# Defence Standards and Testing Infrastructure – Critical Enablers in India's Indigenisation Journey

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# Foreword

The defence industry is an area of strategic importance and India, one of the largest armed forces in the world, has long been dependent on imports to fulfil its requirements. While the dependency has reduced considerably over the years, there is still much more to be done to achieve the goal of 'Aatmnirbhar Bharat'. A major step taken in this direction was to turn focus towards building a robust domestic defence manufacturing industry that could cater to the needs of the armed forces. As part of its Make in India initiative, the government has given particular attention and thrust to the defence sector with several steps taken to catalyse the development of indigenous capabilities in defence manufacturing. These initiatives to energise defence manufacturing would need to be complimented by equipping, synchronising and streamlining the defence testing ecosystem considering the stringent standards / quality assurance requirements. There is also a need to make the manufacturing base, primarily comprising MSMEs, familiar with the testing and qualification ecosystem along with the details of existing facilities.

In order to objectively assess the defence testing ecosystem that is currently available, KPMG in India has carried out a study based on research, objective analysis and survey of MSMEs, Start-ups and established industry players. The survey was conducted in December 2021 and was aimed at evaluating the familiarity to applicable standards, availability of test facilities and ease of access, besides soliciting relevant suggestions. The study covers the existing test systems/capabilities in defence organisations that have been made available to private industry along with steps taken with regard to standardisation and development of defence standards. In order to provide a benchmark for standardisation, a case study was also carried out highlighting the development of defence standards in the USA.

The study aims to provide a macro level view of the defence testing infrastructure and efforts for development of standards. It highlights the on-ground challenges and needs as felt by the industry players so as to provide key insight with regard to the specific areas to be addressed to strengthen the defence testing ecosystem in India.

**The key recommendations are:**

- The need to create a uniform, non-duplicitous set of standards and specifications.
- Streamlining existing India-specific standards and also adopting global / commercial standards where feasible.
- Augment existing test infrastructure in a systematic manner considering existing facilities already available at defence organisations, with an aim to provide widespread access across regions avoiding duplication.
- Creation of an online central database, which provides easy access to all relevant information on applicable defence standards as well as existing / upcoming test facilities.

**Abhishek Verma**
**Partner**
Aerospace and Defence
KPMG in India

# Abbreviations

| | |
|---|---|
| A&D | Aerospace & Defence |
| ADE | Aeronautical Development Establishment |
| AP-ADE | Andhra Pradesh Aerospace & Defence and Electronics Park |
| ARDE | Armament Research and Development Establishment |
| ASSIST | Acquisition Streamlining and Standardisation Information System |
| AVNL | Armoured Vehicles Nigam Limited |
| AWEIL | Advanced Weapons and Equipment India Limited |
| BDL | Bharat Dynamics Limited |
| BEL | Bharat Electronics Limited |
| BEML | Bharat Earth Movers Limited |
| BPM | Business Process Management |
| CABS | Centre for Airborne Systems |
| CFEES | Centre for Fire, Explosive and Environment Safety |
| CID | Commercial Item Descriptions |
| DAP 2020 | Defence Acquisition Policy 2020 |
| DCAN | Defence Codification Authority Number |
| DDP | Department of Defence Production |
| DDPMAS | Design, Development and Production of Military Air Systems and Airborne Stores |
| DEF-STAN | Defence Standards |
| DGAQA | Directorate General of Aeronautical Quality Assurance |
| DGCA | Director General of Civil Aviation |
| DIC | Defence Industrial Corridor |
| DID | Data Item Descriptions |
| DLJ | Defence Laboratory Jodhpur |
| DLRL | Defence Electronics Research Laboratory |
| DMRL | Defence Metallurgical Research Laboratory |
| DMSRDE | Defence Materials and Stores Research and Development |
| DOD | Department of Defense |
| DPEP 2020 | Draft Defence Production and Export Promotion Policy 2020 |
| DPIIT | Department for Promotion of Industry and Internal Trade |
| DPSU | Defence Public Sector Undertaking |
| DRDE | Defence Research Development Establishment |
| DRDO | Defence Research and Development Organisation |
| DSP | Defense Standardisation Program |
| DTI | Defence Testing Infrastructure |
| DTIS | Defence Testing Infrastructure Scheme |
| ECIL | Electronics Corporation of India Limited |
| EDP | Electronic Data Processing |
| EMC | Electromagnetic Compatibility |
| EMI | Electromagnetic Interference |
| EOI | Expression of Interest |
| FDI | Foreign Direct Investment |
| FY | Financial Year |
| GIL | Gliders India Limited |
| GRSE | Garden Reach Shipbuilders & Engineers Ltd |
| GSL | Goa Shipyard Limited |
| HAL | Hindustan Aeronautics Limited |
| HEMRL | High Energy Materials Research Laboratory |
| HSL | Hindustan Shipyard Limited |
| HQ | Headquarters |
| iDEX | Innovations for Defence Excellence |
| IGMDP | Integrated Guided Missile Development Programme |
| IHQ | Integrated Headquarters |
| IOL | India Optel Limited |
| IS | Indian Standards |
| ISA | International Standardisation Agreements |
| ISEPC | Inter Services Equipment Policy Committee |
| IT | Information Technology |
| JS | Joint Services |
| JSPR | Joint Services Preferred Range |
| JSPS | Joint Services Policy Statement |
| JSQR | Joint Services Qualitative Requirement |

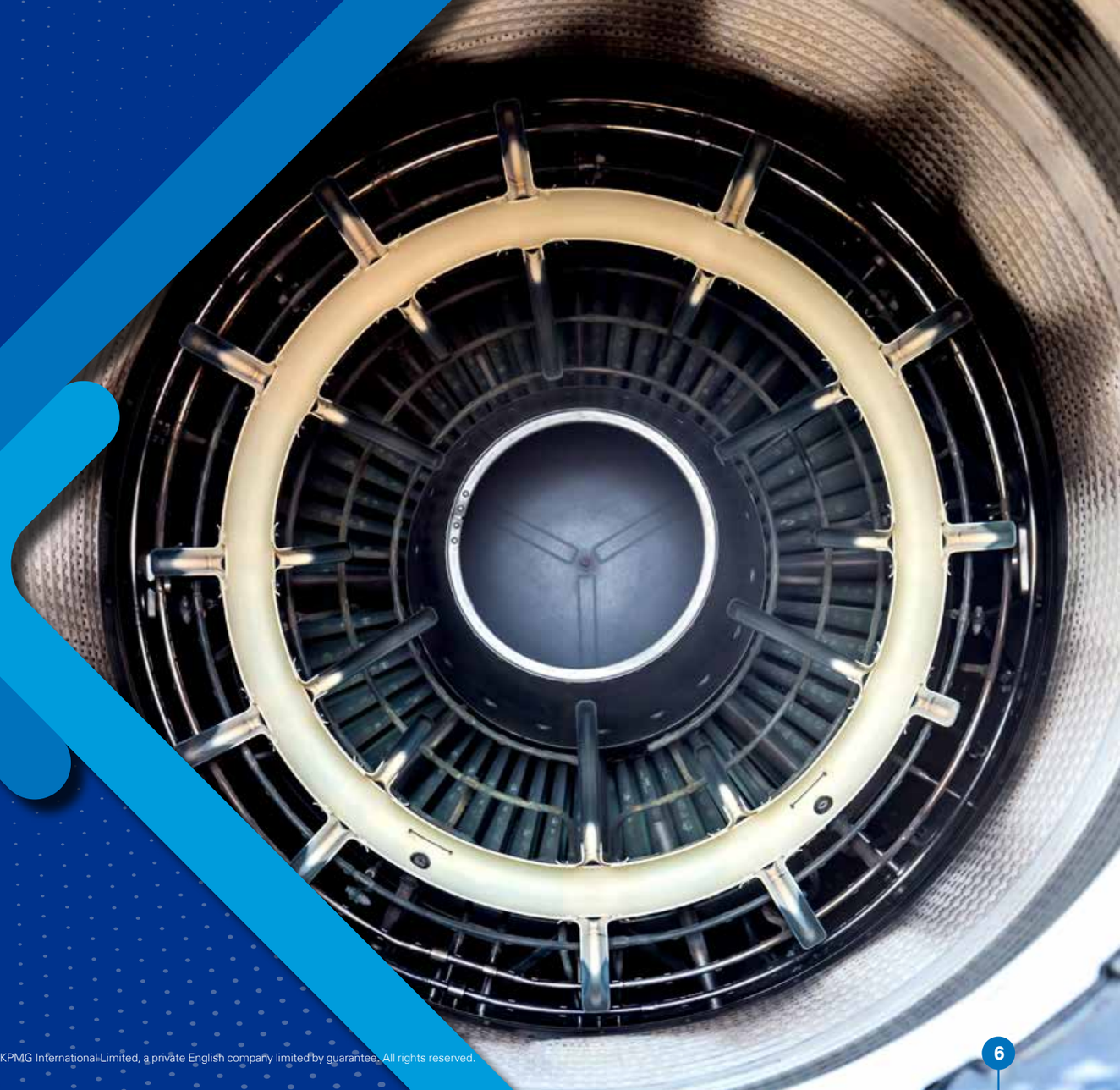
# Abbreviations

| | |
|---|---|
| JSRL | Joint Services Rationalised List |
| L&T | Larsen & Toubro |
| LRDE | Electronics & Radar Development Establishment |
| MBDA | Matra BAE Dynamics Alenia |
| MDL | Mazagon Dock Shipbuilders Limited |
| MIDHANI | Mishra Dhatu Nigam Limited |
| MIL | Munitions India Limited |
| MIL-STD | Military Standards |
| MOCA | Ministry of Civil Aviation |
| MoD | Ministry of Defence |
| MPLS | Multiprotocol Label Switching |
| MRO | Maintenance, Repair, and Overhaul |
| MSME | Micro, Small and Medium Enterprises |
| NATO | North Atlantic Treaty Organisation |
| NGS | Non-government Standards |
| NMRL | Naval Materials Research Laboratory |
| NSTL | Naval Science & Technological Laboratory |
| OEM | Original Equipment Manufacturer |
| OFB | Ordnance Factory Board |
| PXE | Proof & Experimental Establishment |
| QA | Quality Assurance |

| | |
|---|---|
| R&D | Research & Development |
| R&DE | Research & Development Establishment |
| RCI | Research Centre Imarat |
| RFP | Request for Proposal |
| SAG | Scientific Analysis Group |
| SEZ | Special Economic Zone |
| SRI | Self-Reliance Index |
| SRRV | Self-Reliance Review Committee |
| SSPL | Solid State Physics Laboratory |
| TANDICO | Tamil Nadu Defence Industrial Corridor |
| TBRL | Terminal Ballistics Research Laboratory |
| TCL | Troop Comforts Limited |
| TDF | Technology Development Fund |
| UAS | Unmanned Aerial Systems |
| UK | United Kingdom |
| UNIDO | United Nations Industrial Development Organisation |
| UPDIC | Uttar Pradesh Defence Industrial Corridor |
| US | United States |
| UT | Union Territory |
| VRDE | Vehicles Research Development Establishment |
| YIL | Yantra India Limited |

## Chapter 1

# India's thrust on indigenisation



**1.1** The defence industry is an area of strategic importance and India has one of the largest armed forces in the world which is dependent on imports. While the dependency has reduced considerably over the years, there is still much to be done to achieve the national goal of self-reliance. A major step taken in this direction was to turn focus towards building a robust domestic defence industry that could cater to the needs of the armed forces.

**1.2.** The Indian Navy was perhaps a frontrunner in this quest for indigenisation wherein the first strides towards indigenous design, construction and maintenance of ships were made in the 50s and 60s. The Indian Navy has developed an eco-system of indigenous manufacturers who are progressively replacing foreign shipboard equipment and material with indigenous equivalents. In parallel, the Navy, developed an ecosystem of standards and test facilities for qualifying various shipboard equipment and material through rigorous tests and trials. The Army and the Air force also followed suit in this indigenisation journey, with support from DRDO as well as DPSUs & erstwhile OFB for indigenous development, testing and induction of equipment and platforms on land as well as in air. The mid -1980s saw emphasis on R&D and enabled DRDO to undertake eminent projects. In 1983, the Integrated Guided Missile Development Programme (IGMDP) was sanctioned to develop five missile systems:

01 **Prithvi (surface-to-surface)**

02 **Akash (surface-to-air)**

03 **Trishul (surface-to-air)**

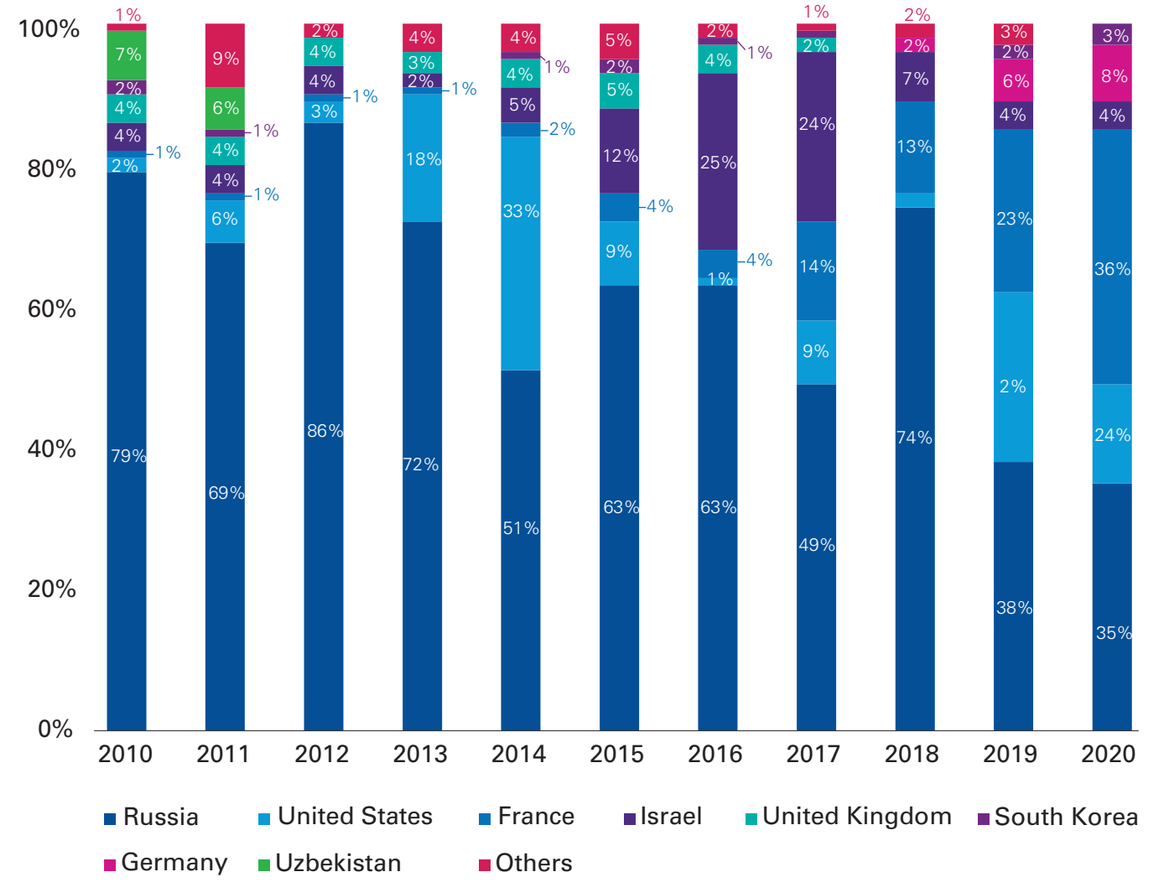
04 **Nag (anti-tank)**

05 **Agni ballistic missiles**

**1.3.** Further in 1990, a Self-Reliance Review Committee (SRRV) under Dr A.P.J. Abdul Kalam, formulated a 10-year self-reliance plan. The Self Reliance Index (SRI) defined that the percentage share of indigenous content in total procurement expenditure should progressively increase from 30 per cent in 1992-1993 to 70 per cent by 2005[1]. In pursuance of the same in 1998, India and Russia signed an inter-governmental agreement to jointly produce BrahMos supersonic cruise missile. Apart from Russia, India has also partnered with other countries such as Israel and France for a number of projects.

1. Indian Defence Industry Issues of Self-Reliance, IDSA Monograph Series, No. 21, Laxman Kumar Behera, July 2013

**Countries exporting to India 2010-2020**




Source: SIPRI

## Chapter 2

# Make in India

**2. Make in India** initiative aims to facilitate investments, nurture innovative environment, promote skill development and create world class industrial infrastructure in the country. The Department for Promotion of Industry and Internal Trade (DPIIT), Government of India leads the programme that is aimed at 25 sectors. This initiative plays a pivotal role in economic growth of the country as it aims not only to employ the existing skill base but also create additional employment opportunities. Another important aspect of this initiative is building the Ease of Doing Business (EoDB) index by eliminating redundant procedures, simplifying practices and making the state more receptive and responsible. Amongst the 25 sectors, defence sector has received particular attention, with several steps taken to catalyse the development of indigenous capabilities.

**2.1. Indigenisation lists -** DPSUs along with the Armed Forces have identified items which are to be indigenised and the details have been shared with the private industry.

**2.2. Simplification of procedures -** Focus has been given to institutionalising, streamlining and simplifying defence procurement procedure.

**2.3. Increase of Foreign Direct Investment (FDI) -** FDI in the sector has been increased to 74% through automatic route from an earlier 49%.

**2.4. Defence Industrial Corridors (DIC) -** Industrial corridors act as a catalyst to encourage indigenous production and nurture the domestic defence industry, 02 DICs have been established respectively in Uttar Pradesh and Tamil Nadu.

**2.5. Defence Acquisition Policy (DAP), 2020 -** Introduction of new category of capital procurement in the Buy Indian - Indigenously Designed, Developed and Manufactured (IDDM) category to encourage indigenous design, development and manufacturing of defence equipment. Moreover, preference has been given to 'Buy (Indian)', 'Buy and Make (Indian)' and 'Make' categories over 'Buy (Global)' and 'Buy and Make (Global)' categories.

- Simplification of the 'Make' Procedure with provisions for funding of 90% of development cost by the Government.
- Separate procedure for 'Make-II' category has been notified to encourage indigenous development and manufacture of defence equipment, whereas Make-III category has been introduced for Start Ups
- Number of industry friendly provisions such as relaxation of eligibility criterion, minimal documentation, provision for considering proposals suggested by industry/individual etc. have been introduced in this procedure.
- The offset guidelines have been revised, with preference given to manufacture of complete products over manufacture of components.

**2.6. Defence Production and Export Promotion Policy 2020 (DPEPP 2020) -** The DPEPP 2020 is envisaged as overarching guiding document of MoD to provide a focused, structured and significant thrust to defence production capabilities of the country for self-reliance and exports.

**2.7. Positive Indigenisation List/Import Embargo[1] -** Two indigenisation lists consisting of 101 and 108 items were announced by the Ministry of Defence (MoD) in Aug 2020 and May 2021 respectively to boost indigenisation and ensure active participation from both the public and private sector. The list comprised of weapons, platforms, complex systems, sensors, simulator and ammunition with timelines indicated against each item for commencement of embargo on their import. In Dec 2021, MoD notified another list of sub-systems/ assemblies/subassemblies/ components comprising of 2851 items; 2500 of which are already indigenised and 351 items to be indigenised by Dec 2024.On 24 Mar 2022, another list of 107 strategically important Line replacement Units (LRUs)/sub-systems with a timeline for imposing import embargo was released. Finally, on 07 Apr 2022, MoD released a third positive list to indigenise 101 weapons and platforms to further advance the Aatmanirbhar Bharat vision. In addition, 30 agreements for 21 DRDO technology transfers were also handed over.

**2.8. Streamlining of grant of industrial licenses -** The procedure for grant of licenses has been streamlined along with release of the guidelines for extension of validity which has been increased from three years to 15 years with provision to grant extension for a period of three years on a case-to-case basis.

**2.9. Innovations for Defence Excellence (iDEX) - iDEX -** has been created with the aim of developing an ecosystem that cultivates innovation and by engaging the industry as well as the academia.

**2.10. Technology Development Fund (TDF) -** Created under DRDO, the TDF promotes self-reliance in defence by means of public/private industries partnership.

**2.11. Strengthening of MSMEs -** GoI has launched several instruments to redefine MSMEs, launch of the online platforms such as SRIJAN and CHAMPIONS and financial aid under comprehensive economic package to strengthen MSME base of the country.

**2.12. Allocation for domestic procurement -** Allocation for domestic procurement for the FY 2021-22 has been enhanced compared to previous years and is about 64.09% of the allocated amount for military modernisation[1].

**2.13. Support to the private industry -** A level-playing field between the private and the public sector is being established and promoted wherein outsourcing and vendor development guidelines issued for DPSUs is a step towards attaining this.

1. Ministry of Defence, PIB Releases

## Chapter 3

# Enablers for growth of the private domestic sector

## 3.1. Industrial clusters:

**3.1.1.** Industrial clusters are a key attribute for any plan designed to bring about a regional economic development and are defined not just by geographic proximity, but also by the magnitude of cluster effects. These cluster effects are of great interest because they confer a positive benefit on an individual firm in the cluster, independent of other characteristics of the location[1]. Industrial clusters represent an organisational structure which is very spatial in nature i.e., the chain can be traced horizontally as well as vertically and at the same time interlinked. Clusters also generate competition and these are mostly positive as:

- There is increase in productivity.
- Increase in innovation as each unit desires to differentiate itself.
- Stimulates formation of new businesses as units expand and strengthen themselves within the cluster.

**3.1.2.** Another key aspect of industrial clusters is that clustering affords the sharing of some key infrastructure and resources particularly required for testing, transportation etc. With careful macro level planning, clusters make it possible to minimise overall infrastructure investment. This is particularly relevant for A&D manufacturing clusters which have certain unique requirements for testing and evaluation. The details of existing defence industrial clusters located across India are as mentioned.

### 3.1.2.1. Karnataka

- **North cluster**

  India's first private aerospace SEZ with ~250 acres of area is situated in Belagavi for A&D manufacturing and assembly.

- **Central cluster**

  Aerospace research and innovation centre collocated with IISc at Chitradurga.

- **South cluster**

  Hi-tech A&D park with ~1000 acre area situated in Devanahalli, Bengaluru.

- **MRO**

  World class Maintenance, Repair and Overhaul (MRO) facility planned in Bangalore, Mysuru to leverage recently announced tax rationalisation opportunities.

25% of India's aircraft and spacecraft industry lies in Karnataka with 67% of all aircraft and helicopter manufacturing for Armed Forces, 70% supplier base for India's A&D industry and 2000+ SMEs with capability to carry out niche sub-contracting[2].

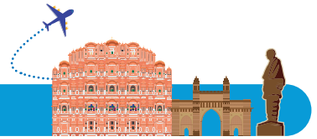
### 3.1.2.2. Andhra Pradesh

Andhra Pradesh Aerospace & Defence and Electronics Park (AP-ADE) is strategically located in Anantapur district of Andhra Pradesh and is likely to emerge as future hub for defence research and manufacturing in India[3]. The PSUs which are planning to set up units near AP-ADE are:

- Bharat Dynamics Limited (BDL).
- Electronics Corporation of India Limited (ECIL).
- Bharat Electronics Limited (BEL).

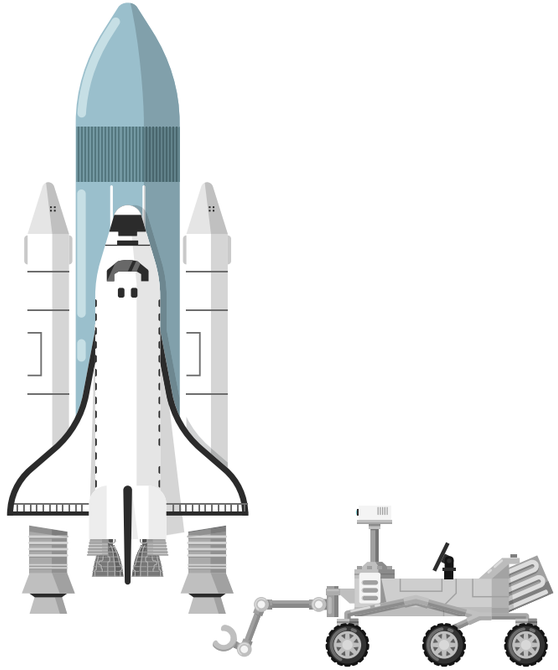
### 3.1.2.3. Madhya Pradesh

The defence cluster of Madhya Pradesh is located at Jabalpur and Itarsi. Main anchor units present in the cluster are Gun Carriage Factory, Grey Iron Foundry, Vehicle Factory, Ordinance Factory, Telecom Factory etc. There are 45 industrial units in this defence cluster but only few are catering to the anchor units.



### 3.1.2.4.

Apart from these states Rajasthan, Maharashtra, Gujarat are aggressively developing clusters to aid A&D sector with their capabilities and strength to innovate.



1. Clusters and the New Economics of Competition, Harvard Business Review, Michael E. Porter, 01 Nov 1998
2. Invest Karnataka website
3. AP-ADE website

## 3.2. Defence Industrial Corridors (DIC)

As elaborated in the preceding paragraphs, the current focus is on expansion of defence market and identifying the arenas to strengthen indigenous manufacturing. The two DICs in Uttar Pradesh and Tamil Nadu were announced with the aim of expanding defence manufacturing capability within the country and reducing foreign dependency.

### 3.2.1. Uttar Pradesh Defence Industrial Corridor (UPDIC)

The UPDIC is a greenfield project for boosting defence manufacturing and is planned across six nodes namely Agra Aligarh, Chitrakoot, Jhansi, Kanpur and Lucknow. The state is creating land banks, formulating policies to incentivise the industries towards setting up of manufacturing units for attracting investments and developing infrastructure around these nodes to provide faster access along with industry grade services. The project has seen success with industry players partnering with the state from various parts of the country and setting up as part of expansion/diversification. Though, the state of Uttar Pradesh had an existing defence base owing to the presence of defence PSUs such as Hindustan Aeronautics Limited (HAL), Bharat Electronics Limited (BEL) and the erstwhile Ordnance Factories, creation of the Corridor, has provided a large influx of the private players. Further, with stalwarts such as BrahMos Aerospace and Bharat Dynamics Limited (BDL) becoming a part of UPDIC, more traction has been provided to the state.

Uttar Pradesh is also home to the largest number of MSMEs in the country and has an existing industrial base of metal works, leather, textiles and automobiles. Many existing industries have also shifted focus towards diversifying into related defence domains of components, sub-systems and sub-assemblies manufacturing, materials and composites, precision engineering, specialised textiles etc. which gives a great boost to the domestic manufacturing capabilities as well as generates more employment opportunities within the existing skilled workforce. In addition, the Indian Navy and the Indian Airforce have also joined hands with the corridor to establish a direct dialogue with the manufacturer and customise their solutions as per requirements.

### 3.2.2. Tamil Nadu Defence Industrial Corridor (TANDICO)

Tamil Nadu already has a strong manufacturing presence with an existing industrial base. The state records the highest number of factories as well as the number of operational SEZs (41). The defence ecosystem in the state, which currently consists of more than 120 aerospace manufacturing units and more than 700 vendors supplying to the various defence PSUs[3], will further be enhanced by the setting up of the DIC. Tamil Nadu is also a hub for passenger vehicles, accounting for 70 per cent of the country's automobile exports[4]. It is also a leading generator of renewable energy and has a robust base for electric vehicle manufacturing, electronics, heavy engineering, IT and textiles. Owing to this as well as having a high literacy rate in the state, Tamil Nadu has always been a preferred location for foreign investment wherein the state is the largest recipient of the Korean Foreign Direct Investment (FDI) to India[5]. The DIC is coming up across five nodes namely Hosur, Coimbatore, Tiruchirappalli, Salem and Chennai with an existing industrial ecosystem. A major advantage of Tamil Nadu is its large coastline that is home to three major seaports and 15 minor ports[6] in addition to the other world class infrastructure already existing in the state.

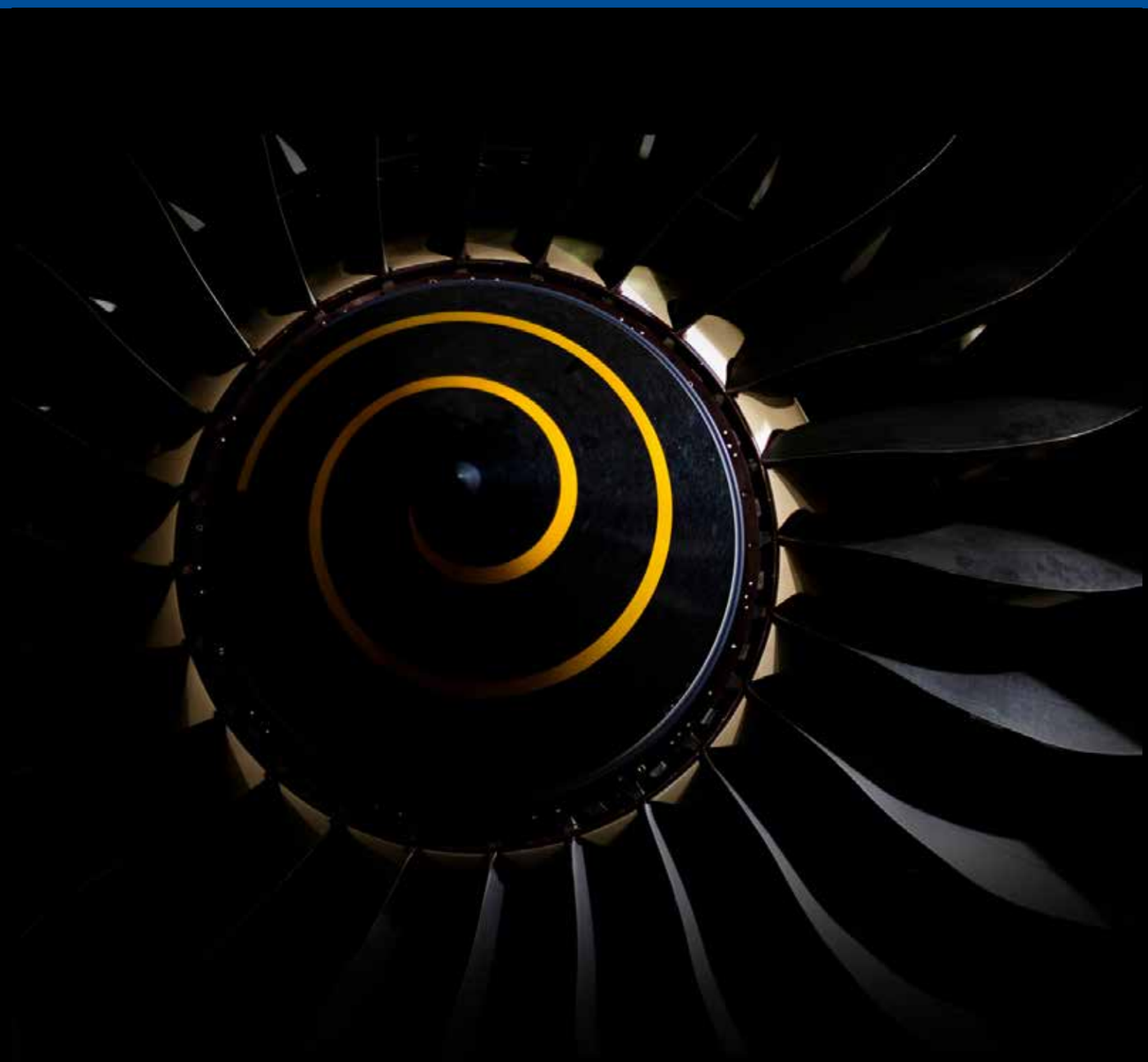
3. Invest India website, Tamil Nadu state page
4. Invest India website, Tamil Nadu state page
5. Make in India website, Defence Industrial Corridors in India page
6. TANDICO website, Advantage Tamil Nadu page

## 3.3. Need for synchronised ecosystem for testing and trials

**3.3.1.** The government has already set in motion several initiatives to energise the defence manufacturing ecosystem in the country. While manufacturing is being boosted through these measures, the above initiatives would need to be complimented by efforts to equip, synchronise and streamline the testing ecosystem. This is particularly relevant considering the stringent defence standards and testing / quality assurance requirements that are necessary for equipment and material to comply with. Therefore, in order for the manufacturing ecosystem to grow sustainably, existing and emerging manufacturers in the A&D sector would need to acquire a high level of familiarity with:-

- Specific standards and test requirements applicable to successful acceptance of the particular equipment / material.
- Testing equipment / facilities / infrastructure that are required to prove the compliance of the manufactured equipment / material to the relevant standard.
- Details of existing facilities if any i.e., location, specific type of tests that can be carried out, means of accessing the facilities, specific standards to which tests can be carried out at these facilities.

**3.3.2.** In order to objectively assess the level of familiarity and awareness of defence test standards along with facilities including the issues faced by manufacturers particularly MSMEs, a survey was carried out amongst various representatives of the manufacturers across the country. The findings of the survey are detailed in the subsequent section.



## Chapter 4

# Awareness on defence testing standards and facilities

## 4.1. Introduction and background

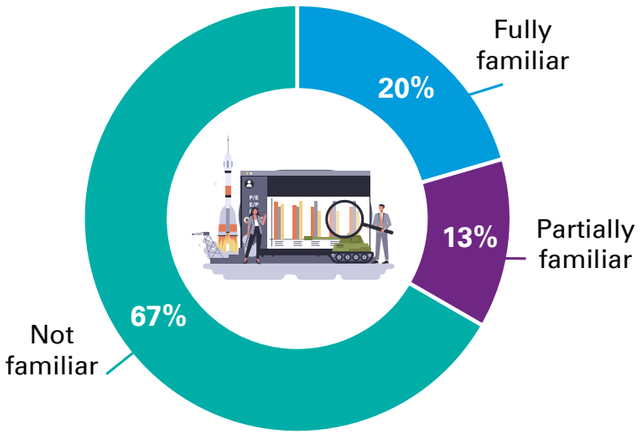
An online survey was conducted among 200+ manufacturing industries in defence sector comprising - Start-ups, MSMEs and existing market leaders or companies intending to enter this space. Around 80 defence manufacturing organisations of different categories primarily Startups/MSMEs and a few existing players in defence sector responded to the survey.

The objective of this survey was to understand the level of familiarity amongst manufacturers with regards to the standards, testing requirements, infrastructure etc. that are applicable for design, manufacturing, testing and performance evaluation of the product. The survey was also used to identify any issues being faced and obtain relevant inputs/ suggestions in this regard. The survey assessed some basic parameters with regards to familiarity with defence standards, awareness and access to databases / catalogues of relevant standards, awareness with regard to testing requirements, access to information on existing test facilities, availability of in-house test facilities etc.

## 4.2. Familiarity with defence / military standards

The respondents were asked about their awareness of the existing standards and specifications in use in the Indian defence manufacturing sector. The graph below plots the responses and also highlights that a majority of the respondents were not familiar with the same.

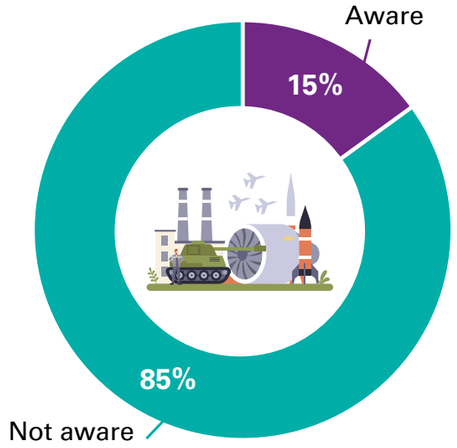
**Familiarty with Defence/Military Specific standards**



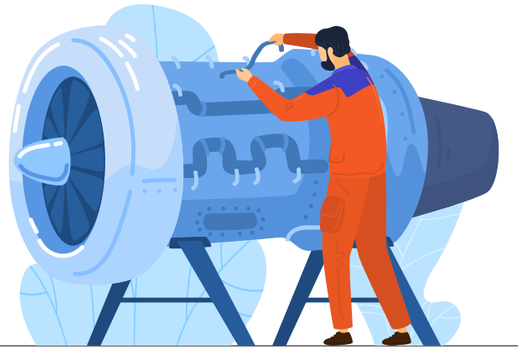

## 4.3. Familiarity with database / catalogue for standards

The survey endeavoured to assess if the manufacturers are aware of any such repository/ website (or different distributed sources/ websites) that lists all the standards that are applicable for manufacturing in the A&D sector in India from which they can identify the various standards that may be relevant to their products/ processes/ services.

**Awareness of repository /website listing all standard related to aerospace and defence manufacturing sector**



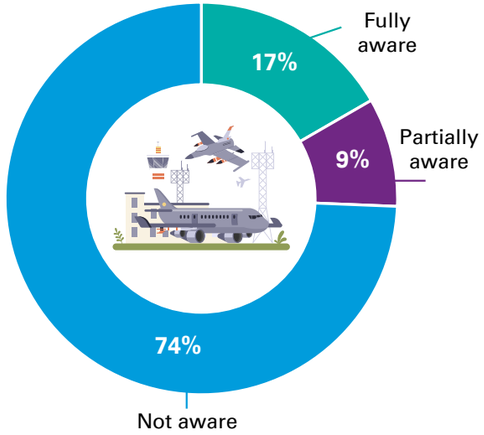

Respondents also indicated that when there was a requirement to access relevant information, the sources used were sae.org, everyspec.com, assistdocs.org, website of government . organisations like DGCA, MoD, MoCA etc. From these responses it was inferred that relevant and critical information with regards to standards is difficult to access to most manufacturers, as the information available in public domain is scanty and scattered across many websites/portals.



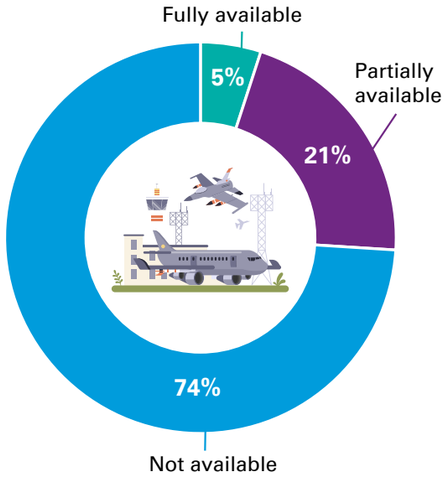
## 4.4. Testing facilities

The survey also assessed the awareness of the specific test facilities and testing infrastructure requirements that are necessary for qualifying the products they offer. It emerged that majority of the manufacturers were not aware of testing facilities or infrastructure specifically required to enable qualification of their products to meet the requirements of A&D material / equipment.

**Awareness of necessary testing infrastructure requirements**

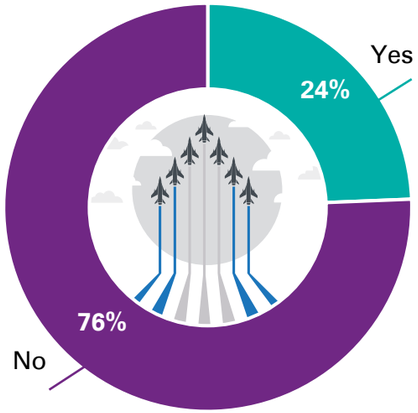



**Availability of inhouse testing infrastructure**




The Survey endeavoured to assess awareness amongst the industry players with regards to the existence of the many government owned testing facilities that offer their facilities to be used by private organisations.

**Awareness of government owned/ DRDO labs/ DPSU owned testing facilities offered for utilisation to private industries**

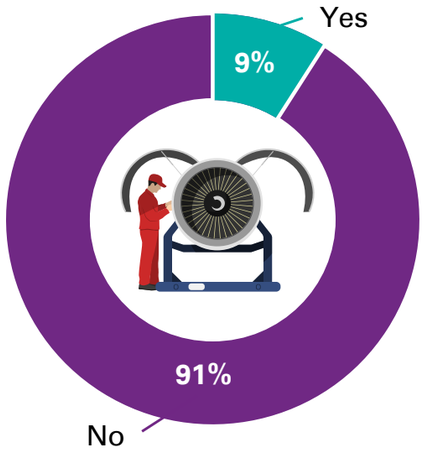



In addition to the above, majority of respondents indicated that whenever there is a requirement to locate details of test facilities available, they search on the internet or try to contact DRDO or similar organisations to obtain inputs. It therefore emerges that despite facilities for testing in DRDO labs, DPSUs etc. being made open to private manufacturers, sufficient information on the facilities is not available in public domain.

## 4.5. Information

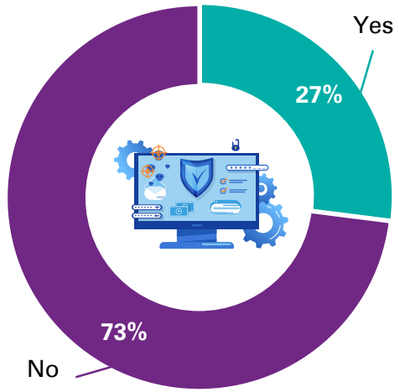
The government / Ministry of Defence, for its part has endeavoured to share information with regards to applicable standards and available test facilities that are relevant for a manufacturer, albeit distributed across various portals/ websites of government as well as DPSU organisations. The survey explored the level of awareness and accessibility amongst respondents with regards to this information that has been shared by the government / defence agencies /public information sources

**Awareness and access to information shared by the government / Defence agencies / Public information sources regarding standards.**



Further the survey highlighted the lack of comprehensive information regarding defence standards and test facilities in the public domain indicating a gap in information exchange between the authorities and the manufacturers.

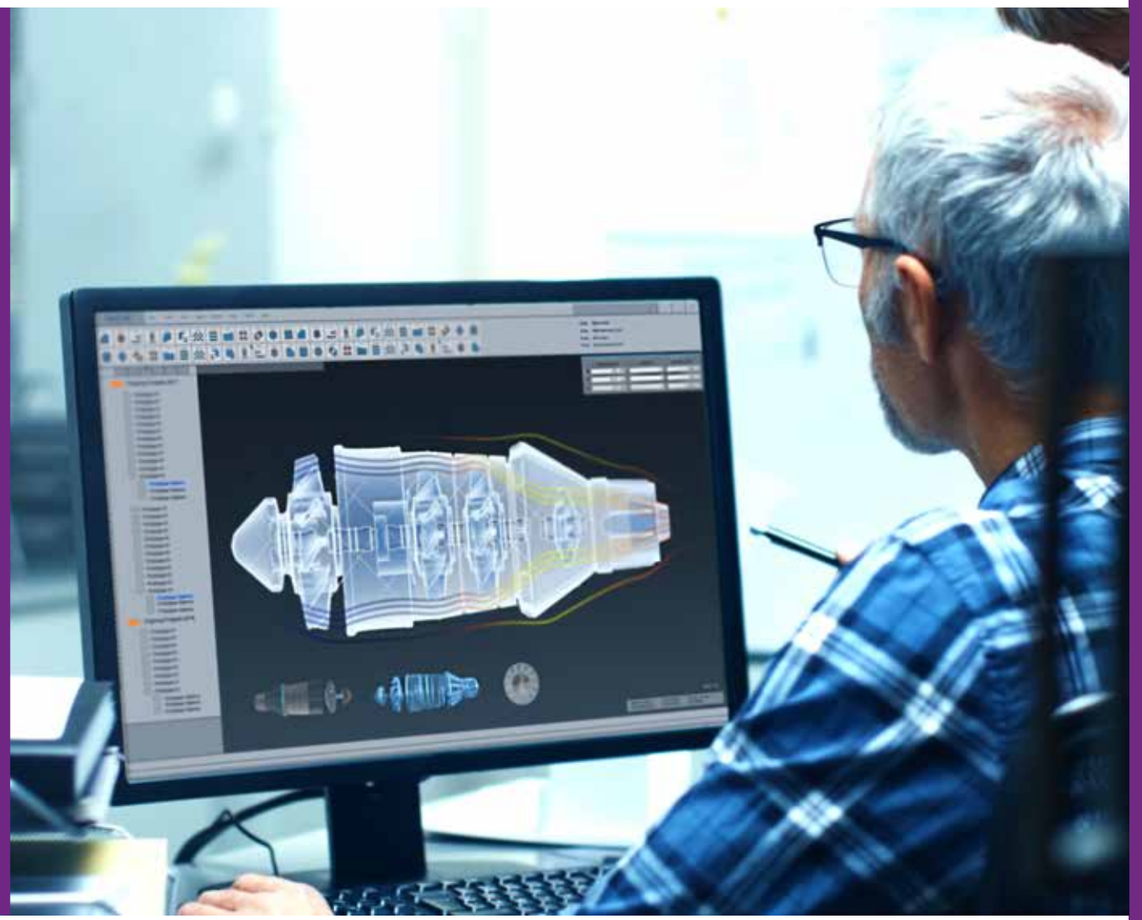
**Availability of comprehensive information in public domain regarding defence standards and test facilities**




## 4.6. Recommendations

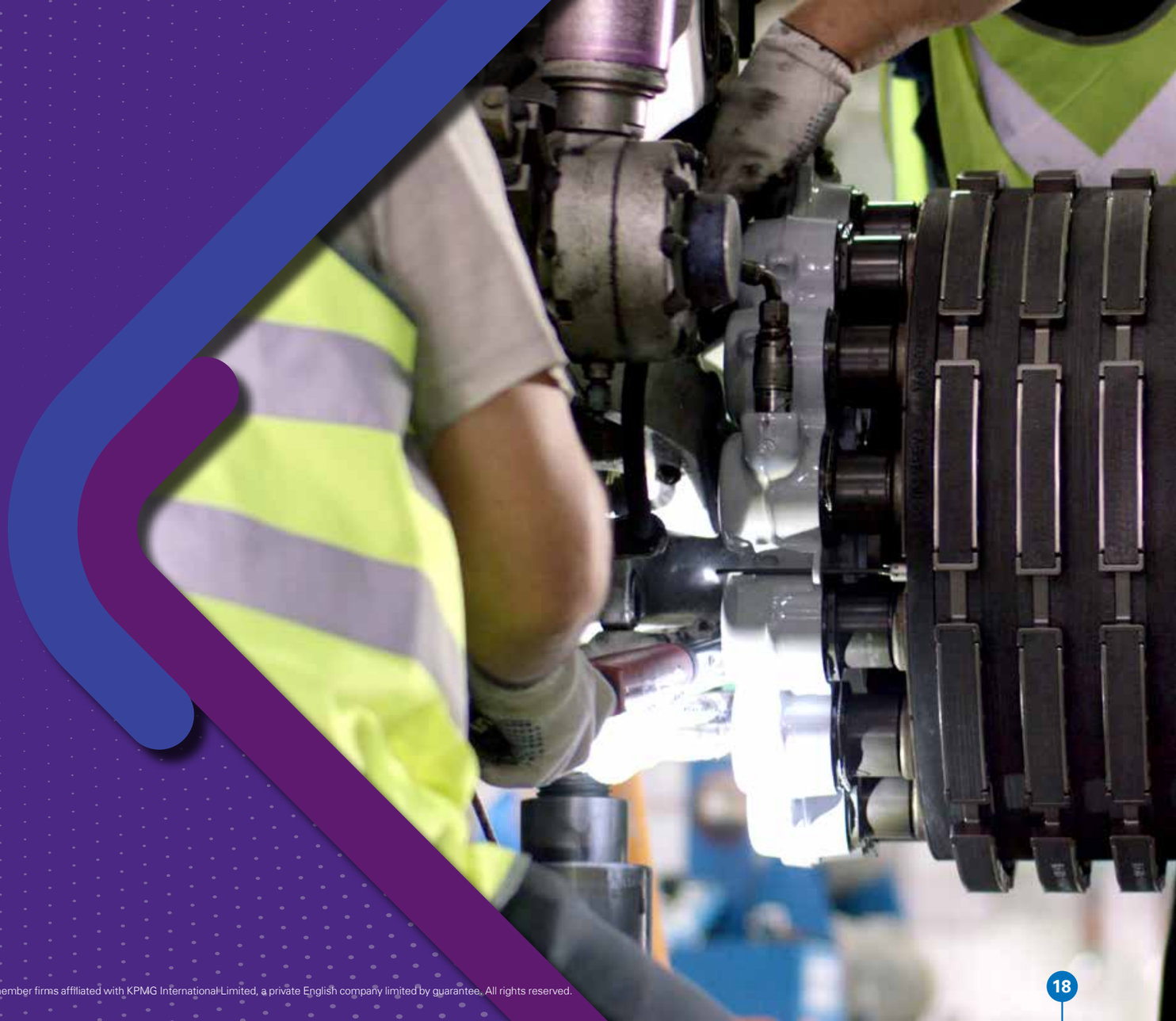
The recommendations that were received from our survey are as follows -

- There is an urgent requirement of a comprehensive and dedicated website/ portal listing all applicable defence standards and test facilities available in the nation.
- Information to be published as a detailed master document like DDPMAS (Design, Development and Production of Military Air Systems and Airborne Stores).
- A subscription / paid service-based portal and app can be developed with all specifications, standards and related information.
- Directorate of Standardisation in conjunction with other related government bodies can manage information related to standards by organising / categorising on the basis of product / component name.
- Many test facilities, like crash ratings for security gadgets are not available in India and should also be included in future scope.
- Government should support MSMEs to establish the test/ lab facilities in the supplier facility through incentives.



## Chapter 5

# Defence testing infrastructure



## 5.1. Testing facilities or Infrastructure

This is a broad term used to denote the various facilities established to offer services to the industry. It houses equipment required to gauge the finished products with reference to the requisite standards and specifications as per the product requirements published in a tender. To establish the envisaged next generation indigenous domestic defence manufacturing industry, the private players need a robust and state of the art support system in terms of testing infrastructure. On account of the stringent standards and specifications required in the defence industry, many a times, private players venturing into this sector or existing MSMEs face a mammoth challenge of catering to the testing requirements of these products.

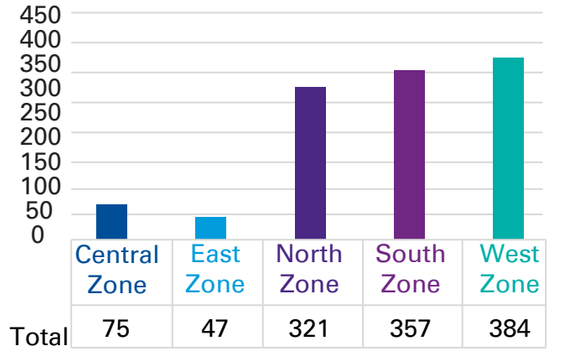
The MoD in its endeavour to encourage the emerging manufacturing ecosystem, has consciously made an effort to open the existing defence test facilities in DRDO laboratories, DPSUs and Armed Forces to emerging manufacturers and equipment developers, particularly the MSMEs. As part of these initiatives, the entities were asked to upload details of the test facilities on their own websites that can be utilised by private manufactures. As brought out in the survey, it emerged that majority of manufacturers were either unaware or did not have sufficient information about the availability of these facilities. Further, on studying the information collated from all these various related sources in this regard, it emerged that a total of 1,184 testing systems/capabilities were spread across 84 locations in the country. For the sake of analysis, the testing systems were categorised into the following types of tests:

| | | | | | |
|---|---|---|---|---|---|
| Aircraft testing | Ballistics / Explosion testing | Biological testing | Calibration | Dimension testing | Dynamic / Mechanical testing |
| Electrical / Electronic testing | EMI testing | Environmental testing | Firefighting testing / measurements | Hydrodynamic testing | IR signature measurement |
| Material composition and microstructure analysis/ testing | Material testing (Physical properties) | Nuclear radiation testing | RCS measurement | Software testing | Vehicular emission testing |

## 5.2. Overview of existing testing systems/capabilities in government owned organisations/units

A study was conducted by KPMG in India on availability of defence testing systems/capabilities in various government owned organisations/ units. This data obtained from the Department of Defence Production website and other links provided thereof were compiled and analysed.[1] The graphs below represent the defence testing systems/capabilities available in the country and how they are spread across the various zones and organisations.

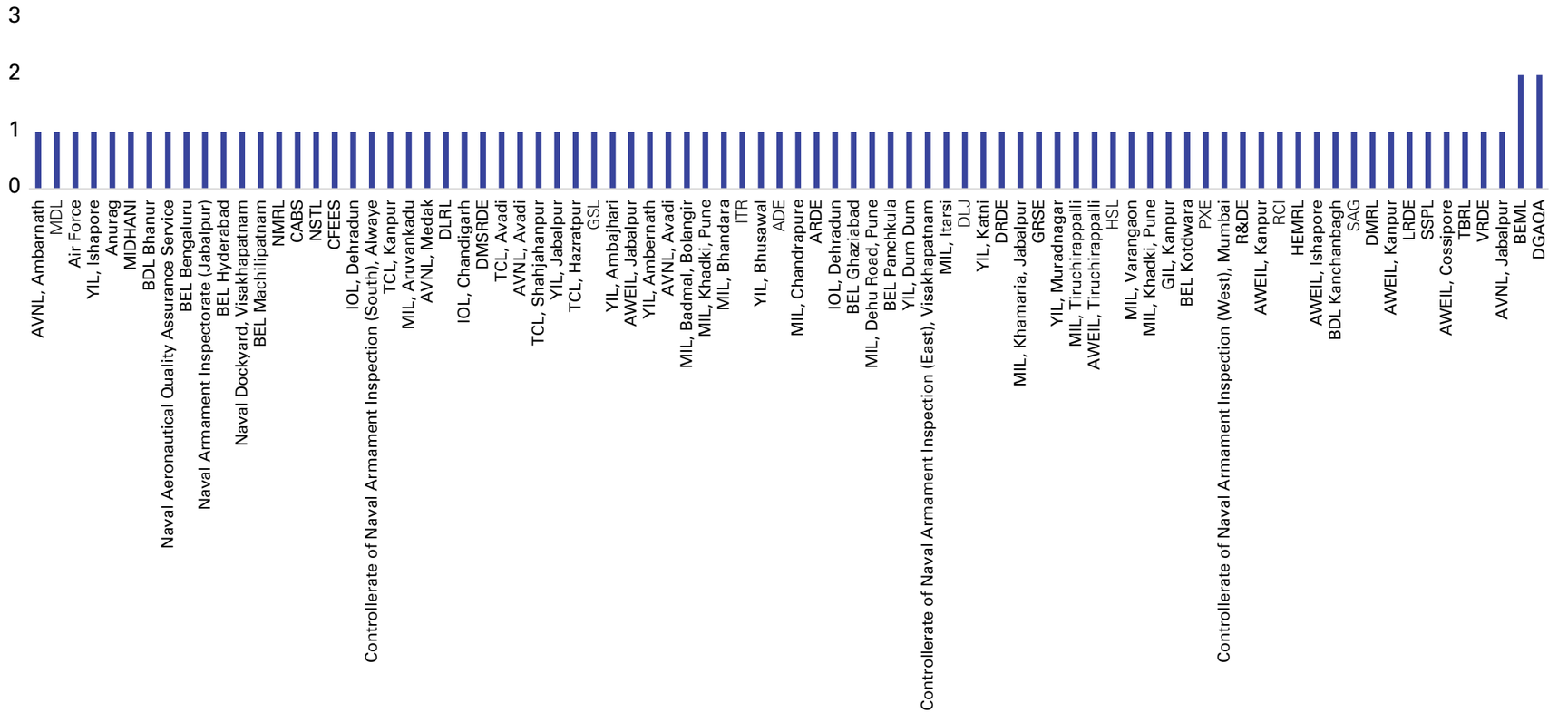
**Defence testing systems/capabilities available in India**




Graphical representation of 1184 defence testing systems/capabilities spread across 84 locations spread across the five zones

The testing systems/capabilities in the country are widely asymmetrical with the west zone having the highest testing systems/capabilities while the east and central zones are lagging far behind.

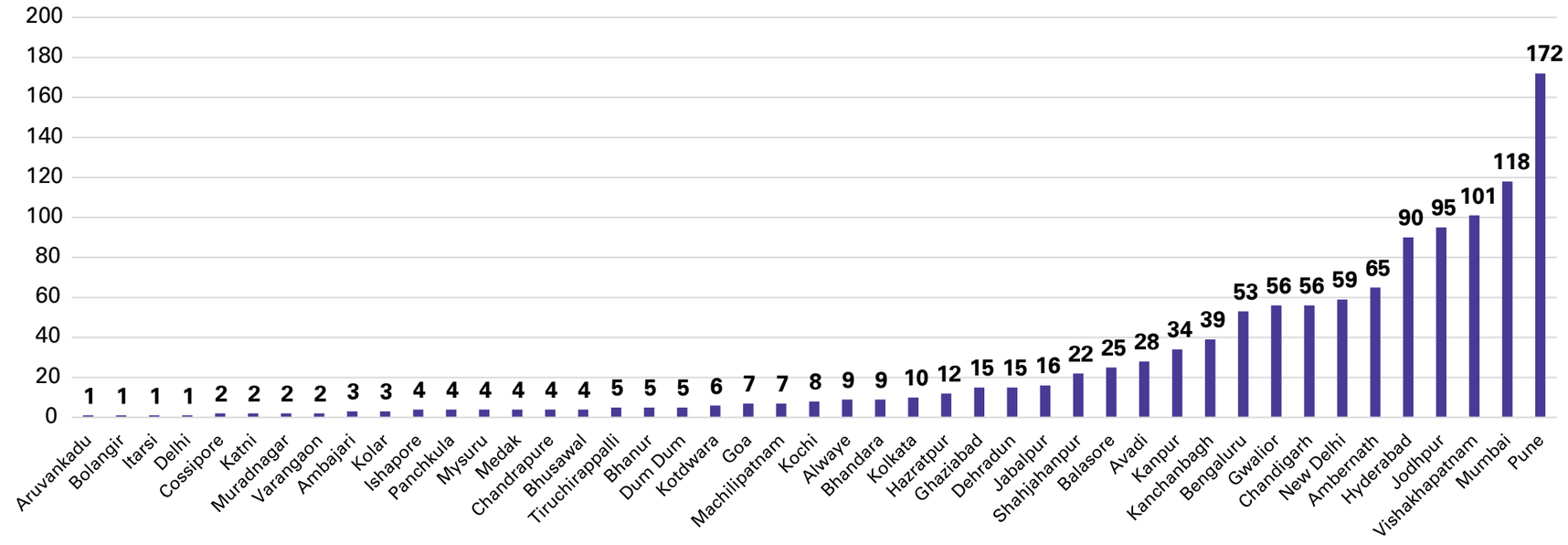
**Government owned units with defence testing systems/capabilities spread across 84 locations in the country**




Graphical representation of various government owned units with defence systems/capabilities spread across 84 locations within the country

1. Department of Defence Production website, Test Facilities Available For Private Defence Industries page

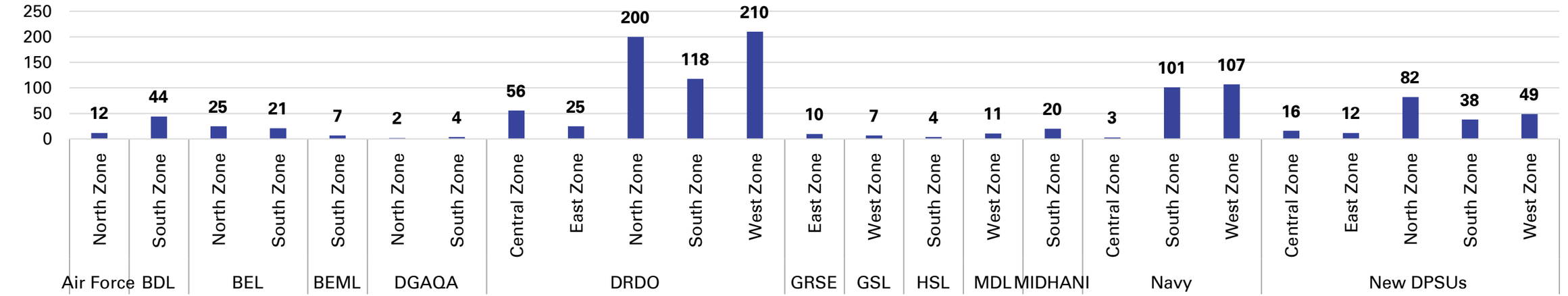
## Government owned defence testing systems/capabilities available in 84 locations across the country




Graphical representation of 1184 government owned defence testing systems/capabilities available in the 84 locations in 45 cities across the country

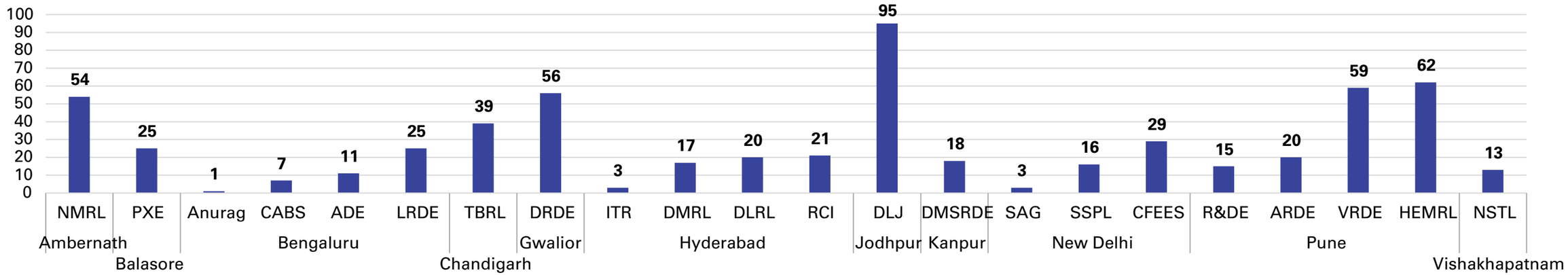
- The graph above highlights disproportion in the spread of these testing systems/capabilities. It is observed that a majority of these testing systems/capabilitiess lie in Pune (172) followed by Mumbai (118) and Vishakhapatnam (101).
- Due to such disproportionate setting, organisations not having own private testing systems/capabilities face accessibility issues and at times have to travel farther to carry out the testing required.
- Major factors for this can be inferred from the graphs represented in the succeeding pages.

**Defence testing systems/capabilities of the various government owned organisations**

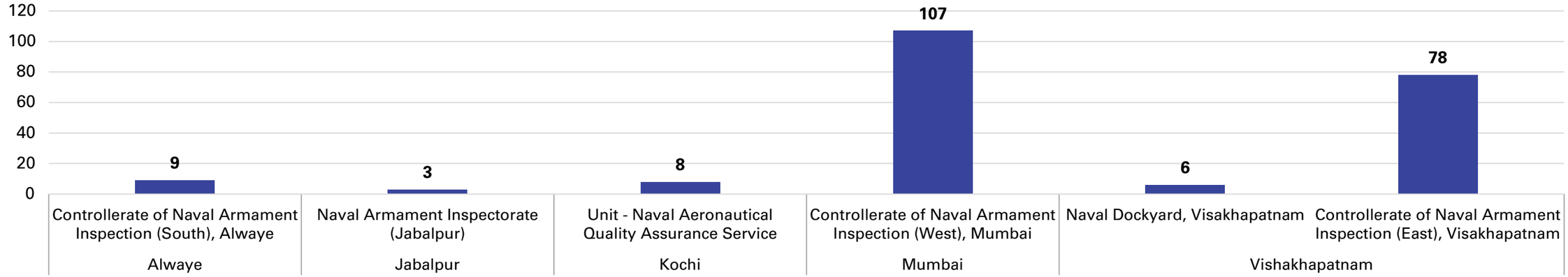



Graphical representation of government owned units spread across the five zones in 84 locations having 1184 defence testing systems/capabilities

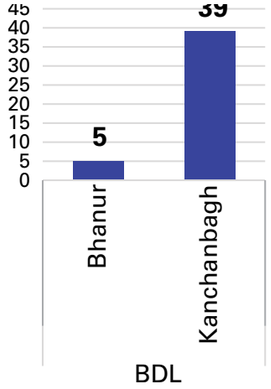
**DRDO - 22 locations with 609 defence testing systems/capabilities**



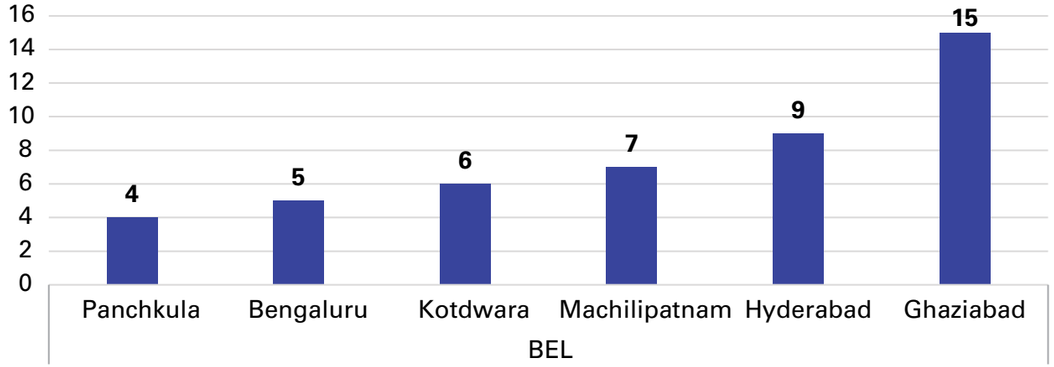
## Indian Navy - six units in five locations with 211 defence testing systems/capabilities



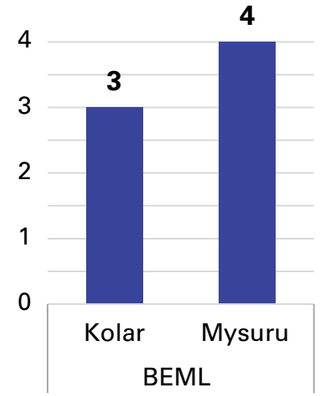

**BDL - two locations with 44 defence testing systems/capabilities**



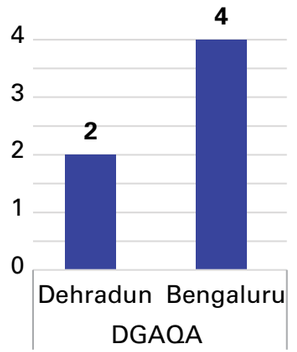

**BEL - six locations with 46 defence testing systems/capabilities**



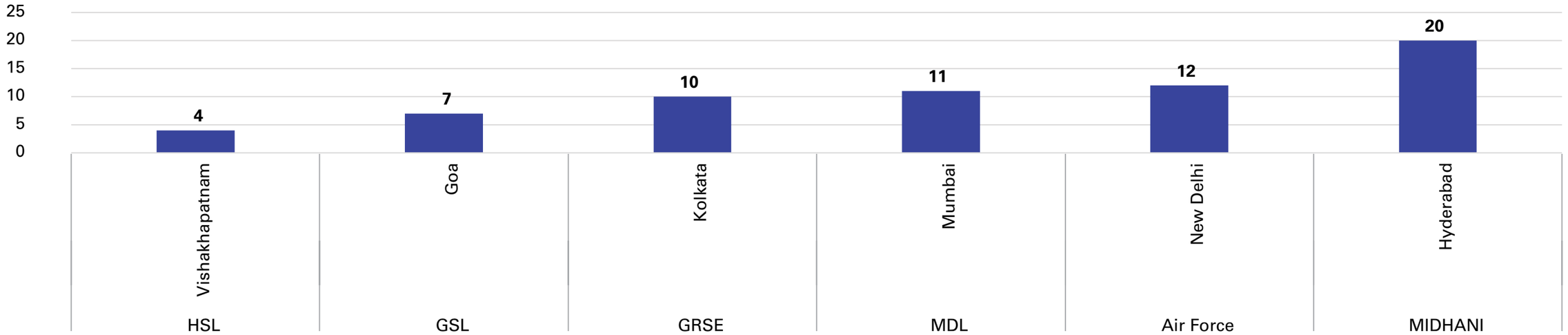

**BEML - two locations with seven defence testing systems/capabilities**



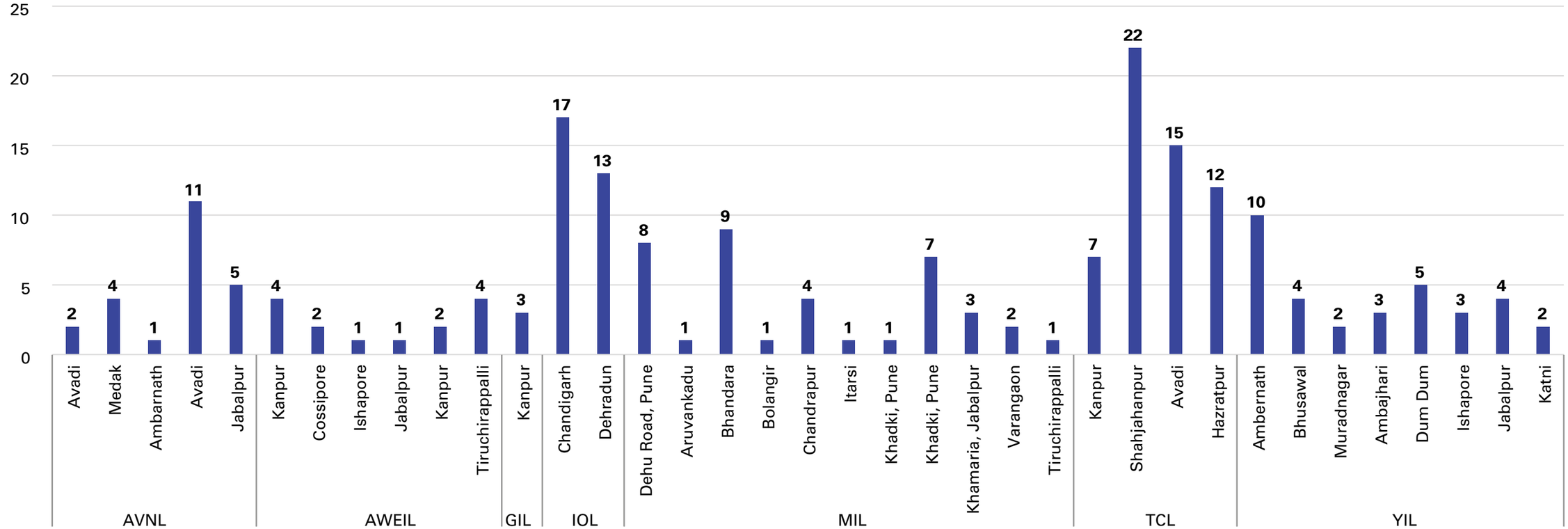

**DGAQA - two locations with six defence testing systems/capabilities**




**Defence testing systems/capabilities of HSL, GSL, GRSE, MDL, IAF and MIDHANI**

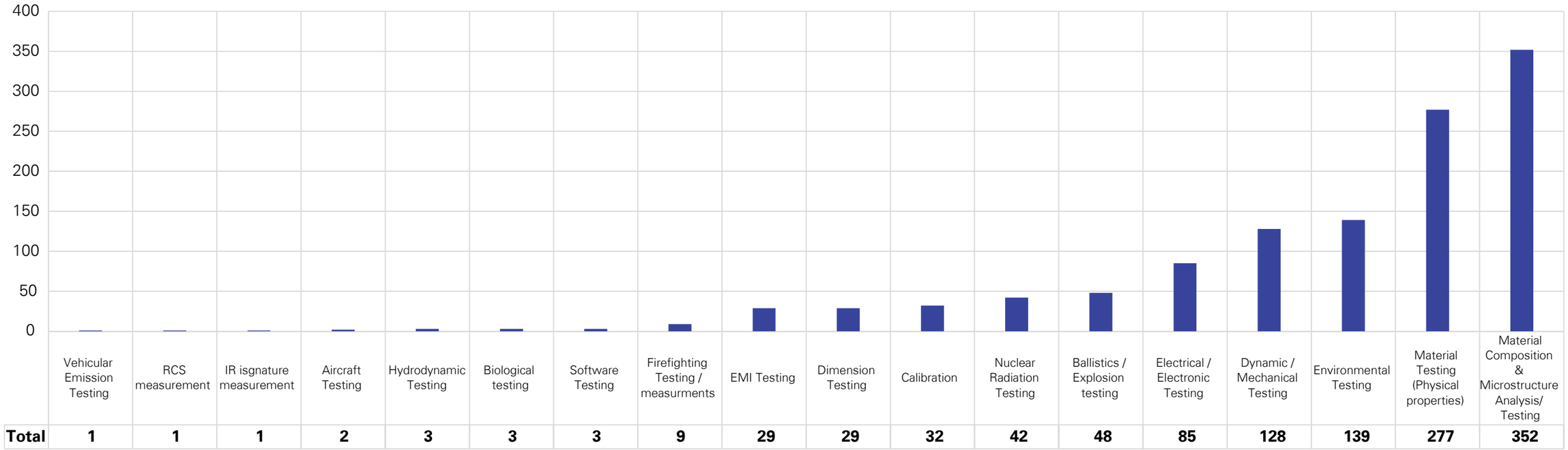


**New DPSUs (erstwhile OFB) - 197 defence testing systems/capabilities**




- A majority of testing systems/capabilities are held with DRDO at a whopping 609 which is more than 50% of the total government owned defence testing systems/capabilities in the country and are mostly concentrated in the West and North Zones.
- The Indian Navy and factories of the erstwhile OFB follow with around 211 and 197 testing systems/capabilities respectively. However, it must be noted that the facilities of Indian Navy are majorly concentrated in Mumbai and Vishakhapatnam owing to the presence of the Naval Dockyards in these cities

## Category wise distribution of government owned defence testing systems/capabilities

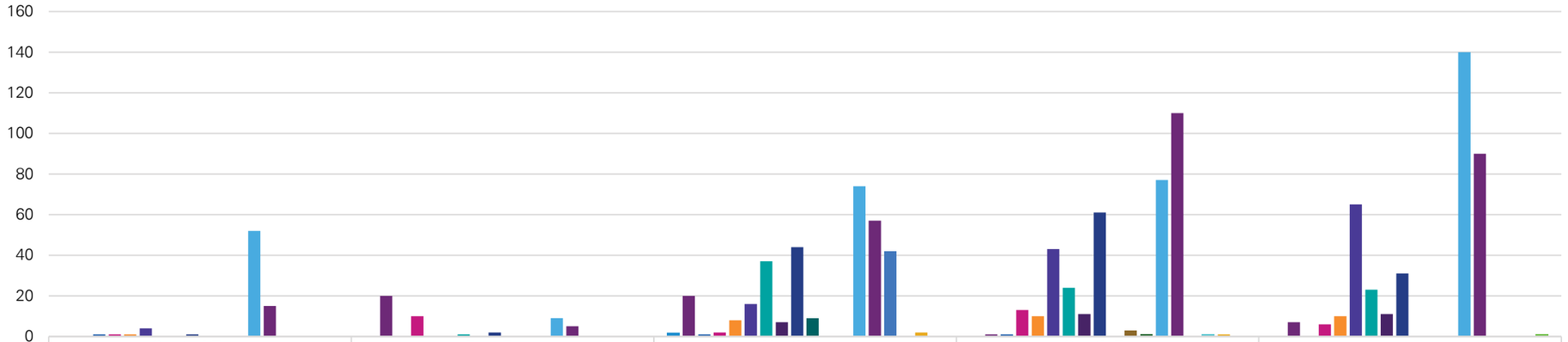



| | Vehicular Emission Testing | RCS measurement | IR isgnature measurement | Aircraft Testing | Hydrodynamic Testing | Biological testing | Software Testing | Firefighting Testing / measurments | EMI Testing | Dimension Testing | Calibration | Nuclear Radiation Testing | Ballistics / Explosion testing | Electrical / Electronic Testing | Dynamic / Mechanical Testing | Environmental Testing | Material Testing (Physical properties) | Material Composition & Microstructure Analysis/ Testing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total** | **1** | **1** | **1** | **2** | **3** | **3** | **3** | **9** | **29** | **29** | **32** | **42** | **48** | **85** | **128** | **139** | **277** | **352** |

Graphical representation of 18 categories of defence testing systems/capabilities available in the 84 locations across the country

- Most of the current testing systems/capabilities are in the fields of material testing (53.13%), followed by environmental testing (11.74%) and mechanical testing (10.81%).
- The systems/capabilities of aircraft testing, software testing and biological testing are relatively scarce.

## Categories of testing systems/capabilities spread across five zones

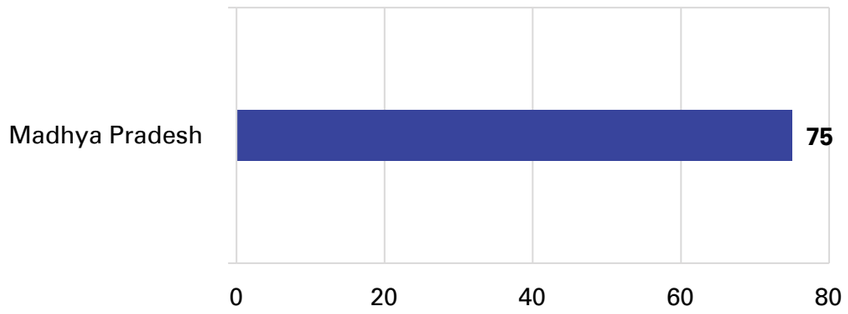



| | Central Zone | East Zone | North Zone | South Zone | West Zone |
|---|---|---|---|---|---|
| Aircraft Testing | | | 2 | | |
| Ballistics / Explosion testing | | 20 | 20 | 1 | 7 |
| Biological testing | 1 | | 1 | 1 | |
| Calibration | 1 | 10 | 2 | 13 | 6 |
| Dimension Testing | 1 | | 8 | 10 | 10 |
| Dynamic / Mechanical Testing | 4 | | 16 | 43 | 65 |
| Electrical / Electronic Testing | | 1 | 37 | 24 | 23 |
| EMI Testing | | | 7 | 11 | 11 |
| Environmental Testing | 1 | 2 | 44 | 61 | 31 |
| Firefighting Testing / measurments | | | 9 | | |
| Hydrodynamic Testing | | | | 3 | |
| IR isgnature measurement | | | | 1 | |
| Material Composition & Microstructure Analysis/ Testing | 52 | 9 | 74 | 77 | 140 |
| Material Testing (Physical properties) | 15 | 5 | 57 | 110 | 90 |
| Nuclear Radiation Testing | | | 42 | | |
| RCS measurement | | | | 1 | |
| Software Testing | | | 2 | 1 | |
| Vehicular Emission Testing | | | | | 1 |

Graphical representation of 18 categories of 1184 defence testing systems/capabilities in the five Zones across 17 states/UTs available in 84 locations

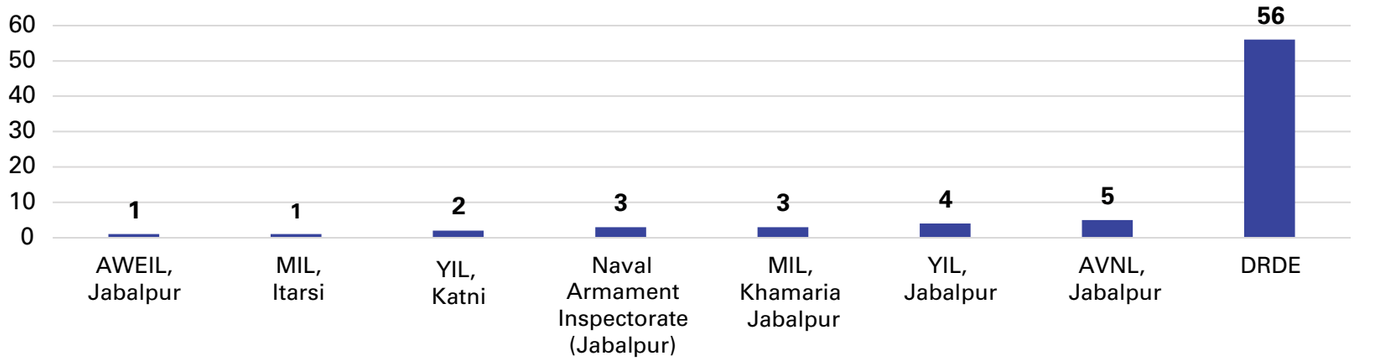
# Central Zone

## Testing systems/capabilities - Central Zone



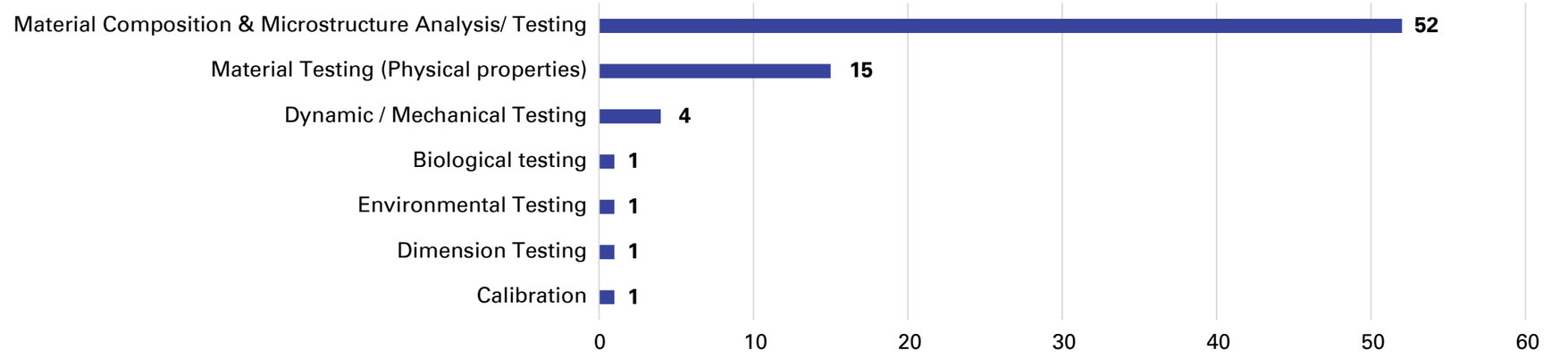

Graphical representation of 75 testing systems/capabilities in the Central Zone across one state

## Organisations / Units with testing systems/capabilities - Central Zone




Graphical representation of 75 defence testing systems/capabilities in the Central Zone available in 8 government owned units

## Categories of Testing available - Central Zone

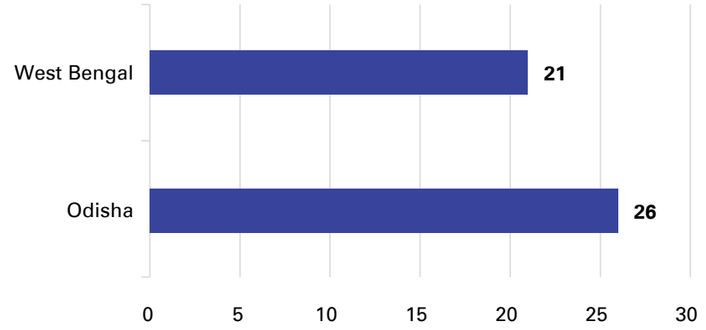



Graphical representation of seven categories of 75 defence testing systems/capabilities in the Central Zone available in eight government owned units

- The government owned defence testing systems/capabilities in the Central Zone are only present in the state of Madhya Pradesh.
- It can be inferred from the graphs above that out of the 75 testing systems/capabilities, 67 are in the field of material testing followed by mechanical. There is hardly any capability available for other types of testing

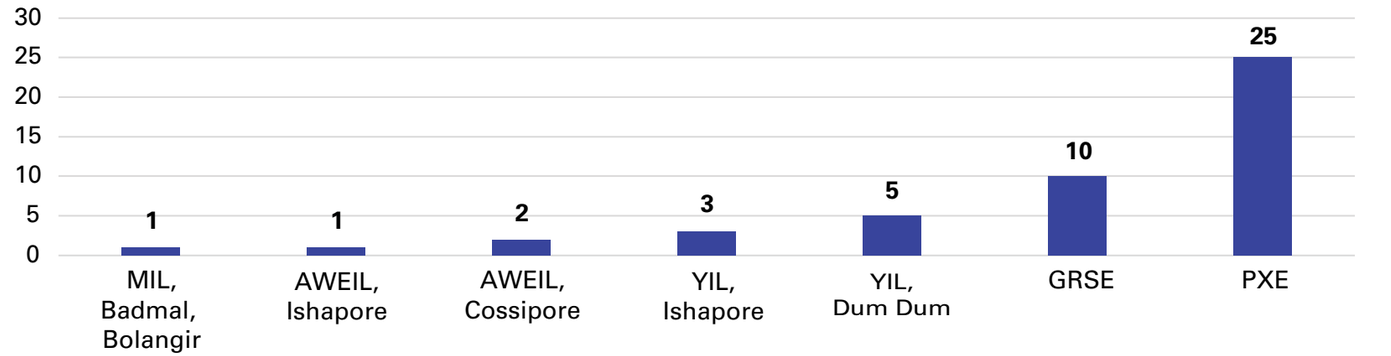
# East Zone

## Testing systems/capabilities - East Zone



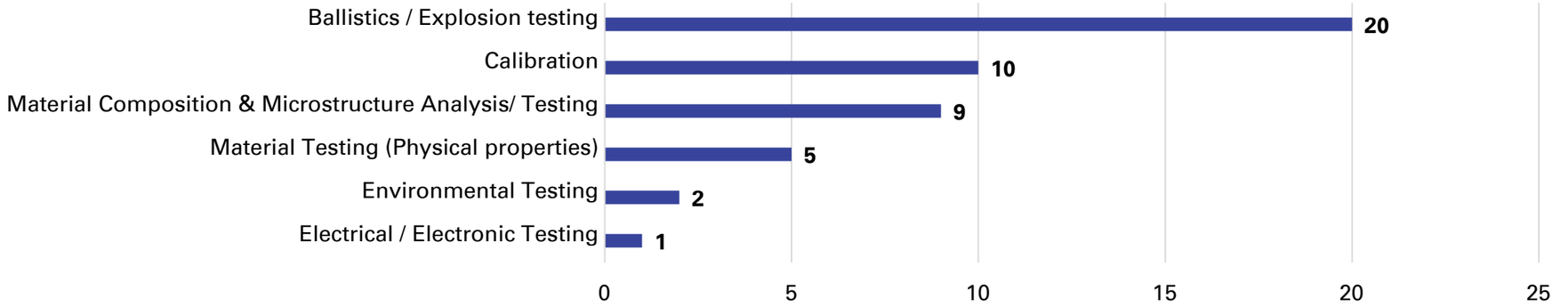

Graphical representation of 47 defence testing systems/capabilities in the East Zone across two states

## Organisations / Units with testing systems/capabilities - East Zone

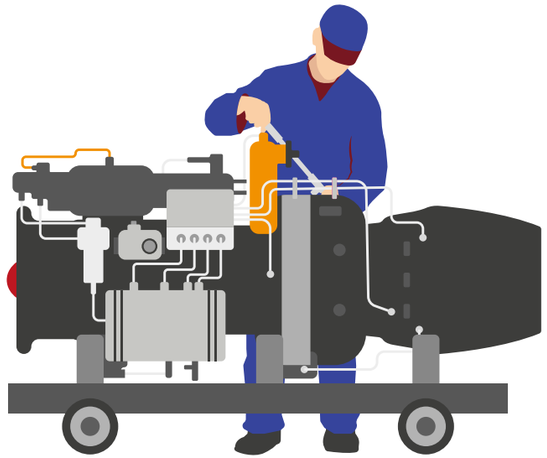



Graphical representation of 47 defence testing systems/capabilities in the East Zone available in seven governemnt owned units

## Categories of Testing available - East Zone



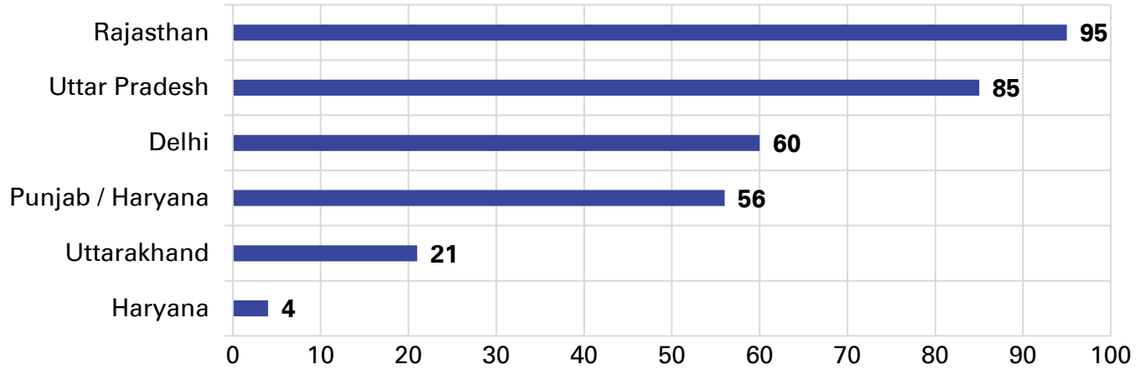

Graphical representation of six categories of 47 defence testing systems/capabilities in the East Zone available in seven government owned units



- In the East Zone, government facilites for defence testing are only exisitng in the states of West Bengal and Odisha. As such, entities present in the eastern part of the country must travel to various other states/locations to fulfill all their testing requirements.
- The majority of testing systems/capabilities are in the field of ballistics, calibration and material testing.

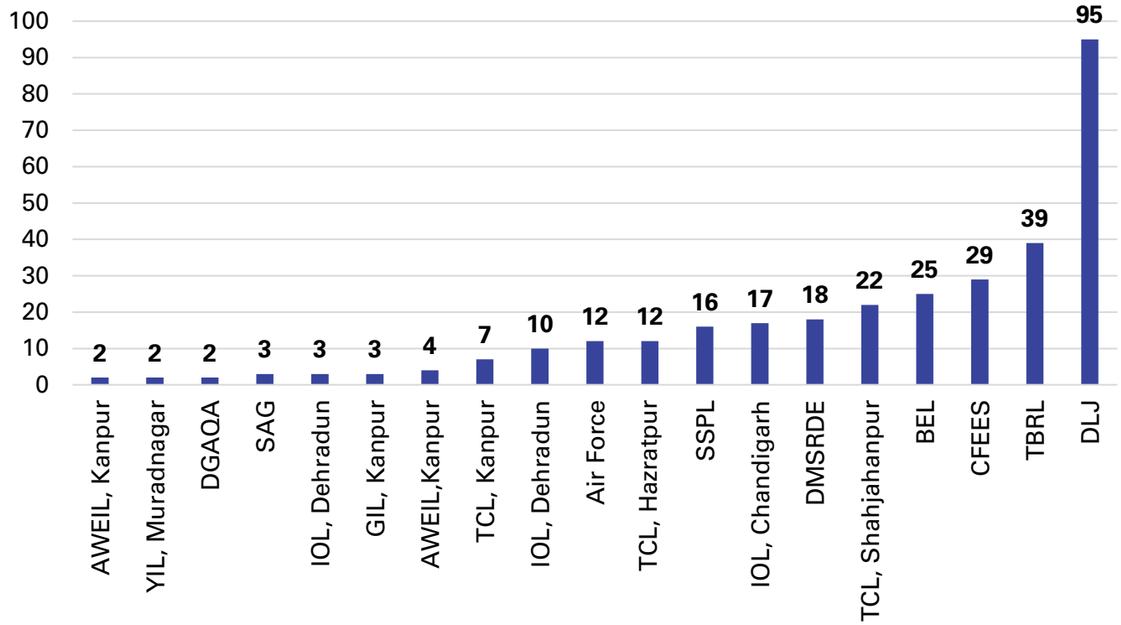
# North Zone

## Testing systems/capabilities - North Zone



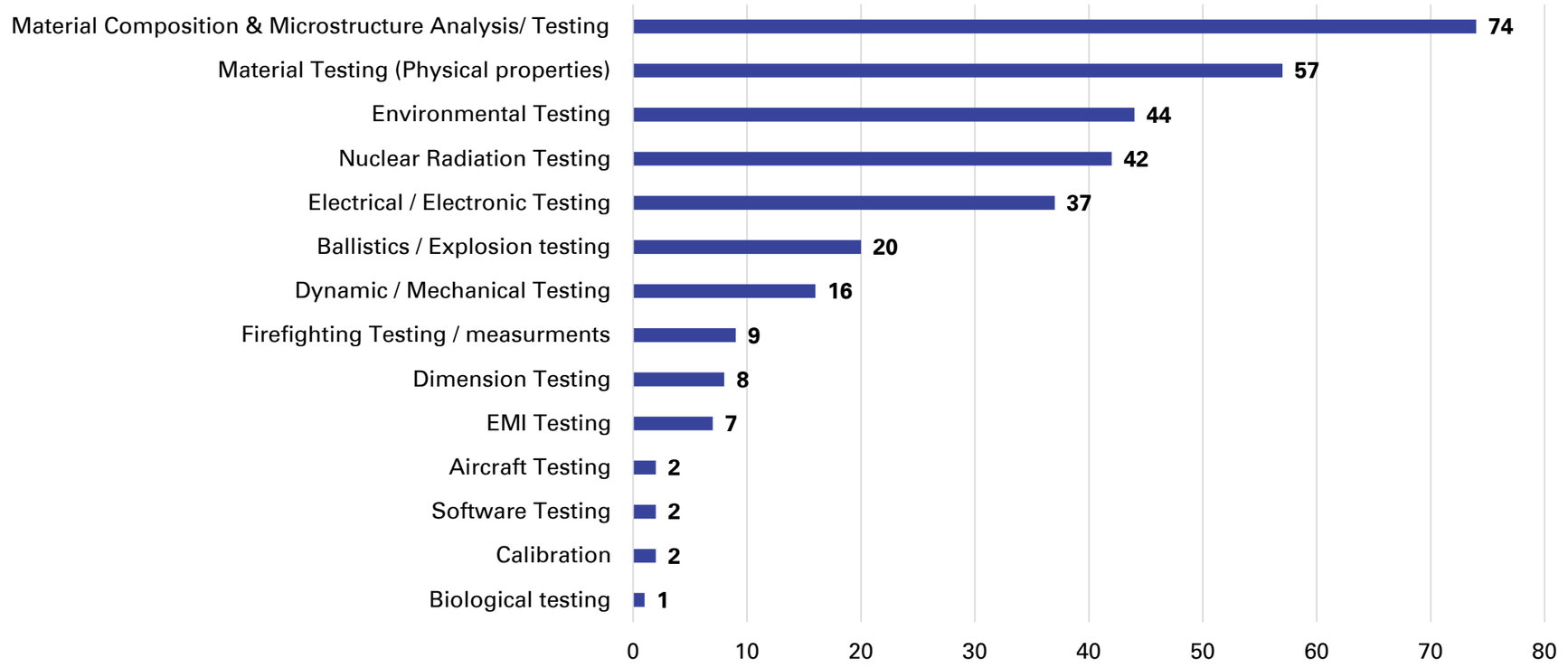

Graphical representation of 321 defence testing systems/capabilities in the North Zone across six states/UTs

## Organisations / Units with testing systems/capabilities - North Zone



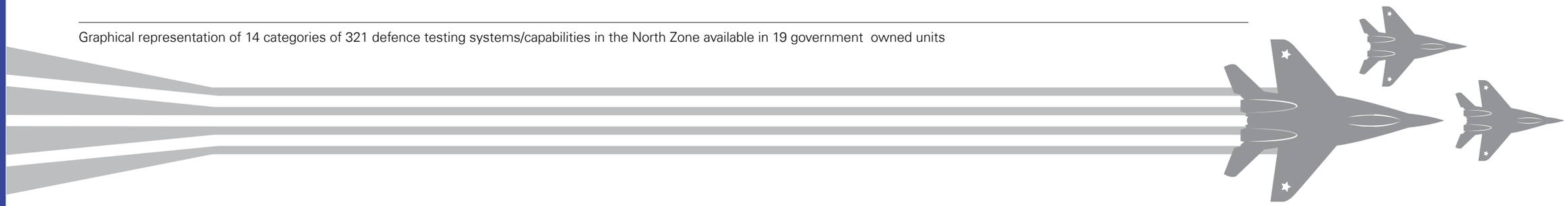

Graphical representation of 321 defence testing systems/capabilities in the North Zone available in 19 government owned units

## Categories of Testing available - North Zone



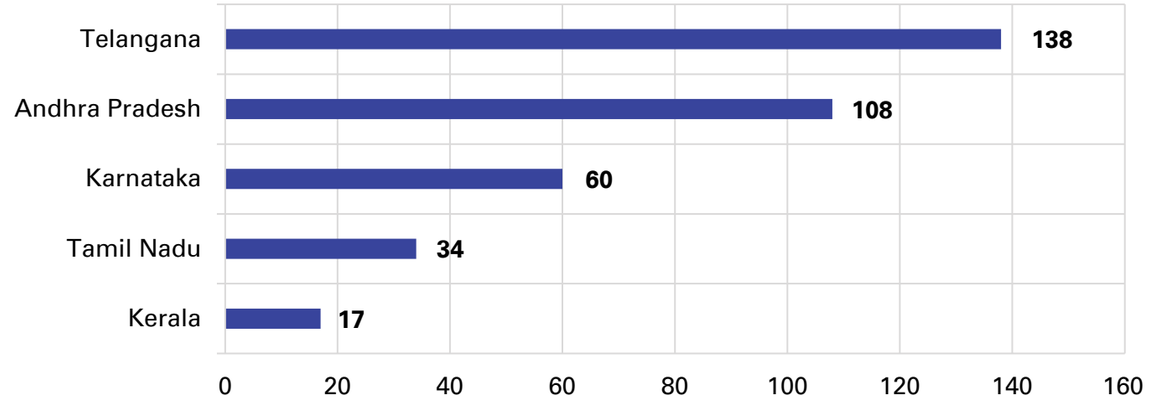

- The North Zone has a total of 321 defence testing systems/capabilities housed in 14 organisations (including nine Factories of erstwhile OFB) spread across six states/UT.
- While the majority of testing systems/ capabilities are still held with DRDO, there is a greater range of testing systems/ capabilities as compared to Central and East zones.
- However, most testing systems/ capabilities are focussed around material testing with about 131 testing systems/capabilities in the field, 66 of which are in the state of Uttar Pradesh followed by 28 in Rajasthan.
- Also, the nuclear radiation tests are concentrated in the state of Rajasthan while Punjab/Haryana house all the ballistics testing and EMI testing systems/capabilities.
- The skewed distribution of test systems/ capabilities and the consequent access limitations to existing as well as emerging manufacturers in this regard is clearly discernable here.

Graphical representation of 14 categories of 321 defence testing systems/capabilities in the North Zone available in 19 government owned units

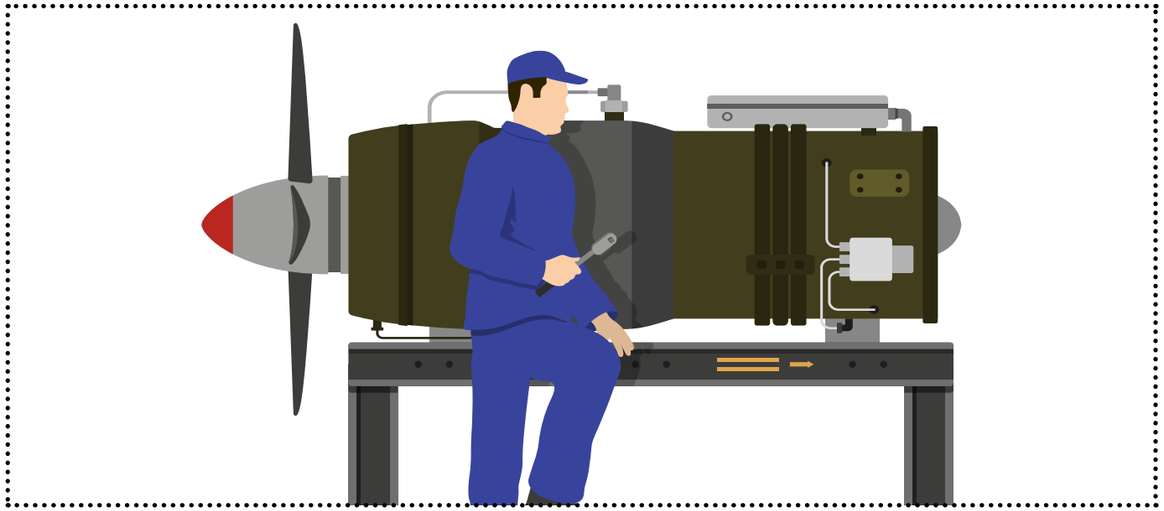


# South Zone

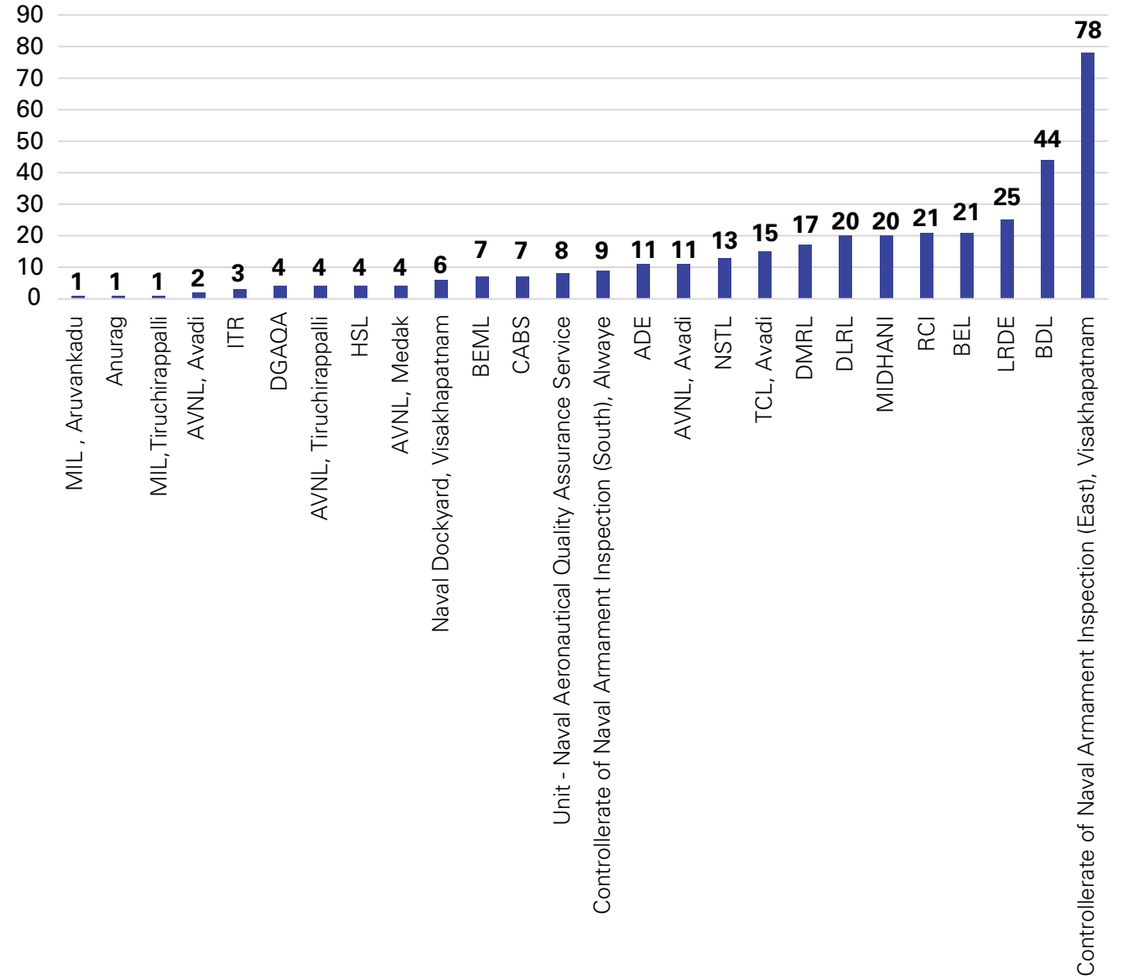
**South zone – testing systems/capabilities**




Graphical representation of 357 testing systems/capabilities in the South Zone across five states

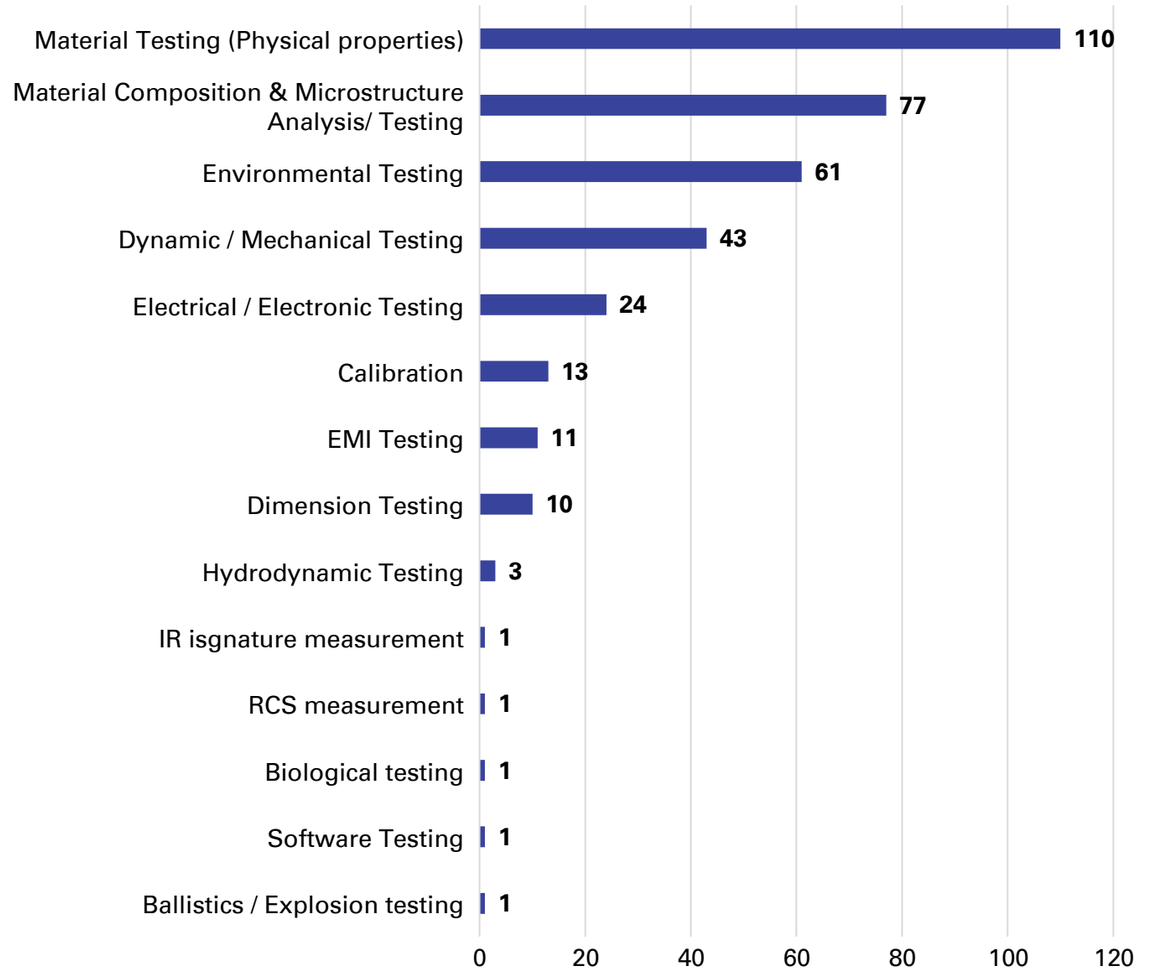


**Organisations / Units with testing systems/capabilities - South Zone**




Graphical representation of 357 defence testing systems/capabilities in the South Zone avaialable in 26 government owned units

**Categories of Testing available - South Zone**

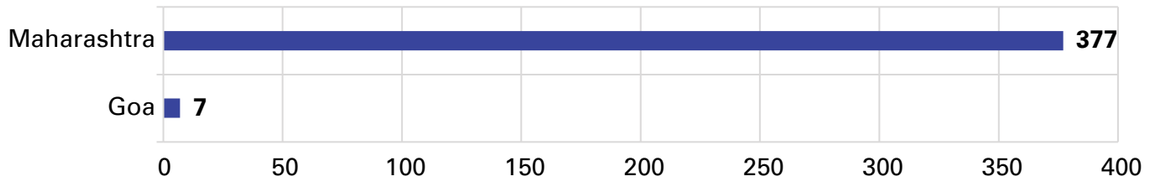



Graphical representation of 14 categories of 357 defence testing systems/capabilities in the South Zone available in 26 government owned units

- The South Zone has a total of 357 defence testing systems/capabilities spread across five states, concentrated heavily in the states of Telangana and Andhra Pradesh.
- Once again, majority of testing systems/ capabilities are in the field of material testing, 187 in total, followed by environmental (61) and mechanical (43) testing.

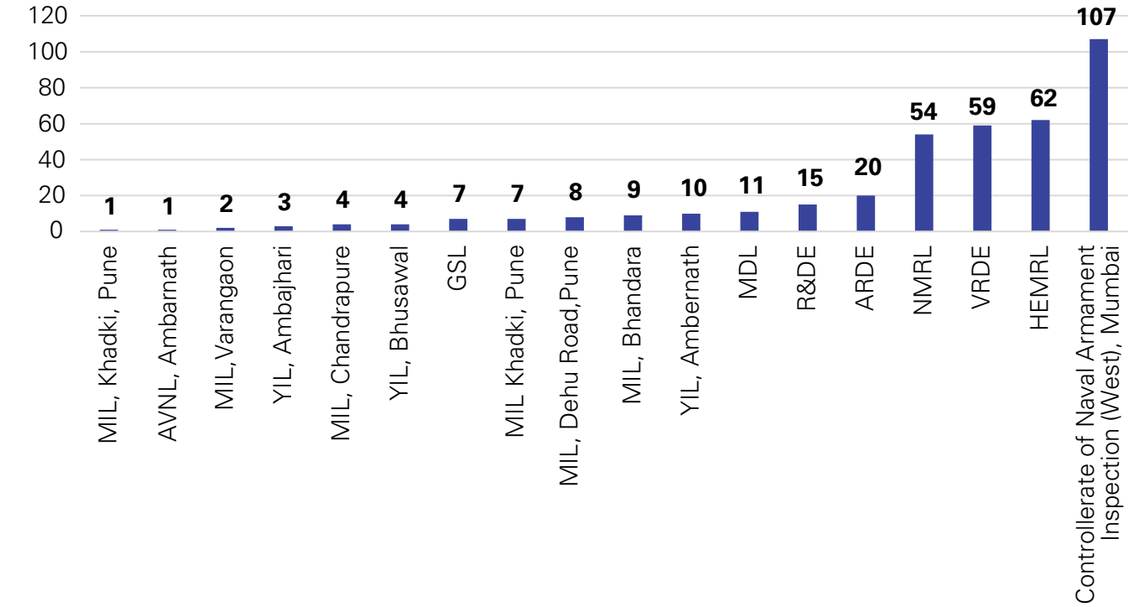
# West Zone

## Testing systems/capabilities - West Zone



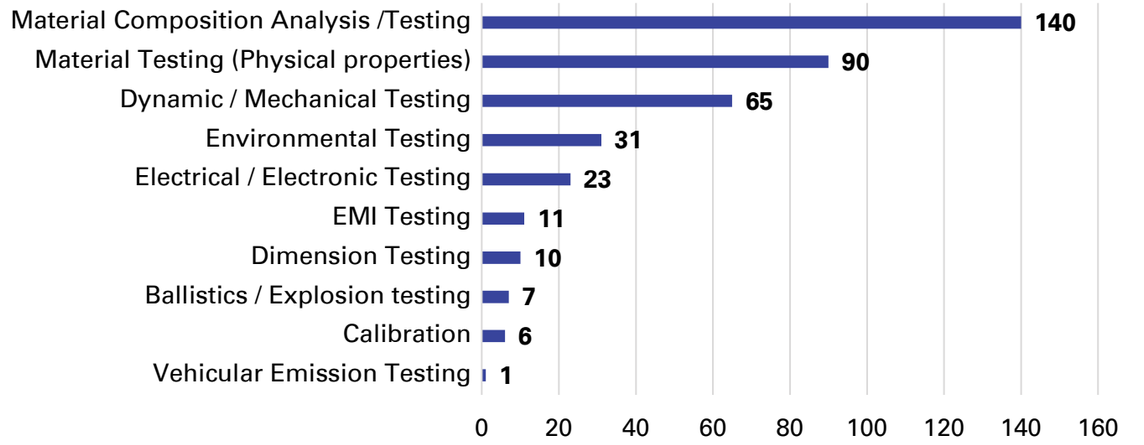

Graphical representation of 384 defence testing systems/capabilities in the West Zone across two states

## Organisations / Units with testing systems/capabilities - West Zone




Graphical representation of 384 defence testing systems/capabilities in the West Zone available in 18 government owned units

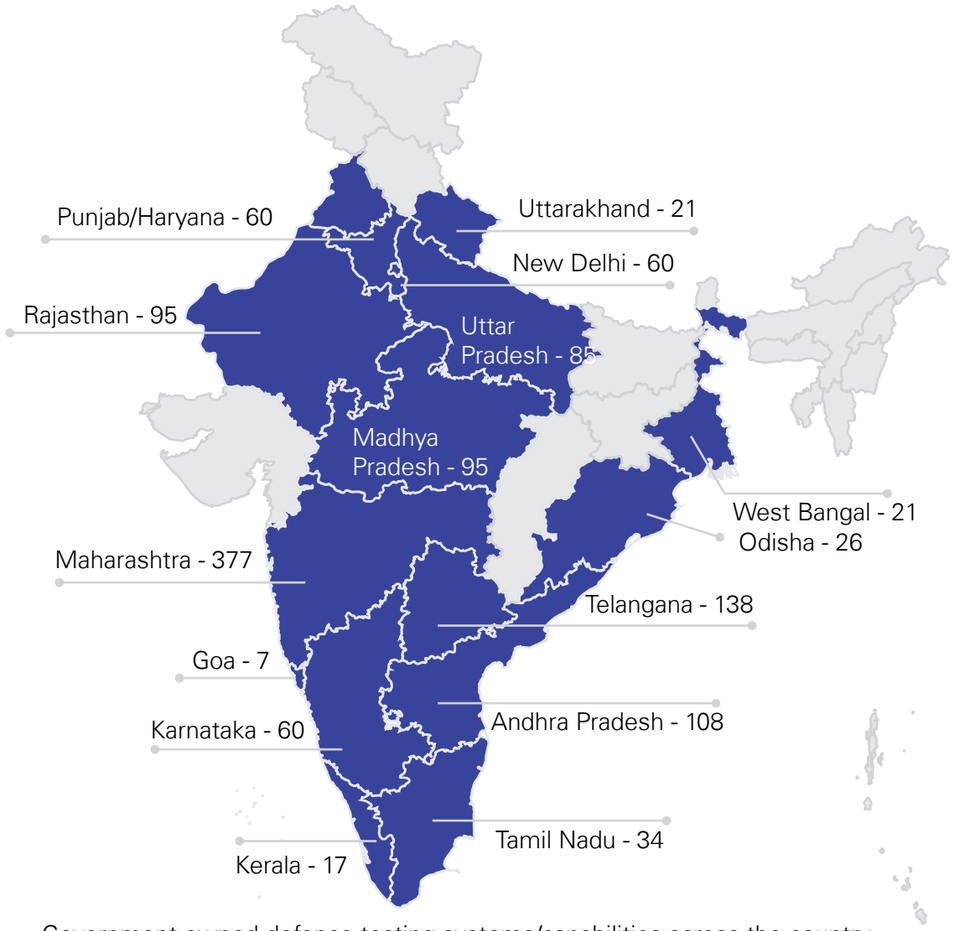
## Categories of Testing available - West Zone




Graphical representation of 10 categories of 384 defence testing systems/capabilities in the West Zone available in 18 government owned units

- The West Zone has the highest defence testing systems/capabilities (384) and is spread across just two states, concentrated heavily in the state of Maharashtra.
- The majority of testing systems/capabilities, again are in the field of material testing, 230 in total, followed by mechanical testing at 65.
- Moreover, Maharashtra is the only state with the capability of vehicular emission testing of which we only have one government owned testing facility.
- These capabilities are mostly held with DRDO.
- It may be noted, that the state of Gujarat, which is gearing towards setting up a robust defence industry, does not have even a single government owned defence testing lab/facility.

**As inferred from the graphs in the preceding pages, the existing government owned testing facilities are unevenly distributed and concentrated in particular regions.**

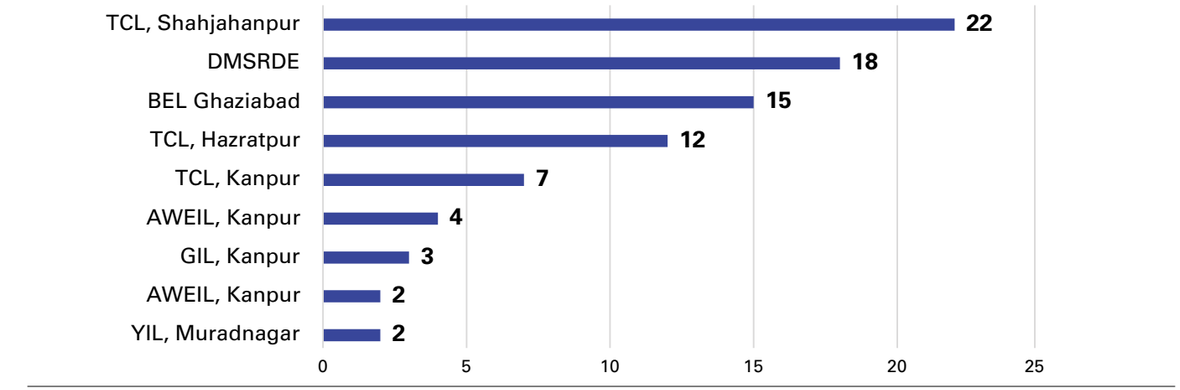



Government owned defence testing systems/capabilities across the country

The DICs are being developed with the aim of strengthening domestic defence industry, develop local manufacturers and reduce import dependency.

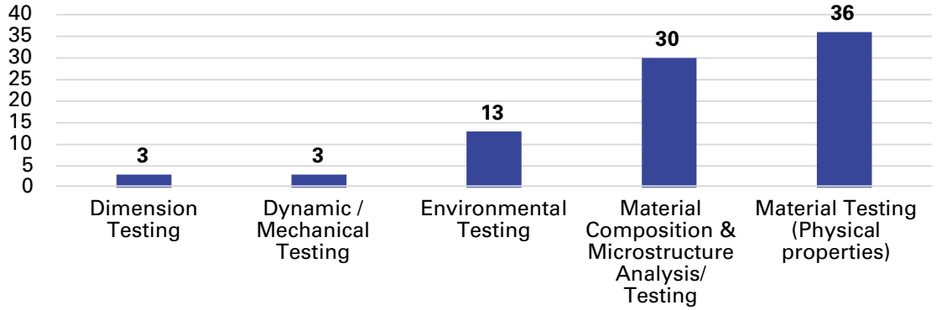
UPDIC is spread across six districts of the state and is currently home to nine government owned organisations having 85 systems/capabilities of testing. The facilities in the state are focused on material testing owing to the dominance of metal works industry in the state where out of the 629 material testing systems/capabilities (inclusive of both Physical properties test and Composition and micro-structure analysis test) in the country, the state has 66 of these facilities.

**Government owned defence organisations with testing systems/capabilities in Uttar Pradesh**

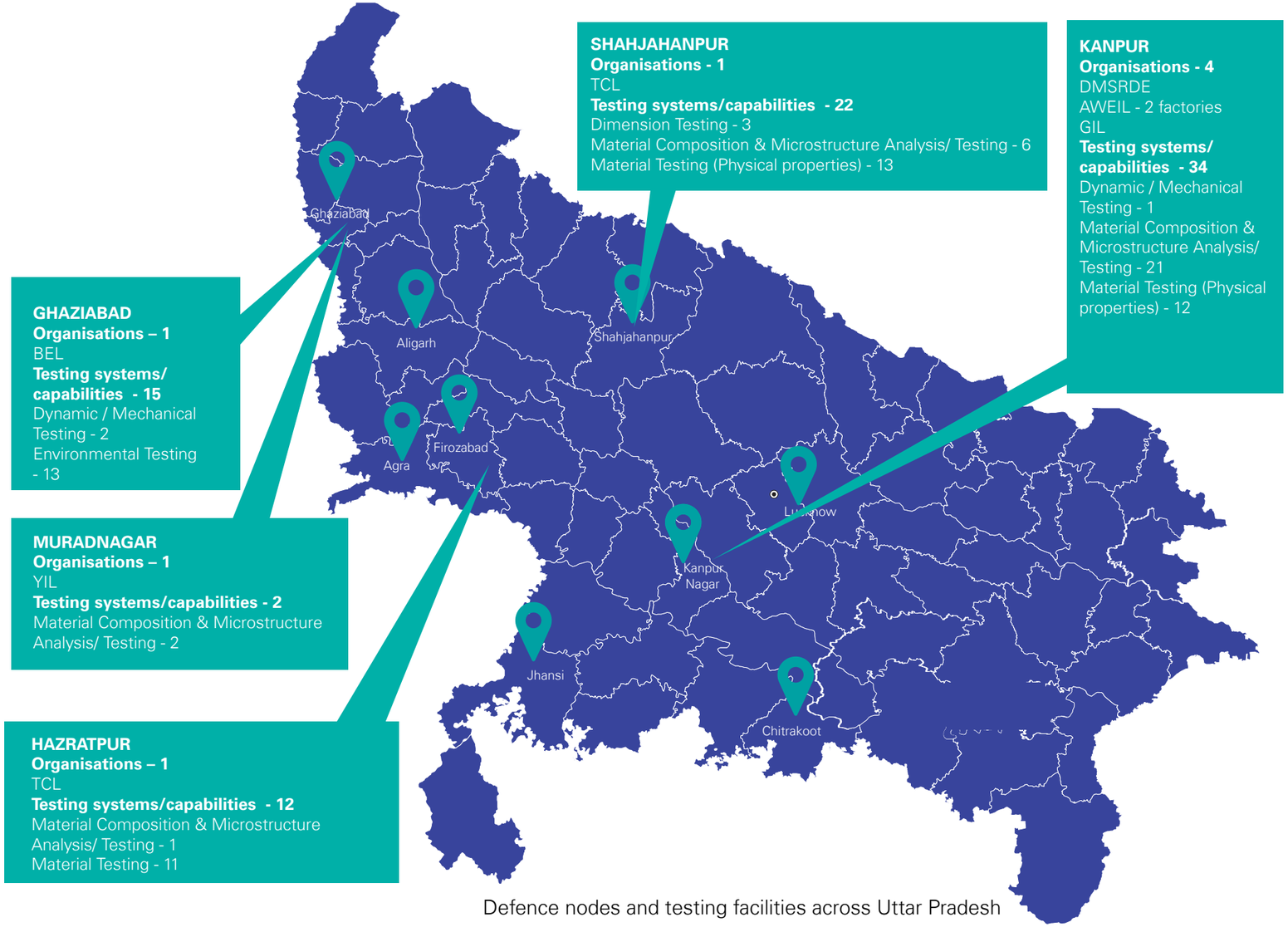



Graphical representation of government owned defence organisations with testing systems/capabilities in Uttar Pradesh

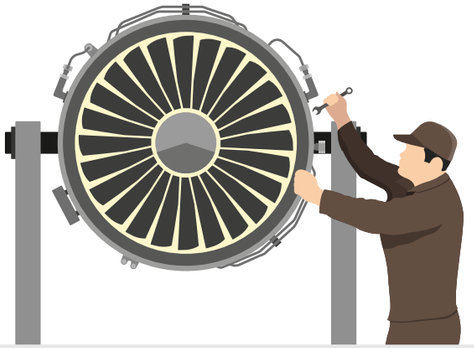
**Categories of testing available in Uttar Pradesh**




Graphical representation of various testing systems/capabilities in Uttar Pradesh available in nine organisations




Defence nodes and testing facilities across Uttar Pradesh



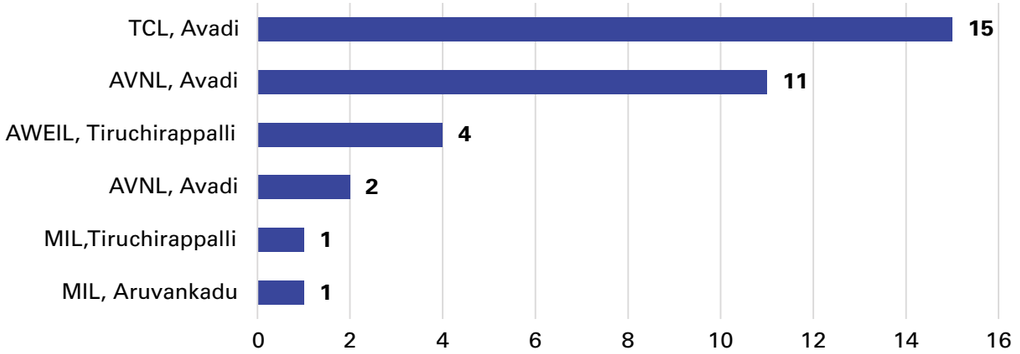
The defence nodes have an existing industrial capability and are also being developed to support additional industrial base.

| Node | Existing capability | Proposed industry |
|---|---|---|
| **Aligarh** | Metal works and hardware | Unmanned Aerial Systems, component manufacturing, precision component, small arms and metal works |
| **Agra** | Leather, textile and rubber | Electronics and non-polluting industries |
| **Lucknow** | Automotive, machine tools, steel, plastics | Aerospace hub and aero engine cluster |
| **Kanpur** | Leather and textile | Special clothing, bullet proof jackets, ammunition, components and parachutes |
| **Jhansi** | Electronics, repairing and overhaul of machinery and Lead acid batteries | Land systems, arms, ammunition and MRO |
| **Chitrakoot** | Woodwork | Testing facilities |

Source - UPDIC website

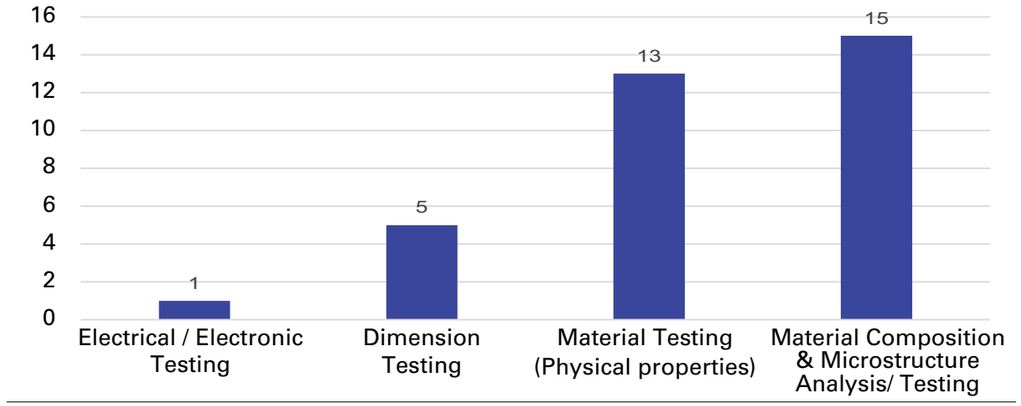
Similarly, TNDIC is spread over five districts, having an existing ecosystem to support the industry to establish additional interventions so as to strengthen and augment. Tamil Nadu also boasts of the presence of DPSUs. In addition, there is a strong presence of private players such as L&T and MBDA (in collaboration), Sundaram Fasteners etc. At present, Tamil Nadu has six government organisations which have 34 defence testing systems/capabilities.

**Government owned defence organisations with testing systems/capabilities in Tamil Nadu**

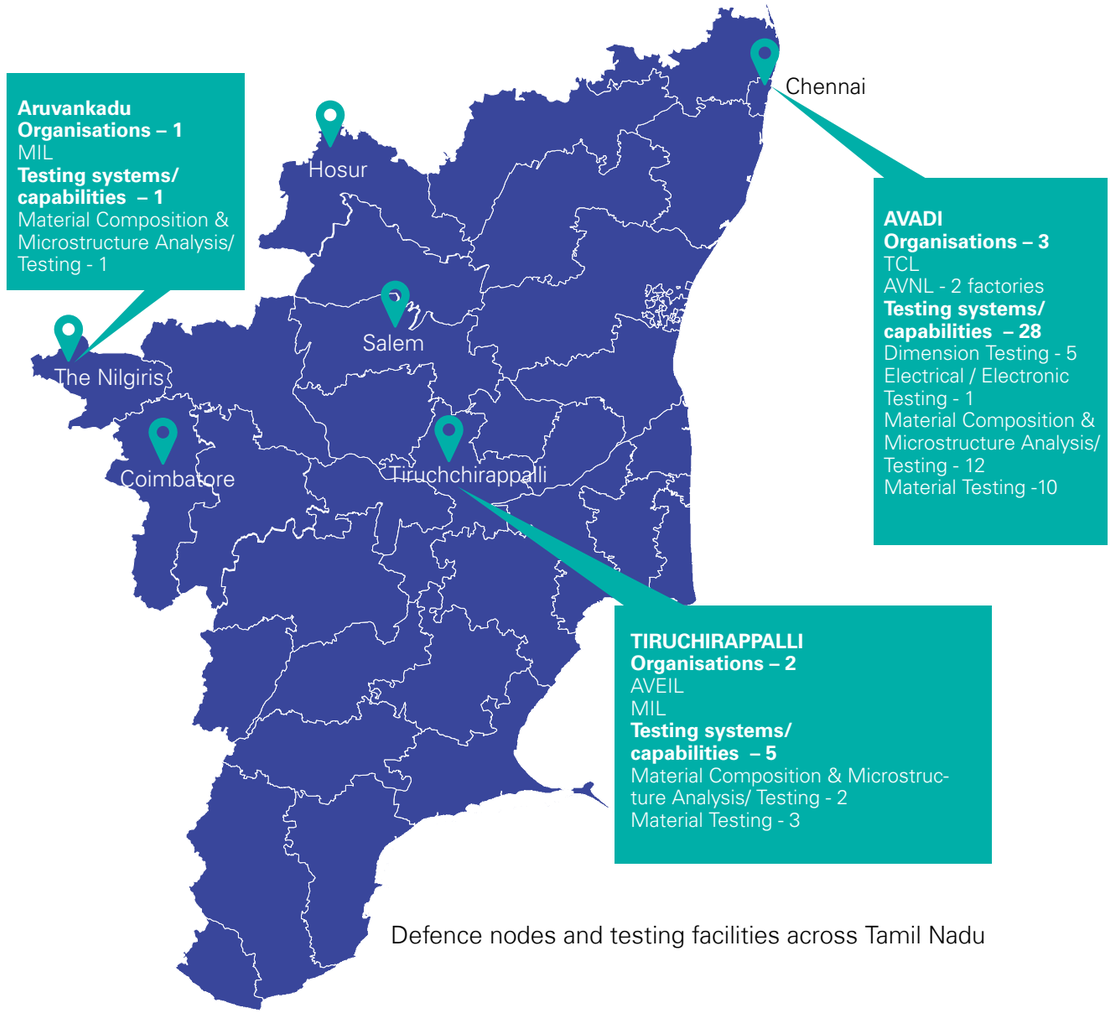



Graphical Representation of government owned defence organisations with testing systems/capabilities in Tamil Nadu

**Categories of testing available in Tamil Nadu**




Graphical representation of various categories of testing systems/capabilities in Tamil Nadu



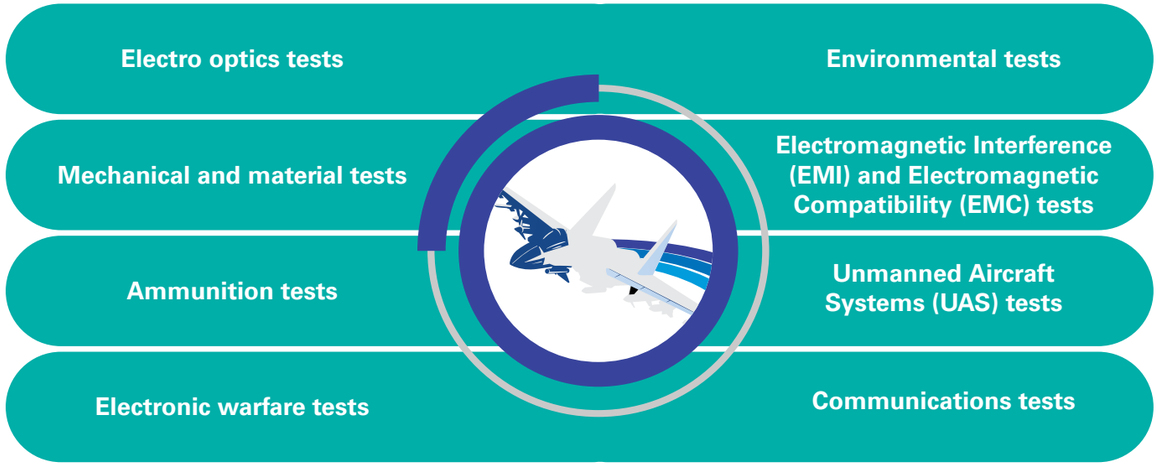

Defence nodes and testing facilities across Tamil Nadu

| Node | Existing capability | Proposed industry |
|---|---|---|
| **Chennai** | Automotive, electronics, armoured vehicles and IT industry | Additive manufacturing |
| **Coimbatore** | General engineering and aircraft & space industry standard parts | Post processing for precision machined components |
| **Hosur** | Automotive and MRO | Common facility for precision manufacturing |
| **Salem** | Steel, textiles and MRO | Integrated MSMEs centre for supporting MRO activities |
| **Trichy** | Fabrication and precision manufacturing | Test centre for MSMEs |

As such, setting up of new hubs will create requirement of support infrastructure such as testing and prototyping.

## 5.3. Defence Testing infrastructure Scheme (DTIS)

The Government is focussed on development of domestic manufacturing base and has announced many initiatives to achieve it. The Defence Testing Infrastructure Scheme (DTIS) is one such major step where it is intended to set up greenfield defence testing infrastructure as a common facility under private sector with Government assistance mainly in the DICs. The scheme would provide financial assistance to private sector for setting up six to eight testing and certification facilities for manufacturers of defence equipment/systems. The financial assistance will be from Central Government in the form of grant-in-aid of INR 400 crores for setting up of defence testing infrastructures in the following domains[2].




In furtherance of the above scheme, the government has initiated certain actions for the establishment of facilities and issued Request for Proposals (RFPs) inviting a consortium which will be the implementation agency and shall be a Section 8 company. MoD / concerned agencies must endeavour to develop an easily accessible database / portal that lists the specific details of government owned facilities that already exist, what types of tests complying what specific standard / range of standards can be addressed by these existing facilities and what steps are required for anyone to avail these facilities. As new facilities under the DTIS scheme are set up, the portal can be suitably expanded.

2. Department of Defence Production website, Scheme Guidelines DTIS & Amendment page

## Chapter 6

# Development of military / defence standards

## 6. Defence / Military Standards

A technical standard or merely a standard can be understood as a set of precise requirements of how an object/equipment must be in order to fulfil its specific use. Over the years of evolution of industrial manufacturing and trade, countries have developed certain set of technical specification for materials and products. This practice allows quality control, access to supply from different economical sources and reducing the cost of production of spares. Though all industrial standards are of utmost importance, military equipment however, takes precedence when it comes to precision in manufacturing. The military standards are rigorous and painstakingly elaborate to shrink as much error as possible. These standards and specifications are essential as they allow for integration of the domestic industry into the sector and the local industry to become a part of the global value chain.

### 6.1 Case study - United States of America (USA)[1]

**6.1.1.** Defence standards were developed owing to the necessity of creating a specific set of guidelines for equipment and processes. During the late 18th century and throughout the 19th, the American and French militaries adopted and advocated standardisation with interchangeability. However, World War II saw a wave of standardising and cataloguing by all nations like U.S. AN- cataloguing system (Army-Navy) and British Defence Standards (DEF-STAN). The need for standardisation arose due to the differences in dimensional tolerances faced during the World War II where American screws, bolts, and nuts did not fit British equipment properly and were not interchangeable thus creating the need for defence standards. This resulted in ammunition and food cases that can be opened without tools, vehicle subsystems that could be quickly swapped into the place of damaged ones. USA fashioned a large number of standards, nearly 30,000 by 1990 and in 1994, issued a memorandum that prohibited the use of most military specifications and standards without a waiver. Many military specifications and standards were also cancelled and Department of Defense (DoD) directed the use of performance specifications and non-government standards instead. However, in 2005, DoD issued another memorandum which removed the requirement to obtain a waiver to use military specifications or standards.

1. Department of Defense Manual, Number 4120.24, DoD USA, September 24, 2014, and Understanding Military Specification & Standard Requirements, David L. Melton, P.E.

### 6.1.2. Defence Standardisation Program (DSP)

The DSP is organised as per the provisions of cataloguing and Standardisation Act and is responsible for maintaining a unified standardisation program. The procedures also act as the final decision-making authority on all DSP related matters as well as assist in resolving all disputes occurring between the different agencies. It is aimed at improving operational readiness, reducing the ownership costs and reducing the cycle time where these goals are facilitated in the following manner:

**Improvement of military operational readiness**

- Interoperability of systems, subsystems, and equipment with USA allies and among the military departments.
- Reduction in the variety of supply items which aids in improving the logistics support.
- Improving the reliability, maintainability and safety of systems.
- Supplementing existing systems, subsystems, and equipment through modernisation as per technology advances occurring in each domain.

**Reduction of total ownership costs**

- Reducing nonstandard parts, training costs, etc.
- Facilitating competition, promoting common processes and open systems and standard commercial processes and practices.
- Standardisation of best training practices.
- Optimising systems engineering requirements by reaching a consensus on requirements.
- Updating of standards by periodic incorporation of cost-saving changes and lessons learned.

**Reduction in cycle time**

- Employment of readily available standard items.
- Recognising and categorising interchangeability and interoperability requirements which assist in introduction of new technologies and updating of systems.

The Acquisition Streamlining and Standardisation Information System (ASSIST) database has also been created to support this policy. It identifies approved standardisation documents, adopted non-government standards (NGS) and the U.S. ratified material ISAs. The types of standardisation documents are as follows.

### International Standardisation Agreements (ISAs)

The ISAs are developed by transnational treaty organisations such as the North Atlantic Treaty Organisation (NATO) to encourage interoperability and commonality amongst the allies and is of significant importance to the DoD.

### Non-Government Standards (NGSs)

NGSs are developed and established by the private sector organisations using a consensus process. NGSs support DoD's commercial acquisition goals, conserve the resources by providing standards, support the domestic industrial base, allow for dual-use technology, improve the mobilisation capabilities and allow for healthy competition.

### Commercial Item Descriptions (CIDs) [Federal Standardisation Manual]

When a suitable NGS is not available due to obsolescence, a CID is developed under the Federal Standardisation Manual to meet the delivery requirements. This is also used in the case of standalone service/item in substantial quantities in the commercial marketplace for specific tasks and under standard commercial terms and conditions.

Federal Specifications and Federal Standards [Federal Standardisation Manual]. When an existing NGS contains the basic technical requirements for a product/process, it is ascribed in the federal specifications and standards. This document only contains the additional requirements needed by the federal government.

### Defence Specifications, Defence Standards and Defence Handbook (Military StandardMIL-STD-961E, Military Standard MIL-STD-962D and Military Standard MIL-STD-967 respectively)

Defence specifications, standards, and handbooks which have been developed conforming to the procedures established by the DSP to establish requirements for military-unique processes, procedures, practices, or methods, or commercial processes, procedures, practices, or methods that must be substantively modified to include military-unique requirements

### Guide specifications

These are the performance specifications used to categorise vital requirements for systems, subsystems, equipment, or assemblies that are recurring in nature. These specifications need to be defined for every acquisition prior to the vendor selection and prevent a constricting single-solution requirement.

### Data Item Descriptions (DIDs) [Military Standard MIL-STD-963]

DID is a document defining the complete set of data deliverables which is mandatory to be furnished by a defence vendor. These include databases, reports, computer programs, documentation, design documents and other recorded information, etc. The document outlines the data and its intended use with the intent of achieving standardisation by the DoD.

## 6.1.3. Acquisition Streamlining and Standardisation Information System (ASSIST)

ASSIST is a comprehensive website maintained and developed by the Department of Defence to support the defence standardisation program. The ASSIST has three versions: -

**Public:** The public website is accessible to the general public and is limited to DSP documents that have been cleared for public release.

**Public/Restricted:** This site mandates a registration process and registered users have access to more services as compared to the public website. The user can create custom profiles and track changes to specific documents, email alerts and other information.

**Private:** This site is accessible only to employees of DoD and DoD contractors with approved credentials.

ASSIST not only provides access to defence standards but can be used as a workflow management tool to manage standardisation projects, coordinating documents for review and publishing standardisation documents. It is a valuable tool for all entities associated with the defence program as is a one stop solution for all related requirements. Over the years, additional functions and tools have been incorporated into ASSIST to assist in automating processes and analysis for the users. The website has assisted defence contractors in adhering to the latest defence standards and ensuring proper performance, maintainability and reparability, ease of MRO, and logistical usefulness of military equipment. The ASSIST portal provides insight into how best existing digital technology can be best utilised to ensure that manufacturers are able to easily follow the latest defence standards.

## Chapter 7

# Roadmap for evolution of Indian standards and specifications

# 7. Indian standards and specifications

## 7.1. Development of military standards

In 1958, a standardisation committee was set up under MoD and a full-fledged Directorate of Standardisation was finally established in 1962, which was placed directly under the control of Department of Defence Production (DDP) in 1965. The succeeding years saw addition of a Metrication Cell, a Technical Information Centre (TIC) and sanction of a pilot project for introduction of Electronic Data Processing (EDP) system in defence standardisation. In 1979, sanction was granted to make this EDP cell a permanent part of the Directorate of Standardisation and in 1984, nine Defence standardisation cells were sanctioned and set up in Kanpur, Bengaluru, Pune, Jabalpur, Calcutta, Madras, Dehradun, New Delhi and Hyderabad.

The Directorate of Standardisation (DoS) is responsible for coordinating the standardisation practices in DPSUs and is nodal agency for all the defence standards. It also prepares joint services catalogues based on NATO codification system to prevent duplication and achieving entry control.

## 7.2. Defence Standardisation Organisation (DSO)[1]

DSO is responsible for implementing standardisation in all fields in MoD and is controlled by DDP. It regulates the following:

### 7.2.1 Entry control

The directorate prepares joint services catalogues based on NATO codification system. The catalogues are published group-class wise and circulated to all concerned Authorities Holding Sealed Particulars (AsHSP) and the secretaries of the standardisation sub-committees. When a new store/item is introduced to the services, these catalogues are checked through computer media to prevent duplication thereby ensuring entry control.

### 7.2.2 Variety Reduction

7.2.2.1. The directorate prepares two types of documents to achieve Variety Reduction.

7.2.2.2. Joint Services Preferred Range (JSPR) is a list of stores based on Catalogues of a particular commodity/equipment/ assemblies /sub-assemblies/ item belonging to a specific discipline like Armament, Electronics etc.

7.2.2.3. Similarly, the JSRL are prepared to ensure "Variety Reduction".

**7.2.3.** Further, Joint Services Specifications are prepared to ensure for a particular store, or Indian Standards (IS) is adopted based on the JSPR and JSRL already prepared in a particular group class of stores/items.

## 7.3. Standardisation Committee

The Standardisation committee is the foremost policy making body on all matters pertaining to Standardisation and lays down the policy guidelines concerning standardisation and other matters within the scope of standardisation directive. To assist the Standardisation Committee in implementation of the policy, 13 Standardisation Sub-Committees with adequate and appropriate representation of the Services, R&D Organisations and concerned agencies have been formed.

## 7.4. Codification

A significant part of Standardisation is the Codification process. This involves the following:

**7.4.1. Item Identification** - Identifying items on the basis of their characteristics, usage and manufacturer and assigning an approved item name and description as per NATO System of Item Identification (H6 Series).

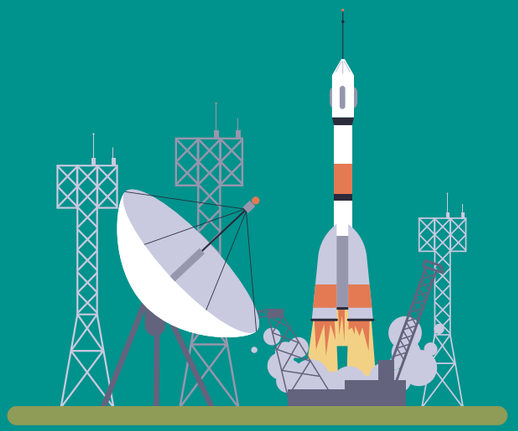
**7.4.2. Classification -** Classifying items into appropriate classes in accordance with NATO Supply Classification System (H2 Series).

**7.4.3. Allotment of Number -** Assigning a unique item identification number to an item which is called Defence Codification Authority Number (DCAN).

**7.4.4. Recording of Identification Data -** Keeping a record of the identification data of all items codified along with allotted DCAN.

**7.4.5. Hosting of Data on MPLS and Web Site -** The records of all items codified are required to be catalogued into a proper document and same needs to be hosted on CodiSAP software on MPLS and Directorate web site for the benefit of the users and environment.

The software employed by Directorate are fully compliant with NATO Codification System and procedures and are continuously updated to match the requirements of NATO Codification.



1. Directorate of Standardisation website

## 7.5. Standardisation Documents

**7.5.1 Joint Services Specifications:** Applicable to more than one service. The following priorities are considered while selecting items for preparation of JSS/Approval Notification:

- **PRIORITY I**
  - High Cost/high volume common user items under indigenisation applicable to all the three services.
  - High Cost/high volume common user items already indigenised applicable to all the three Services.
- **PRIORITY II**
  - High Cost/high volume common user items under indigenisation and applicable to two Services.
  - High Cost/high volume common user items already indigenised and applicable to two Services.
- **PRIORITY III**
  - Balance of common user items under indigenisation and applicable to more than one service.
  - Balance of common user items already indigenised and applicable to more than one service.

**7.5.2. Joint services preferred range:** A preferred range of stores is a list of stores based on a series of preferred numbers and prepared out of a detailed analytical study of various aspects such as design expertise, technical know-how, production and inspection capabilities and user requirements. It also permits the use of minimum number of sizes or grades of an item to cover adequately the current and futuristic requirements and aids in exercising effective "Entry Control" through standardisation by restricting the use of variety of components.

**7.5.3. Joint services preferred range rationalised list:** It is a list of items arrived at after the process of elimination of superfluous variety of existing inventory adequate to meet the prevailing needs of users at a given time. These are compiled to show the minimum number of different stores necessary to fulfil the requirements of large varieties used by the user/services.

**7.5.4. Joint Services Guide:** This document generally deals with miscellaneous subjects not covered by various standardisation sub-committees. These guides deal with both general and technical activities associated with standardisation discipline. In addition, the areas of the guide may include general guidelines on the selection of components, materials, finishes, surface treatment, preferred numbers and mathematical formulas, statistical methods associated with standardisation activities.

**7.5.5. Approval notification:** Approval notification is the adoption of Indian Standards in full for use by defence services. It is the policy of government and the standardisation committee to adopt BIS standards where practicable in preference to making departmental specifications.

**7.5.6. Joint Services Policy Statement (JSPS):** It is prepared by Inter Services Equipment Policy committee (ISEPC) and lays down the development policy for a range of equipment / stores. It also covers the short term and long-term requirements of the services in respect of design, development, procurement, user trails of the particular category of equipment and stores for use by the three services to meet their static and operational role. JSPS covers the aspects such as ranges of equipment, their capacities, roles, value engineering, mobility, transportability etc.

**7.5.7. Joint Services Qualitative Requirement (JSQR):** JSQR lays down the qualitative requirements of an inter-service equipment item and is a mutually agreed document between the ultimate user and the development agency. It covers the aspects such as proposed service employment, operational, technical / physical characteristics, value engineering, life expectancy, maintainability etc.

## 7.6. Need for codification / Standardisation

**7.6.1** Presently our defence inventory consists of largely uncodified and unidentified items whose full particulars are not known and recorded. Provision, procurement, inspection, storage, maintenance and issue documents are held in the three services for these inventories of items using different systems of identification. Quite a number of these are common usage items having identical or similar specifications but known by different names in the three services and held under different cat/part numbers, pattern number or reference number as in vogue in that service. This results in duplication and multiplication of stores. The system of classification of stores in the Army, Navy and Air force is different from each other. Therefore, present system does not encourage identification of common items, inter-operability, and standardisation.

**7.6.2.** The codification system is a process under which equipment, components and parts of the defence supply systems are uniformly named, described, classified, and assigned a code known as DCAN/NATO Stock Number based on physical, operational, chemical etc. characteristics of an item. Thus, it enables to identify an item uniquely. Any item codified in using such system provides a common supply language which operates effectively in a multilingual environment, facilitates inter-operability curbs duplication (both within particular service or organisation and between services and organisations), permits interchangeability, promotes standardiation and maximises logistics support in the most economical manner possible. It ensures that defence personnel deployed in an operational scenario can be assured of getting the right items to successfully complete their mission. The system is required to achieve maximum effectiveness in logistic support, to facilitate data management in the area of material identification and to identify items with identical characteristics. It thereby becomes possible to reduce inventory (equipment, assemblies, components, and spare parts) and to keep the required quantity of stocks under control.

## 7.7. Gaps in India's ecosystem for defence standards

**7.7.1. Uniformity in standards and specification:** Currently India does not follow a uniform set of standards and specifications which hampers the growth of the domestic defence industry. In some cases, US Military Standards or UK (DEF STAN) or IS standards are followed, while in other cases standards customised to operating philosophies of the Indian Armed Forces that have been developed by the concerned Armed forces HQs or QA organisations are being prescribed. A case in point are the Naval platforms & systems wherein a wide range Mil-Stds, Def Stan or standards developed by IHQ MoD (Navy) are followed. In some cases, particularly for some non-critical equipment, commercial standards are also adopted to facilitate qualification of the material/ equipment / system. However, there is no single comprehensive cataloguing system/ structure for standards that can help anyone understand what relevant set of standards would be applicable for design, manufacture and testing of a particular material/equipment/system. This gap is equally relevant for land and air systems.

**7.7.2. Information Accessibility:** There are also major gaps in the availability / accessibility of information with regard to these much-required standards and specifications in the public domain. This has been highlighted in the survey and it has been found out that majority of the industry is not aware of many of the relevant standards. This therefore slows down any thrust towards indigenisation as a new entrant spends considerable time just to become aware of the various applicable standards before one can understand the requirements and take actions accordingly at an early stage.

**7.8.** It would be prudent to further study the established ecosystems in US, UK etc. and adopt a similar structured approach for development, cataloguing and public accessibility of defence standards / specifications.

## Chapter 8

# Conclusion and recommendations

## 8.1. Creating a uniform set of standards and specifications

India currently follows varied set of standards and specifications which need to be streamlined, re-organised and made easily accessible. The target would be developing and organising a comprehensive list of standards and specifications covering all types of material and equipment in the A&D sector. This can be achieved by adopting global military standards where feasible, developing / updating India specific standards where necessary, adapting/ adopting commercial standards where possible and weeding out any duplicitous / obsolete standards. This will allow a greater participation of the domestic manufacturers and aid in achieving interoperability. India has already taken a step ahead in this direction by creating the Directorate of Standardisation and also charting a roadmap for evolving and establishing standards. However, a firm execution of the plan needs to be carried out in a time bound manner to synchronise with the ongoing efforts to boost defence testing systems/capabilities.

## 8.2. Creation of an online central database

Unlike the US ASSIST website, India does not have a comprehensive database of standards and specifications available at one place. Creation of an online portal containing an exhaustive list of standards and specifications in use within the country will aid the industry in generating an all-inclusive cross referenceable list of standards and specifications which can be utilised by all stakeholders. The central database / portal should also aim to provide information on the test facilities (both existing and upcoming as part of DTIS) covering the following details

- Location / Organisation housing test facility.
- Capabilities of facility.
- Military standards for which compliance can be established at the facility.
- Procedure to be adopted for availing the facility.
- Time slot availability.

## 8.3. Augmentation of existing infrastructure

It has been brought out that the country has a vast number of government owned defence testing capability already existing in varied domains. It would therefore be prudent for the upcoming DTIS to complement the existing facilities. The following may be relevant in this regard: -

**8.3.1.** Detailed analysis covering the exact nature of facilities already available and mapping of all applicable defence standards / requirements thereof with the facilities to identify specific gaps.

**8.3.2.** The new facilities being established must be done so with aim of providing the specific facility required at the specific location(s) based on detailed analysis of the geographical spread of existing facilities and the exact nature of test systems/capabilities already available, mapped to relevant standards. Inputs from industry stakeholders & MSMEs may also be obtained in this regard.

**8.3.3.** MoD / concerned agencies to carry out a detailed assessment of the market demand and growth scope for the facilities prior tendering actions for establishing these facilities.

**8.3.4.** Incorporate measures to incentivise private participation and also to bring in foreign expertise and technology while establishing new facilities.

**8.3.5.** Develop a database with regards to facilities and synchronise it with the database of standards applicable to develop a comprehensive single window database / portal that is easily accessible to any stakeholder. Subscription based services may also be considered in this regard.

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