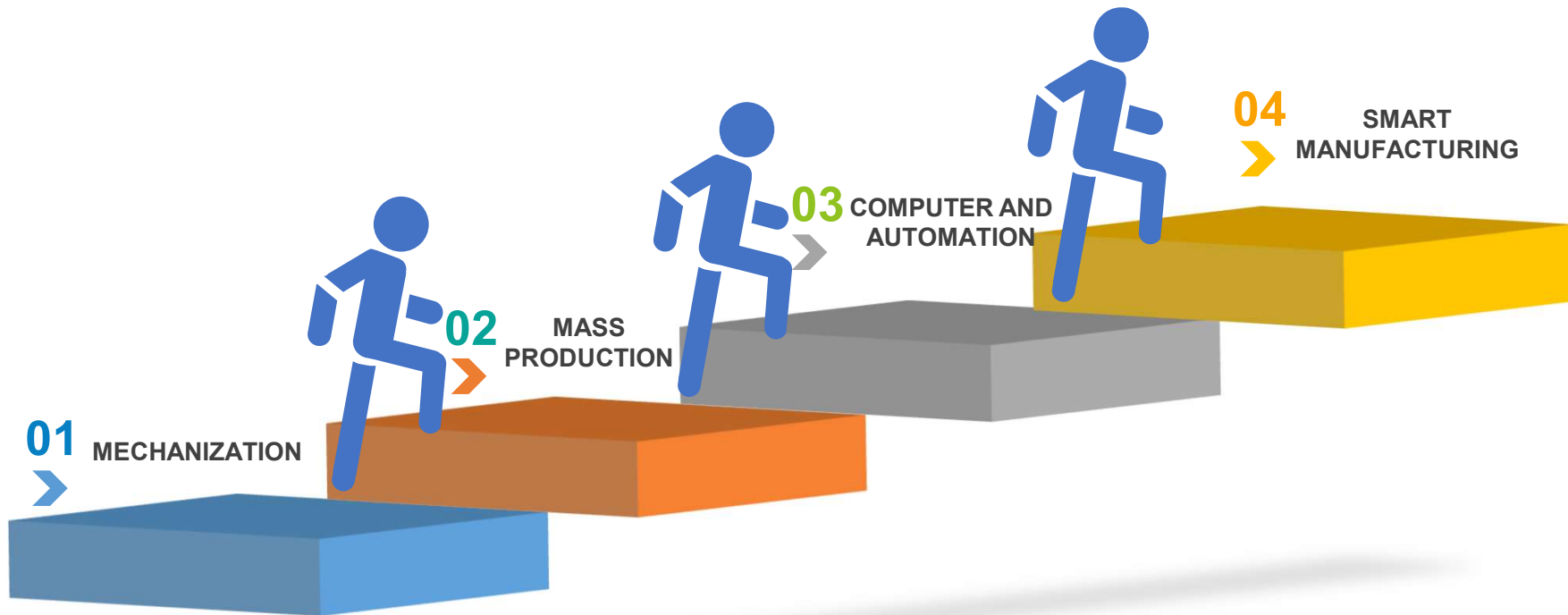


BHEL SAMVAAD 3.0

- सहयोग से सफलता

AI in Manufacturing Technology



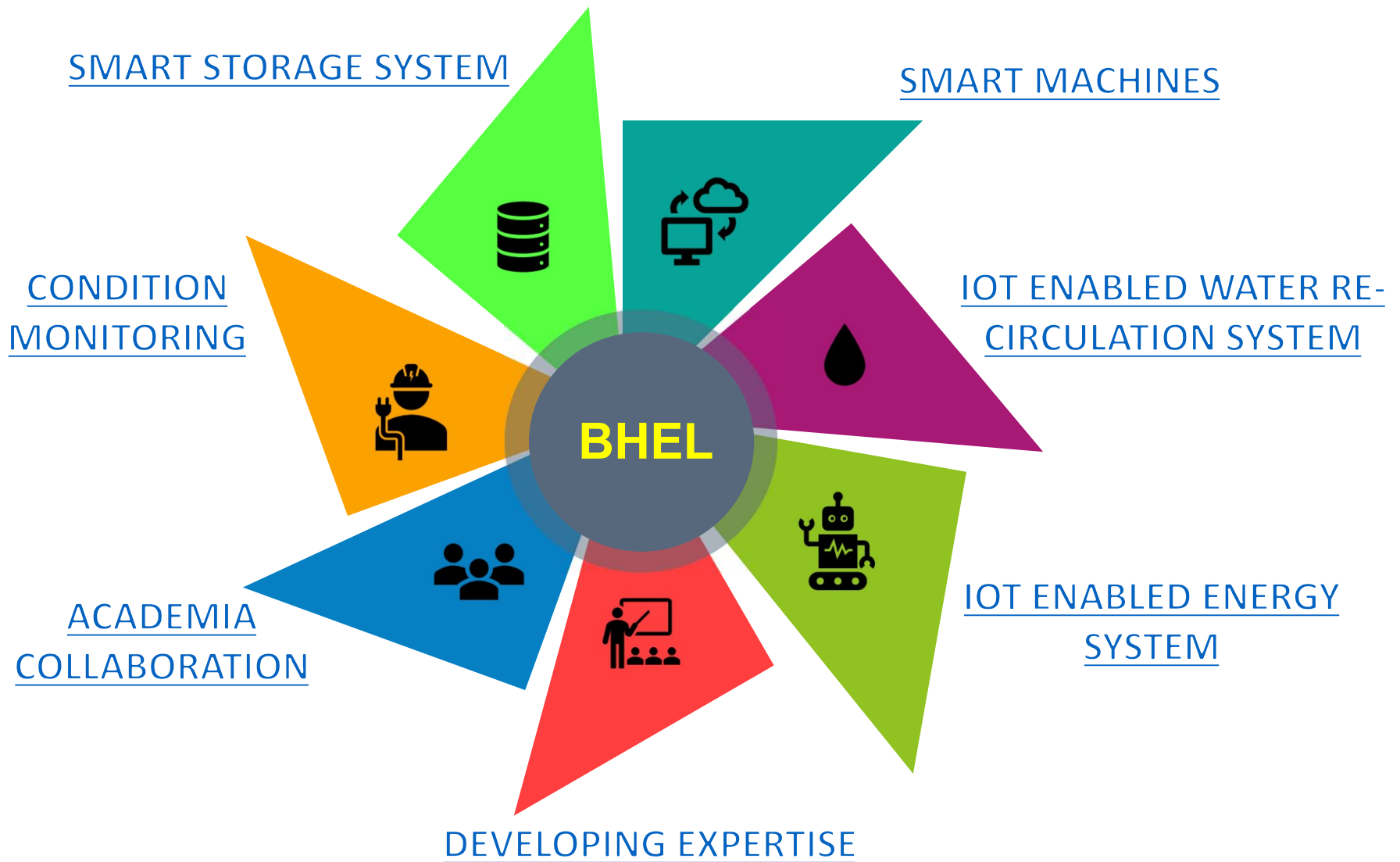
9th Nov 2023

Bharat Mandapam, New Delhi

Session – AI in Manufacturing Technology

AI in Manufacturing Technology

BHEL.... Moving ahead with small steps.....



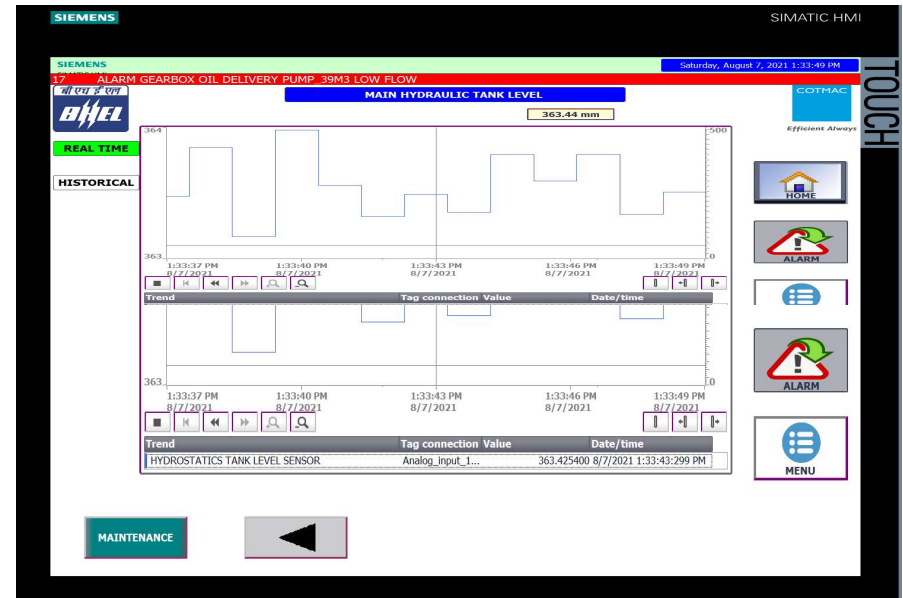
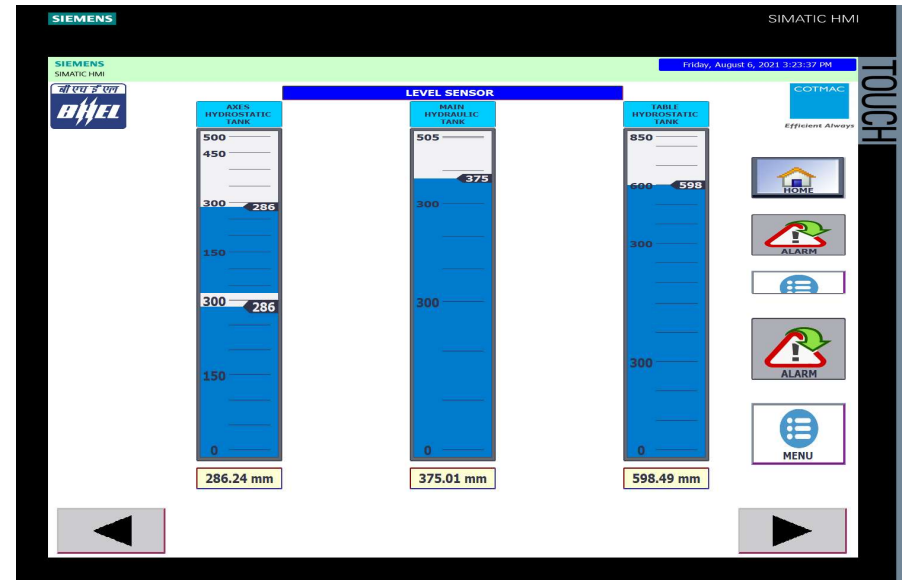
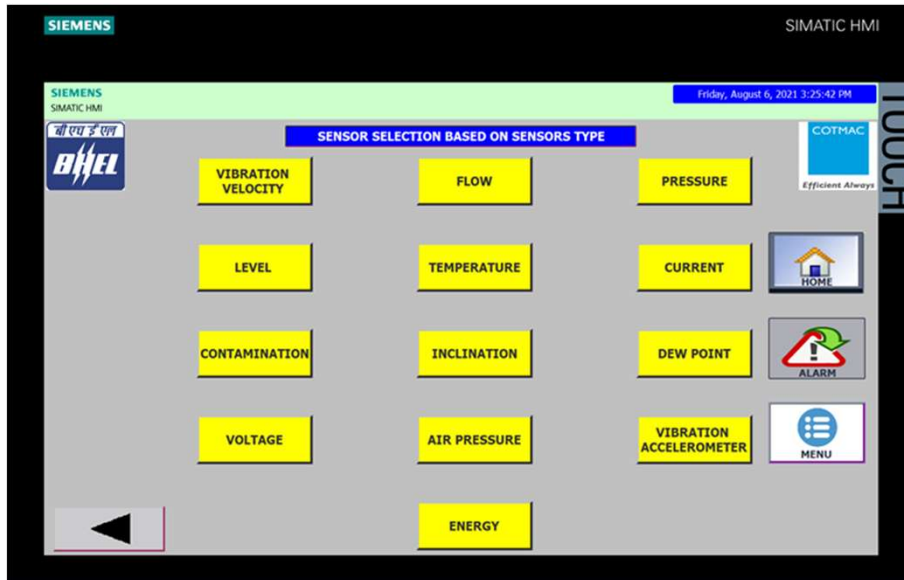
Applications - Smart Machines

- ✓ Large CNC vertical borer with table dia of 6.5m & work piece height of 7m.
- ✓ Phase-1: Discrete sensor Data collection & utilization -
 - ✓ Added 71 analog sensors to get key insights.
 - ✓ Dedicated server.
 - ✓ Generation of system generated e-mails/ SMS for alarms/ pre-alarms.
 - ✓ Display of Real time & historical trends.
- ✓ Phase-2: Controller Data collection & use -
 - ✓ Real time collection & display of critical CNC Parameters.
- ✓ Substantial reduction in machine breakdown hours (YoY basis).



Pietro Carnaghi CNC Vertical Borer machine - Turbine Shop
HEEP, Haridwar

Applications - Smart Machines



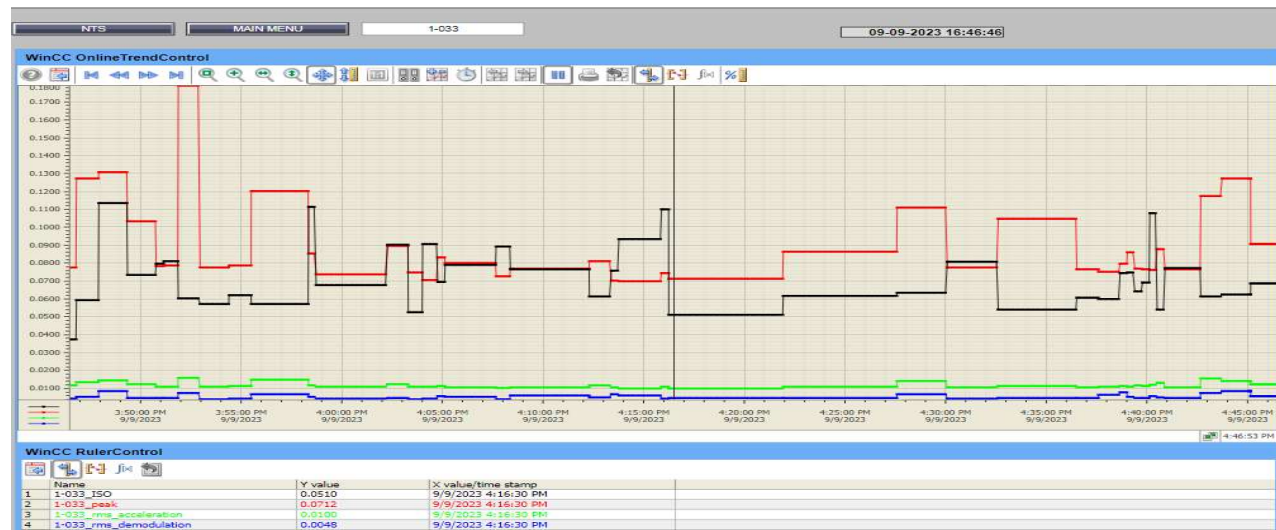
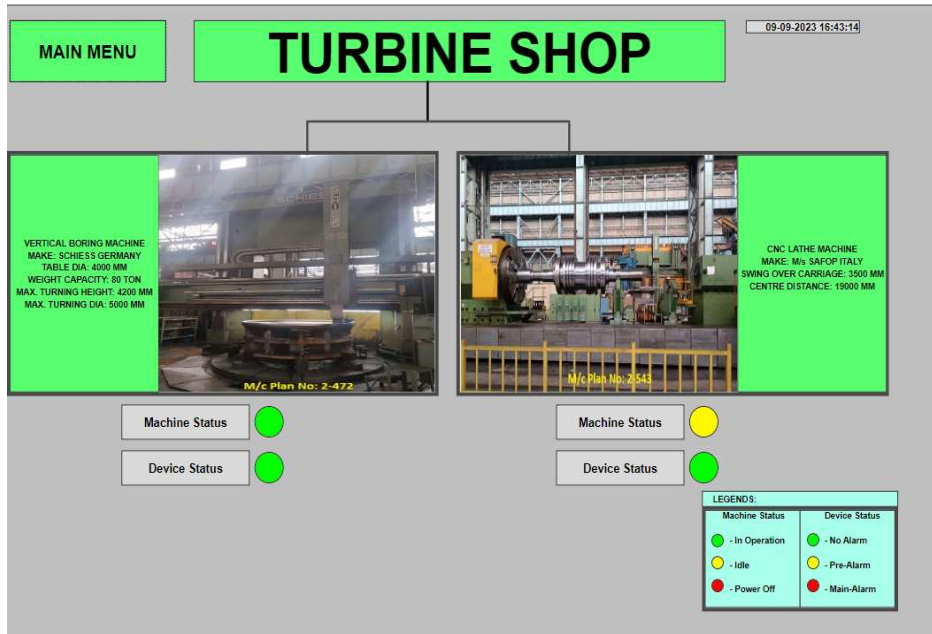
Applications – Condition Monitoring

- ✓ Vibration & Temperature Monitoring System (Critical Machine Assemblies)
- 6 Critical CNC Machines - Turbine Shops.
- ✓ Real time graphical display and historical data being captured.
- ✓ Generation of pre-alarm through automatic e-mails/ SMS.
- ✓ Can reset the alarm status of sensors from remote location.
- ✓ Dashboard for data visualization.



Smart sensor installed on machines

Applications – Condition Monitoring

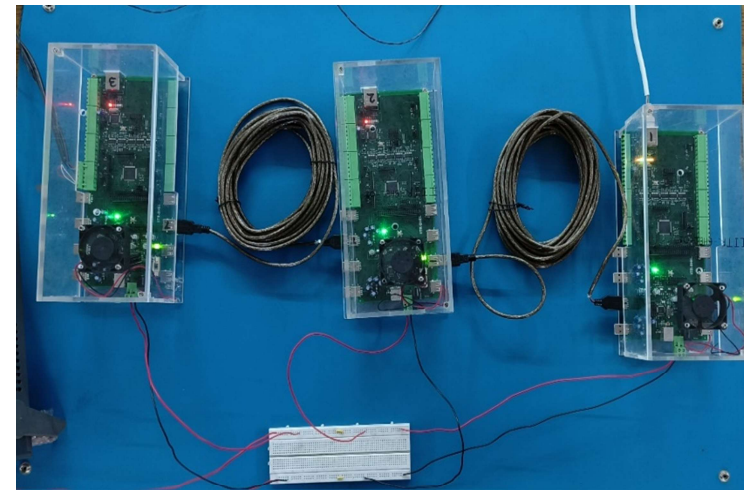


Academia Collaboration

- ✓ BHEL in collaboration with academic institutions developed a solution for conversion of Old/Legacy Machines into Smart machines.
- ✓ Project includes:
 - ✓ Design & fabrication of hardware for collection of data from sensors.
 - ✓ Development of Graphic user interface (GUI).
- ✓ Storage of sensor data on Laptop/ PC along with provision for queries.
- ✓ Report Generation Facilities on dashboard.



Developed Hardware (PCBs)



Hardware Simulation in Lab



Applications - Smart Storage System

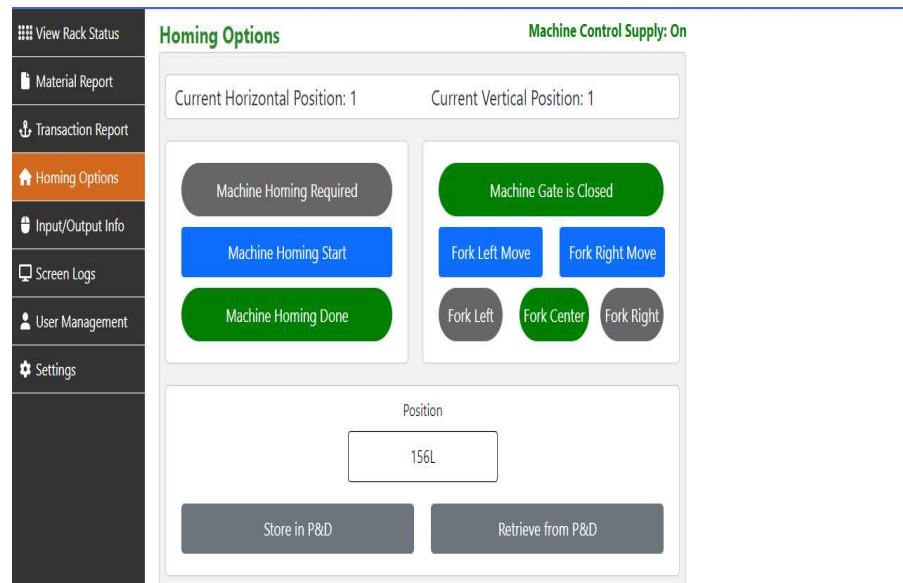
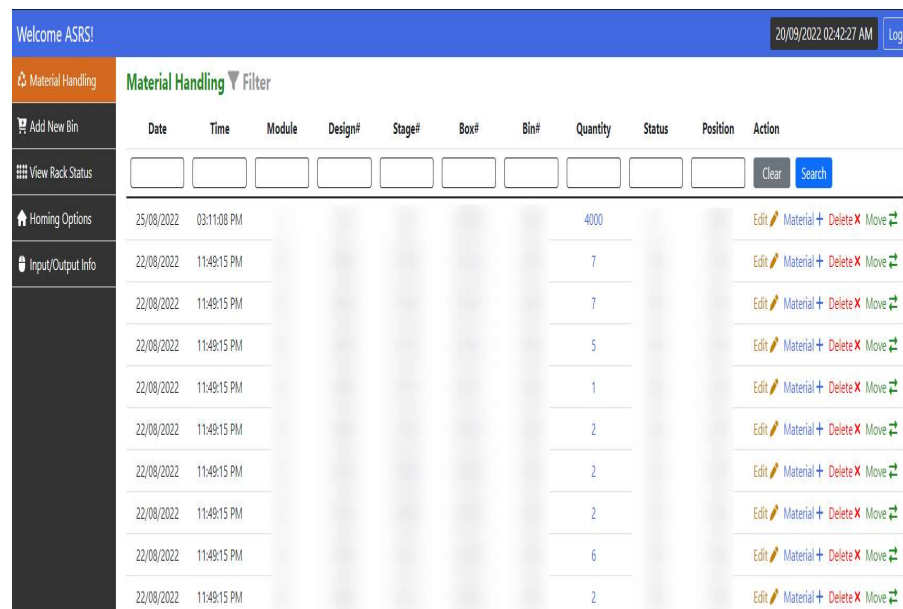
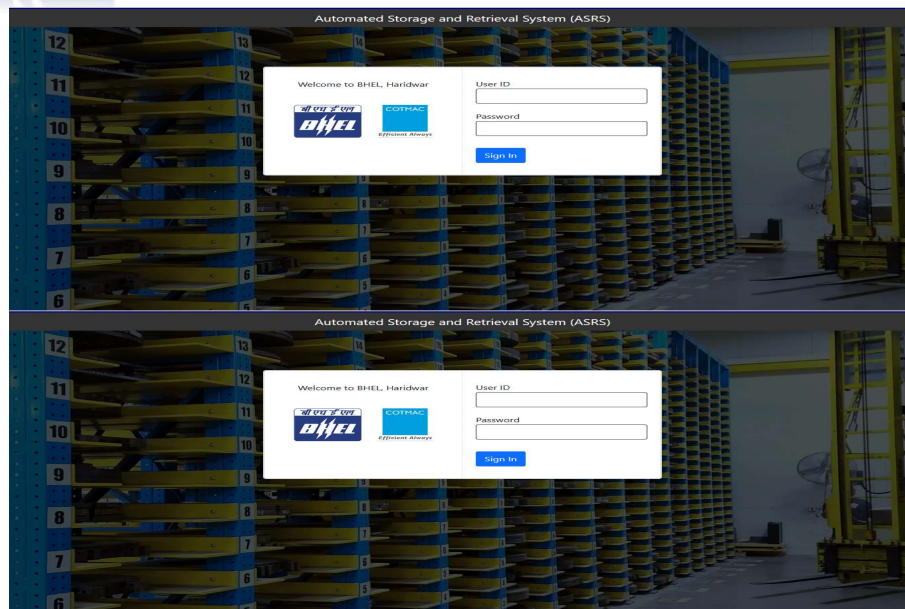
- ✓ Cost-effective solution for BHEL's own product with IOT/ Industry 4.0 integration.
- ✓ Wireless Communication (in metallic environment) between Stacker Crane and Operator Station.
- ✓ Developed HMI screens for machine operations.
- ✓ Display of Real time & historical trends at remote location.
- ✓ Diagnostic and Maintenance Friendly Setup using Smart HMI and PLCs.



Automated Storage & Retrieval System (ASRS) – New Blade Shop, HEEP, Haridwar

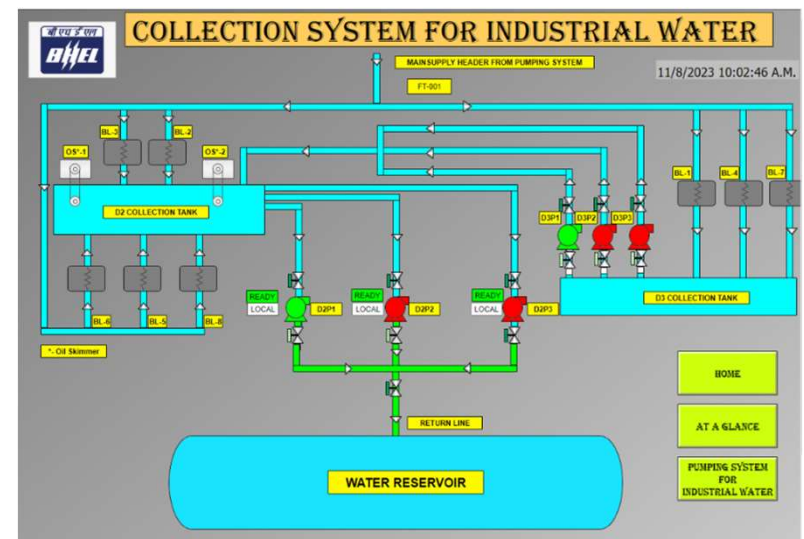


Applications - Smart Storage System



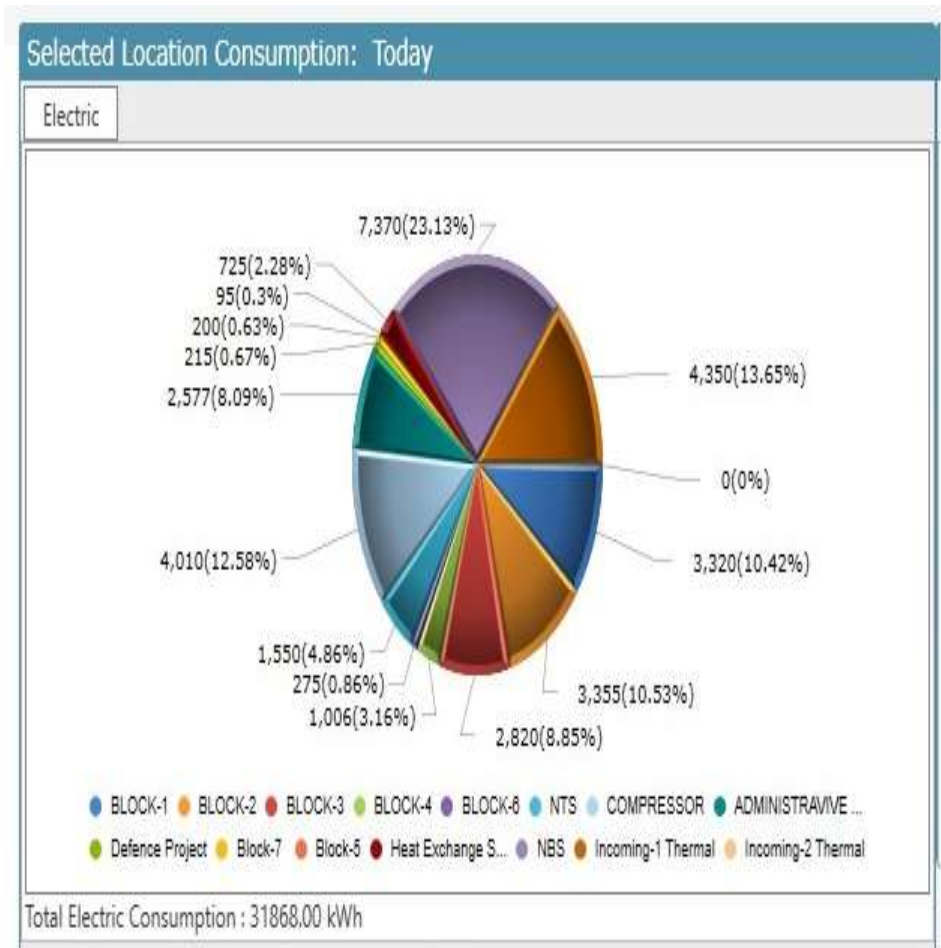
Applications – Water Re-Circulation System

- ✓ Established a real time monitoring system for industrial water usage and its re-circulation.
- ✓ Provision of Alarms and Messages on connected devices.
- ✓ Energy Saving due to need based automatic operation.
- ✓ Reduction in ground water extraction.
- ✓ Data storage, monitoring and analysis.



Applications – Energy System

- ✓ Real time monitoring of electricity consumption at Haridwar units.
- ✓ Automatic data logging.
- ✓ Monitoring parameters viz. Active & Reactive Power, Power factor, Maximum demand, Harmonic Analysis etc.
- ✓ Monthly, weekly & daily report generation.
- ✓ Real time trends of block-wise consumption.
- ✓ Developed Dashboard for user interface.



Applications – Energy System



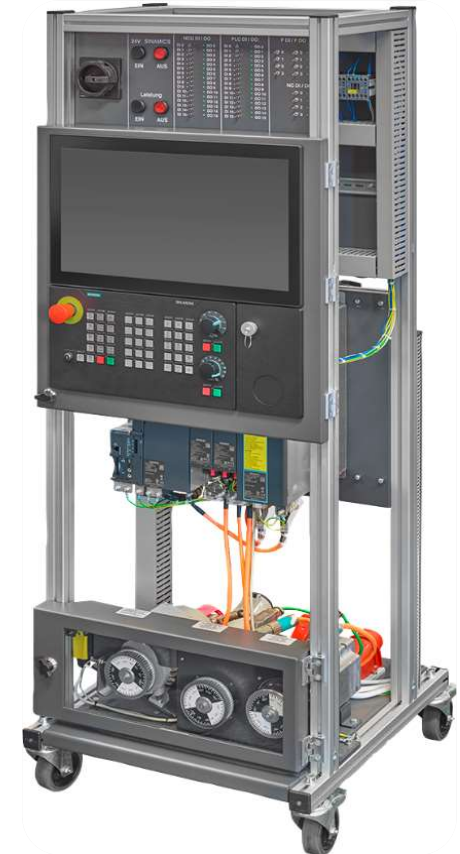
Energy Monitoring System (Dashboard)



Developing Expertise



- ✓ BHEL is highly focusing on Skill development of its employees in advanced technologies.
 - ✓ Latest Siemens make CNC controllers for training and simulation of IIoT projects in machine environment.
 - ✓ Tie up with industry experts/ educational institutes for training modules.



THANK YOU....

BACK-UP SLIDES



AI in Manufacturing Technology



Other Initiatives under Progress

- ✓ Establishment of single connector (MPI to Ethernet Protocol) on CNC machines in HEEP, Haridwar.
- ✓ Blades Dispatch monitoring system with marking machines at HEEP.
- ✓ All new machines & CNC controllers are OPC-UA compliant.