTRIAL POLICY AND PROMOTION, MINISTRY OF COMMERCE &amp; INDUSTRY (DIPP)</li> <li>• DEPARTMENT OF DEFENCE PRODUCTION, MINISTRY OF DEFENCE</li> <li>• DEFENCE ACQUISITION COUNCIL, MINISTRY OF DEFENCE</li> <li>• DEFENCE OFFSETS MANAGEMENT WING, MINISTRY OF DEFENCE</li> </ul>	<ul style="list-style-type: none"> <li>• Formulation and implementation of industrial policy, including the relevant FDI policies from time to time.</li> <li>• The primary agency dealing with the production of defence equipment in India.</li> <li>• Responsible for the purchases to be made for the Indian defence forces.</li> <li>• Review the post contract status of all the offset agreements entered into by IOPs.</li> </ul>
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**C. MAJOR CONTRIBUTIONS FROM EACH CLUSTER OF DEFENSE RESEARCH AND DEVELOPMENT ORGANIZATION (DRDO) IN TERMS OF PRODUCTS & SYSTEMS DEVELOPED/ ACCEPTED/ INDUCTED, TECHNOLOGIES, DEVELOPED AND INFRASTRUCTURES FACILITIES ESTABLISHED**

<b>CLUSTER</b>	<b>PRODUCTS &amp; SYSTEMS DEVELOPED ACCEPTED/ INDUCTED</b>	<b>TECHNOLOGIES DEVELOPED AND INFRASTRUCTURES FACILITIES ESTABLISHED</b>
<b>Aeronautical Systems</b>	<p>LCA-Tejas India's first indigenously designed, developed and produced Light Combat Aircrafts (seven) have completed 11.50 flights. Induction of squadron of 20</p> <p>LCAs is scheduled 2010-11. The Naval variant of LCA is also likely to roll out by 2010. The other success stories are Lakshya Pilotless Target Aircraft. Nishant-Unmanned Aerial Vehicle, Electronic Warfare Suites, Radar Warning Receivers including High Accuracy Direction. Finding (HADF) RWR Mission</p>	<p>A wide range of highly complex technologies have been mastered and massive infrastructure created in the process of development of LCA-Tejas, its sub-systems and the Gas Turbine Engine- Kaveri.</p> <p>Unstable Aerodynamics, Flight Control Laws for Unstable Configuration Aircraft, Fly-by-wire Digital Flight Control System. Open Architecture Structure, Hardware and Software for Simulators.</p>

	<p>computers and avionics upgrades for several fighter aircrafts. Missile Approach warning System and Laser Warning System have been developed and are being fitted on various military aircrafts and helicopters. As spin-offs, variants of Kaveri engine are being developed for propulsion of marine vessels with great advantages.</p>	
<p><b>Armament Systems</b></p>	<p>Large number of armaments designed and developed by DRDO have been inducted in the armed forces. Over a million pieces of 7.62 mm Ishapore Self- Loading Rifle (SLR) developed by DRDO were produced till replaced by 5.56 mm INSAS (Indian Small Arms system) was made available in fixed &amp; foldable bott versions of a Assault Rifle &amp; LMG, all firing the same ammunition and having 70% commonality of parts. Multi-Barrel Rocket System-Pinaka, FSAPDS ammunition, Influence Mines Mk-1,</p>	<p>Hydro-Pneumatic Suspension, Rocket Motor and Thermal Protection. Composite Propellant.</p> <p>Pre-fragmented, Incendiary and Bomblet Warhead. Electric and Electro-hydraulic Launcher</p>

	<p>Multimode Grenade Under-Barrel Grenade Launcher, 84 mm light weight launcher, Bund blasting device, Instant fire detection &amp; suppression for BMP-II, 303 inch and 7.62 mm non-lethal bullets are examples of wide range of products.</p>	
<p><b>Combat Vehicle and Engineering</b></p>	<p>Over 50 Main Battle Tank-Arjun including 45 for the 1st Arjun Armored Regiment (45 tanks) and 649 Combat Improved Ajay Tanks equipped with Explosive Reactive Armour (ERA), Global Positioning System (GPS), Integrated Fire Detection &amp; Suppression System (IFDSS) &amp; reconfigured Smoke Grenade Discharger (SGD) have been produced. Other major achievements are BHIM-76. Self Propelled 155 mm gun, Ex-tank-a combination of T-72 (Ajeya) Chassis and the most advanced MBT Arjun Weapon System, Bridge Layer Tank Arjun (capability to convert Arjun Tank to BLT within few hours),</p>	<p>Engine Test Facility, Transmission Test Facility. Full Injection Pump Test Rig, Variable Speed Drive Test Facility, Variable Speed Drive Test Facility, Road Wheel Test Rig. Air Cleaner Test Rig. Suspension Test Facility, Hydraulic Test Bench, Universal Gear Tester, Ultrasonic Fflaw Detector, Test Facilities for Aircraft Gearbod, Environmental Test Facilities consisting of Low temperature chamber, Driving rain chamber, Water immersion chamber, Dust chamber, Mould growth chamber, Salt spray chamber, Shock test machine and Bump test machine, Test Track Facility, Dry heat chamber and Dump heat for evaluation of structural integrity and performance of electronic and electrical equipment.</p> <p>Rapid prototyping and Prototype manufacturing facilities.</p> <p>A National Centre for Automotive</p>

	<p>Bridge Layer Tank T-72 SARVATRA mobile bridge laying system (up to 75m within 100 minutes), SAKAV 46 m single span bridge system, MLC70 &amp; MLC 40 Modular Bridges, Carrier Command Post Tracked, BMP-II, Armored Amphibious Dozer, Mobile Camouflage System (integrated in MBT Arjun), NBC protected Integrated Field Shelter, Remotely Operated Vehicle (Daksh) a robotic vehicle capable of remotely handling IED, Riot Control Vehicle, Unmanned Ground Vehicle(UGV), Trackway Expedient Mat Ground Surfacing, Armoured Ambulance BMP-II, Carrier Mortar Tracked on BMP-II, Containerized Operation Theatre Complex on wheels, Ground Support Vehicles for various indigenous strategic and tactical missiles, Nishant launcher, Counter Mine Flail (CMF) on T-72 Tank, Snow galleries, Micropile foundation for the effective</p>	<p>Testing (NCAT) at VRDE is equipped with state of the art infrastructure for testing and certification of defence as well as civil vehicles where a modern EMC (electro- magnetic compatibility) test facility, one of the biggest in the world, has been recently added.</p>
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	transfer of snow pressure.	
<b>Electronic &amp; Computer Systems</b>	<p>Artillery Combat command Control System- ACCCS.</p> <p>Indian Doppler Radar INDRA-I &amp; II.</p> <p>INDRA-I &amp; II.</p> <p>Rajendra – multifunction phased array radar. Super Vision Maritime Patrol Radar (SV-2000 MPAR). Avalanche Victim Detector (AVD), Battle Field Surveillance Radar- BFSR, a man-portable, battlefield and perimeter surveillance radar has been produced in large numbers. Electronic Warfare systems SAMUKTA &amp; SANGRAHA fir Army and Navy 3D-CAR (Central Acquisition Radar) medium range Early Warning Sensor - Revathi for Navy. Weapon Locating Radar. EON 51- Electrooptic Fire Control System. Briefcase SATCOM Terminal. Sectel (Secure Telephone). Sujav - a compact Communication Electronic warfare suit.</p>	<p>Technologies for achieving High Accuracy Direction Finding, High Power Jamming. Voice Recognition and Voice Print Analysis Data/ image Fusion, Jam-Resistant Data Link CI Systems, Satellite Communication, Secrecy Systems, Multifunction electronic scanning radars, Parallel processing, I-u CMOS Fabrication Technology.</p> <p>GsAs Crystal Growth Facility, Molecular Beam Epitaxy System, Ion - Implantation system, Electron Beam Micro Lithography system, MOCVD system, Mask Fabrication Facility, Fab line for fabrication of MMIC UHV Processing Stations, Precision. Machining Facilities, Single Point Diamond Turning (SPDT) Micromachining Facility.</p>

	<p>Integrated Weapon System Simulation. Eye Safe Lasers. Laser Designator. PRF Code Recognition Device for decoding the PRF codes of laser target designators. Laser Warning Sensor Palmtop Green Microchip Laser Module. Passive Qswitching EOCM-C class Laser System for both antisensor as well dazzling applications with an operational range of 2.5 km. 6.5 KW pulsed X-band and 10kW pulsed Ku band Coupled-Cavities TWT for airborne radars, S-band 130 KW (pulsed) Coupled-cavity TWT.</p>	
<p><b>Life Sciences</b></p>	<p>Life Support System for Army. Navy and Air Force Personnel. Combat Free Fall system capable to withstand the harsh conditions of free fall from 30,000 ft. NBC Canister. Water Poison Detection Kit. Portable Decontamination Apparatus. NBC Filters/ adapted &amp; fast growing Broiler Sheep. Bio diesel production. Cold tolerant hybrid vegetables. Genetically engineered cold</p>	<p>Life Support Technologies. NBC Defence Technologies. Military nutrition - (fresh and processed foods technologies). Military Psychology &amp; Personnel Selection. Man-machine interface. Technology for removal of fluoride from water. Technology for De-Arsenification of water. Technology for removal of Iron from water. Technology for storage of potatoes under extreme cold.</p>

	<p>tolerant hybrid vegetables. Genetically engineered cold tolerant vegetables. Hyperbaric oxygen therapy Chamber (Samudrasuta). One man High Altitude Pulmonary Oedema (HAPO) chamber. Heating Gloves &amp; Socks for extreme cold conditions. Self-contained self-heating system to warm Ready - to Eat Packed foods at 65 0C. Long shelf life ready to eat packaged food Bio-digestor for treatment of human waste for extreme cold also being introduced in Indian Railway Coaches to avoid soiling of tracks. Multi-Insect Repellent DEPA. computerized Pilot Selection System (CPSS). NBC and high altitude medical Products.</p>	
<b>Materials</b>	<p>AB Class Steel for Naval Applications, Titanium Sponge. High Temperature Titanium Alloys for Aerospace applications. NBC Recce Vehicle. NBC Protective Clothing/ Permeable Suites,</p>	<p>Technologies related to Composite Armor, Special Steels for the Navy, Cast Airfols for Gas Turbines, Titanium Alloys, Rare Earth Metal-based High Energy Magnets. Armour for Fighting Vehicles, NBC Production, Camouflage and Stealth, Desert Systems and Radition Instrumentation.</p>



	<p>NBC water purification system. Camouflage Pattern Generation Software. Synthetic Camouflage Net. Mobile medical post for Navy. Extreme cold weather Clothing systems. Blast Protection Suits. Synthetic Life Jacket.</p> <p>Anti Riot Polycarbonate Shield. Anti Riot Helmet. Brake pads for Aircrafts. Heavy alloy Armor Penetrator Rods. Jackal Armor. Kanchan Armor. Hydraulic Pipeline for Submarine Applications. Investment Casting of turbine components etc.</p>	
<p><b>Missile &amp; Strategic Systems</b></p>	<p>Surface-to-surface strategic missile systems Agni I (700 km) Agni-II (2000 km) and Agni III (3000 km). Prithvi series of surface-to-surface missiles. Brah Mos Supersonic Cruise Missiles for Army and Navy. Dhanush-ship launched SS missile. Akash - multidirectional, multi-target SAM area defence weapon</p>	<p>Technologies for indigenous development, testing &amp; production of Fiber Optics Gyro, Ring Laser Gyro, Accelerometers, Inertial/ Automomous Navigation Systems, MEMS and MEMS based sensors, Directional warheads, Direct Action Trajectory and Altitude Control System, Long range Solid Rocker Motors, Smokeless Propellant, Composite Rocket Motor casings, Carbon Composite Re-entry Vehicles, Composite Radomes, Seals and jet vanes for under water Launch system, Pro-fragmented and Submunition Warheads.</p>

	<p>system. Nag - 3rd generation anti tank missile. Air Defence System against ballistic missiles of up to 2000 km class, both low altitude and high altitude (80 km), RINS - Ring Laser Gyro based INS-GPS-Glonass for long range missiles and Aircrafts. Millimeter Wave Seeker. MINGS-MEMS based Hybrid Navigation System. Computerized war games for Army &amp; Air force.</p>	<p>Technologies for Command Guidance. Ram Rocket Propulsion, Multi Target Engagements, Twin engine Liquid Propulsion Stabilisation of Launch Platform for Moving Ship.</p> <p>Multi-band Radar Seeker Test facility. Electro-magnetic Pulse facility. Electro hydraulic servo valve Limited Production facility. Solid Propellant Processing facility.</p>
<b>Naval Systems</b>	<p>Ship-borne sonar HUMSA. Air Borne dunking sonar MIHIR. Submarine-sonar</p> <p>USHUS. Torpedo Advanced Light Tal. Torpedoes-Fire Control System and Advanced Experimental. Advanced Panoramic Sonar Hull mounted (APSOH) PACHENDRIYA-integrated submarine sonar and tactical fire control system. Underwater Telephone (UWT) TADPOLE sonobuoy high altitude deployable sonar. Auto-controlled Carbon Dioxide</p>	<p>Sonar Technology Homing Technology Pumpjet. Propulsion. Signal Processing for Target Classification. The floating laboratory – INS Sagardhwani, Underwater Acoustics Research Facility. Hydrodynamic Test Facilities. High Speed Towing Tank (HSTT). Cavitation Tunnel. Wind Tunnel. Acoustic. Shock, Noise and Vibration Test Facilities. Under Water Ranges. Torpedo Engineering Centre Electrical Propulsion Test Centre Materials and Acoustic Simulated Test (MATS) facility. cluster computing facility to provide system level simulation of sonar systems-DARPAN, Prototype Manufacturing Facility.</p>

	<p>Control System.  Impressed Current  Cathodic Protection  System for Ship hull.  Indian Activated  Aluminum Galvanic  Sacrificial alloy  system. Poly-LIST  Dockblock- a substitute  for teak wood used for  dry docking of ships.  Heavy duty non-skid  paint. 250 Kw Silver  Oxide-Zinc Battery. IR  Suppression System  For Naval Platforms.</p>	
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#### D. INDIAN DEFENSE PUBLIC SECTOR UNDERTAKING

COMPANY	DESCRIPTION
<p><b>Hindustan  Aeronautics Limited  (HAL)</b></p>	<p>is a “Navratna” Defence Public Sector Undertaking. The Company is committed to achieve strategic self reliance in the aerospace sector and provide full support to the Defence Services. HAL’s core business activities include design, development and production of fixed wing aircraft (Fighters, Trainers &amp; Transport) and helicopters, their avionics &amp; accessories, life cycle customer support through Maintenance, Repair &amp; Overhaul (MRO) of aerospace products and Manufacture of Structures and Integrated systems for space launch vehicles and satellites. The Company has produced 11 types of aircraft from inhouse R&amp;D and 14 types under license. The Company also plays a major role in the Country’s space programme. Structures &amp; completely integrated assemblies for launch vehicles and satellites are produced by the</p>

	<p>Aerospace Division dedicated to meet the production requirements of aerospace structures for ISRO.</p>
<p><b>Bharat Electronics Limited (BEL)</b></p>	<p>is a multi-technology, multi-product company with strong presence in the field of Radars and Sonars, Communication Equipment, Opto-Electronics, Electronic Warfare, Tank Electronics and Strategic Components. BEL supplies Electronic Equipments to the Indian Defence Services, Para-military Forces and other Government users like All India Radio, Doordarshan, BSNL, MTNL, Airport Authority of India, Meteorological Department, Railways etc. BEL also supplies Professional Electronic Components.</p>
<p><b>Bharat Earth Movers Ltd.(BEML Ltd.)</b></p>	<p>is engaged in the design, manufacturing, marketing and after sales support of a wide range of Mining &amp; Construction equipment, Defence products and Railway &amp; Metro products. The company also serves the various core civil sectors of the economy such as mining, steel, cement, power, irrigation, construction, road building. It also provides e-engineering solutions through its Technology Division and trades non-Company products, components, aggregates and commodities for domestic and international markets through its Trading Division.</p> <p>BEML manufactures and supplies Ground support equipment such as Tatra based High Mobility trucks, Armoured Recovery vehicles, Heavy Recovery vehicles, Pontoon Bridge System, Vehicles for Missile projects, Tank transportation trailers, Milrail wagons and coaches, Mine ploughs, Crash Fire Tenders, Aircraft Towing tractors, Aircraft weapon loading trolley, Transmission and final drive systems for</p> <p>BMP Combat vehicles, Suspension system for Battle Tanks. The company also supplies Bull</p>

	<p>Dozers, Excavators and Motor Graders to DGBR and Army for Border road construction/maintenance, snow clearance and other civil works.</p>
<p><b>Mazagon Dock Limited (MDL)</b></p>	<p>is a Premier Ship Builder of the Nation, capable of building warships of upto 6,800 tonne displacement and merchant ships of up to 27,000 DWT. MDL is engaged in construction of warships including Destroyers, Corvettes, Submarines, New Generation Stealth Frigates, Offshore Patrol Vessels, construction of various types of merchant ships and repairs/modernisation of warships, submarines and merchant ships. Fabrication of Offshore Platforms and allied activities for Oil Exploration and general Heavy Engineering jobs were also carried out in the Yard. The Company has built and delivered to the Indian Navy six Leander Class Frigates, three Godavari Class Frigates, one Cadet Training Ship, three Missile Corvettes, four Missile Boats, three Destroyers and two Submarines as also seven Offshore Patrol Vessels (OPV) to the Coast Guard. MDL has also built and delivered Cargo Ships, Passenger Ships, Supply Vessels, Multi Purpose Support Vessels, Water Tankers and various types of Small Crafts like Tugs, Dredgers, Fishing Trawlers, Barges &amp; BOPS for various customers in India as well as abroad.</p>
<p><b>Goa Shipyard Ltd (GSL)</b></p>	<p>is one of the leading shipyards, building medium- sized sophisticated vessels for Indian Navy, Indian Coast Guard and others. It commenced functioning with its own Board of Directors since September 29, 1967. Government of India has conferred the status of Mini Ratna, Category-I in March 2007. Goa Shipyard Limited is an ISO- 9001 certified company. The product range of the shipyard comprises of 105m Advanced Offshore Patrol Vessels (AOPV), 105m Naval Offshore Patrol Vessels (NOPV), 90m Offshore Patrol Vessels</p>

	<p>(90m OPV), Offshore Patrol Vessels (OPV), 50m Fast Patrol Vessels (FPV), Missile Boats (MB), Hydrographic Survey Vessels (HSV), Extra Fast Attack Crafts (XFAC), Sail Training Ship (STS), Landing Craft Utility (LCU), Seaward Defence Boats (SDB), Torpedo Recovery Vessels (TRV), Passenger Vessels (PV), Tugs etc. So far, 182 vessels have been built. The Company has embarked on a major exercise of diversification into building Glass Reinforced Plastic (GRP) boats to cater for orders from Ministry of Home Affairs. GSL is also venturing into building Shore Based Test Facility (SBTF) for aviation specialization.</p>
<p><b>Garden Reach Shipbuilders and Engineers Limited (GRSE)</b></p>	<p>has kept pace with the expanding maritime interests of India and is now recognized as a leading shipbuilding yard and manufacturer of high value, high technology, complex engineering items in Eastern India. The Company has been granted the Category-1 Mini Ratna status. The main business activity of GRSE is shipbuilding and ship repair for the Indian Navy and Coast Guard.</p>
<p><b>Bharat Dynamics Limited (BDL)</b></p>	<p>was established in 1970 for manufacture of Guided Missiles. It is one of the few strategic industries in the world that possesses the capability to produce state-of-the-art missiles. Besides producing indigenously developed Prithvi missile systems under the IGMDP, BDL is engaged in the production of Konkurs-M and Invar (3UBK-20) Anti Guided Missiles in collaboration with Russia. Inhouse developed CMDS (Counter Measures Dispensing System) has been accepted by the Indian Air Force. BDL is working in close association with DRDO for technology absorption/assimilation and extending support by providing missile subsystems/integration of missiles for conducting trials of missiles like Akash, Nag, Article K-15 and Agni Variants (A1, A2 and A3). The Company has ventured into</p>

	<p>productionising underwater weapon systems such as Advanced Light Weight Torpedo (TAL) and Light Weight Mines in Concurrent Engineering mode.</p>
<p><b>Mishra Dhatu Nigam Limited (MIDHANI)</b></p>	<p>was incorporated as a Public Sector Undertaking under the Administrative Control of Department of Defence Production &amp; Supplies, Ministry of Defence in 1973 to achieve self-reliance in the manufacture of Superalloys, Titanium alloys and Special Purpose Steels required for strategic sectors such as Aeronautics, Space, Armaments, Atomic Energy, Navy. Special products such as Molybdenum wires &amp; plates, Titanium and Stainless Steel tubes, alloys for electrical and electronic application such as Soft Magnetic alloys, Controlled expansion alloys and Resistance alloys also form part of the production.</p>
<p><b>Hindustan Shipyard Limited (HSL)</b></p>	<p>Strategically located on the East Coast of the Indian Peninsula, at Visakhapatnam, Andhra Pradesh. It is the Nations premier shipbuilding organization catering to the needs of shipbuilding, ship repairs, submarine construction and refits as well as design and construction of sophisticated state- of-the-art offshore and onshore structures. Direct sea access, excellent infrastructure, skilled workforce, rich expertise garnered over the years in building 181 vessels and repairing 1965 vessels of various types enable HSL to offer competent services for the defense and maritime sectors. Considering the strategic requirements, the yard was brought under the administrative control of Ministry of Defense on 22<sup>nd</sup> February, 2010. The Registered Office of the Company is located in Visakhapatnam and the regional office at New Delhi.</p>

**E. RECENT BREAKTHROUGH IN THE PRIVATE DEFENSE SECTOR IN INDIA**

<b>COMPANY</b>	<b>BREAKTHROUGH</b>
<b>THE TATA GROUP</b>	<ul style="list-style-type: none"> <li data-bbox="507 331 972 743">• Tata Advanced Systems has a joint venture with Boeing in India to co-produce aerostructures and pursue integrated systems development opportunities, and produce Apache fuselages and accelerate momentum for “Make in India”. The JV will initially create a manufacturing centre of excellence to produce aerostructures for the AH-64 Apache helicopter and to compete for additional manufacturing work packages across Boeing platforms, both commercial and defence. Boeing and Tata Advanced Systems intend to grow the JV partnership in the future, with a focus on opportunities to collaborate on development and selling of integrated systems.</li>   <li data-bbox="507 799 972 1425">• Airbus has also offered to build the C295W military transport aircraft in India along with Tata Advanced Systems. Tata Advanced Systems Ltd (“TASL”) had announced empanelment of TASL by Indian Navy for the ongoing &amp; future requirements of naval combat management system in 2014. The empanelment process lasted 18 months of rigorous evaluation process conducted by a high level Indian Navy team. For Naval Combat Management Systems (“CMS”), TASL has partnered with Terma A/S, Denmark under a transfer of technology agreement. The companies have jointly established a CMS Development Centre in Delhi to work closely with the Indian Navy and support the modernization process of Indian Navy. As a leader in the aerostructures industry in India, TASL has successfully undertaken complex global transition programs for Lockheed Martin and Sikorsky Aircraft Corporation and has partnership with RUAG Aviation for the Do 228-212 NG structures.</li> </ul>



	<ul style="list-style-type: none"> <li>• The Tata group won a contract for the Indian Air Force’s Modernization of Air Field Infrastructure (“<b>MAFI</b>”) project for the modernization of 30 of its airbases.<sup>102</sup> A marquee procurement order for the Indian Army, the Integrated Electronic Warfare Systems for Mountainous Terrain (“<b>IEWS-MT</b>”), for the development of an electronic system that coordinated ground forces with their regional command centers through an advanced communication system, was awarded to the Tata Group for approximately INR 920 Crores. The Tata group competed with Elta of Israel, demonstrating the ability of the domestic private defence industry to cater to advanced technology requirements of the Indian Armed Forces.</li> <li>• On February 22, 2017, the MoD signed a contract with Nova Integrated Systems (“<b>NISL</b>”), a subsidiary of Tata Advanced</li> <li>• Systems (TASL) to execute Indian Navy’s surface surveillance radar (“<b>SSR</b>”) project. The SSR programme is the first procurement by MoD under the ‘Buy and Make (Indian)’ category of the Defence Procurement Procedure (DPP). The project involves delivery, installation and commissioning of the radar systems on Indian Navy vessels, as well as delivery of simulators, establishing depot level facilities, and integrated logistics support with deliveries spread over 10 years. The proposed radar is based on the latest solid state technology and also suited for coastal surveillance applications.</li> </ul>
<p><b>THE MAHINDRA GROUP</b></p>	<ul style="list-style-type: none"> <li>• Airbus Helicopters has awarded a contract to Mahindra Aerostructures to make airframe parts for the AS565 MBe Panther.</li> </ul>

These parts will be produced at the Mahindra facility in Bengaluru. They will be shipped directly to the Airbus Helicopter production line in Marignane, France where they will be integrated with the rest of the airframe assembly and will form a critical part of the Panthers sold worldwide. The contract positions Mahindra Aerostructures as the first Indian company to receive a direct manufacturing contract from Airbus Helicopters as a Tier 1 supplier. Mahindra Aerostructures will gradually emerge as the global single source supplier to Airbus Helicopters for these parts. This work package is the first amongst a series of work packages which would embed Mahindra Group firmly in the Airbus Helicopters' global supply chain and bind the two companies in a long-term 'Make in India' partnership.

- Annual procurement of Airbus Group from India exceeds USD 500 million from over 45 suppliers in 2015. It supports more than 6000 local jobs. Due to this supply chain, every Airbus commercial aircraft produced today is partly 'Made in India'. The Group has set its sights on exceeding US\$2 billion in cumulative sourcing, covering both civil and defence, in the five years up to 2020. Around 80% of the Group's nearly 500 direct employees in India are engineers. In addition, the Group operates two dedicated design centers with partners and collaborates closely with institutions such as the IITs, IIMs and the Tata Institute of Fundamental Research ("TIFR").

- In March 2014, Mahindra Defence Naval Systems ("MDNS") inaugurated its new underwater systems and naval applications manufacturing facility in Chakan, near Pune. MDNS is a wholly owned subsidiary of Mahindra Defence Systems, which is part of the USD 16.7 billion Mahindra Group. This new facility enhanced their advanced manufacturing expertise in the area of naval

	<p>defence systems.</p> <ul style="list-style-type: none"> <li>• In July 2016, Boeing Co. and Mahindra Defence Systems formally opened a center to provide C-17 training services to the Indian Air Force. Once fully operational, the new center will be capable of conducting local and multi-site simulations for added realism and more robust training. The training facility, which is located at the Flight Simulation Technique Centre in Gurgaon, will be a full-service location offering instruction to aircrews that operate the 10 C-17 airlifters that Boeing delivered to India in 2014.</li> <li>• In Feb, 2017, Mahindra Aerostructures, a Mahindra Group company, signed an agreement with Segnere SAS of France to collaborate on airframe manufacturing. Mahindra Aerostructure is a unit of Mahindra Aerospace Pvt. Ltd Its facility near Bengaluru makes and exports parts and sub-assemblies. Segnere operates three production facilities in France and a subsidiary in Tunisia. It specializes in hard metal parts and assemblies for aircraft. The partnership will help Mahindra expand capabilities to produce hard-metal parts (titanium, inconel and aerospace steels) and collaborate on other technologies, Mahindra said in a statement.</li> </ul>
<p><b>RELIANCE DEFENCE</b></p>	<ul style="list-style-type: none"> <li>• In October, 2016, Reliance Aerospace announced a joint venture with Dassault to help construct and maintain 36 Rafale fighter jets, which France agreed to sell to India in September, 2016.<sup>107</sup> In February 2017, Dassault Reliance Aerospace Limited (“<b>DRAL</b>”), a joint venture (“<b>JV</b>”) between Reliance Infrastructure Limited (“<b>RInfra</b>”)-promoted Reliance Aerostructure Limited (“<b>RAL</b>”) and Dassault Aviation, was incorporated.</li> <li>• In April 2017, Reliance Defence tied up</li> </ul>

	<p>with South Korean defence firm LIG Nex1 for smart sensors and ammunition. The company, which is a part of Anil Dhirubhai Ambani Group (“ADAG”), has partnered with the Korean defence company for radars and missiles. The two companies will explore opportunities in the identified range of defence products required by the Indian Armed Forces and work on Air Defence and Surveillance Radar that can be manufactured in India as a potential area of co-operation. They will also work on performance enhancement for various systems or platforms in the portfolio of LIG Nex1, to meet the specific requirements of the Indian Armed Forces</p>
<p><b>BHARAT FORGE</b></p>	<ul style="list-style-type: none"> <li>• Kalyani Strategic Systems Ltd entered into a joint venture with Saab Group for manufacturing of surface-to-air missile (“SRSAM”) system and very short-range air defence (“VSHORAD”) air defence programmes.</li>   <li>• In Feb 2017, Kalyani Group, the owners of Bharat Forge, finalized a joint venture partnership with Rafael Advanced Systems. The initiative will enable the development and production of high end technology systems within the country. This will include a wide range of technologies and systems, like Missile Technology, Remote Weapon Systems and Advanced Armour Solutions. The proposed JV will produce Spike Anti-Tank Guided Missiles (“ATGM”).</li>   <li>• Kalyani Strategic Systems (“KSSL”), the defence arm of Kalyani Group and Israel Aerospace Industries (IAI) signed a memorandum of understanding to incorporate a joint venture company in India, at the Aero-India exhibition in Bangalore. As part of the MOU, IAI and KSSL are aiming to expand their presence in Indian defence market and to</li> </ul>

	<p>build, market and manufacture specific air defence systems and ground to ground &amp; ground to sea munitions.</p>
<p><b>LARSEN &amp; TOUBRO (L&amp;T)</b></p>	<ul style="list-style-type: none"> <li>• L&amp;T won the tender in a global bid for manufacture of guns, which originally fell within the expertise of the OFs. L&amp;T in partnership with the South Korean firm, Samsung Techwinwon, was awarded a contract for over a billion dollars</li> <li>• for the supply of 100 howitzer artillery pieces to the Indian Army. L&amp;T competed with Russia's Rosoboronexport during the tender process.<sup>111</sup></li> <li>• In Feb 2017, L&amp;T and the UK-based MBDA, one of the leading global players in missile systems, set up a joint venture (JV) to develop and supply missiles and missile systems to meet the growing potential requirements of the Indian armed forces. MBDA is jointly held by Airbus Group (37.5 percent), BAE Systems (37.5 percent), and Leonardo (25 percent). The Joint Venture Company, named 'L&amp;T MBDA Missile Systems Ltd', will operate from a dedicated work centre, which will include pyrotechnical integration and final checkout facilities. It is expected to be incorporated in the first half of 2017 after necessary approvals.</li> </ul>
<p><b>WIPRO LIMITED</b></p>	<ul style="list-style-type: none"> <li>• Wipro has designed, developed, integrated and maintained solutions for the INDIAN DEFENCE FORCES, DPSUs, DRDO and ISRO for several decades. It is today engaged by several Global A&amp;D companies for providing Manufacturing, Engineering and IT solutions to support Indian as well as Global Aerospace and Defence Programs.</li> <li>• Wipro established an A&amp;D green field plant in Bangalore's Aerospace SEZ and</li> </ul>

	<p>supplies parts/ components for Hydraulic actuation to leading European and US air framers/tier1&amp;2 clients. Wipro now addresses several western Commercial and Defence programs and is moving up the value chain. It today offers Advanced Manufacturing Solutions through 3D printing of parts (prototype and serial production) for several Aero, Space and Defence applications.</p> <ul style="list-style-type: none"> <li>• Wipro along with its foreign technology partners has begun addressing the Control Systems and Avionics LRU's related systems and sub-system requirements for Indian and foreign platform integrators/ manufacturers, besides providing traditional engineering services to its clients.</li> <li>• While being a Valued IT Partner for 'Digitization' and Business solutions, its Business Process Outsourcing services address customers' integrated logistics support, MRO - operations support and technical publications need. Wipro's Product Qualification and Compliance Lab (TARANG) is a 'one-of-its-kind' test facility equipped to perform mechanical, environmental, EMI/EMC and reliability testing to do pre-qualification, qualification &amp; Safety of Flight ("SOF") tests on LRU's, as well as ruggedizing for avionics and defence requirements.</li> </ul>
<p><b>OTHER COMPANIES</b></p>	<ul style="list-style-type: none"> <li>• Lumax Auto Technologies Ltd and SIPAL S.P.A. have entered into a joint venture which is expected to become operational in fiscal 2017 and will be a full service provider for all types of Integrated Logistic Support Engineering having a strong knowledge and experience in Technical Publishing, Product/Manufacturing engineering, Process engineering, design and manufacture of tooling, design of systems of production lines related to the Aerospace, Defence &amp;</li> </ul>

Automotive sectors.

- Punj Lloyd Ltd and Israel Weapon Industries have entered into a joint venture for manufacturing of guns and their components.
- The joint venture between Bharat Electronics Ltd and Thales would be engaged in manufacturing of new technology radars.
- In addition to its domestic success, the private sector has accounted for 60% of India's arms exports which were approved by the Government.<sup>114</sup> The net defence exports by the private sector has seen a significant jump from 500-600 crores until March 2015 to 2000 Crores by March 2016.<sup>115</sup> This is attributed to delisting of several products under the aerospace category from defence export laws which no longer require government clearances. India's domestic defence firms have also made acquisitions of foreign firms to create and augment their capabilities, with the Mahindra Group's acquisition of majority stakes in the Australian defence aviation companies, Aerostaff Australia and Gippsland Aeronautics and Bharat Forge's acquisition of a gun manufacturing plant from the Swiss company Ruag.<sup>116</sup>
- Aircraft engine maker Rolls-Royce Holdings Plc on Thursday opened a new defence service delivery centre ("**SDC**") in Bengaluru, the first outside the US and UK, to provide localized engineering support and solutions and reduce turnaround time for the Indian Air Force, Indian Navy and state-owned Hindustan Aeronautics Ltd ("**HAL**").

## F. MALABAR JOINT TRAINING AND EXERCISES 2018



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