



**Opportunities for Industry
in
BEL's Key Defense Projects**



- **BEL Overview**
- **BEL's Partnership with Industry**
- **BEL's Vendor Development Initiatives**
- **Current Outsourcing by BEL from MSMEs**
- **Way forward with MSMEs**

BEL Overview

Navratna PSU

- Established in 1954 under Ministry of Defence
- R&D / Technology driven Company operating in competitive Defence Electronics area
- 76th among top 100 Companies Worldwide in Defence Revenue (Defence News, USA)

Subsidiary & JVs

- BEL Optronics Devices Ltd – Night Vision Image Intensifier tubes
- GE BE Pvt Ltd – Medical Electronics Parts, X-Ray Tubes
- BEL Thales Systems Ltd – Civil ATM and select Defence Radars

Manufacturing Plants

9 Factories

- Bangalore
- Ghaziabad
- Pune
- Machilipatnam
- Chennai
- Panchkula
- Kotdwara
- Hyderabad
- Navi Mumbai

Human Resources

9716 Employees

4740 Engineers (50% in R&D)

Manufacturing Network



Panchkula (1985)

- Tactical Communication Equipment
- Portable Radars



Navi Mumbai (1986)

- Shelters
- Masts
- Energy Systems



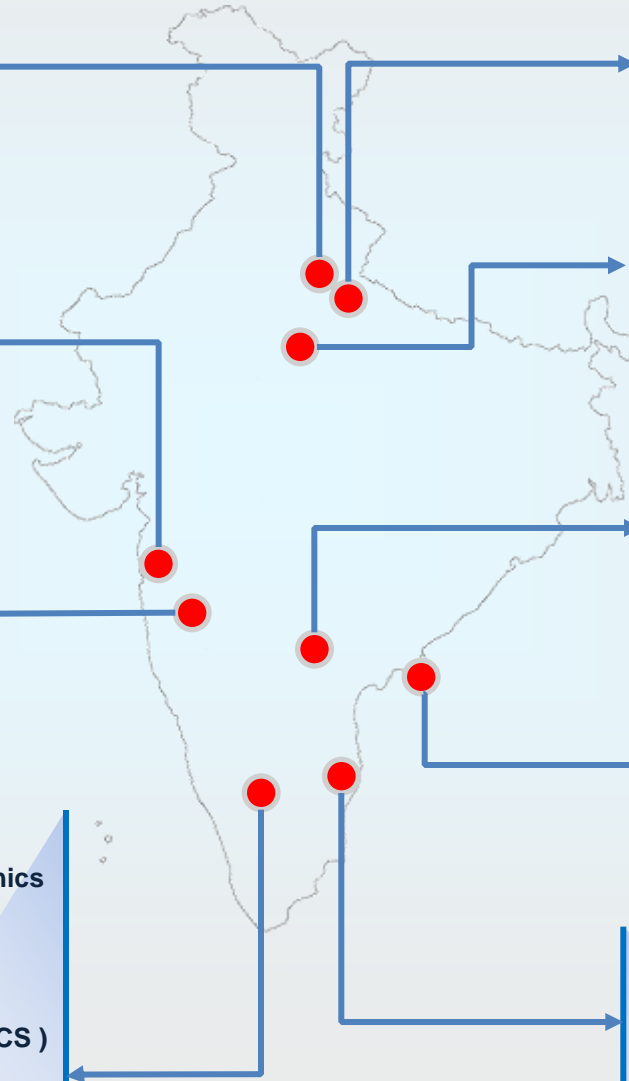
Pune (1979) BELOP

- Batteries
- Electro Optics
- Laser Products
- Fuzes
- NBC Products



Bangalore (1954)

- Military Communication
- Network Centric Systems
- Electronic Warfare & Avionics
- Military Radars
- Missile Systems
- Naval Systems (Sonars & Communication Systems)
- Naval Systems (Radar & FCS)
- Export Manufacturing
- Simulators
- Components



Kotdwara (1986)

- Defence Communication Equipment & Telecom Products



Ghaziabad (1974)

- Radars
- Network Centric Systems
- Satcom & Cellular Communication
- Antenna



Hyderabad (1986)

- Electronic Warfare Equipment



Machilipatnam (1983)

- Electro Optic Equipments



Chennai (1985)

- Tank Electronics
- Land Navigation Sys
- Fire Control Systems
- Gun Upgrades.
- EO Systems



Business Segments



1. Radar & Weapon Systems

2. Communication Systems

3. Electronic Warfare & Avionics

4. Network Centric Systems

5. Anti Submarine Warfare

6. Electro-Optics

7. Tank Electronics / Gun Upg

8. Civilian Products

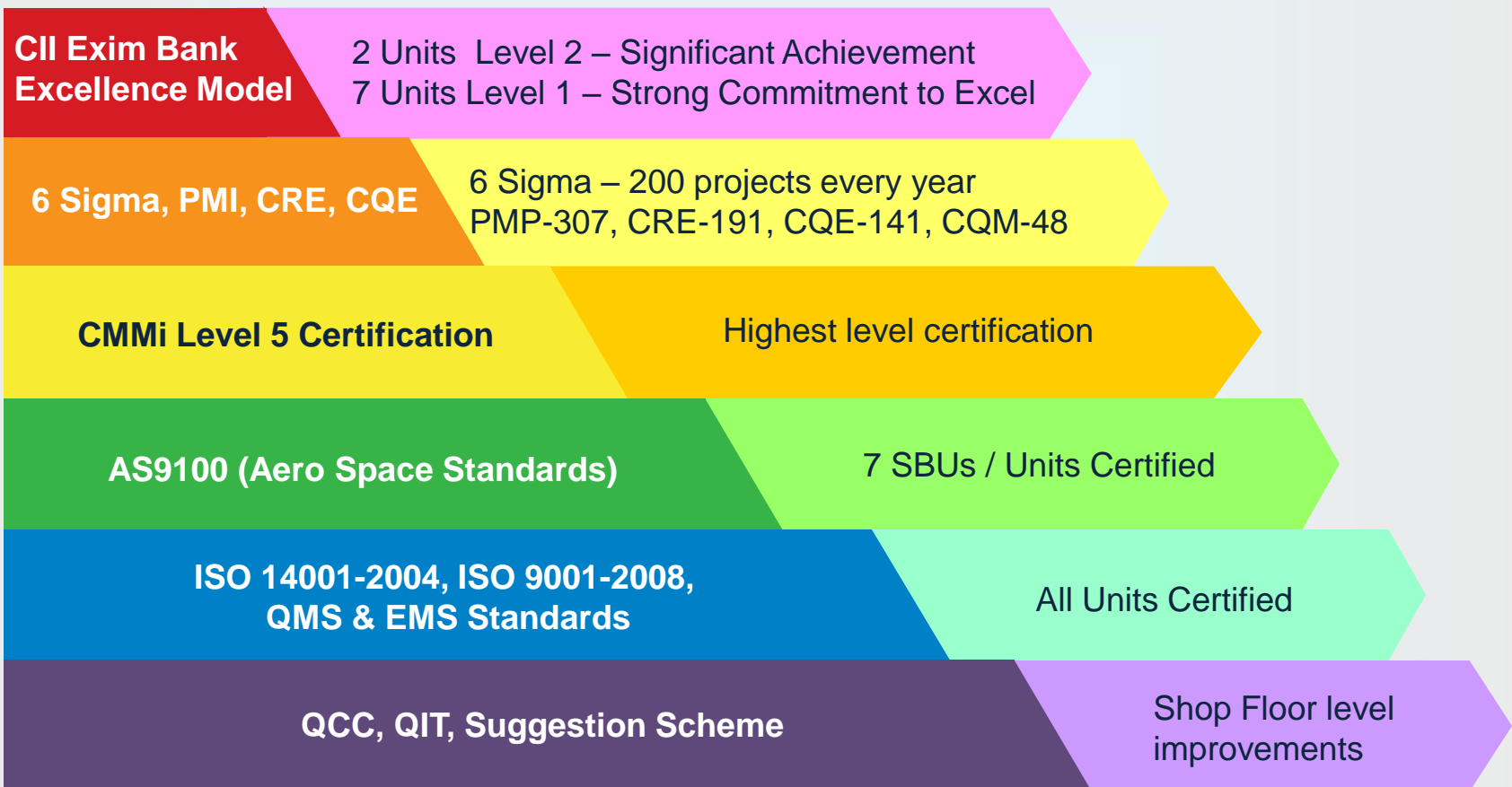
Multi product, Multi technology company – Diverse product range

Research & Development

- 50% Engg. Manpower deployed in R&D
- 87% Sales Revenue from Indigenous R&D
- R&D investment: ~ 8 to 9% of Sales
- CMMi Level-5 Certification for Software development
- Largest Production Partner of DRDO
- Patents - 6 Registered, 55 filed



Quality Management



BEL's Partnerships with Industry

BEL's Industry Partnership Models

Outsourcing

Vendor Development (BTP/BTS)

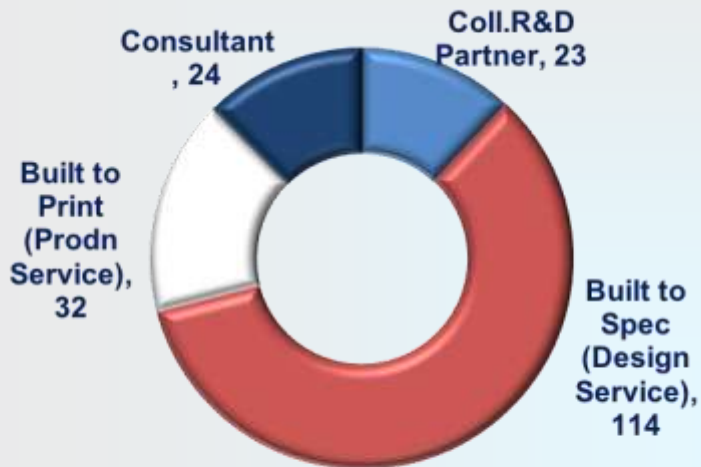
Collaborative R&D

Scope of engagement for Indian Industry



- Outsource : off-the shelf items, items generic in nature
- Local Vendor Development for items requiring special and precision manufacturing processes
(As part of in-depth ToT implementation)
- Local Vendor Development for Import Substitution of critical systems / sub-systems during production phase
(as part of Indigenization drive)
- Collaborative R&D Partnership for Technology sensitive, Strategic and Complex components, products and sub-systems.
(Industry/Academia/Design houses, R&D Institutions,..)

Collaborative R&D Partnership



Total Partners Empanelled: 193 (including 85 MSMEs)

Partner Empanelment status (31st Mar 2017)



Major programs initiated

- System on Chip (SoC)
- Naval Surveillance Radar
- Gun Control Radar
- Digital Beam Control of Antenna
- Video Management System for HLS
- MW Super Components for Radar & EW
- Hull mounted Sonar for Shallow Watercraft
- Towed Array Sonar
- Mobile Autonomous Network Waveforms
- Tactical 3G wireless network
- Small form factor computing hardware
- Microwave ICs

BEL Vendor Development Initiatives

BEL's Vendor Development Initiatives

- Thrust on increasing the outsourcing level year-on-year.
- Outsourcing & Vendor Development Policy released.
(includes long term agreements, collaborative R&D partners)
- IDDM Clause incorporated in Procurement Manual inline with DPP
- New vendors added regularly in the Approved Vendor Directory (AVD).
- 20% of annual procurement from MSMEs
(4% of which will be for industries owned by SC/ST entrepreneurs).
- List of Procurement Plan (~2733 items) uploaded in BEL website.
(~ 358 items reserved exclusively for MSMEs listed)
- Active participation in MSME Exhibitions / Seminars organized by GoI.
(List of items to be indigenized are displayed in Exhibitions/Seminars)
- Organizing periodic Vendor / MSME meet.

BEL's Vendor Development Initiatives

- Unit-wise Nodal Officers nominated to assist vendors regarding Registration Procedure, BEL's requirements etc.
- Developmental / trial orders placed on Vendors.
(Development cost, Tooling cost / set up cost borne by BEL).
- Test facilities identified across all Units of BEL for use by MSMEs.
- Training Programs provided free of cost for MSMEs.
(Problem Solving Techniques, Zero Defect, 5S, Lean Mfr, Six Sigma, QMS, ISO 9001, ISO 14001 etc.,)
- **“Make in India”** Initiatives:
 - BEL website : Information on Collaborative R&D, Items for Indigenization, Test Facilities available to Indian Private Entities, Nodal Officers, etc...
 - Establishment of **“Make in India” Display Cells** in all Units of BEL: wherein prospective vendors can see items of interest & have access to samples, drawings, technical specifications etc

BEL's Test facilities Usage by Private sector

- BEL has established over the years state-of-the-art facilities like
 - Environmental Chambers, Shock & Vibration test facilities,
 - EMI / EMC test facilities, Calibration of Instruments,
 - Material test and Metrology Calibration,
 - Component test and Reliability Analysis
- Usage of these Test Facilities extended to vendors and private industries.
- Around 187 test facilities have been displayed in BEL website for usage by Vendors / Private Sector
- Test charges are kept nominal as compared to the investments. (infrastructure facilities, power, trained manpower, etc)
- Test Facilities Usage data by Vendors / Private Sector :

	2014-15	2016-17
- Private industries during	37	95
- Govt / PSUs during	11	25
- Products tested/calibrated during	~255	~400

BEL's Test facilities available for use by Private Sector



BEL Unit	Facilities made available for Private Sector
Bangalore	X-Ray Inspection, Rain Test, Environmental Test, Calibration Test, EMI/EMC Test
Ghaziabad	Temperature, Thermal Cycling, Altitude, Salt Spray & Bump Tests
Kotdwara	Dust & ESS Chambers, Vibration, Bump, Salt Corrosion, Shock & Rain Tests
Panchkula	Cold/Heat & Thermal Cycling Chambers, Vibration & Bump Tests
Hyderabad	Temperature, Thermal Shock & Vibration, Bump Tests
Machilipatnam	Vibration, Rain & Bump Tests, Climatic, Hot/Cold, Dust & Salt Spray Chambers

Current Outsourcing from MSMEs

Current Outsourcing by BEL from MSMEs

Procurement from MSMEs in the last three years

Year	2014-15	2015-16	2016-17
Procurement from Indian Industry (Rs. Crs)	1262	1652	~ 2150
Procurement from MSMEs (Rs.Crs)	513.0	612.0	~ 880.0
Procurement from SC/ST Entrepreneurs (Rs.Crs)	6.75	8.87	~ 17.09

Some of the major Items procured from MSMEs include:

Power Supply Modules, Antenna Base Assemblies, Fasteners, Cable Assemblies, Coils, Clamps, Cabinets, Welded Brackets, Housings, Adapters, Switches, Junction Boxes, Power Distribution Panels, Current Sensors, Filters, Passive components, Heat Sinks, LED assemblies, Handles, Chasis, EMI Gaskets, Ceramic items, Bushes, Name Plates, PCB Assembly accessories etc.

Major items outsourced in recent past

SHELTER WITH MAST



DG SET



HYDRAULIC JACK



MASTS



TRAILER



POWER DISTRIBUTION BOARDS



Major items outsourced in recent past



BARE CABIN ASSEMBLY (ANTENNA)



TRAVERSE GEAR BOX



ELEVATION GEAR BOX

Way forward with MSMEs

- Air Defence Surface-to-Air Missile Systems
- AESA based Radars (Land / Airborne / Ship-based)
- C4I Systems (BMS, CMS, CSS,..)
- Anti-submarine Warfare systems (Sonars, Comn., FCS, etc.)
- Future Infantry Soldier as a System (FICV)
- Tactical Communication Systems
- Strategic Communication Systems
- Software Defined Radios
- EW Systems for different terrains
- EW suites for Fighter Aircrafts and Helicopters
- Unmanned Aerial Vehicles and Aerostats
- Thermal Imager based Sights for Tanks and Weapons
- Image Intensifier based Passive Night Vision Devices
- Tank Electronics / Gun Upgrades

- Moving from standalone solutions to networked solutions with increasing use of software and other IT tools.
- System/equipment solutions to total platform or turnkey solutions.
- Highly guarded Defence Technologies.
(Technology denial in critical areas, embargoes, proprietary systems,....)
- High Technology development requiring huge spend in R&D.
(Some critical technologies to be painstakingly developed indigenously)
- Long-gestation of projects.
(Concept to Deployment: 8-10 Yrs. Support:15-25-30 Yrs).
- Project execution delays common due to customized user requirements.
- Product Life Cycle Support.
(Obsolescence Mgmt, Product Upgrades, Technical Support, Periodic Trainings)

High technology expertise, in-house R&D focus, perseverance and good financial strength required to stay in business

- Adequate Infrastructure/Resources
 - Test setups, state-of-art assembly/fabrication, quality assurance test setup,..
- Qualified/skilled dedicated manpower
- Investments in R&D
 - Labs, Simulation & Design Tools, Design Knowledge, Prototyping facilities, Knowledge on Reliability, Certification process, Validation/Evaluation Process and Procedures (PDR/CDR/FDR,
- Adherence to delivery timelines
- Compliance to stringent Quality & Reliability standards.
 - ATP / QTP, ESS, Class A/B/C tests, FET, EMI/EMC/EMP, Security Grading,

Support required for Defence Industry (MSMEs)

- Training on quality concepts like Six Sigma, QCC, etc
- Environmental Certification
- Test Facilities support
- Long-term business agreements
- R&D capability enhancements
(Design, Simulation studies, Prototyping, Validation/Evaluation process, Reliability tests, qualification tests, Certification process, etc)

BEL is keen to compliment the capabilities of Indian private industry and extend support to harness their potential for creating a vibrant defence manufacturing ecosystem to achieve self-reliance in Defence Technologies.

Thank You