



 **भारत इलेक्ट्रॉनिक्स**
BHARAT ELECTRONICS
QUALITY. TECHNOLOGY. INNOVATION.



BEL-GHAZIABAD
(RADAR)



Bharat Electronics Limited (BEL)



Navratna PSU

- Established in 1954 under Ministry of Defence
- R&D / Technology driven Company operating in Strategic Electronics in Defence & Non Defence segments

Manufacturing and R&D Facilities

Manufacturing Units

- Bengaluru, Ghaziabad, Pune, Machilipatnam, Panchkula, Chennai, Hyderabad, Kotdwara, Navi Mumbai

R&D Facilities

- Two Central Research Laboratories at Bengaluru and Ghaziabad
- One Product Development and Innovation Centre at Bengaluru



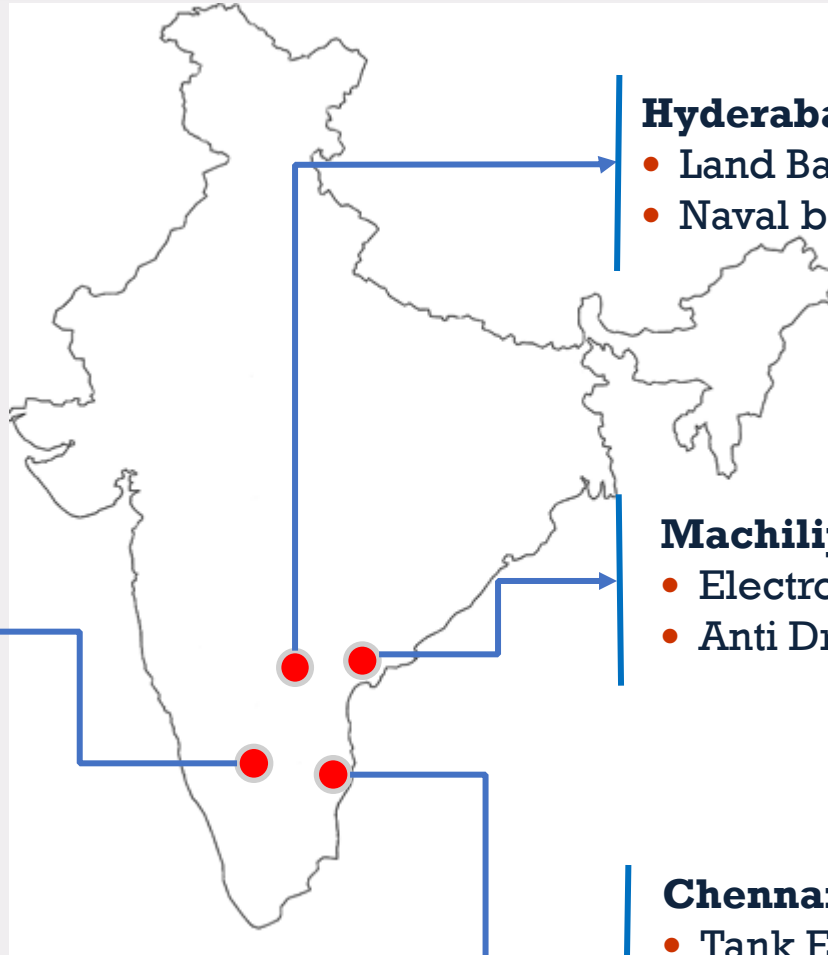
Bharat Electronics Limited (BEL)



Bengaluru (1954)

- Missile Systems (Land & Naval)
- Land- based Radar systems
- Naval Systems (Sonars, Comm. Systems, Radar & Fire Control Systems)
- Military Communication
- Electronic Warfare & Avionics
- Home Land Security & Smart Cities
- EVM/VVPAT
- Unmanned Systems
- Solar Systems and Solutions
- Space Electronics & Systems
- Strategic Components/Devices
- Medical Electronics
- Cyber & Network Security
- Software Solutions & AI
- Arms & Ammunitions
- Seekers

- ❖ **CRL**
- ❖ **PD&IC**



Hyderabad (1986)

- Land Based EW Systems
- Naval based EW Systems



Machilipatnam (1983)

- Electro Optics
- Anti Drone Systems



Chennai (1985)

- Tank Electronics
- Gun Upgrades
- Airborne EO payloads
- Land Navigation Systems
- Gun Control Systems





Bharat Electronics Limited (BEL)



Panchkula (1985)

- Tactical Communication
- Jammers
- Avionics (HUD)
- EV Charging Stations

Navi Mumbai (1986)

- Shelter Systems
- Power Systems
- Mast Systems
- Composites
- Blast Doors/Valves

Pune (1979)

- Energy Storage
- Laser Products
- Fuzes
- Support Systems for AFVs
- Arms & Ammunitions

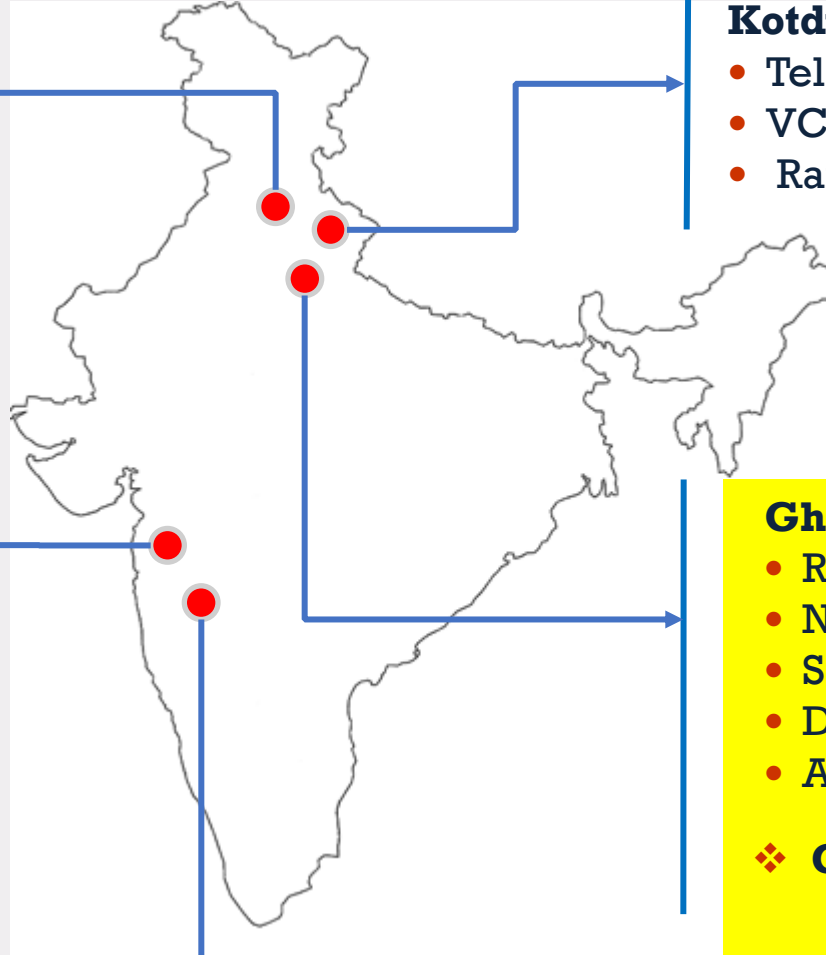
Kotdwara (1986)

- Telecom Products
- VCCS Solutions
- Rail/Metro Solutions

Ghaziabad (1974)

- Radar Systems
- Network Centric Systems
- Satcom & Cellular Communication
- Defence Command & Control System
- Antenna Systems

❖ **CRL**





Bharat Electronics Limited Ghaziabad



Established : 1974

Total Factory Area :
208 Acres

Production Area :
280,000 Sq. Mtr.

Business Segments :
RADAR, C4I & SATCOM

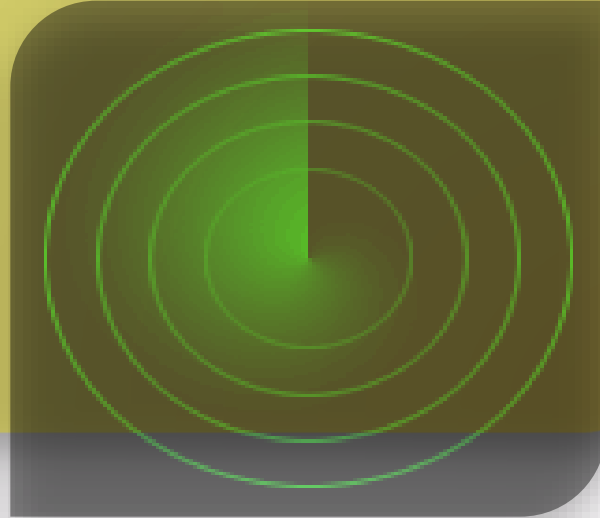
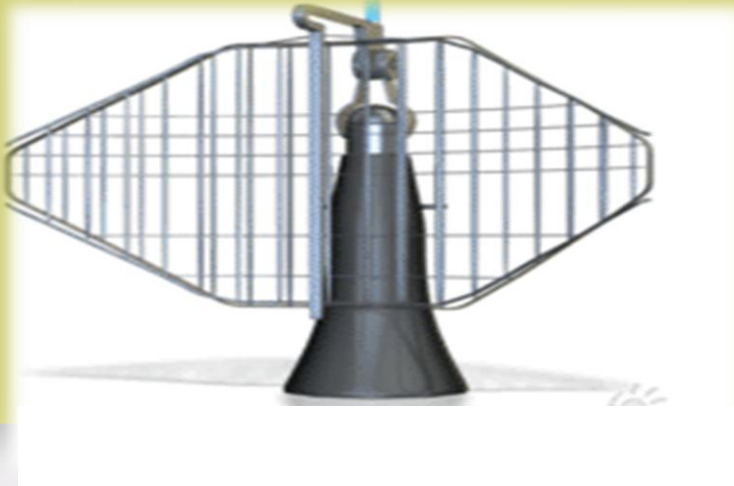
Employees : 1394



Business Segments



RADAR SEGMENT



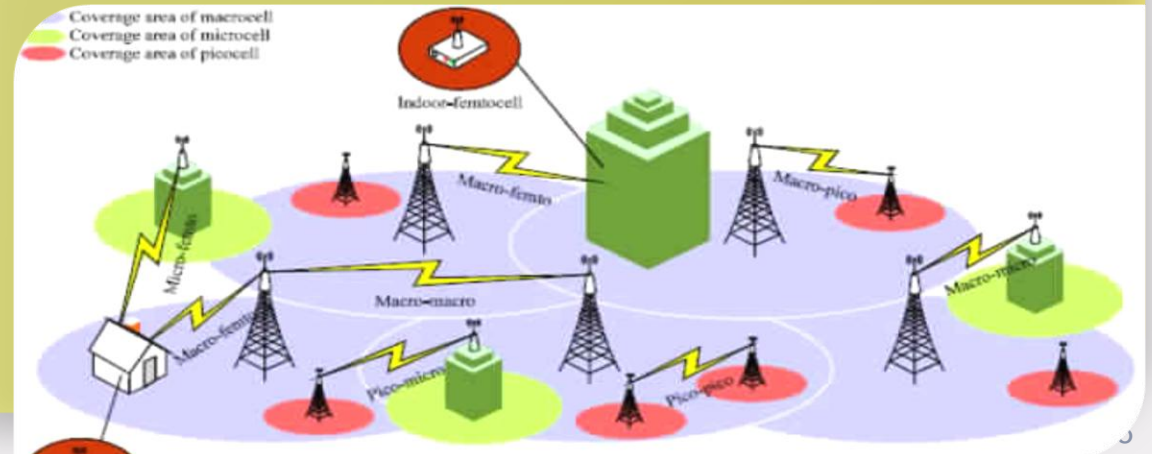
SATCOM

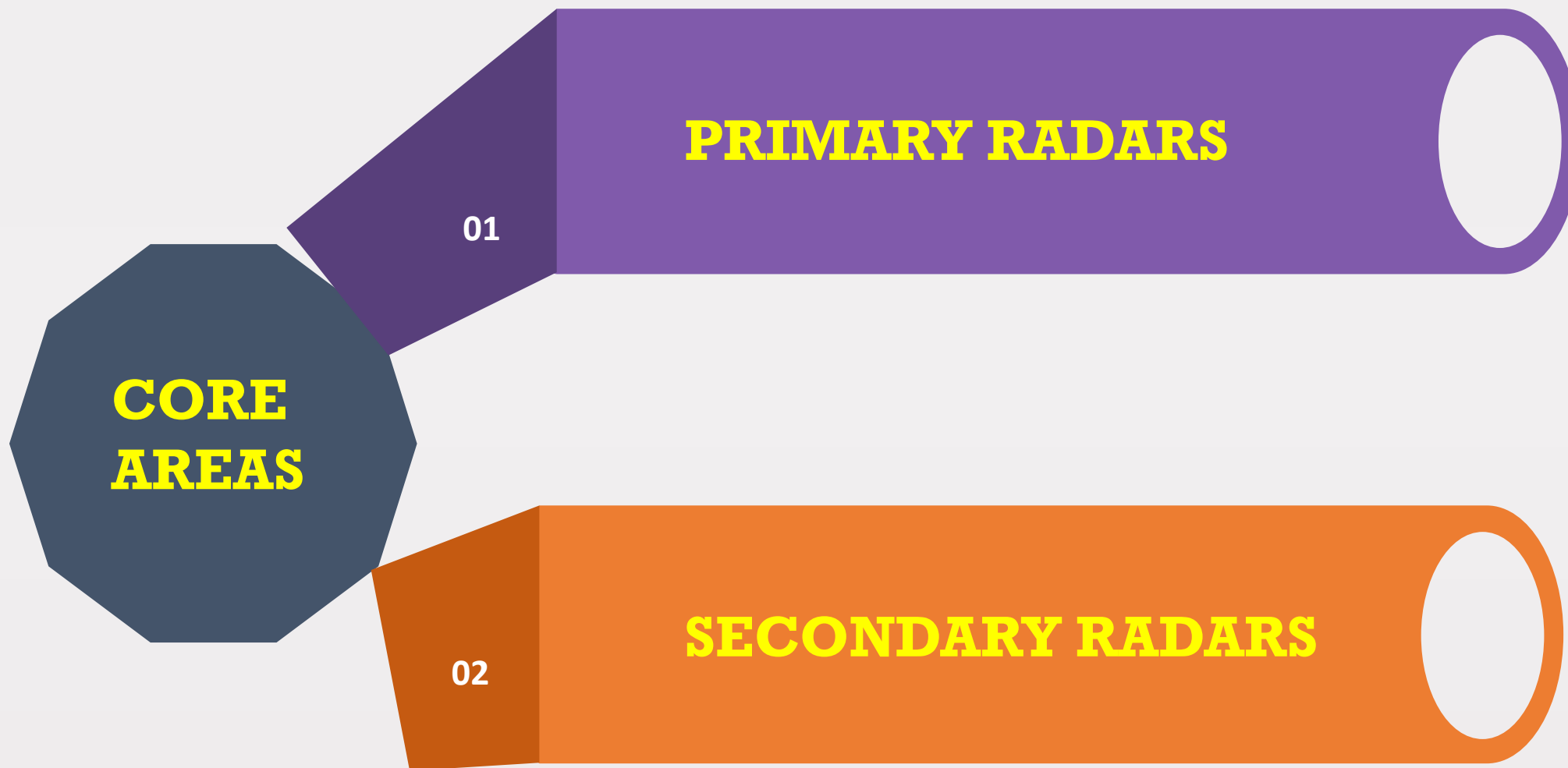


C4I SYSTEM



CELLULAR COMMUNICATION







Technology Evolution



2D Radar

SRE



REPORTER



BHARANI



INDRA



3D Radar

3D TCR



REVATHI



LLLWR



TRS 2215



PSM 33



Aslesha/
CAR Mk-II



THD



4D Radar

ROHINI



ARUDHRA



LLTR



ASHWINI



Mountain Radar





MAJOR PROJECTS WITH LRDE(DRDO)



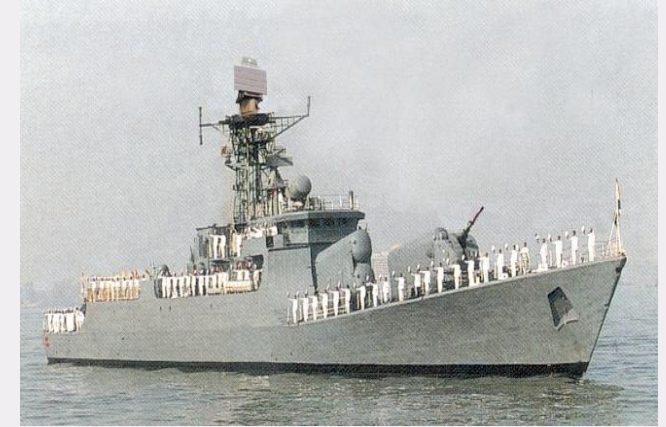
ROHINI



3D TCR

MEDIUM RANGE RADAR (3D SERIES)

- ROHINI
- REVATHI
- 3D TCR
- ASLESHA MK-II



REVATHI



ASLESHA MKII



Projects with LRDE(DRDO)



| <u>PARAMETERS</u> | <u>ROHINI</u> | <u>REVATHI</u> | <u>3D TCR</u> | <u>ASLESHA MKII</u> |
|-------------------|----------------------|----------------------|----------------------|-------------------------------|
| Type | 3D Surveillance | 3D Surveillance | 3D Surveillance | 3D Surveillance |
| Freq band | S-band | S-band | S-band | S-band |
| Range | 150 km | 150 km | 90 km | 120 Km |
| Altitude(Max.) | 15,000m | 18,000m | 10,000m | 12,000m |
| Antenna | Passive Planar Array | Passive Planar Array | Passive Planar Array | Semi Active phase Array Radar |
| Transmitter | Tube-based | Tube-based | Tube-based | Dual TRM |
| Antenna RPM | 7.5 & 15 Rotation | 6,12 & 24 Rotation | 15 & 20 Rotation | 7.5 & 15 Rotation |
| Elevation | 0-30 deg | 0-50 deg | 0-50 deg | 0-50 deg |



PORTABLE SERIES

- BHARANI
- ASLESHA MK-I



BHARANI



ASLESHA MK-I



Projects with LRDE(DRDO)

| <u>PARAMETERS</u> | <u>BHARANI</u> | <u>ASLESHA MK-I</u> |
|--|------------------------|------------------------|
| Target Position | 2D | 3D |
| Detection Range | 40 KM (for 2 Sq m RCS) | 50 KM (for 2 Sq m RCS) |
| Height Coverage | 5400 m | 6000 m |
| Radar Weight (Excluding Power and Communication system) | 200 Kg(Typical) | 205Kg (Typical) |
| Deployment Type | Quadripod | Quadripod |



Projects with LRDE(DRDO)



Medium Power Radar(Arudhra)



- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user :** Indian Airforce
- **Status:** 08 nos to be supplied to IAF. Radar under Production at BELGAD
- **Key Features:**
 - 300 Km
 - 4D AESA
 - Rotating & Staring configuration

Ashwini



- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user :** Indian Airforce
- **Status:** 18 nos to be supplied to IAF. Radar under Production at BELGAD
- **Key Features:**
 - 150 Km
 - 4D AESA
 - Rotating & Staring configuration



Projects with LRDE(DRDO)



VHF Radar



- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user :** Indian Armed Forces
- **Status:** Radar developed.
- **Key Features:**
 - 360 Km
 - Stealth technology
 - Operable for high altitude – 4500m

CAR MK-II



- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user :** Indian Army
- **Status:** Contract received for Improved AKASH WEAPON SYSTEM with upgrade for Indian Army fro Reg 3 & 4.
- **Key Features:**
 - 150 Km
 - Elevation coverage: 50 Deg
 - Height coverage: Up to 18 Km



Projects with LRDE(DRDO)

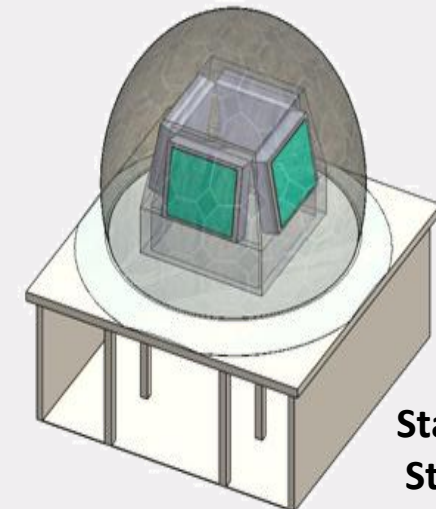


- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user :** Indian Airforce
- **Status:**
 - RFP Received from Indian Airforce for two sites i.e P'futsero & Gulmarg.
 - Techno-commercial Proposal submitted.
 - Technical evaluation under progress.
 - Order expected soon.
- **Key Features:**
 - 400 Km / 350 Km
 - 4D AESA
 - Static & Mobile configuration

Mountain Radar



Rotation & starring mode



Static (4 facet)
Staring mode



Projects with LRDE(DRDO)



Multi Target Multi Beam Radar(MMR)



- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user:** ITR Chandipur(DRDO)
- **Status:** Radar under development.
- **Key Features:**
 - Long Range Operation(LRO)/Medium Range operation(MRO) modes
 - MRO Range : 400 Km for 1 Sq m
 - LRO Range : 600 Km for 5 Sq m
 - 4D AESA

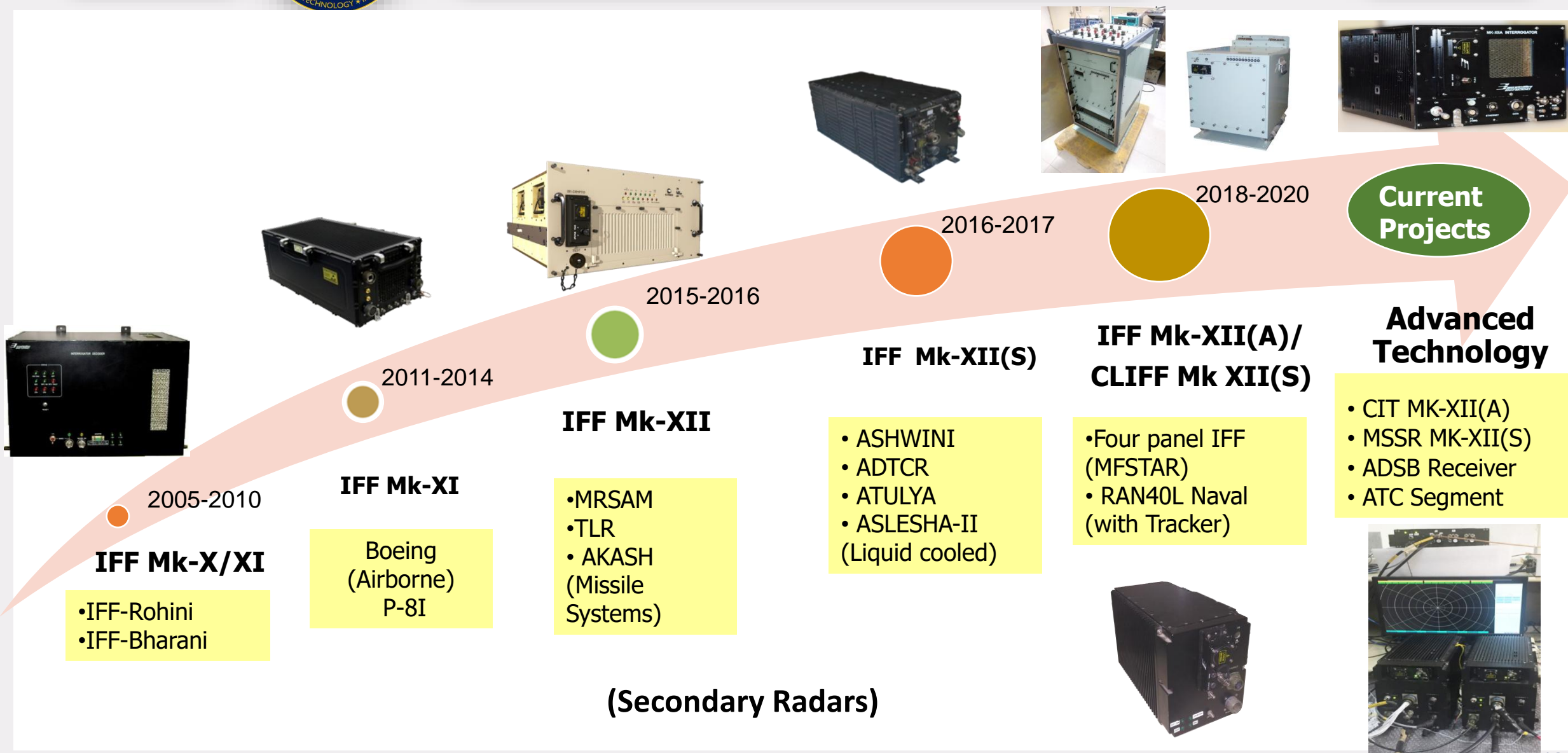
Long Range Battle Maintenance Radar(LRBMR)



- **Project Type:** Indigenous Development in collaboration with LRDE
- **End user:** LRDE(DRDO)
- **Status:** Contract received from LRDE. Development under progress.
- **Key Features:**
 - 380 Km
 - 4D AESA
 - Rotation and Staring modes



IFF Technology Evolution

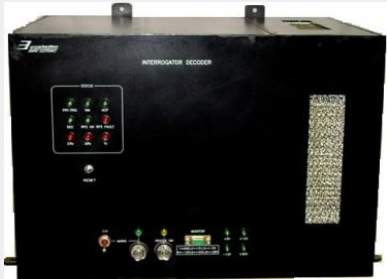




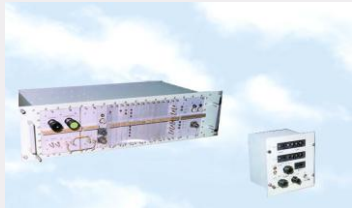
IFF Technology Evolution



IFF Legacy



IFF-ROHINI & ModKit Navy



IFF Mk-X For Flycatcher



IFF for Navy

IFF Pride



**IFF Mk-XI for P8I
Customer: Boeing, USA/Indian Navy**



**IFF Mk-XII for MRSAM
Customer: Elta Israel/ Indian Air Force**



**IFF Mk-XII(S) Ashwini/ Atulya
Customer: Indian Air Force/ Army**

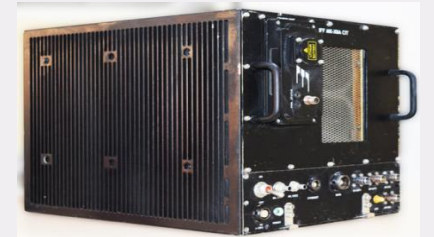
IFF Upcoming



ADS-B Receiver



Compact Light Weight IFF Mk-XII (S)



CIT IFF Mk-XII(A)



MSSR IFF Mk-XII (S)



ASR-MSSR



Project Type/End user:

- Pro-active development
- Indigenous ASR-MSSR Radar for ATC applications

Status:

- a) Order received from Airport Authority of India (AAI) for the supply of 05nos of ASR-MSSR. Supply is under execution.
- b) Order received from HAL for the supply of 02nos of ASR-MSSR. Supply is under execution.

Key Features

ASR Maximum range: 60 NM for 2 sq m RCS

MSSR Maximum range: 200 NM for 2 sq m RCS



Infrastructure & Facilities



Microwave Lab



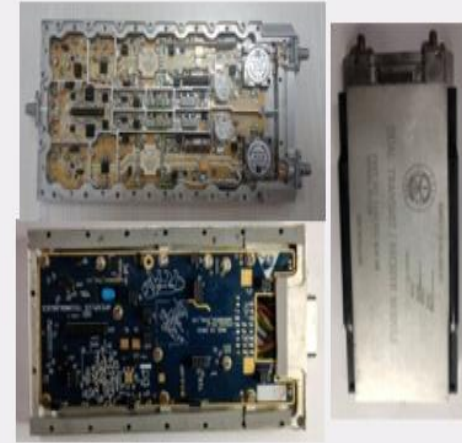
Class 1000 Facility with Work Stations



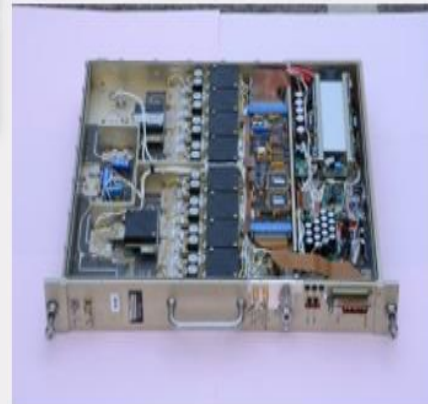
**Rx Tile
(LLTR Radar)**



**Octopack for Transmitter
(LLTR Radar)**



**100 W DTRM for AAAU
(Ship Borne Radar)**



**High Power Amplifier
(SRE Radar)**



4 KW IFF Transmitter



**3-Channel Mono-Pulse Receiver for
Mark XII IFF**



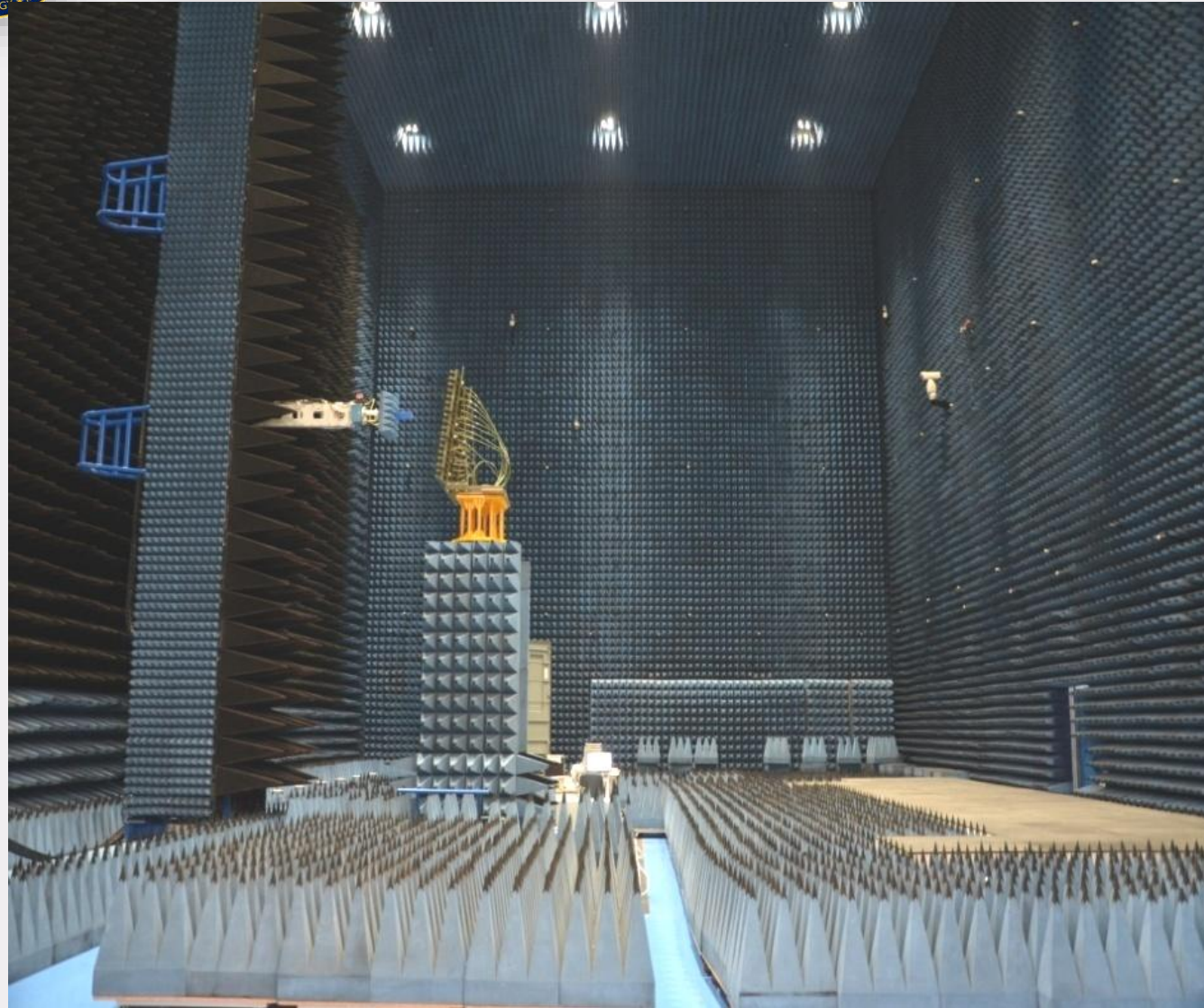
Radar Testing Facilities



All weather Radar Testing & Integration Hangars



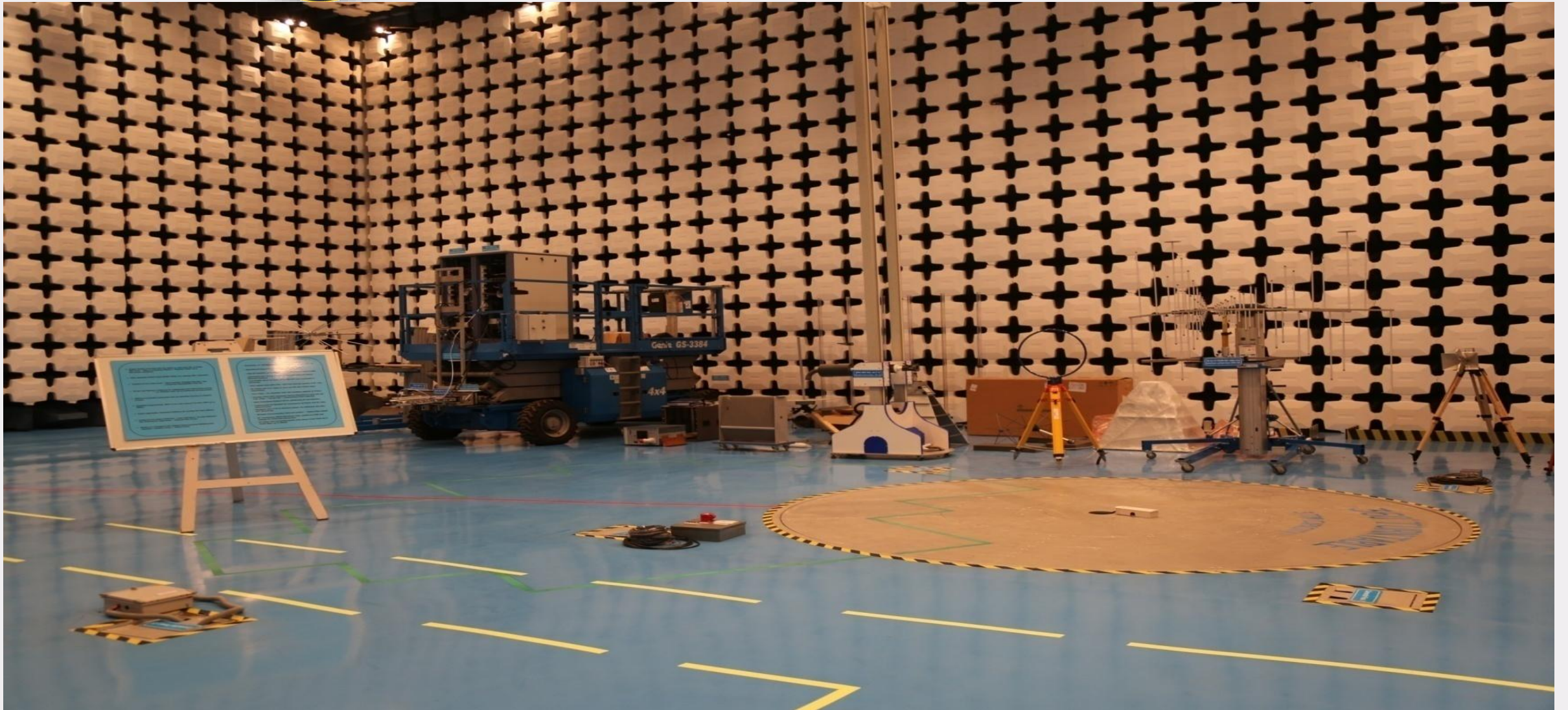
Antenna Testing Facilities



NEAR FIELD TEST FACILITY



EMI / EMC Test Facility





Environmental Test facilities



TEMP / TROPICAL / DAMP



THERMAL SHOCK



WALK IN CHAMBER



VIBRATION TEST



BUMPTTEST



SALT SPRAY



Thank you