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AMMO INDIA 2022

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Military Ammunition

Make in India - Opportunities and Challenges



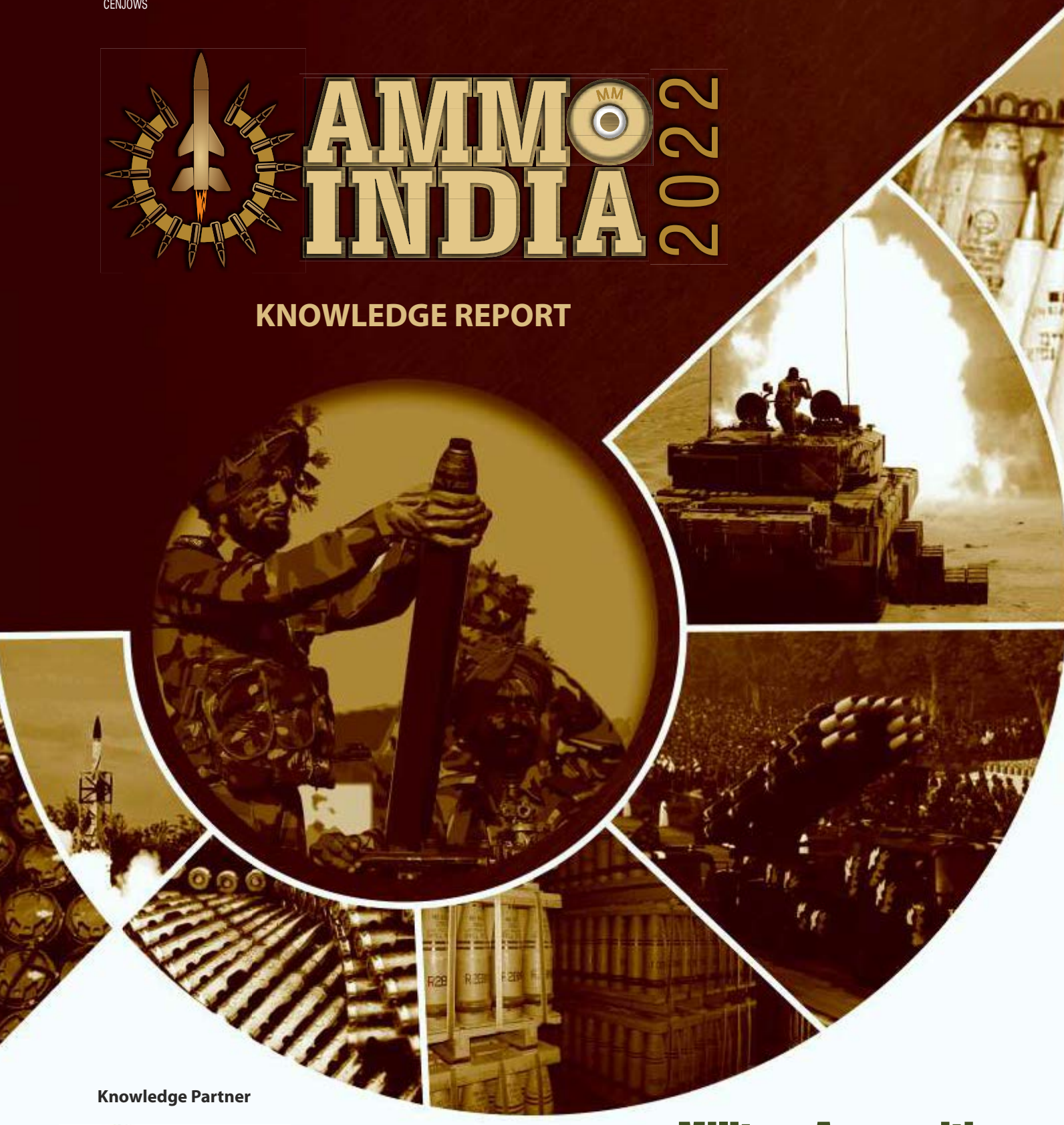
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Foreword



Towards ensuring that India becomes well-prepared to meet the challenges and threats posed by Covid-like pandemic or any other major disruptions in supply chain, the Government of India has initiated various significant measures. During the last couple of years several key schemes were announced and implemented to kickstart the revival of the economy and boost the degree of 'Atmanirbharta' in our economic landscape including the defence sector. As a part of these initiatives, three positive indigenization lists were announced. The first list of indigenization included 17 items related to ammunition and artillery.

Historically the bulk of the requirements of ammunition for our armed forces and Central Armed Police Forces (CAPFs) was catered to by the erstwhile Ordinance Factory Board (OFB) and Defence Public Sector Units (DPSUs). However, imports of these critical items were necessitated in times of conflict to meet urgent requirements. This paradigm was not sustainable as it left the country dependent on external sources of supply. The current conflict between Russia and Ukraine has brought to the fore the fault-lines of being over-dependent on other countries for critical items like ammunition. Thus, there is an urgent need for India to enhance its production capacity and R&D capability. The development of this sector will meet the current demand-supply gap in critical equipment and also go a long way in reducing our reliance on import. So, this area holds immense opportunities for the private sector. We are happy that it is being progressively encouraged and promoted by the supportive and forward-looking policies enacted by the Ministry of Defence under the leadership of the Hon'ble Raksha Mantri Shri Rajnath Singh.

FICCI in association with the Centre for Joint Warfare Studies (CENJOWS) launched "AMMO India" Conference on Military Ammunition in 2018. The first of its kind in India, the programme was highly appreciated and benefitted the industry including the end-users. For "AMMO India 2022", we have expanded the scope of the conference to cover the extensive range of ammunition requirements of the entire armed forces - the Indian Army, Air Force and Navy. I am confident it will offer a unique platform for all stakeholders i.e. Industry, Users, DRDO and Academia to meet and work towards

achieving greater self-reliance in Ammunition manufacturing and moving towards Atmanirbhar Bharat in the Defence sector.

This report is a follow-up to our knowledge paper released in 2018 on 'Ammunition manufacturing in India', and covers the developments in the policy and market space of the Indian Ammunition and Munition sectors. It also proposes the way ahead to further enable the industry on our path to Atmanirbhar Raksha Utpadan! I hope the concerned stakeholders will find it a good read!

I wish AMMO India 2022 a great success.

Arun Chawla
Director General
FICCI



Foreword



We have come a long way since the British set up a gun powder factory in 1787. Through the wars of the 20th Century, a growing cluster of ordnance factories, the sole public sector providers of munitions, remained the mainstay of British and Indian armed forces. Over time, however, challenges of varied non-indigenous weapons, compounded by the volumes, modernisation, efficiency and capacity, eventually led to structural reforms that saw the amalgamation of clusters of Ordnance Factories into new DPSUs including Munitions India Limited (MIL) and Yantra India Limited (YIL) in Oct 2021, and policy reforms that incentivise ATMANIRBHARTA through a growing role of the Indian private sector to address the modernisation and capacity deficits. How do we ensure that these transformative changes deliver the desired outcomes?

We face a challenge of capacity. Victory in the Kargil conflict was scripted in no small measure by firing over 5000 artillery, mortar and rocket rounds daily. *Tiger Hill was captured with over 9000 rounds fired on that fateful day!* Over 250,000 rounds are believed to have been fired in a *limited conflict, over two months*. The Armed Forces are reportedly mandated to maintain War Wastage Reserves of 40 days of "intense conflict" ie 40(I). Post the Pakistan sponsored terror strikes at Uri (2016), procurements under emergency powers were undertaken to bring critical stocks to 10(I). Pakistan sponsored terror attack at Pulwama (2019) and the ongoing stand-off in Eastern Ladakh since May 2020, impelled repeated emergency procurements between 2019-2021 to enhance the stock levels. Regrettably, CAG reports have repeatedly lamented slippages in supplies and voids in the inventory, besides poor quality checks at the manufacturing stage. The Russian army is reportedly firing over 20000 artillery shells every day, as compared to 6000 shells by Ukraine. Dumb munitions have assumed primacy after guided and smart munition stocks have likely become critical. These trends are instructive while scaling our reserve stocks, maintenance and surge capacities.

The other challenge is of technology, modernisation and import dependence. *Kinetic application of force will remain the decisive deterrent and war-winning factor for countries like India, beset with border disputes and conflicts since independence*, which defy an early resolution. Several specialised munitions like anti-tank, air-to-surface, air-to-air and surface-to-air, loitering, GPS guided artillery shells, rockets, MANPADS and grenades have been imported post 2016. The conflict in Nagorno-Karabakh in 2020 saw extensive use of modern loitering munitions and guided rockets. Precision, thermobaric and

hypersonic weapons are being used by Russia in Ukraine. Battlefields of tomorrow will see intelligent, multiple sensor-fused munitions being used in all domains, leveraging technologies to hit targets with ever increasing precision, reach, lethality and discrimination, with embedded algorithms to augment human decision making. Harnessing these technologies, where the private industry can play a big role, will govern the exploitation of these game changing munitions in the future conflicts.

The key to ATMANIRBHARTA, clearly lies in policy implementation. Though the Arms Rules, licensing & FDI policies and acquisition procedures have been revamped between 2016 to 2020 to incentivise active participation of the Private Industry, re-tendering of cases since 2017 has been a dampener. Recent initiation of several Make-In-India and Make-II cases could potentially trigger the transformative inflection. The three positive lists, issued between 2020-2022, progressively preclude import of a plethora of guided munitions, range extension kits, mines, course correcting fuzes, cruise, anti-ship & anti-radiation missiles and loitering munitions. With clear and firm requirements known for the next 10 years, the opportunity for both the Private Industry and invigorated DPSUs, is indeed unique and unprecedented.

AMMO India 2022, co-hosted by FICCI & CENJOWS, provides the right platform to all key stakeholders to work together with renewed zest and synergy to make "Make-In-India" in munitions a reality. Presence and visionary thoughts of Hon'ble Raksha Mantri and the support of the MoD, DDP, HQ IDS, the three Services, DRDO and Captains of the industry will help this event catalyse the drive towards ATMANIRBHARTA in munitions.



Lieutenant General
Sunil Srivastava, AVSM, VSM (Retd)**
Director, CENJOWS

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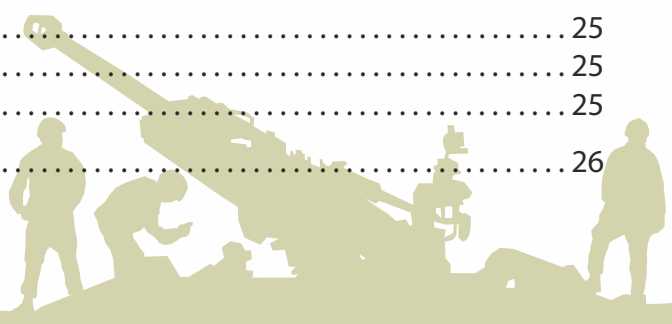
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1 Overview

1.1. Global Demand for Ammunition

The global ammunition market size was valued at USD 22.35 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 3.2% from 2022 to 2030. Which would mean a market size of close to USD 30 billion by 2030.[1] A rise in the number of geopolitical conflicts, internal conflicts and hostilities across the globe is likely to increase the procurement of defence equipment by prominent militaries across the globe, which will further drive the market for ammunition.

The small calibre segment led the market and accounted for over 50.0% share of the global revenue in 2021. This trend is attributed to a wide array of small-calibre ammunition applications including shotgun pistols, assault rifles, rifles, and revolvers.[2]

1.2. Impact of Ukraine War

It has been more than 150 days since Russia's invasion on Ukraine. What initially seemed like a swift war which might get resolved with talks, is now a near intense long drawn war. None had envisaged a war of this scale in this day and age when there are swift battles and close quarter exchange of firepower. The Ukraine crisis has forced many governments into thinking more critically about their Defence strategies on long-term warfare.

It is being reported that Ukraine is losing the frontline war and is heavily dependent on the West for supply of weapons and ammunition if they are to sustain any further. It appears to be predominantly an artillery war, with both sides continuing their strikes. Ukraine is said to be using 5000-6000 artillery rounds a day. Having used up most of their stock ammunition, they have moved to 155mm NATO standard shells[3]. They are running out of ammunition stocks as European manufactures are not able to match the demand. Based on this, one can make a rough estimation of the kind of demand for ammunition in such intense war scenarios. This will also put most Armies into thinking about their stock keeping strategies and fulfilling demand during a war situation.

[1] *Market research report from Grand View Research*
[2] *Market research report from Grand View Research*
[3] *The Guardian*

1.3. Implications for India

While the ammunition industry is seeing greater activity due to the current conflict in Ukraine, India has and always will be facing challenges at its northern and western borders. Both China and Pakistan are a constant threat and we have witnessed multiple escalations in the recent past. There has always been a possibility of a two-front war.

Ammunition stocks in the Armed Forces are based on the concept of Minimum Acceptable Risk Level (MARL). This is the minimum level of ammunition to be stocked to sustain intense war for 20 days. The number of days has been under debate and changed as per the situations. Until 2017, the CAG reports which were made public, stated several shortages in ammunition stocks of various calibres. Since we are not privy to the reports anymore, it would be for the Ministry of Defence and Indian Armed Forces to analyse the data and formulate an appropriate stock keeping strategy.

Historically we have had the Ordnance Factories and Public sector manufacture ammunition for the armed forces. This will not be enough with the current scenario and a sight on the future. India must enhance the ammunition technology R&D as well as design & development by industry, which would ultimately result in production capacities within India. The indigenous ammunition programs identified by the forces must be progressed at a faster pace to meet existing and future demands.

2 Policy

2.1. DAP 2020

The Defence Procurement Procedure (DPP) (Renamed Defence Acquisition Procedure - DAP in 2020) is a set of guidelines approved by the Defence Acquisition Council (DAC) that govern capital procurements in terms of Defence equipment, manufacturing capabilities and technology. It provides framework and criteria for allotment of Defence contracts. The first DPP was formulated in 1992 but came into effect only in 2002. Since then, it has been revised in 2005, 2006, 2008, 2009, 2011, 2013, 2016 and 2020.

DAP 2020, a product of extensive analysis, deliberations, interactions and focused formulations, aims to further 'Self Reliance' of the country in the Defence sector and implement 'Ease of Doing Business' with emphasis on Simplification, Delegation, Reduced Timelines and making the process as Industry friendly as possible. The following chapters have been introduced in DAP 2020,

- Chapter IV - Procedure for Acquisition of systems designed and developed by DRDO/DPSU/OFB
- Chapter VIII - Acquisition of Systems Products and ICT Systems
- Chapter IX - Leasing
- Chapter X - Other Capital Procurement Procedure
- Chapter XI - Post Contract Management

Reservation in Categories for Indian Vendors. The categories of Buy (Indian-IDDM), Make I, Make II, Production Agency in Design & Development, OFB/DPSU and SP model will be exclusively reserved for Indian Vendors meeting the criteria of Ownership and Control by resident Indian Citizens **with FDI not more than 49%.** This reservation will provide exclusivity in participation to domestic Indian industry.

Procurement Categories

In decreasing order of priority, the priority of procurement categories are as follows: -

Priority	Category	Buy From	Qualification	IC %
1	**Buy (Indian-IDDM)**	**Indian Vendor**	Indigenously designed, developed and manufactured	50%
2	**Buy (Indian)**	**Indian Vendor**	Manufactured in India (not designed and developed indigenously)	Indigenous design - Min 50%, otherwise - Min 60%
3	**Buy & Make (Indian)**	**Indian Vendor**	Initial procurement from FOEM followed by phased production in India with ToT from FOEM	Min 50% of MAKE
4	**Buy (Global – Mfr in India)**	**FOEM**	Outright purchase from FOEM followed by indigenous manufacturing in India	Min 50%
5	**Buy (Global)**	**FOEM or Indian Vendor**	Outright purchase from FOEM or through Indian Vendor	Min 30% for Indian Vendor

2.2. Defence Procurement Manual

The Defence Procurement Manual 2009 (DPM 2009) contains principles and procedure relating to procurement of goods and services for the Defence Services, Organizations and Establishments falling under Revenue Expenditure. The term procurement means acquiring all types of goods (both scaled and non-scaled), such as equipment, stores, spares, technical literature, etc., as well as all types of services, including packing, unpacking, preservation, transportation, insurance, delivery, special services, leasing, technical assessment, consultancy, systems study, software development, maintenance, updates, conservancy, etc. implies procurement of items and equipment, including replacement equipment (functionally similar) assemblies/sub-assemblies and components, to maintain and operate already sanctioned assets in the service, the necessity of which has been established and accepted by the Government.

Revenue Procurement : Implies procurement of items and equipment, including replacement equipment (functionally similar) assemblies/sub-assemblies and components, to maintain and operate already sanctioned assets in the service, the necessity of which has been established and accepted by the Government.



Channels of procurement – by placing demand on

- The Director General of Ordnance Factories
- Other ministries of government and state governments
- Industries/Factories/Statutory Corporations (partially or wholly owned by govt)
- Indigenous trade either directly or through the Director General of Supplies
- Local Purchase in respect of items which are not supplied by the central procurement authority/ organizations of the Services / Departments and stores emergently required
- Defence Public Sector Undertakings and other Government Public Sector Undertakings

The updated draft of Defence Procurement Manual 2021 was released on 25th Mar 2021. It has taken 11 years to get a new version of the DPM, which is still in the draft stage. There have been some noteworthy amendments in the 2021 version with regards to Indigenous Procurement, Goods & Services, Information & Communication Technologies, and Consultancy. Industry looks forward to see DPM 2021 become official at the earliest.

2.3. Industrial Licence

Manufacturing in the Defence sector is governed through industrial licensing under The Industries (Development and Regulation) Act, 1951. Before 2001, manufacturing in Defence sector was limited to public sector companies (OFB & DPSUs). However, in 2001, the Government allowed 100% Indian private sector participation in Defence manufacturing sector subject to licensing under IDR Act.

1	**Governing Acts**	Industries (Development and Regulations) Act 1951 Arms Act 1959 / Arms Rules 2016
2	**Licencing authority**	DPIIT (for the listed defence products except for small arms of calibre 12.7mm and above) MHA (for small arms of calibre up to 12.7mm)

Manufacturing in the Defence industry requires industrial license (IL) as per the Industries (Development and Regulation) Act, 1951 (IDRA) or the Arms Act 1959 depending on the equipment to be manufactured. Since 2014, several clarifications have been issued in this regard for ease of business. The last relevant press note on Industrial Licence was released in 2019 which categorized the products requiring IL as follows

- MHA as the licensing authority under Arms Act / Arms Rules
- DPIIT as licensing authority under Arms Act / Arms Rules
- DPIIT as licensing authority under I(D&R) Act

Press Note 2 (2019 Series) dated 11 September 2019 clarified that no IL/Arms licence is required for the manufacture of any parts or accessories in Defence sector, unless specifically listed in any annexure of Press Note 1 (2019 series). This shall not apply to issues of Arms licence for small arms by MHA.

2.3.1. Procedure to Obtain IL

- All applications for Industrial License under IDR Act, 1951 and Arms Act, 1959 can now be applied online on NIC Portal in their respective forms.
- The Applications are scrutinized for their completeness. Information in respect of incomplete applications is sought from the applicants.
- If the applications for grant of licence are complete in all respect with necessary documents, DPIIT circulates them to concerned administrative ministries, Ministry of Home Affairs, Concerned State Government and other concerned agencies for their comments.
- After receipts of Comments from the concerned Ministries/Agencies, files are processed and submitted to the Licensing committee for consideration.
- Licensing committee can recommend for grant of licence/rejection of proposal/deferment of the proposal, based on the comments received and deliberations in the Committee. After recommendation, the approval of the Minister in charge of DPIIT is obtained for grant of licences or otherwise.
    - **Fee.** The licence fee ranges from a minimum of INR 5000/- to the maximum of INR 50,000/- which is to be paid at the time of grant of license for items falling under Arms Act, 1959.
- **Validity**
    - Vide MHA Arms Rules, 2016, the licence granted by MHA and powers delegated to DPIIT under Arms Act, 1959 for manufacturing shall now be valid for the lifetime of the licensee company.
    - Vide DPIIT's Press Note 10 (2015 Series) dated 22/09/2015, the initial validity of Industrial License for defence sector has been revised to 15 years, which is further extendable upto 18 years.

3 Ammunition Procurement in India

Modernisation of the infantry soldier is aimed at enhancing lethality and providing individual protection. Towards this end, procurement cases for modern weapons such as ATGMs, Air Defence Guns, Sub Machine Gun with Ammunition, Light Machine Gun, Assault Rifles & Under Barrel Grenade Launcher (UBGL), Close Quarter Battle (CQB) Carbines, Light Tanks, Main Battle Tanks are being progressed. All these equipment will require ammunition of various calibres and categories.

The management of ammunition was done by placing five-year Roll-on Indent on Ordnance Factory Board (OFB) to enable it to plan its production. (Now the privatised Munitions India Limited and Yantra India Limited) The indent was placed on mutually agreed targets keeping the DPSUs capacity in view. The remaining ammunition, which is not being manufactured by the DPSUs, the Army either imports or procures from Indian Private industry through capital and revenue route. The ministry of defence has also identified several large calibre ammunitions to be procured under the "Make in India" category of acquisition.

Classification of Ammunition[4]

Type	Diameter Range	Main Weapons
Small Calibre	5.56 to 12.7 millimeter (mm)	Carbine, Rifle, Light Machine Gun
Medium Calibre	14.5 to 40 mm	Anti-Material Rifle, Grenade Launcher.
High Calibre	73 to 155 mm	Rocket Launcher, Gun, Tank
Mortar Bombs	~~	Mortar
Missiles	~~	Tanks & Missile Launcher

3.1. RFI/RFPs for Ammunition

With the governments push for Make in India in the recent years, certain measures have been put in place to encourage indigenous development of ammunition through Indian private sector and DPSUs. There was a slew of RFIs / RFPs issued in the last 4 years, seeking participation of the industry in supply of ammunition to the armed forces. Following is a list of RFI/RFP released in the last few years (This is not an exhaustive list)

[4] *Source: DGOS (OS-15) letter dated 12.12.2013*

Type	Service	Description	QTY	Published Date
Global Tender	Army	Cartridge SA 7.62mm×51mm NATO	180631	09-Feb-18
Global Tender	Army	Cartg SA 7.62 mm x 39 mm ball intermediate rimless ammunition for rifle AK-47	2,17,36,850	23-Apr-18
Global Tender	Army	Round 40mm HEAP Round 40mm HEDP Round 40mm smoke RP MGL	7,23,770 1,94,610 1,94,610	28-Mar-18
Global Tender	Army	Round 20mm semi armoured piercing high explosive incendiary (SAPHEI) ammunition	25060	11-Dec-18
Limited Tender	Army	30MM HE/T ammunition	34418	18-Jan-19
Single Tender	Army	30mm VOG-30 ammunition		15-Jan-19
Open Tender	Army	Supply of .50 Calibre (12.7MM) Long Rage Sniper Rifle Ball Ammunition	15000	17-Jun-20
Open Tender	BSF	AGL Ammunition 30 MM HE	30000	14-Jul-20
Make in India Tender	Army	30mm HEI and 30mm HET	188600/yr for 10 years	03-Mar-21
Make in India Tender	Army	Round 40mm HEAP 1,51,400 Round 40mm HEDP 43,200 Round 40mm RP 32,400 Round 40mm HE VOG-25 for UBGL GP-25 73,000	300000/year for 10 years	09-Apr-21
Make in India Tender	Army	122 mm Grad BM ER and Non ER rockets	5000/year for 10	03-Mar-21
Global Tender	Army	Cartg SA 5.56 mm ball NATO for Tavor assault rifle	5,73,08,208	20-Dec-21
Make in India Tender	Army	40mm Low velocity HE grenade for under barrel grenade launcher (UBGL)	153620/year for 10 yrs	29-Apr-22
Make in India Tender	Army	Cartridge SA 9mm Subsonic Calibre 158 GR	159313/yr for 10yrs	13-Apr-22
Make in India Tender	Army	Grenade 30 mm for AGL 17/AGS 30	500000/yr for 10yrs	19-Apr-22
Make in India Tender	Army	BMCS (low zone and high zone)	100000/yr for 10 yrs	26-Apr-22

Type	Service	Description	QTY	Published Date
Make in India Tender	Army	Supply of carts SA 7.62mm amn (05 variants)	6,85,08,599	06-May-22
Make in India Tender	Army	20mm Semi armoured piercing high explosive incendiary (SAPHEI) amn	3,04,130	11-May-22
Make in India Tender	Army	Shell 155 mm ammunition (04 variants)	18942/yr for 10yrs	25-May-22

Note :- All GTE tenders where indigenous capability exists have been foreclosed to encourage domestic industry and being initiated as OTE.

3.2. Positive Indigenisation List

India has been infamous for being one of the largest importers of Defence Equipment in the world. Realising the need to curb imports and promote indigenisation the Ministry of Defence released a '101 Negative Import List' in August 2020. The aim was to

- Recognise the potential of local defence industry.
- Invigorate impetus to domestic Research and Development by attracting fresh investment into technology and manufacturing capabilities.
- Provides an opportunity for 'start-ups' and MSMEs to take up certain products.

The list is now called 'Positive Indigenisation List'. There have been 2 more lists, after the First List in Aug 2020. Upon analysing all the three lists, it is quite evident that ammunition is a key focus area for localisation. Close to 43 products in total have been identified for domestic procurement only. Here is a list of all the ammunition related items identified by the Ministry of Defence:

List	Name of Platform/ Weapon/ System/ Equipment	Indicative Year-Import Embargo
First List	120mm Fin Stabilised Armour Piercing Discarding Sabot (FSAPDS) Mark II Ammo	Dec 2020
	All variants of Depth Charges	Dec 2020
	General Purpose Pre Fragmentation Bombs between 250-500 Kg	Dec 2020
	125 mm Fin Stabilised Armour Piercing Discarding Sabot (FSAPDS) New Generation Ammunition	Dec 2021
	30 mm Ammunition for Infantry Fighting Systems	Dec 2021
	Mine Fragmentation	Dec 2021
	Mine Anti-tank	Dec 2021
	Mine Anti-Personnel Blast	Dec 2021

List	Name of Platform/ Weapon/ System/ Equipment	Indicative Year-Import Embargo
First List	Multipurpose Grenade	Dec 2021
	40mm UBGL (Under Barrel Grenade Launcher)	Dec 2022
	155 mm Artillery Ammunition	Dec 2022
	GRAD BM Rocket	Dec 2023
	30MM HEI/HET	Dec 2023
	23 mm ZU Ammunitions	Dec 2024
	30mm VOG 17	Dec 2024
	Electronic Fuses for Artillery Ammunitions	Dec 2024
	Bi- Modular Charge System (BMCS)	Dec 2024
Second List	Helicopter Launched ATGM upto 7 Km	Dec 2021
	Anti-Torpedo Decoy System for Ships (Mareech)	Dec 2021
	Bund Blasting Device	Dec 2021
	Counter Mine Flail (CMF) (Land Based)	Dec 2021
	Processor Based Ground Mine (PBGM)	Dec 2021
	Processor Based Moored Mine (PBMM)	Dec 2021
	Rocket RGB-60 HE with Fuse	Dec 2022
Second List	Rocket RGB-60 Practice	Dec 2022
	Rocket RGB-12 HE with Fuse k3m	Dec 2022
	Rocket RGB-12 Practice	Dec 2022
	80 MM Tandem Warhead Rocket	Dec 2022
	Laser Ordnance Disposal System	Dec 2023
	40MM (Multi Grenade Launcher) Ammunition	Dec 2024
	Limpet Mines (7 Kg & 15 Kg)	Dec 2024
	Aerial Fuse for Mk-80 Series Bombs	Dec 2024
	14.5 MM API (Armour Piercing Incendiary) for Anti Material Rifle (AMR)	Dec 2025
	Surface Mine Clearance System (Land Based)	Dec 2025

List	Name of Platform/ Weapon/ System/ Equipment	Indicative Year-Import Embargo
Third List	Armour Piercing Fin Stabilised Discarding Sabot (APFSDS) 125MM Practice Ammo	Dec 2022
	20 mm ammunition HE/I, HE/T & TPT	Dec 2022
	Air to Ground Rocket 68mm	Dec 2022
	81mm Anti Thermal Anti Laser (ATAL) Smoke Grenade	Dec 2023
	40mm Multi Grenade Launcher (MGL)	Dec 2023
	5.56 x 45 mm (Tavor Ammunition)	Dec 2023
	7.62mm x 54 (Sniper) Ammunition	Dec 2025
	155mm Terminal Guided Munition	Dec 2025
	155mm Ammunition with Course Correctible Fuse	Dec 2026

3.3. Make Programs

The Make scheme of acquisition was introduced in early versions of Defence Procurement Procedure (DPP). Now, with higher focus on indigenisation and introduction on import embargo on defence equipment, new Make programs have been identified. In future as well, we might see a lot of the items from the Positive List transitioning to the Make scheme.

Here is a list of Make-II projects associated to ammunition [5]

SHQ	Name of Project	Qty	Tentative Cost (in Rs Cr)	Present Status
Airforce	80 MM Rockets	5000		Feasibility study in progress. Case under examination for Make-III
Army	Electronic Fuze for Pinaka Rocket Ammunition	14040 (over 10 years)	140.4	Pre AoN stage
Navy	127 mm Guided Projectile			AIP accorded on 21.6.2022.
Navy	Limpet Mine Mk 414 (7 Kg) and Mk 430 (15 Kg)	50-7Kg, 100-15Kg	20.06	AoN accorded on 04.8.21. EOI issued on 22.9.21.

[5] *https://www.makeinindiadefence.gov.in/projects/projectlist/2/1*

SHQ	Name of Project	Qty	Tentative Cost (in Rs Cr)	Present Status
Airforce	70 mm Air to Ground Rockets	80000 (over 3-5 years)	-	PSQR under finalization
Army	125mm APFSDS Ammunition for T-72 & T-90 Tank	85,000	1955	PSO issued on 11.11.2020
Army	155 mm Terminally Guided Munitions	1966	1239.36	EoI issued.
Army	Pre-fragmented programmable proximity fuzed ammunition	3,30,000 over 12 years	30.6	SoC being formulated.
Navy	Proximity, DA and Graze fuse for 76/62 SRGM with universal capability for 76-127mm calibre ammunition	5000 fuzes @ 500 fuzes/year	241	AoN Stage

3.4 The End User Perspective

With contributions by Lt Gen SK Upadhya, PVSM, AVSM, SM, VSM (Retd)

Speaking at North Tech Symposium in Udhampur in May 2022, Vice Chief of Army Lt Gen B S Raju said that the Acceptance of Necessity for almost all weapons and equipment for the Indian Army will be given to the Indian industry. He further added that future wars need to be fought with indigenous equipment and that the army intends to categorise 90% of the AONs for indigenous production. Speaking to the gathered audience while delivering his inaugural address, "Hereafter, the Acceptance of Necessity (AoN) will only be given to indigenous defence manufacturers. We will come more than half a distance to meet your aspirations. We will give you all the facilities that are required, whether it is equipment, testing facilities and most importantly our time."

As can be seen from the list of opportunities, the Armed Forces have backed the Make in India initiative and most tenders are issued under the same category. However, this has posed several challenges in terms of execution. Many of the RFPs issued in 2017/18 have been reissued in 2022 as the Indian industry was unable to convert the opportunities. The predominant reason for this would be the lack of technical know-how available within the industry. Even if they were to partner with a Foreign OEM, it is unlikely that the FOEM would forego their IP rights.

There is no doubt about the large requirement of ammunition for the Armed Forces. The challenge is to develop indigenous vendors who can provide quality ammunition as well as sustain the capacities for the forces.

In this regard, certain realities associated with Indian ammunition dynamics are:

- Ammunition manufacture in India has been a 100 per cent Govt sector activity only. This in turn was a total OFB monopoly, except for BEL & ECIL producing electronic fuzes for artillery.
- In 2016 the Govt approved the enablement of private industry participation in ammunition manufacture through long-term contracts. However, due to procedural and other delays, no contract has been finalised till today.
- Platforms or weapon systems are the focus of acquisition, selection, modernization paradigm and ammunition is incidental or part of the package provided by the OEM. As the bulk of the Indian war fighting inventory was imported, so was the ammunition to be used with it.
- As a corollary the need for the separate development of ammunition rarely existed and accordingly ammunition R&D was low. The outcomes with respect to designing and providing ammunition for indigenous platforms have also not been very encouraging.
- As a result of the above overtime the Indian ammunition ecosystem developed predominantly to produce indigenised foreign products. The success of various products depended on effective absorption of technology, if available or successful reverse engineering and subsequent long term sustainment of knowledge, quality etc.

The lack of ammunition indigenization over the years may be ascribed to:

- With ammunition being bundled with the platform denial of technology for indigenous manufacture during initial acquisition could rarely have been the case. However not insisting on the same along with the original platform or deliberately choosing to rely on in-house R&D or reverse engineering solutions meant sustained import dependence over the life cycle of the platform.
- Non-localisation of the complete supply chain of indigenised ammunition and the imported inputs constraining capacities.
- Non-renewal of time-bound or quantity-restricted licenses.
- Quality deterioration, high failure rate and a large number of accidents leading to the destruction of large stocks (sudden voids) and loss of confidence in indigenous sources, ultimately ending up in reverting back to imported sources.
- Non-indigenisation due to small quantities required.

The above was further compounded by procedural and other decision-making issues some of which were:

- Until 2015, the financial powers to sanction import contracts were not vested with the users and sanctions were subject to interminable scrutinies and delays.
- Treating ammunition procurement like any other commodity led to situations like insistence on global tendering instead of buying from OEMs who had designed and certified the ammunition for warfighting platforms in the inventory. This introduced trials for prospective new suppliers and competitive vendor behaviour like complaints invariably leading to non-finalisation of contracts. Certain OEMs refused to participate in such tenders to protest other bidders not having the necessary IP rights from the OEM.
- Blacklisting or ban on dealing with suppliers who were the sole single source worldwide.
- Vintage platforms not being replaced in time and OEMs discontinuing the manufacture of ammunition where after repeated tendering elicited no response.

The situation started to redeem after 2016 with the following:

- Unshackled from debilitating procedures under the emergency procurement powers of 2016, the users made up immediate shortages by obtaining stocks from OEMs and well established sources.
- Additional special provisions in 2017 to speed up and regularly address ammunition problems were delegated to the users. These however met with limited success due to certain old processes and procedures tending to creep in.
- Emergency procurement powers delegated yet again over 2020 and 2021, provided due boost to relief for users' tribulations.
- None of the above, however, were able to introduce due urgency into the 2017 project for achieving full ammunition indigenisation through the industry by obtaining requisite technologies and setting up manufacturing infrastructure at zero cost to the Govt. Despite more than 05 years results are not in sight in the immediate future.
- Since 2020, the users have embarked on offering indigenisation of all imported ammunition to the industry on a similar model without waiting for the outcomes of the ongoing 2017 cases.
- In addition, new types of ammunition required by the users have been offered under the Make 2 category to encourage industry R&D and obtain indigenous solutions.

3.5 Challenges

Due to the ever changing nature of threats across the globe, India needs to focus on becoming self-reliant to ensure continuous and timely modernisation of the forces. The challenges likely to be faced are as follows:-

a) Of the overall defence budget, only six percent is allocated to R&D

b) High R&D costs with extended incubation periods for realising R&D benefits have dissuaded involvement and investments in R&D by private industry.

c) India is faced with limited expertise in designing critical components in advanced munitions such as smart and precision munitions.

d) India lacks sufficient infrastructure, and qualified human capital to support R&D ingenuities.

e) Existing agencies have not been efficacious in sharing R&D know-hows with private players.

f) Lack of competition within R&D agencies.

g) Certification process is a long-drawn process. In addition, while much effort has been to provide access to testing facilities to the private sector, limited number of facilities and long process means that companies have to wait a long time to be the chance to test their prototype/products.

4 Defence Public Sector Units

Ordnance Factory Board (Now 7 new privatised entities) and DPSUs like BDL and BEL have the oldest and largest industrial setup for ammunition manufacturing. With the primary objective of achieving self-reliance in equipping the armed forces with state-of-the-art battlefield equipment.

4.1. Munitions India Limited

MIL is India's largest manufacturer and marker leader in the production of ammunition & explosives. MIL manufactures a comprehensive range of ammunition including Small Arms ammunition, Medium Calibre ammunition, Artillery ammunition, Tank ammunition, Mortar ammunition, Aerial Bombs, Naval ammunition, Shoulder fired Rockets and Pinaka Rocket. Our explosive portfolio includes High Explosives, Primary Explosives, Propellants, composite propellants etc.

MIL has 12 state of the art factories spread over five states in India. These are equipped with modern manufacturing facilities coupled with all requisite test and evaluation facilities. MIL is continuously modernising its manufacturing facilities to achieve higher standards of quality and become more competitive. MIL has designed and developed indigenous automated solutions for ammunition filing and assembly with the assistance of Indian companies. In addition to the Filling and assembly facilities of the ammunitions, MIL has inhouse infrastructure for manufacture of initiatory compositions, high explosives, propellants etc. This makes MIL a complete end-to-end solution provider, reduces our dependence on external agencies and ensures quality of products. MIL has achieved indigenization level of 95 % in its current product portfolio.

4.2. Yantra India Limited

Yantra India Limited, Nagpur is one of the seven Defence Public Sector Undertakings, carved out of erstwhile- Ordnance Factory Board. The company is fully owned by Government of India. Yantra India Limited is a conglomeration of production units, Training Institute, Regional Controllerate of Safety and Recruitment Centre. The production units are located in West Bengal, Uttar Pradesh, Madhya Pradesh and Maharashtra.

The company possesses state of the art plant and machinery for production of small medium high calibre shell body hardware for Artillery Tank Guns, mortars, rockets, pod assembly, air

dropping bombs and cartridge cases. Mechanical and Electronic Fuze hardware are also manufactured at YIL.

4.3. Bharat Dynamics Limited

Bharat Dynamics Limited (BDL) has graduated from being a missile manufacturer to a Weapon System Integrator and has emerged as a complete solution provider for the Indian Armed Forces.

BDL has four manufacturing units, out of which three are located in Telangana State (Hyderabad, Bhanur and Ibrahimpatnam) and one in Andhra Pradesh (Visakhapatnam). As a part of its expansion plan, BDL is setting up one unit at Amravati in Maharashtra to cater to the growing demands of the Armed Forces.

BDL, with the support of DRDO, has been manufacturing various types of indigenously designed and developed missiles and underwater weapons. One such product being produced by BDL is the Akash Weapon System, a Surface-to-Air indigenous Missile, involving of a large number of supply chain partners from the industry. Similarly, The Heavy Weight Torpedo and Light Weight Torpedo developed by NSTL, DRDO, are being manufactured by BDL at its Visakhapatnam Unit with active participation from the industry. The Light Weight Torpedo is also being exported.

BDL is now set to produce the world class 'Beyond Visual Range' Astra Weapon System for the Indian Armed Forces. The weapon system has been developed by DRDO. The Company is also extending its technical support to its vendors including providing test facilities available with BDL. The procedures have been streamlined to encourage active participation of 'start-ups'. BDL is also working with DRDO for Transfer of Technology for products like Infra-Red Flares, which are a part of Counter Measures Dispensing System to be manufactured and offer to Indian Armed Forces as a 'comprehensive counter measure solution'. These items are currently under import category.

Recent trends indicate rapid strides are being made by countries over the globe in utilizing Artificial Intelligence (AI) based technologies for development of Next Generation of weapon systems. Taking cognizance of this fact, BDL has started undertaking development of products for the Armed Forces with AI Technologies with active participation of start-ups.

As a part of its R & D efforts, BDL has developed Amogha - III, the third generation Anti-Tank Guided Missile. The missile will be offered after successful completion of user trials to the Indian Armed Forces as well as export market. The Company has entered into an MoU with International Institute of Information Technology (IIIT), Hyderabad, India for joint development of AI based technologies for its range of products. Thrust is being given to explore tie-ups with other foreign OEMs for new missiles and underwater weapon programmes with potential Transfer of Technology and meeting the 'Make in India" criteria.



4.4. Bharat Electronics Limited

Bharat Electronics Limited (BEL) is an Indian Government-owned aerospace and defence electronics company. It primarily manufactures advanced electronic products for ground and aerospace applications. Headquartered at Bengaluru, BEL is executing its business through 9 Units with 14 Strategic Business Units as production centers, 2 Central Research Laboratories & 1 Product Development & Innovation Centre as Technology House, and numerous Regional Product Support Centers, Marketing Offices (In India & Overseas) and overseas Procurement Offices for its vast customer base.

BEL manufactures Aerospace & Defence equipment which include Weapon Systems, Radars, Sonars, Fire Control Systems, Tank Electronics, Electro-Optics, Communications, Electronic-Warfare, Network Centric Systems, Homeland Security & Smart City Business, Software, Missile Electronics, Composites, Space Electronics, Unmanned Systems, Arms & Ammunition

Depending upon the business trend, BEL has already expanded its portfolio in the business segment like Arms & Ammunition, Energy Storage Products, Seekers & Missiles, Network & Cyber Security, Railways & Metro Solutions, Healthcare Solution & Medical Electronics, Civil Aviation and Composites. Depending upon the business trend in future, further diversification is anticipated.

BEL has its subsidiaries with World players like Thales and GE in Aerospace & Defence and Healthcare respectively, namely, BEL-Thales Systems Limited and GE-BEL. Further Technology collaborations with various OEMs are in place based on project specific requirements.

5 DRDO

5.1. Ammunition Technology

Defence Research and Development Organisation (DRDO) is India's premier institute for research on defence technologies. Close to 41 labs under DRDO focus on different aspects of military technologies. The key labs which work on ammunition and missile technologies are listed below.

Laboratory Name	Location	Area of Research
Advanced Centre for Energetic Materials (ACEM)	Nashik	Composite Propellant
Advanced Systems Laboratory (ASL)	Hyderabad	Missiles & Strategic Systems
Armaments Research & Development Establishment (ARDE)	Pune	Armaments
Centre for Fire, Explosives & Environment Safety (CFEES)	Delhi	Explosives
Defence Research & Development Laboratory (DRDL)	Hyderabad	Missile & Strategic Systems
Research Centre Imarat (RCI)	Hyderabad	Missile & Strategic Systems
Terminal Ballistics Research Laboratory (TBRL)	Chandigarh	Ballistics

5.2. Transfer of Technology

Defence Research and Development Organisation (DRDO) has been developing technologies, products, systems that are required for Indian Armed Forces. These projects are undertaken by DRDO as Mission Mode (MM), Technology Demonstrator (TD), Science & Technology (S&T), Infrastructure (IF) and Product Support (PS) projects. In addition, DRDO also undertakes/ supports various technologies & products whose development has been undertaken through Research Boards, Extramural Research and grant-in-aid schemes.

DRDO has developed Guidelines for Transfer of Technology, which is evolved continually to meet end user goals. Following is a list of some of the ammunition technologies developed by the relevant DRDO labs:

Ammunition Technologies Developed by DRDO

Lab/Centre	*Technology Developed*
ARDE	Advanced warhead Technology
	KE Rod Technology
	Multi Point Initiation Technology
	Deep Penetration Warhead
	Low L/D Shaped Charge Warhead
	Ferroelectric Pulse Power Technology for Initiation Of Warheads
CFEES	Environmental & Explosive Safety Technology
DRDL	Two pulse Rocket propulsion system
	Solid Fuel Ducted Rocket Ramjet technology
	Liquid Propellant based Ramjet System
	End game system based on Laser Proximity Fuse
	Control guidance algorithms for various class of missiles
	Development of on the move Communication system, on the move tracking system, on the move command control system.
TBRL	Ultra-fine β-HMX and Fine RDX< 6 mm (surface mean)
	Electronic Fuze for 81mm Mortar Bomb
	Post Impact Delay Fuze for Air Delivered Bomb
	Multi-Mode hand grenade
	Bund Blasting Device (BBD) Mk-II

6 Role of Private Industry

To achieve the goal of self-reliance in the Defence sector, continuous efforts are being made to increase indigenization, wherever technologically feasible and economically viable. With the said changes and amendments in various policies, the Indian private industry is keen on supporting the requirement of the Armed forces and the Make in India vision.

Post liberalisation of the defence sector in 2001 and further amendments in 2006, we are now looking at a more than a decade of development since then in the private industry. In the next few sections, we look at the companies with Industrial Licence for arms and ammunition manufacturing, and what progress has been made within the ammunition industry along with technology collaborations.

6.1. Key players in Private Industry

Company	Products	Collaboration	Future Plans
Bharat Forge	• 120 FSAPDS (Mk II) and 125 FSAPDS • 30 mm HEIT/APIT • 30 mm VOG • 40 mm HEAP/HEDP/RP for MGL and HE VOG 25 for UBGL • Shells of 40mm, 120 mm, 60mm and above, 155mm • BMCS with partner • New Family of Munitions for Indian Armed Forces	• A JV exists with Elbit Advanced Systems Ltd. • A MoU exists with Bharat Explosives Ltd and Munitions India Ltd for specific items. • A MoU exists with IAI and Elbit Israel for specific Item. • MoU with Arsenal India Ltd.	Plan to manufacture as Make in India product for all the items listed with their explosive partner through Kalyani Strategic Systems Ltd (KSSL), a fully owned subsidiary of Bharat Forge Ltd.
Blue Horizons Strategic Engineering (BHSEL)	Manufacture of Range Extension Kits for converting the unguided bombs to guided bombs with range enhancement from 8km to more than 100km with precision.	The BHSEL is established as JV of Elbit Systems Ltd, Israel and Aditya Precitech Pvt Ltd, Hyderabad	Propose to manufacture Long range Guided missiles, laser guidance kits, modernisation of existing laser guidance kits, for Futuristic Indigenous Combat Vehicle, light tank

Company	Products	Collaboration	Future Plans
Adani	• Small Calibre – 5.56x45mm, 7.62x51mm, 7.62x39mm,9x19mm,.338 Sniper • Medium Calibre 23mm – HEIT and APIT 30mm- HEI and HET 40mm HEAP, HEDP, RP, VOG-25, LV HE • Large calibre – 155mm	• Small Calibre – Italy • Medium Calibre- Bulgaria	• Small calibre ammunition capacity to be enhanced to 220 million rounds per year. • Medium calibre 23mm HEIT – 3,00,000 per year 23mm APIT – 2,00,00 per year 30mm HET- 40,000 per year 30mm HEI- 1,50,000 per year 40mm HEAP- 3,00,000 per year 40mm HEDP- 3,00,000 per year 40 mm RP – 3,00,000 per year 40mm VOG-25- 3,00,000 per year
SMPP	• Ballistic Protection Products and Ammunition. • Produce Boron Carbide and all other materials for Ballistic protection. • Combustible Cartridge Cases for Bi Modular Charge System for all calibres of Tanks and Artillery Guns & Mortars in Indian Army.		• Manufacturing of Full Ammunition for Tanks, Artillery and Infantry Support Weapons. • Ballistic armouring of Fixed and Rotary Wing aircrafts, Naval vessels and Land Platforms. • Armouring / manufacturing of Wheeled and Tracked platforms.
LTMMSL (L&T MBDA Missile Systems Limited)i	• Missile sections • Air-borne Launchers for missile systems	LTMMSL is a joint venture between L&T and MBDA. LTMMSL is looking to establish MOUs with MBDA's global partners / supply chain and LTMMSL, and its domestic supply chain.	LTMMSL is looking to expand its capabilities to offer ATGM and SRSAM missile systems under Buy Indian or IDDM processes.

6.2. Foreign Collaboration

The fact that India ranks amongst the top 10 countries in the world in terms of its military expenditure, makes it one of the most attractive markets for defence. This makes it a no-brainer for any foreign original equipment manufacturer (FOEM) that India should be on their customer list. Having said that the GoI has an agenda to reduce import dependence in defence by 35-40 percent and it is actively promoting indigenous defence manufacturing with initiatives like Make in India and policy reforms including allowing 100 percent Foreign Direct Investment (FDI). So instead of direct product import the role of FOEM is seen to be changing towards co-development and co-partnership.

Several overseas defence companies, such as Expal of Spain, Nexter of France, Rosoboronexport of Russia, Chemring Group of the United Kingdom, Saab of Sweden, Elbit of Israel, Rheinmetall Defence of Germany, Diehl Defence of Germany, Denel of South Africa, Yugoimport of Serbia, Bumar of Poland, Orbital ATK Armament Systems of the United States and Arsenal of Bulgaria, are/were in talks with private Indian companies to provide cutting-edge technology for multiple Indian ammunition programs.

The role of FOEM would be that of a technology partner to the Indian company. As of date no Indian private company has produced ammunition for the armed forces. The GoI would expect 100% transfer of technology (ToT) from the FOEM. This technology transfer will not be restricted to the know-how but also include the know-why of the design and processes. From a business point of view the FOEM would be expected to make investment in the Indian venture through the FDI route. This would make them an official stakeholder in the process and ensure complete cooperation in terms of ToT. The FOEM can look at export potential once the Indian company is fully operational and is able to provide a cost advantage vis a viz their current manufacturing operations outside India.

7 Way Forward

7.1 Recommendations from the Industry

7.1.1.Ministry of Defence

- Due considerations should be given by the end-user and DGQA for trials required, and the number of ammunition rounds sought when dealing with Make in India programs.
- Certain ammunition/components/modules need to be imported from OEMs and need considerable time to indigenise. However, the Office Memorandum released from the Department of Expenditure during Aug 2020, in the subject matter of Global Tender Enquiry, increases the project execution time for PSUs. This needs a relook from the MoD.
- Procurement process has too many agencies involved, in addition to the limited time given to the industry after the issue of the RFP.
- Industry could be intimated of the Long/Mid-term procurement plans for better planning. Also, several RFPs have been issued without any further action. More transparency and a collaborative environment are required for greater success. This also helps in assessing business viability for the private sector. As all the Make in India programs requires substantial capital investment, technology collaborations and a long gestation period.
- When the industry develops and proves the ammunition product, there will be a huge export potential as well. The government may look at schemes to fast-track the development of these programs for private industry.
- Early realisation of Integrated Capability Development Scheme (ICADS) of the Indian armed forces to facilitate synergy among the forces and promote defence manufacturing and R&D
- Leverage the liberalised FDI policy to encourage technology transfers from foreign OEMs for high-end technologies

7.1.2. Industrial Licence

- There is a need to ease licensing for explosives products. A provision for status updates and tracking of applications should be provided.
- Implement a redressal mechanism to allow companies to track and clarify any deficiencies in applications. Mechanism to be put in place to ensure the processing applications for licences is completed strictly within stipulated timelines.

- Greater transparency to be established regarding the grant/denial of licenses. The applicant should receive adequate information on why the licence is being denied.
- Access to nodal officers assigned by licencing authorities may be improved.
- If the licence demands what is not given in the SOP, then the process becomes extremely complicated and slow when companies are asked for something not given in the formatted documents. A standardised format for submitting additional information and holding an interactive meeting with applying industry/organisations to explain requirements may help speed up the process

7.1.3. Export / Import Licence

- End User Certificate format may be reviewed, especially the clauses pertaining to the re-export of the products.
- Previously, companies would procure Critical raw materials/components, which are not available in India, and spares/accessories of Imported machines directly from OEMs or their Indian dealers. However, due to minimum Indigenous content requirements, Indian dealers are unable to offer import critical items. This results in delays in the procurement of raw material/spares/ accessories of foreign origin. The government may relook at Import policies from this aspect for ease of supply chain management.

7.1.4. Technological

- Accelerate and promote a certain degree of defence research and development outside DRDO. Ease the process of contracting R&D from academia and private industry.
- Technology being transferred should have current and futuristic defence applications and Issues relating to IPRs and Patent must be addressed

7.1.5. Ammunition Supply

- Plan for ammunition indigenisation must be discussed in parallel when inducting a new platform.
- Unshackle the 2017 proposal for industry-led ammunition indigenisation cum production and complete the same before end 2022.
- Facilitate and stabilise at least two manufacturers (one DPSU and one Private sector) for every type of ammunition.
- Permit and minimise processes to a single window model for ammunition exports by industry.

About Sugosha Advisory

Sugosha Advisory, is founded on the principle of providing "Value Based Consulting" to our clients, partnering with them, so as to create an impact on their revenue growth. With a team of erudite industry veterans, having deep domain experience in the Aerospace and Defence verticals, Sugosha Advisory specialises in Defence Policies, Procurement Procedures and Offsets. Sugosha Advisory leverages the expertise of the sectoral experts for a comprehensive and a result-oriented approach.

Our other core services include Regulations & Licensing (Industrial, Export and Import), Strategic Business Development, Market Research for defence manufacturing companies.

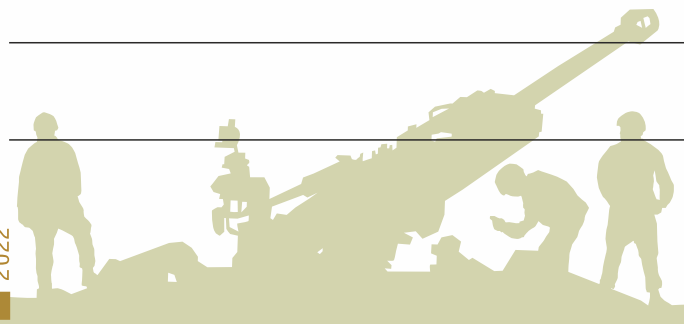
We at Sugosha, also publish a monthly magazine, DefInsights, featuring news focused on procurement for the Indian Armed Forces. DefInsights, a Sugosha Media presentation, enjoys a circulation of more than 3000 professionals worldwide.

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About FICCI

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies.

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

FICCI provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community. Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialization, and its emergence as one of the most rapidly growing global economies.A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

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About CENJOWS

CENJOWS was raised at the initiative of Ministry of Defence on 24 Aug 2007 and is registered under 'The Societies Registration Act 1860'. The centre has been set up to:

- Rise above sectoral and departmental legacies, and examine joint warfare and synergy issues in their entirety.
- Provide the much-needed interface between various stakeholders, viz the government, public and private sector, academia, NGOs and civil society.
- Initiate debates and discussions in an independent and unbiased milieu for emergence of best possible alternative.

Mission

To promote Integration as a synergistic enabler for the growth of Integrated National Power and provide alternatives in all dimensions of its applications through focused research and debate.

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