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Atmanirbhar Bharat : Indigenization for Defence Forces

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Abstract - Self sustenance in terms of ' Atmanirbhar Bharat' is a delayed need for Indian subcontinent. The slogan of
"Make in India" and the reality of "Made in India"
are the matter of intensive realization for actual need based implementation. A missing link between above two realities are visible on ground. Professional affiliation with national and international institutions, capital expenditure for capacity enhancement in terms of machineries, test equipments and single window hassle free clearance are the challenges encountered by Atmanirbhar Bharat Aviyan in general and indigenization program for defence sectors in particular. Transfer of Technology (ToT), Memorandum of Understanding (MoU) with Original Equipment Manufacturers (OEMs) for sustenance, Capacity Requirement Planning (CRP) , Research and Development (R&D) entities for time bound desired deliverables are the critical issues of 'Atmanirbhar Bharat' realization. Vendor developments, Affillate Marketing, Automation and Modernization of industries, Adoption of IoTs, uses of AI & ML with effective data analytics are key criteria of success to Indinigesation for Defence forces in particular. Under 'Atmanirbhar Bharat' program. Additive manufacturing, 3 D printing, non conventional machining , global marketing , alternative fuel source identification and Industry-Academia integration for research advancement for gap filling with respect to conventional entities like CSIR, DRDO,RDSO and others.

Keywords – Make in India, Made in India, International Standards, Industrial best practices, Participative management and Single window clearance.

INTRODUCTION

The steps taken by Indian subcontinent on "Make in India" and "Made in India" are two mile stones of " Atmanirbhar Bharat" . However "Make in India" is a concept and "Made in India" is the reality. The challenges encounter by Defence forces and associated manufacturers for spares and equipment indigenization are unique in terms of technology infusion, war field requirements, matching performance with advance countries products and the most important is capital expenditure requirements. The aspects of vendor developments, acquisition of state of art plant and machineries including test and diagnostic equipments, Up skilling and Re skilling facilities and adopting international standards with industrial best practices are the other areas of critical concern. Further the self sufficiency in Defence forces is critical time bound requirement but other sectors like health care, educational facilities, agricultural upliftment, infrastructure provisioning and creation of world class centre of excellence R & D institutions are the pressing requirements to realize desired deliverables.

NEED FOR ATMANIRBHAR BHARAT

Few good examples of emerging needs which are in current demand for sustainable Atmanirbhar Bharat are as follows:

- PPP models
- Disinvestment of non performing assets
- Organisation to be headed by domain experts
- Autonomy
- Intensive Industry – Academia interface for mutual developments
- Affiliate Marketing
- Adaptability
- Artificial Intelligence and Machine Learning
- Blockchain
- Cloud Computing
- Coding
- Creativity on Ideas and innovations
- Cyber Security
- Telemetry and Data Analytics
- Dedicated Funding Institutions
- Prescriptive Maintenance
- Participative Management in decision making
- Professional Affiliations
- Continual Up skilling and Re skilling
- Close monitoring of R & D institutions

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INDIGENISATION IN DEFENCE FORCES

Keeping in view of diversified unique nature equipment used in depth and range by Armed Forces having most origin to advance nations and rapidity of modernization taking place in short span of time, the Atmanirbhar Bharat program is a critical time bound compulsion for Indian Subcontinent. The technical features required by Armed Forces during field trials and war situations demands customized specification changes and design modifications. Eventually these aspects calls for complete dependency on foreign manufacturers and involves higher expenditure and foreign currency drain. Therefore all out efforts are being made to carryout substantial indigenization on defence requirements. Both government and private entities are involved to accelerate the indigenization program under Atmanirbhar Bharat initiatives.

SCOPE OF INDIGENISATION IN DEFENCE FORCES

The scope of indigenization in respect of Defence forces of Indian Sub continent is intensive and extensive as well. The facilities and equipment required for day to day activities and war requirements are all high end techno dependent. The priority requirement of indigenization are in the domain of the following:

- Armoured Technology and Autonomous Vehicles
- Secured Communication Devices
- Radars , Interceptors and Surveillance systems
- Guns and Ammunitions
- Unmanned Arial Vehicles and Drones
- Night Vision and Optical Devices
- Solider comfort equipments
- Rare Earth Material Applications
- Non Conventional and Additive Manufacturing
- Test and Diagnostic Equipment
- AI & ML
- Cloud Computing, Quantum computing and Data Analytics
- Cyber Security for protection from cyber attacks
- Nano Materials and Sensors with Telemetry
- Laser Beam Technology as war head
- Simulator developments for Augmented Reality and Virtual Reality
- Identification of Foe and Friend in War field
- Camouflaging and Image Analysis Technology
- R & D set up
- Nuclear, Biological, Chemical and Radiation Protection
- Prescriptive Maintenance on IoT platform
- Integrated Tactical Power Management System
- Uninterrupted Navigation
- Blockchain
- Non Lethal Weapon

ORGANISATIONS CONTRIBUTING TO DEFENCE INDIGENISATION PROGRAM

Due to restrictions on commercial exploitation front and stringent requirements on field trials, very limited government and private entities are engaged in Indigenisation support program in particular in product development and manufacturing. The rate of failure of prototypes are nearly 50% and time required to complete different rounds of pilot testing , user extensive validation and maintenance trials is unexpectedly high. The cost factor involved during these validation processes are much beyond anticipated project cost. Further by the time all set to roll on indigenized product, there is every possibilities of modification required keeping in view of current situations. Keeping in view of above attributes the following entities are engaged in indigenization support work:

- Dedicated eight Army Base Workshops
- Directorate of Indigenization under Army HQ
- Ministry of Science and Technology, Govt of India through Council of Scientific and Industrial Research (CSIR).
- Defence PSUs like MIDHANI, BEL,GRSE,BDL,BEML, MDL,Hal
- Defence Laboratories
  - Advanced Centre for Energetic Materials
  - Defence Metallurgical Research Laboratory
  - Defence Research and Development Laboratory
  - Research Centre Imarat
  - Naval Science & Technology Laboratory
  - Combat Vehicles Research & Development Establishment
  - Microwave Tube Research & Development Centre
  - Solid State Physics Laboratory
- Restructured Ordnance Factories into seven DPSU clusters of specialization
  - Munition India Limited
  - Armoured Vehicle Nigam Limited
  - Advance Weapons and Equipment India Limited
  - Troops Comfort Limited
  - Yantra India Limited
  - India Optel Limited
  - Gliders India Limited
- Other Prominent Institutions extending support
  - International Advanced Research Centre for Powder Metallurgy and New Materials
  - Raja Ramanna Centre for Advanced Technology
  - Indian Rare Earths Limited (India0
  - Semiconductor Complex limited

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PROGRESS MADE ON INDIGENISATION PROGRAM

The deliverables of above mentioned entities are restricted due several intrinsic factors of unique nature involved since war like equipments and associated components are under indigenization. Athugh the program is exhaustive and time consuming, following definite progress were achieved in recent past:

- Manufacturing of Special Maintenance Tools and Special Test Equipments in respect of most of foreign origin equipment
- Spares manufacturing in respect of routine maintenance requirements of imported equipments
- Establishing facilities for Metallurgical investigation as per international standards, product development using additive manufacturing and 3 D printing. Also creating facilities for non contact quality assurance systems and progressing product development on Rare Earth Elements.
- Restructuring of 41 Ordnance Factories to seven specialized clusters with effect from 01 October 2021 as DPSUs having autonomy to carry out intensive indigenization activities.

PRIORITIES OF INDIGENISATION

The basic elements of indigenization under Atmanirbhar program in Defence sector are summarized below:

- Self Sufficiency in all fronts (Atma Nirbhar)
- Made in India Realization (MSMEs)
- Export Orientation (Up Skill, Re Skill)
- Import Substitution (Alternatives)
- Infrastructure Development (R & D, Reverse Engg , Vendor Development)
- Special Economic Zones (SEZs)
- Dedicated Financial Institutions (EXIM, SIDBI, NABARD, ICICI,DIC,IDBI,IFC)
- Professional Affiliation with Standards bodies
- Resource mobilization
- Adoption of Green Technology
- Identification of Alternative Fuels
- Emphasis on Reuse, Re cycle and Reduce
- Eco compatibility
- Academia – Industry interface

FEATURES OF INDIGENISATION

- Continuous Evolution
- Intermittent Evaluation
- Mechanization & Automation
- Security Classification
- Unique Coding for Defence Applications
- Capacity Requirement Planning (CRP)
- Coded Design Communication
- Shop Floor Control (SFC)
- Material Requirement Planning (MRP)
- Computer Aided Process Planning (CAPP)
- Concurrent Engineering
- IT Enabled Service (ITES)
- Discrete & Continuous Manufacturing
- Simulation
- Aesthetic Approach as per Defence Requirement
- Reliability Assessment at Field level
- Creative & Innovative Design
- Brain Storming & Participative Management
- Quality Cycles
- Ergonomic Approach

INDIGENISATION CYCLE FOR DEFENCE FORCES

As the indigenization activities is unique to Defence requirements , hence following customized cyclic steps are used in product development:

- Need Analysis of Product or Service
- Formulation of Blue Print of Model
- Prototype or Pilot Sample
- Prototype Trial on Select Users in field formation
- Amendment to Design Parameters on the basis of user trial
- SWOT Analysis on the basis of friendly foreign countries
- Continuous Vendor Rating
- Bulk or Mass Production
- Warehousing by supply chain
- Packaging & Preservation for extreme temperature and weather conditions
- Shipment and Customized Delivery in remote locations and diversified terrains
- User Feedback after field use or exercises
- Competitors SWOT Analysis
- Need Analysis for Continual Improvements on user feedback
- Design Modifications as per real time threat perceptions
- Discard Policy for implementing new features on time bound manner and prevailing threats

CHALLENGES IN INDIGENISATION PROCESS

As the indigenization process in India may upset many potential countries in terms of supplying defence items hence many challenges are created by those countries and few limitations are inherent in our system. Few extreme challenges encountered by various entities are mentioned below for immediate attention and follow up remedies:

- Cyber Security since indigenization programme is intensively IoT dependant
- Data capturing, Telemetry and Data Analytics are techno intensive hence requires required infrastructure and experts for handling systems
- Adequate dedicated funding

- Uses of Predictive & Prescriptive Maintenance to keep functioning Plants, Machineries and Specialist Equipment meant for indigenization
- Participative Management to share ideas & smooth functioning
- Adequate professional affiliation with standards bodies, Academia & R & D institutions
- Continuous Upgrdation & Reskilling to match with competitors
- Development of in lieu materials to reduce cost and making ease of functioning
- Introduction of Alternative fuels and Non Conventional energy source during indigenization process to adhere green technology requirements and eco balance

CONCLUSIONS

Keeping in view of current hostile situations and strained relationships with neighbors, it is felt by higher leadership to go for indigenization program in war footing manner under Atmanirbhar Bharat Aviyan to develop technology, infrastructure, best practices, trained highly skilled manpower, working ambience and above all making government entities autonomous. However the under mentioned critical aspects are required to be I fore front always:

- Field users first
- Continuous Requirement Assessment as per ground reality
- Identification and up keeping of Skills for Sustenance
- On Job Training for Up Skilling and Re Skilling
- Affiliation with Professional Institutions like BIS , CII, FICCI, CSIR, DRDO and others
- Global Standards Adoption
- Set Up SEZs to support indigenization and substantiate foreign currency reserve
- Single Window Clearance for rapid materialization of projects

REFERENCES:

The author was posted as OIC manufacturing in Army Base Workshop for more than two decades and intensively involved in indigenisation and method engineering, process planning, formulation of operation planned schedule and trial evaluation of indigenized products of Defence equipments. The author was posted as Deputy Director , IHQ (Army), MoD New Delhi during 2015 to 2020 dealing with HR issues and skill development of civilian workforce engaged in indigenisation activities. Presently the author is posted as course control officer in premier Military College of Electronics and Mechanical Engineering of Indian Army where besides routine work, established modern manufacturing training facilities which involves Additive manufacturing, 3 D printing, powder metallurgy, Rare Earth Materials applications in collaboration with IREL(India), CSIR-IMMT, DRDO, MIDHANI, ARCI and Ordnance Factories. The technical papers of the author were selected and presented during 34th and 35th Indian Engineering Congress and 35th National Convention of Production Engineers (35Th NCPE) conducted by The Institution of Engineers (India) . The author also contributes technical articles regularly to EME journal published by Military College of EME Secunderabad..