



Automation
Capabilities

Wipro Group



170,000+
workforce



\$21Bn
market capitalization



\$9.5Bn
sustained growth

Wipro Group

Wipro Enterprises

Wipro Limited



Wipro Infrastructure Engineering

- Hydraulics
- Aerospace
- Water Treatment
- Additive Manufacturing
- Automation Solutions



Wipro Consumer Care & Lighting

- Personal Care
- Wellness
- Lighting, Furniture and Switches



Wipro Kawasaki Precision Machinery

Hydraulic Pumps and Swing Motors for Excavators



Wipro-GE Healthcare

Healthcare Equipment and Solutions



IT
BPO
R&D
Services
Consulting
Services

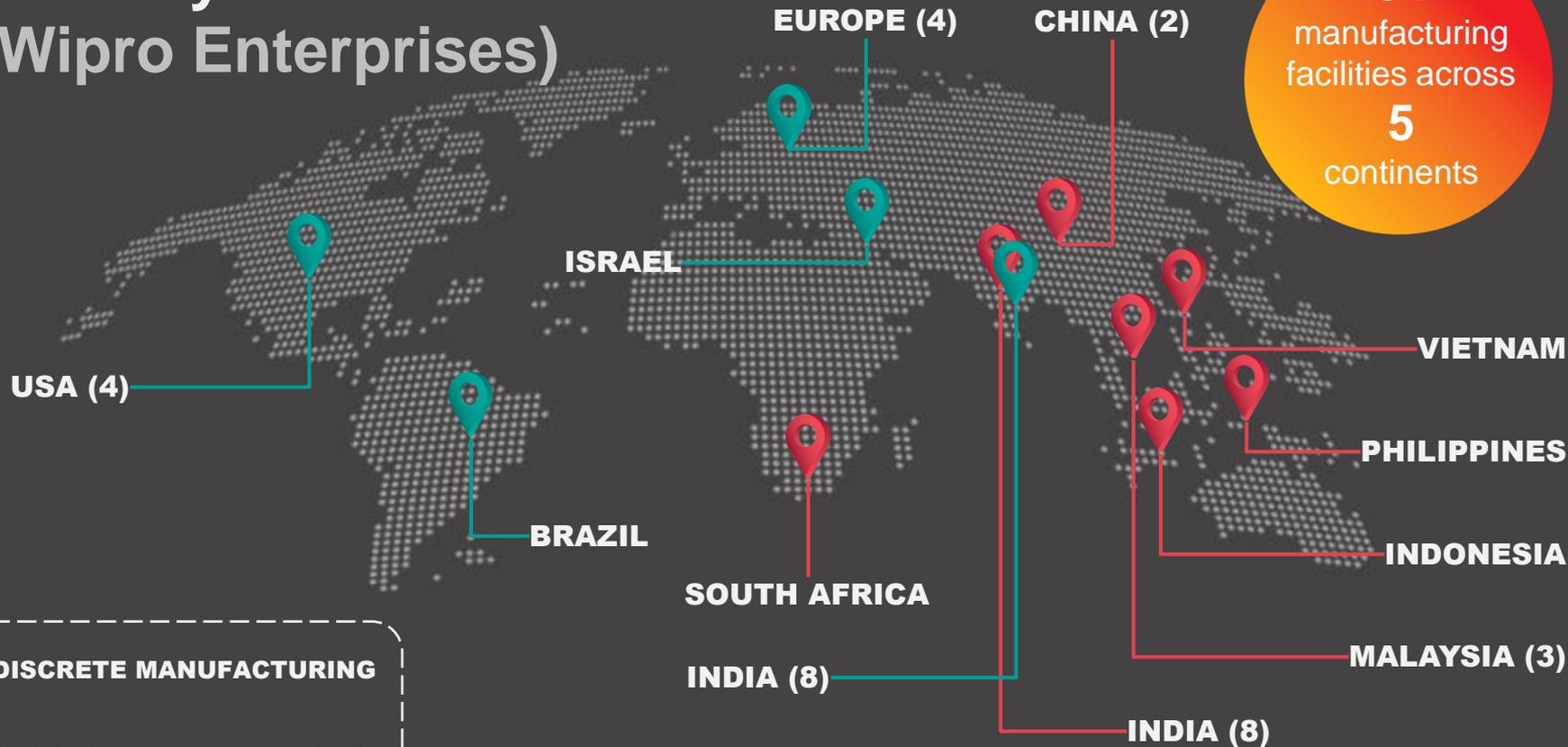
Joint Venture

Revenue of \$1.44Bn, workforce of 12000+

See above

Globally connected (Wipro Enterprises)

34
manufacturing
facilities across
5
continents



 **DISCRETE MANUFACTURING**

 **PROCESS MANUFACTURING**



WIPRO PARI Global Facilities



Rochester Hills, MI, USA

Automotive Business World Head
Quarter

- Team of 30+ employees
- Supported by strong team of 110+ USA VISA Holders from PARI Asia
- Key Functions being handled –
 - Project Management
 - Mechanical and Electrical Design coordination
 - Service Support



Pune, India

Engineering & Manufacturing Hub

- 29 Acres or Campus with 400,000 sqft of built up facility.
- Inhouse facilities for
 - Metrology & Standards Room
 - Tool Room & Prototype Facilities
 - Fabrication & Machine Shop Facility
- Ability to Simultaneously execute Build & Run-off for 10 Machining or Assembly line programs



Stuttgart, Germany

Europe Business Centre

- Focused on serving European Customers
- Key Functions being handled
- Sales (Front End Sales and Customer Engagement Activity)
- Customer Support (Post sales support to the PARI Supplied equipments in Europe)
- Design co-ordination (Customer Interface for Design Activities)

History

Over 2000 Automation Solutions & 250 Turnkey Lines implemented Globally.

1990: Inception of PARI

- 1995: Powertrain Machining
- 1997: Powertrain Assembly

Global Business & Facilities Expansion

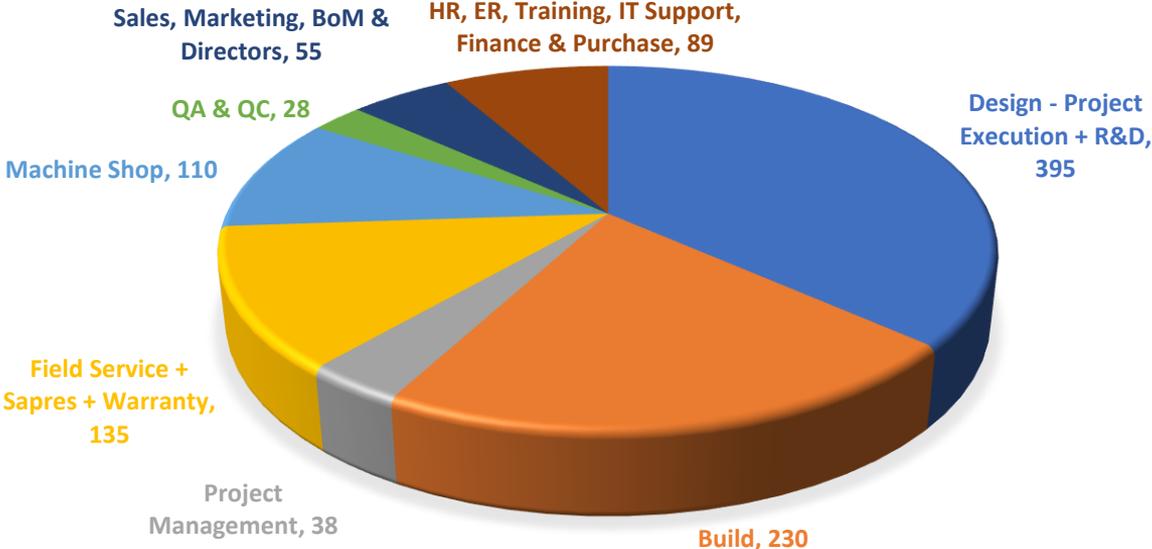
- 2001: PARI Inc. (US) Established
- 2007-8: First Turn key Assembly and Machining Automation Programme at FIAT, GM & Renault Nissan
- 2009 Global Program in South Africa with Ford
- 2010-2014: Major US & Europe Projects
- 2012: Completion of US\$14M Facility Expansion in India.

Global Expansion and Entry in EV Mfg Solutions

- 2016: Major Projects in Canada & Mexico
- 2017: PARI Europe: GmbH
- Global Sales & Service Network expanded through APAC, Europe region
- 2017: EV R&D Program, HEV Battery Project execution
- 2018: EV MEL Assembly Project in EUROPE & BEV Assembly in NA.
- 2019: EV Transmission for OEM and Tier I
- 2020: Turnkey Battery Pack & Module Assembly in Southeast Asia

Team Size

With a total 1300 full time employees, WIPRO PARI has the largest automation and robotics engineering teams in India

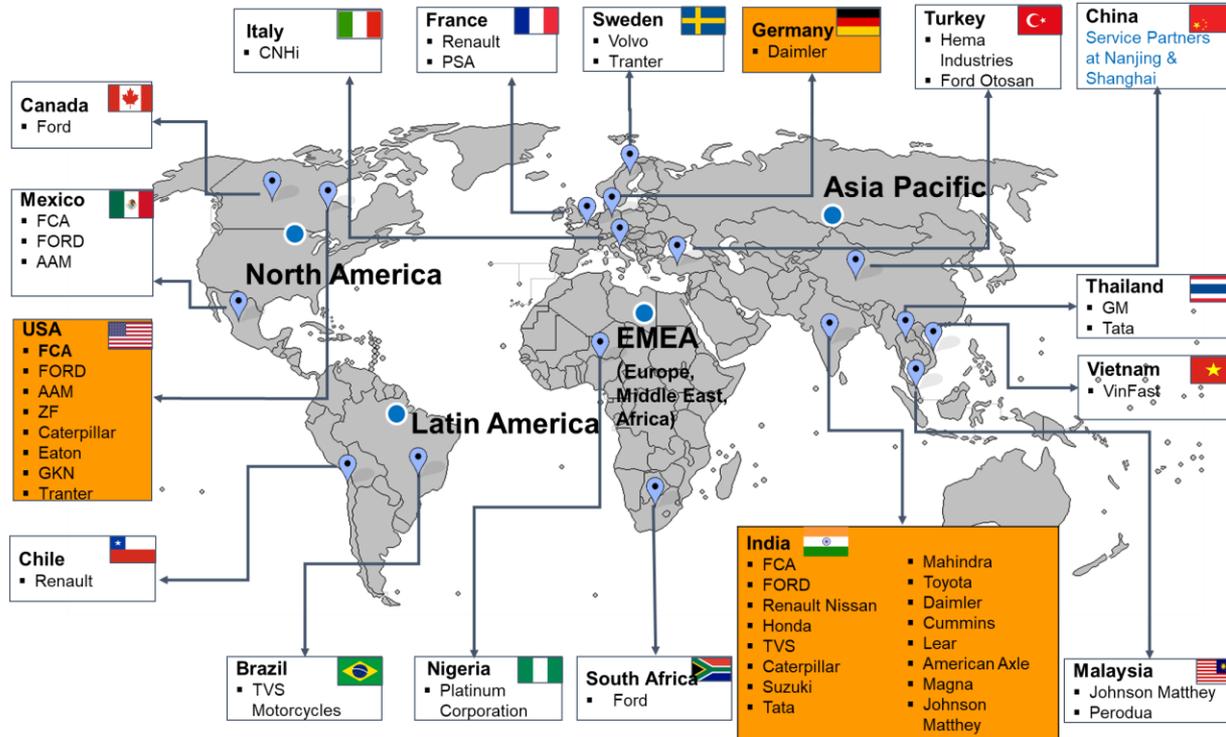


Inhouse Manufacturing Facility - India

- State of the Art of Manufacturing facility, which is equipped with Machines , equipments and required resources for operations.
- The machining facility is equipped with like Large, Medium and small size VMC, HMC & Turning Centers.
- Precision fabrication facility, which includes Daimler tables for the modular fixturing , Daimler Rail System for large jobs, MIG Welding Machines etc.
- Sheet metal section includes CNC fiber Laser, CNC Bending Machines & Welding Systems for the precision sheet metal components.
- Heat Treatment facility includes Stress Relieving Furnace and Fluidized Bed System.
- Surface Treatment facility is equipped for Shot blasting , Painting , Powder Coating & Black Oxidization.
- QC facilities has 3D Co-ordinate Measuring System, Height Masters, inspection tables and all precision measuring instruments.



Global Customer Base



Key Business Segment

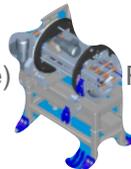
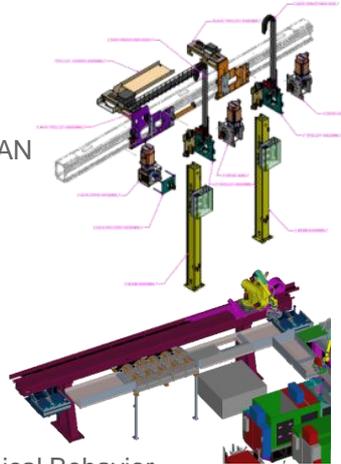
Electric Vehicle Mfg Solutions	Powertrain Assembly	Machine Tending	Welding	Tier 1 Segment	Intralogistics & Storage	Car Parking Solution	Food, Beverages & Pharma
<ul style="list-style-type: none"> Battery Assembly (HEV/PHEV/B EV) Stator Assembly Solutions Rotor Line Automation Electric Engine (Motor) Assembly EV Transaxle and Gearbox Assembly 	<ul style="list-style-type: none"> Engine Assembly Line Transmission Assembly Line Axle Assembly Line Various sub-assembly Line 	<ul style="list-style-type: none"> Gantry Systems Robotic Handling Floor Automation Measurement (Gauging), Pressing, Tightening, Marking etc. nonmetal cutting machines 	<ul style="list-style-type: none"> MIG, TIG Welding Spot Welding Welding fixtures Checking Fixtures 	<ul style="list-style-type: none"> Seat Assembly Solutions Tire Handling and Storage through out Tire Mfg. Plant Various Material Handling and Assembly Solutions to Automotive Tier 1 Customers 	<ul style="list-style-type: none"> Automatic Storage & Retrieval System Automatic Guided Vehicles (AGVs) Automatic Truck Loading System 	<ul style="list-style-type: none"> 2 Step Stacker Puzzle Parking Stacker Crane CART Parking Level Parking Tower Parking Chess Parking 	<ul style="list-style-type: none"> Part Picking Packaging Palletizing Storage Automation



Engineering Capabilities

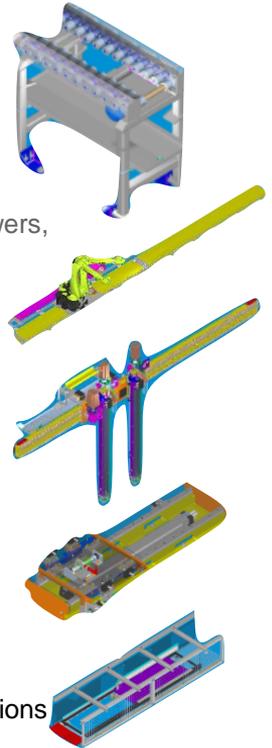
Engineering Infrastructure

- CAD Facilities & Engineering Stations
 - 300+ Engineering Workstations
 - CAD Platforms
 - CATIA, Solid Edge, AutoCAD, e-PLAN
- Simulation
 - Factory CAD
 - Layout Visualization
 - Coarse Timing Study for Planning
 - Rob CAD
 - Detailed Timing Study
 - Off-line Programming
- Virtual Commissioning
 - Define Kinematics & Electromechanical Behavior
 - Test Programs
 - Test Issues / Failure modes
 - Report performance (issues, cycle time, setup change time)
 - 15 People Team Trained on VC Technology



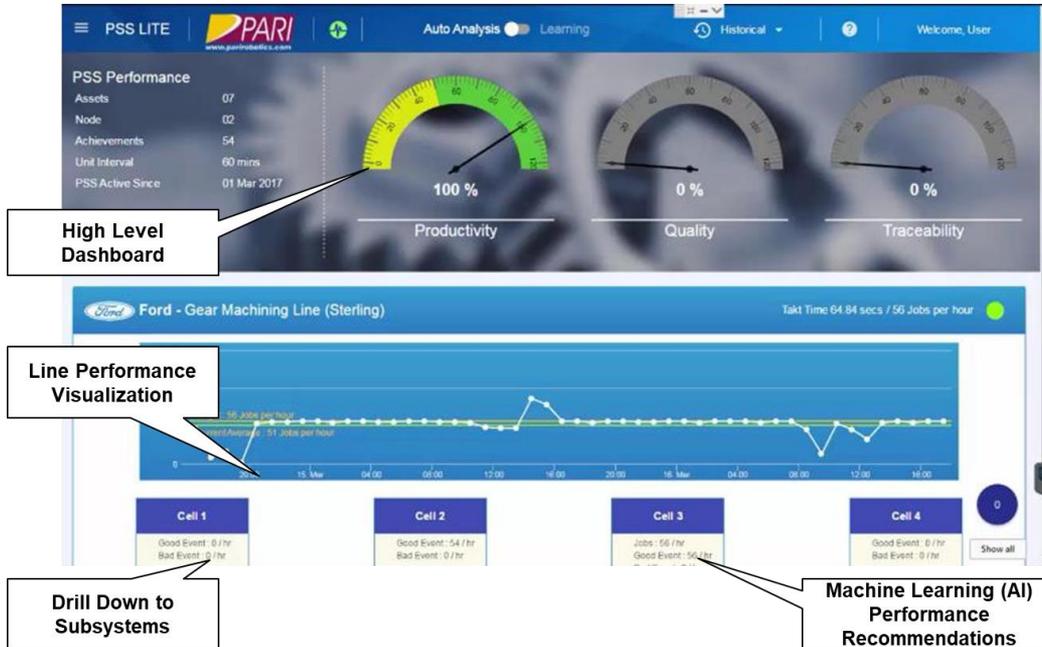
Engineering Standardization

- Floor Automation
 - Conveyors, Shuttles, Transporters, Lifters, SPC Stations, Buffers, Nests, Storage Towers, Rotates, Turnovers
- Process Modules
 - Presses, Rams, Reaction Tools, Machine Modules, XY Positioners, Dispensers, Traceability Modules, Vision Modules
- Tooling Modules
 - Grippers, Pallets, Nests, Clamps,
- Motion Modules
 - Slides, Shuttles, Stoppers, Rotary Axis, Indexers,
- Gantry Robots & Accessories:
 - Columns, Under-guarding, Cable Carriers, Hatch Doors
- Robotic Integration Modules
 - Robot Gantry, Shuttles, Positioners, Workstations



IIOT Solutions

PSS Productivity Solution Synthesis (IIoT App – Line Data Capture & Data Analytics)



Virtual Commissioning

➤ Efficiency through Early Collaboration with Line Supplier

- End-to-End virtual verification of Mechanical and Control systems design
- Risks & Failure Modes
- System performance
- Reducing Travel & Visits for Run-off Tests

➤ Fast Ramp-up of New & Retool Lines

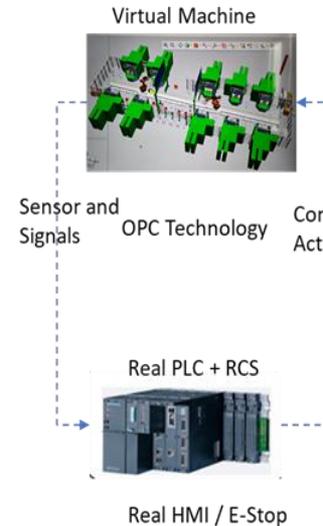
- End-to-End virtual validation of
- Software Operation
- System performance
- User Interface & Usability

➤ Virtual Commissioning Steps –

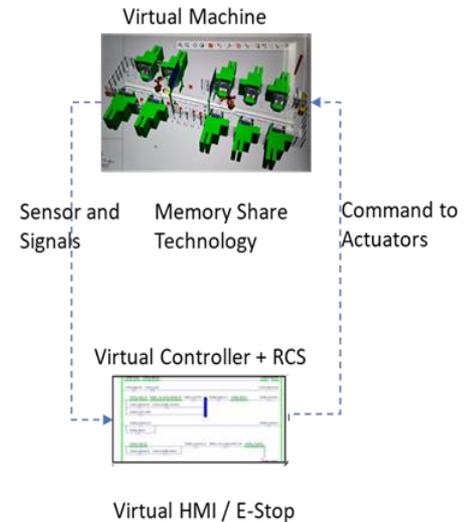
- VC Setup – Hardware in Loop
- Mechanical & Control Modeling
- Unit Verification
- Interference Checks
- Sensors Verification
- Operating Sequence Verification
- Software Interfaces Verification
- Cycle Time Verification
- Start-up & Recovery from Faults
- Full System Simulation to Visualize & Virtually Validate

VC Setups

Hardware-In-Loop



Software-In-Loop





Experience in Various Automation Solution

Application Expertise



EV Solution



Powertrain Assembly Solution

- Engine Assembly
- Transmission Assembly



Machine Tending Automation

- Machining Line Automation
- Pack in Pack out Cell



Welding Automation



Tier 1 Segment



Intra Logistics & Storage Automation

- Automatic Storage & Retrieval System
- AGV/RGV/RGC

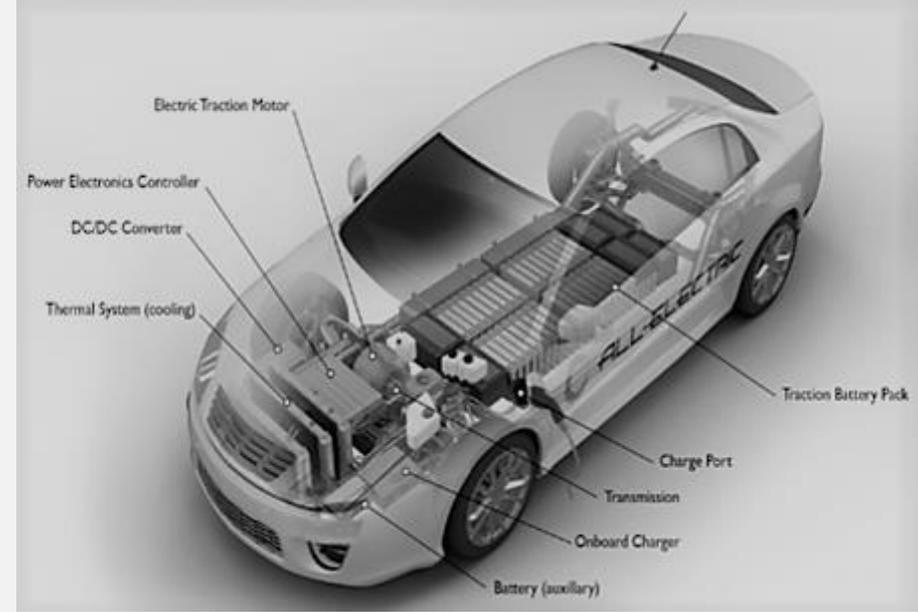


Car Parking Solution



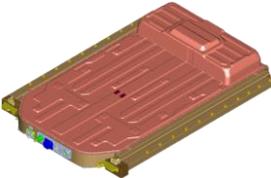
FMCG & Pharma

Electric Vehicle Mfg Assembly Solution

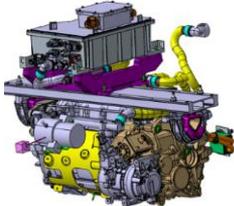


Global Competencies in e-mobility Manufacturing Technologies

Battery Modules & Pack Assembly



Electric Drive Assembly



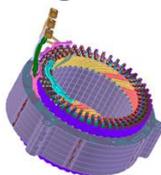
EV Transmission Assembly Lines



Rotor Assembly



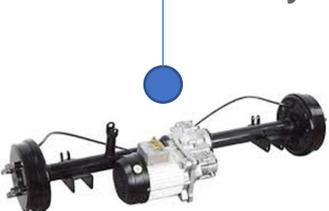
Stator Line Automation



Motor Assembly



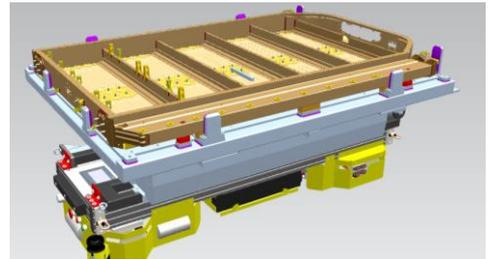
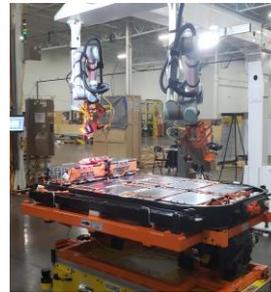
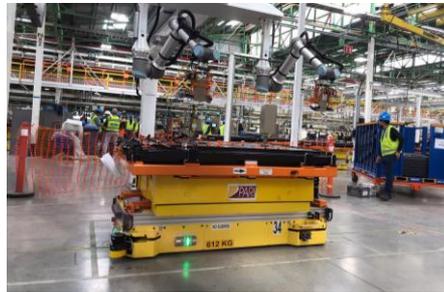
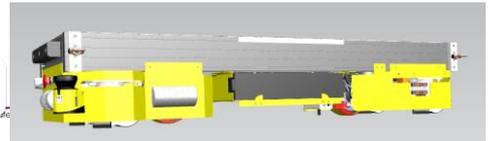
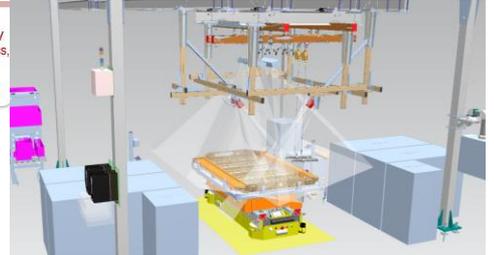
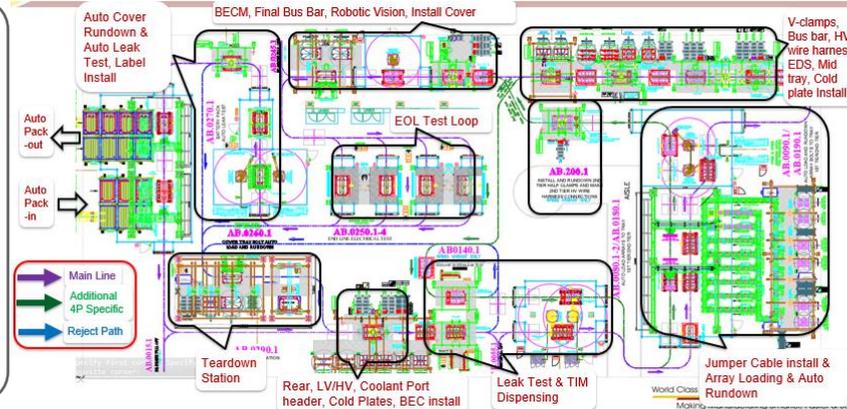
e - Axle Assembly



BEV Battery Assembly Line

Application: Battery Assembly Line

- **Part :** BEV Battery
- **Battery Capacity :** 120 KW
- **Area of Assembly Line :**
(L) 41m x (W) 15m
- **Production Details :** 75
K/annum
- **TAKT :** 172 Sec



Electric Drive (Engine) Assembly Line

Application: Electric Drive (Engine)
Assembly Line

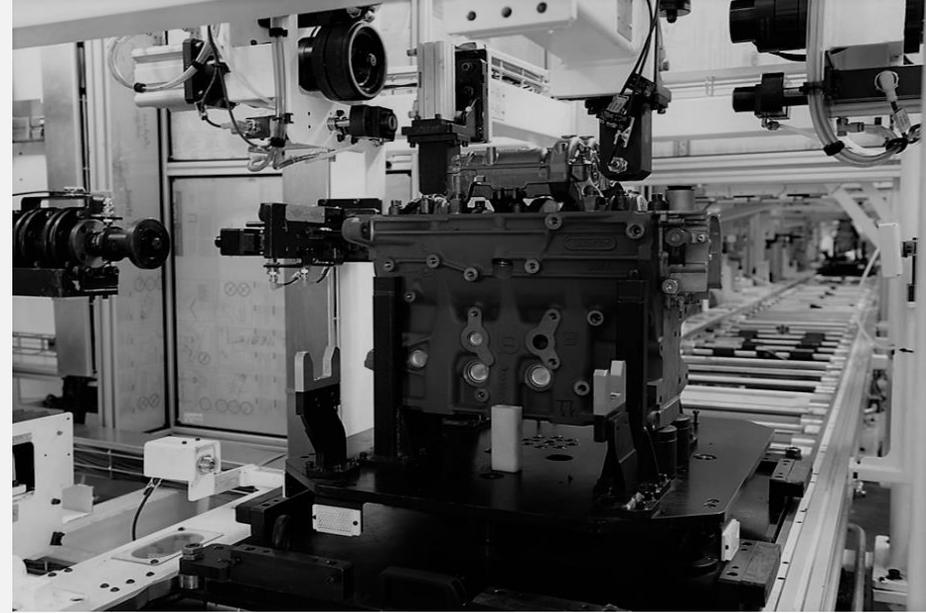
- **Part :** Electric Engine
- **Area of Assembly Line:**
(L) 78.5 m X (W) 43.5 m
- **Production Details :** 180K/
annum
- **TAKT :** 172 Sec



Powertrain Assembly Solutions

- Engine Assembly Lines.
- Transmission Assembly Lines
- Axle Assembly Lines
- Drive Head Assembly Lines

- Transport Systems – Conveyors, Pallets, AGVs
- Assembly Equipments – Pressing, Tightening, Sealant Dispensing
- IPV & Quality Control – Torque / Backlash / Shim measurement, Vision System, Pokayoke
- Data Acquisition – MES integration, Data acquisition & processing, IIOT based tool for deep learning



Engine Assembly Line

Application: Engine Assembly Line

- **Part :** 4 Cylinder Engine
- **Variant :** 02
- **Weight :** 184 Kg
- **Production Details :** 100K/ annum
- **TAKT :** 144 Sec

Process Involved:

- Leak Testing, Tightening
- TOD, No. marking & checking
- Piston Protrusion Checking
- Manual Loctite application , oil plug pressing
- **Transport System :**
Power & Free Roller Conveyor



Transmission Assembly Line

Application: Transmission Assembly

- **Production Details :** 48K / annum
- **TAKT :** 300 Sec

Process Involved:

- Shaft line
- Pre-Assembly Line
- Main line (Pressing, tightening and gauging)
- Robotic sealant dispensing
- Heating and bearing pressing



Machine Tending Automation

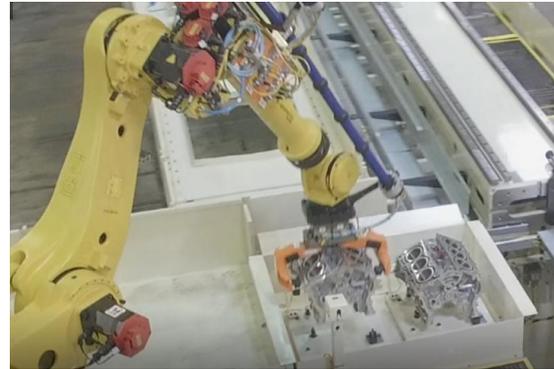
- Linear Gantry Solutions
- Robotic Handling / Robot Gantry Automation
- Floor Conveyors
- SPMs – Leak Testing, Number Marking, Pressing, Tightening etc.



Cylinder Block Machining Line Automation

Application: Machining Line
Part: Cylinder Block

- **Robot:** Robot on Rail
- **Takt Time:** 280 Sec
- **Production:** 46K/yr (3 Shift Basis)
- **Payload:** 363 lbs



Gantry Automation for Cylinder Block Line

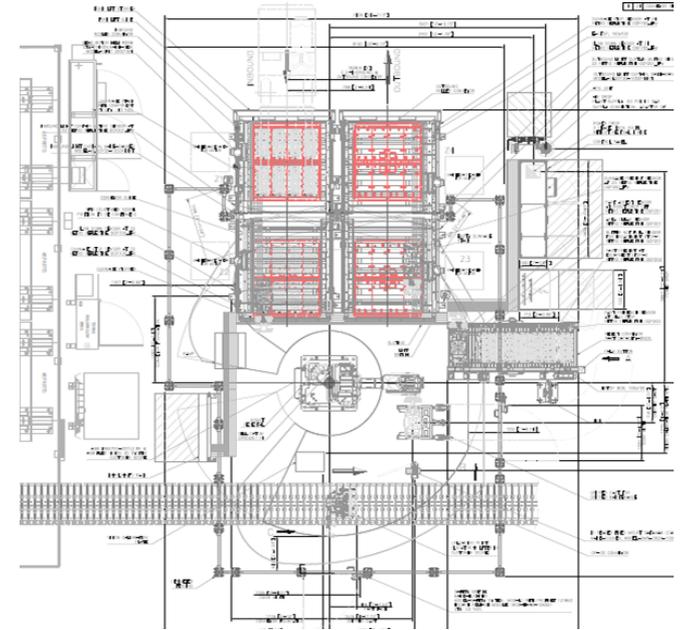
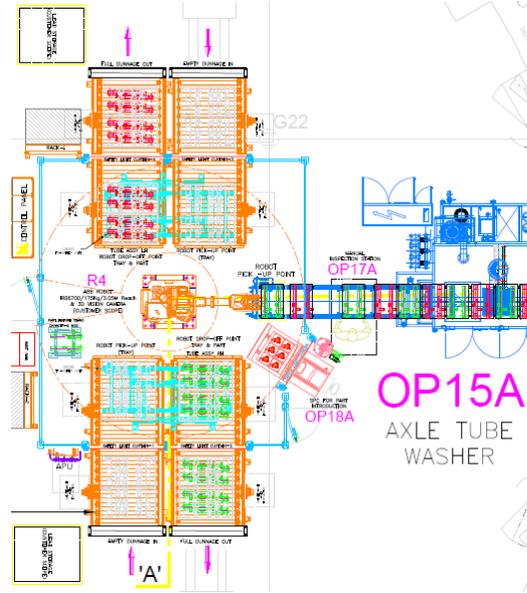
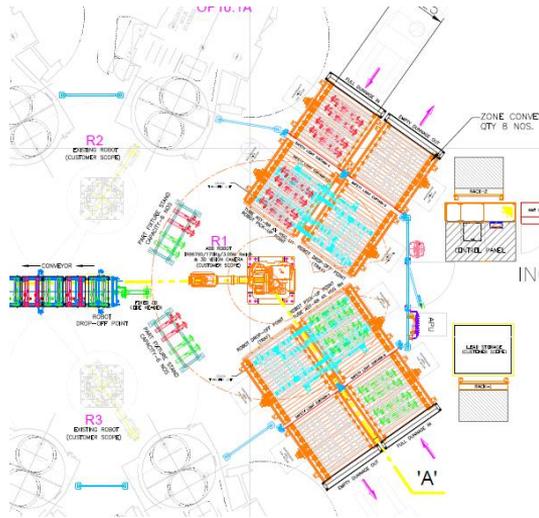
Application: Machining Line,

- **Part:** Cylinder Block
- **Robot:** H Type
- **Takt Time:** 64.7 Sec
- **Production:** 264K/yr (3 Shift Basis)
- **Payload:** 661 lbs



Pack-in / Pack-out cells

- Implemented for Assembly lines and Machining Line to feed parts and stack the finished part
- Typical arrangements for pack-in / pack-out cells



Robotic Pack In Pack Out Cell

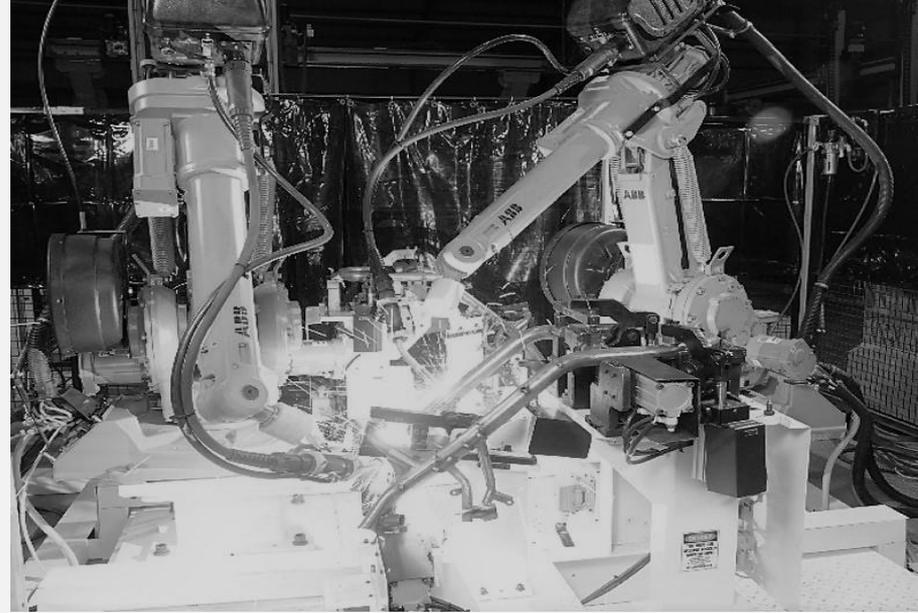
Application: Handling Automation
Part: Cylinder Block

- **Takt Time :** 61.2 Sec
- **Station Equipment**
Robotic PIPO Cell
3DL Vision System Robot Mounted



Welding Automation

- MIG, TIG Welding
- Spot Welding
- Welding Fixtures
- Checking Fixtures



Robotic Welding Cell for Scooter Frame Front and Rear Component

Application: Welding Automation

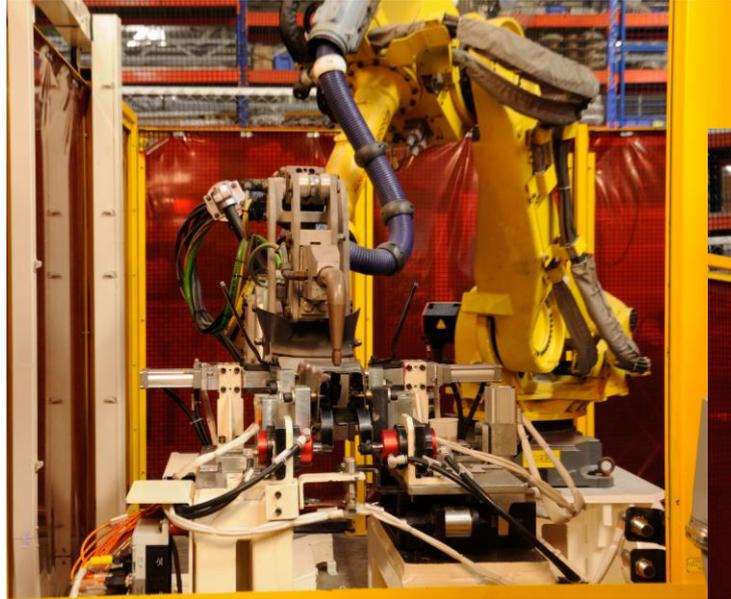
- **Part:** Frame
- **Vehicle Type:** Two Wheeler
- **Head/Robot Type:** Robotic Cell
- **No. of Robots:** 2



Robotic Spot Welding System for Front Bumper– Subassemblies & Assemblies

Application: Spot Welding
Automation

- **Part:** Front Bumper

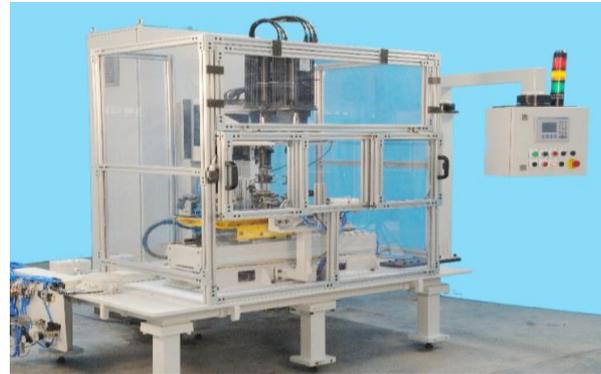
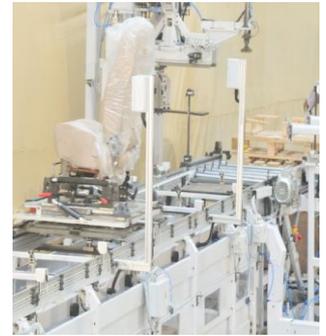


Tier 1 Segment

- Seat Assembly Solutions
- Tyre Handling Automation
- Various Material Handling and Assembly Solutions to Automotive Tier 1 Customers



Tier 1 Segment



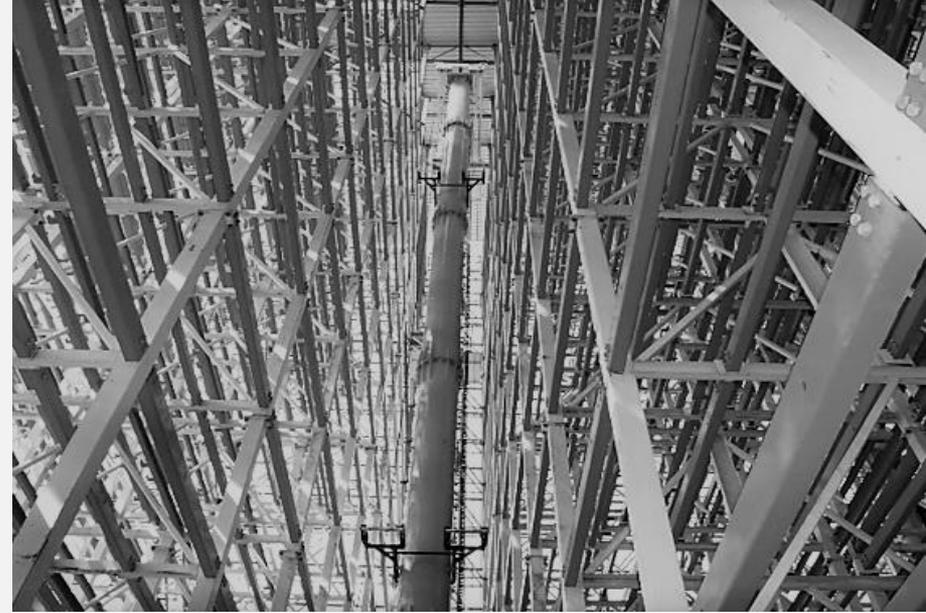
Tyre Handling Automation

Application: Handling Automation

- **Part:** Tyre
- **Takt Time:** 14 Sec
- **Throughput:** 1458K/yr (3 Shift Basis)



Intra Logistics & Storage Automation



PARI's Capabilities for In-Plant Logistics

Turnkey Solutions Form

- Raw Material In...To Finish Goods Out..
- Features with Automatic Truck Loading – Unloading.
- Automatic Warehouse with Value Engineered Solution.
- In-Plant Movements of Goods With AGV's/EMS/ Conveyors Systems



PARI's Capabilities for In-Plant Logistics

Automatic Truck Loading
& Unloading Solution



Various Automatic
Storage Solutions



Conveyor Systems
Overhead Interfaces



AGVs Automated
Guided Vehicle



Palletizing Solutions with
Robot and Gantries



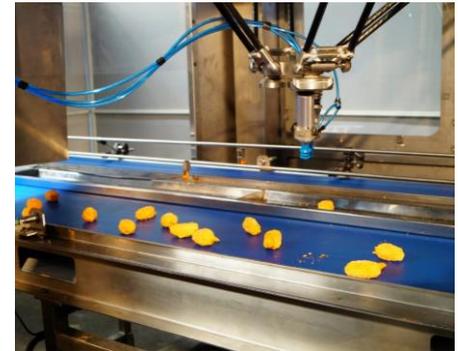
Conveyors



Packaging Automation

Application: Handling Automation

- **Component:** Crab
- **Takt Time:** 0.225 Sec
- **Production:** 9,07,20,000/yr (3 Shift Basis)



Palletizing Automation

Application: Palletizing Automation

- **Component:** Air Conditioning Unit
- **Takt Time:** 10 Sec
- **Production:** 2041K/yr (3 Shift Basis)



Automatic Truck Loading Automation

Application: Storage Automation,

- **Part:** Yarn Box
- **Takt Time:** 12 Sec
- **Production:** 1701K/yr (3 Shift Basis)



ASRS Based Automation

Application: Storage Automation

- **Part:** Motorcycle
- **Stacker Mechanism:** 42 ft height
- **Takt Time:** 20 Sec
- **Throughput:** 1020K/yr (3 Shift Basis)



AGV Based Solution

Application: Assembly Area Logistics

- **Part Handled:** Motorcycle Engines mounted on Trolley
- **Guidance:** Magnetic Tape
- **Number of AGV's:** 2
- **Payload Capacity:** 500 kgs
- **Total Loop Length:** 110 Meters



Car Parking Solution



PARI Offering in Automated Car Parking

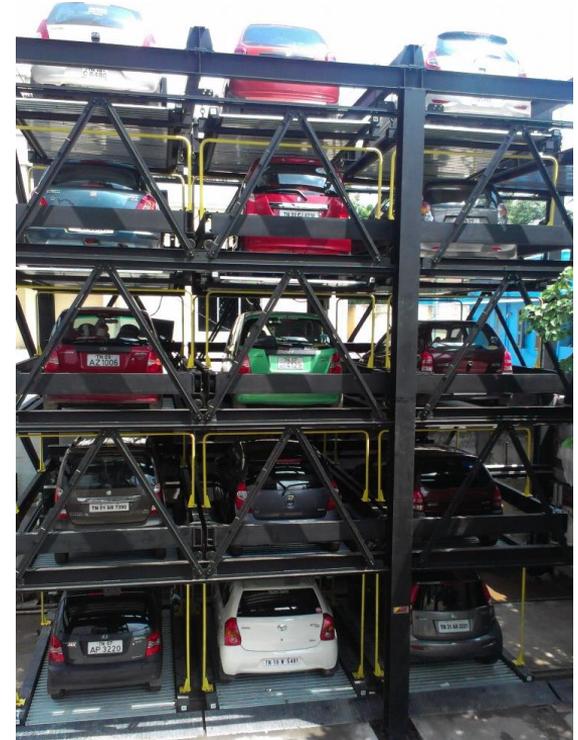
Semi Automatic Parking Systems:

- Stacker Parking System
- Puzzle Parking System

Fully- Automatic Parking Systems:

- Level Parking System
- CART Parking System
- Tower Parking System
- Chess Parking System

The above parking systems are suitable for:
Residential complexes, Commercial Complexes, IT parks, Malls, Hotels, Public Parking areas etc.



FMCG / Pharma Project Experience



Packaging Automation

Application: Packaging Automation,

- **Component:** Detergent Pouch
- **Takt Time:** 5 Sec
- **Production:** 4,000,000 Cartons/yr (3 Shift Basis)



Pallet Storage Automation

Application: Storage Automation,

- **Component:** Pallet
- **Stacker Mechanism:** 16.5 meter height, Travel Speed- 2.5m/sec
- **Takt Time:** 120 Sec (Per pallet basis)
- **Throughput:** 30/hour



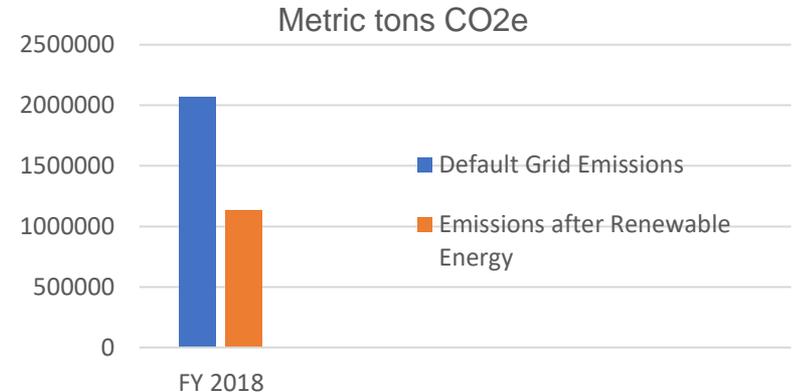
Green Initiative

Rainwater Harvesting System-

- The Company Constructed pond for the rainwater harvesting. With the use of this pond, Company harvests around 20 Lakhs liters of water per annum. As on the date of this report, the said pond is holding a record 40 Lakhs liters of water.
- Tree Plantation-
- The Company planted approx. 300 trees and 800 plants + shrub + Lawn around its Dhargarwadi premises. Including the number of plantation made during the year, the Company is maintaining around total 1300 trees & 5800 plants+ shrubs as on date of this report at its Dhargarwadi premises.

Renewable Energy – Solar

- More than 45% of the electricity we use at our Shirwal plant is generated from Solar Power Plant of about 1 Mw capacity.
- This effort have lowered more than 40% of emissions from our facility.





**Thank you for
your time !**