

# INDUSTRY 4.0

## ISP's Journey of Digital Transformation: Empowering Innovation, Productivity, and Sustainability

*Deepak Kumar, AGM (Computer & Automation)*  
*Firaz Ahmad, Sr. Mgr. (Instrumentation)*



# About Authors



Speaker's Name	DEEPAK KUMAR
Organization	Steel Authority of India Limited
Designation	Assistant General Manager
Academic Accomplishments	Bachelor of Engineering in Electrical & Electronics Engineering
Professional Experience	Consultant in IT Industries for 4.5 years. Working in Steel Authority of India Limited since 2011. Have wide experience on Software Development, Data Integration and Digital Project Management. Currently convenor of Digital Transformation Unit at ISP .
Awards / Honours	Jawahar Award, SAIL Nehru Group Awards, SAIL
Publications / Patents	Technical paper on SMCA; Technical Paper on Dx in ISA journals



Speaker's Name	Firaz Ahmad
Organization	Steel Authority of India Limited
Designation	Senior Manager
Academic Accomplishments	
Professional Experience	10 years of experience managing DCS, PLC systems, and field instruments in the power and blowing station domain. In the past 3 years, have expanded my expertise to include digitalization initiatives, such as designing KPI dashboards and developing data-driven models to enhance system efficiency and decision-making. My role involves ensuring the seamless operation and maintenance of critical systems to optimize performance and reliability.
Awards / Honours	DIC's Excellence Award, SAIL, Productivity Excellence Award 2023 -Platinum Category, OSPC

# Outline

- The Approach
- SAIL-ISP Journey of Digital Transformation
- Recent Dx Initiatives
- Planned Dx Initiatives
- Way Ahead





# The Approach



**Formation of DX  
Functional Teams**

**Core Team,  
Cross Functional Team (CFT)**

**Strengthening of Digital  
Infrastructure**

**Automation Systems/  
Network/Connectivity/  
Cyber Security/**

**Cultural  
Transformation**

**Centre of Excellence,  
Reverse Mentoring,  
Interactions**

**Capability Building  
Initiatives**

**Data Scientists Program,  
MoU with Start-ups/  
Strategic Partners/  
Academia**



# Key Areas Identified For Digital Transformation



## Security/Safety

- Increased Safety
- Increased Security to Asset
- Enhanced Data Security
- Access Control



## Process Optimization

- Improved Yield
- Improved Energy Efficiency
- Improved Throughput
- Improved Quality



## Asset Management

- Predictive maintenance
- Overall Equipment effectiveness
- Smart Inventory Management
- Drawing Management



## Paperless Office

- E- Notesheet and File movement in Digital Form
- Digitization of all drawings/documents
- Online Gate pass Systems
- Biometric Attendance system



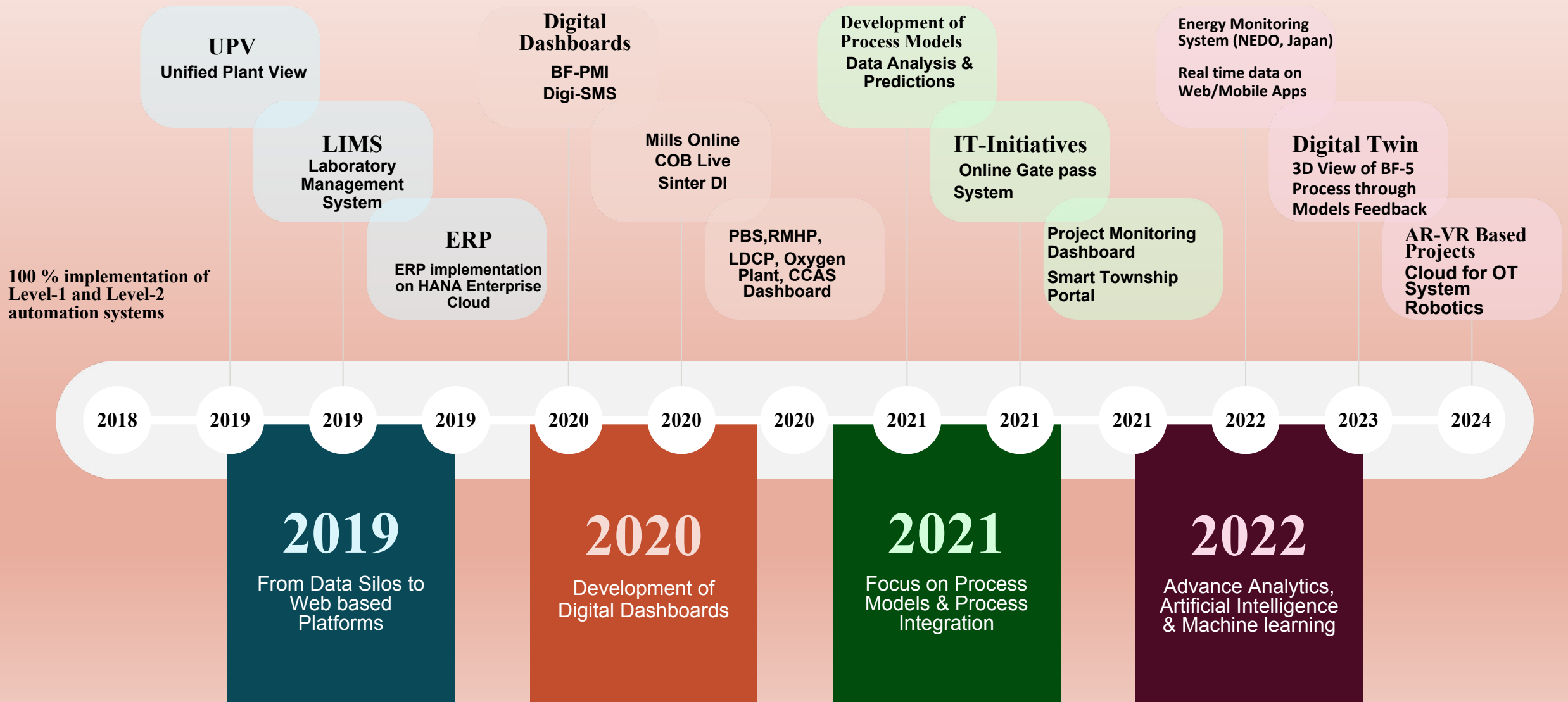
## Cultural Transformation

- Reverse Mentoring
- Dx Workshops & Programs
- Training of Employees
- Visit across industries



## Connected IISCO

- Connected Process
- Connected People
- Connected Assets





# Safety, Security & Surveillance Systems at ISP



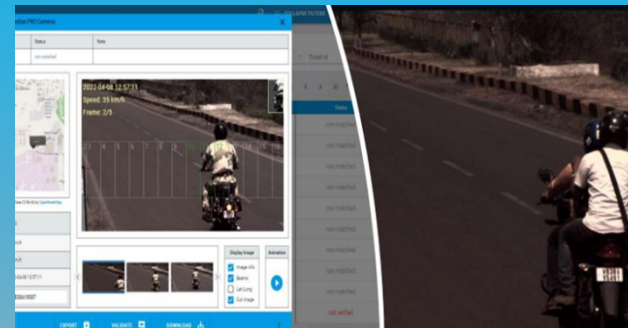
## Vehicle Tracking System (VTS)

Provide 24\*7 monitoring of outside vehicles entering the plant for analysis purposes. Information on speed/stops of vehicle is displayed online on real time basis



## Drone Surveillance at ISP

Drone has been procured with requisite DGCA clearance. Helps in surveillance of remote and strategic locations during daytime and at night.



## Vehicle Speed Monitoring System

Installation of speed Enforcement System and awareness system has been done at 09 locations. Additional installation is in progress.



## CCTV Surveillance System

The perimeter wall, entry gates, loading points are covered with PTZ cameras.

CCTV Camera installation in critical areas, audio alarm system and signal blinkers at all level crossing.

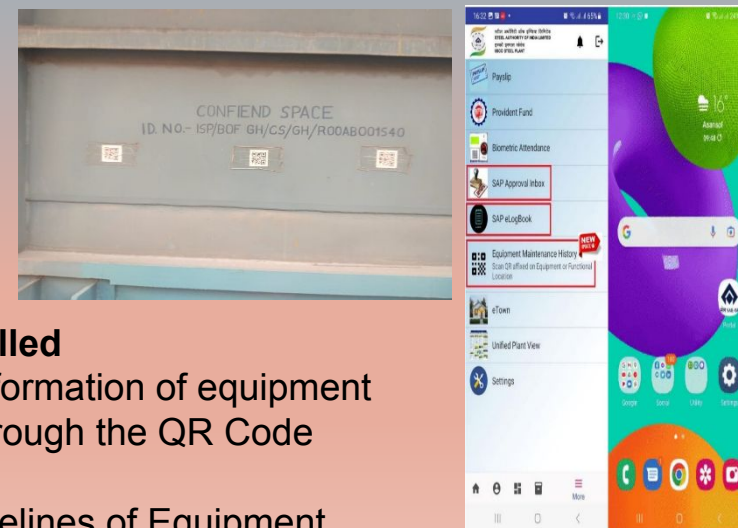
A proposal for Intrusion Detection system is in approval stage.

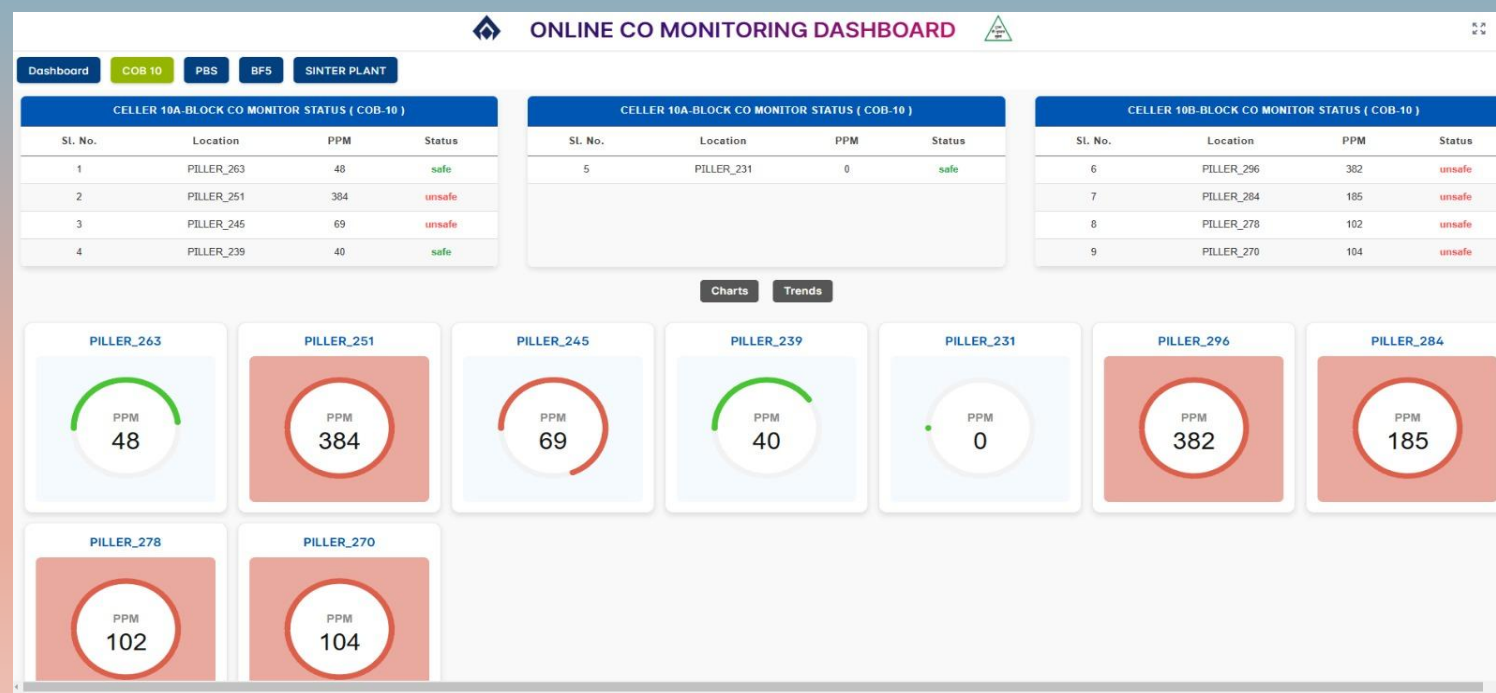


## QR Code on equipment installed

Maintenance History related information of equipment is now accessible on mobile through the QR Code Affixed on equipment.

User Manual/Instructions/ Guidelines of Equipment can also be downloaded. Integrated with SAP.







# Major Digital Transformation Initiatives



## Digitalization Projects

## Benefits


**In-house Development of Online Platforms viz. of Unified Plant View(UPV), Laboratory Information Management System (LIMS), Torpedo Ladle Management System(TLMS)**

- Real Time monitoring of process data
- Real time monitoring of quality parameters
- Torpedo Ladle Management

**Digital Dashboard for RMHP (WeB- RMHP), Sinter Plant (Sinter-DI), COB-10 & COB-11 (COB LIVE), PBS( Digi-PBS), BF #5 (BF-PMI), LDGP (WeB-LDGP), CCAS (CCAS-Live), SMS (Digi-SMS), Mills (Mills-Online), Oxygen Plant (OxyOnline), WMD (Digital WTP), MRS (Digi MRS)**

- Real time Monitoring of Process, Production & CMS for Critical Equipments
- Digital view of important process
- Machines operation in real-time

# In-house Developed Digital Dashboards

**इस्को इस्पात कारखाना** इस्को इस्पात संयंत्र **IISCO STEEL PLANT**

 **Digital Dashboard** 31°C Wednesday, 01 November, 2023 12:26:14 PM



SINTER PLANT: Digital Dashboard for SINTER PLANT

SINTER PLANT Live



COB 11: Digital Dashboard for Coke Oven Battery 11,BPP,CHP & CDCP

COB-11 Live



COB 10: Digital Dashboard for Coke Oven Battery 10,BPP & CHP

COB-10 Live



PBS : Digital Dashboard for PBS

Digi PBS



BF 5 : Digital Dashboard for Blast Furnace

BF PMI



SMS: Digital Dashboard for BOF,CCP and SRU

Digi SMS



Mills : Digital Dashboard for Mills

Mills Dashboard



CCAS LIVE :Digital Dashboard for CCAS

CCAS LIVE



LIMS: Laboratory Information Management System

LIMS



Oxygen Plant : Digital Dashboard for Oxygen Plant

Digi Oxygen



Digi MRS : Digital Dashboard for Power Distribution

Digi MRS



Digital WTP : Digital Dashboard for WMD

Digital WTP



TLMS : Torpedo Laddle Management System

TLMS



WeB RMHP

WeB RMHP



WeB LDCP:Digital Dashboard for LDCP

WeB LDCP



WeB Propane:Digital Dashboard for Propane

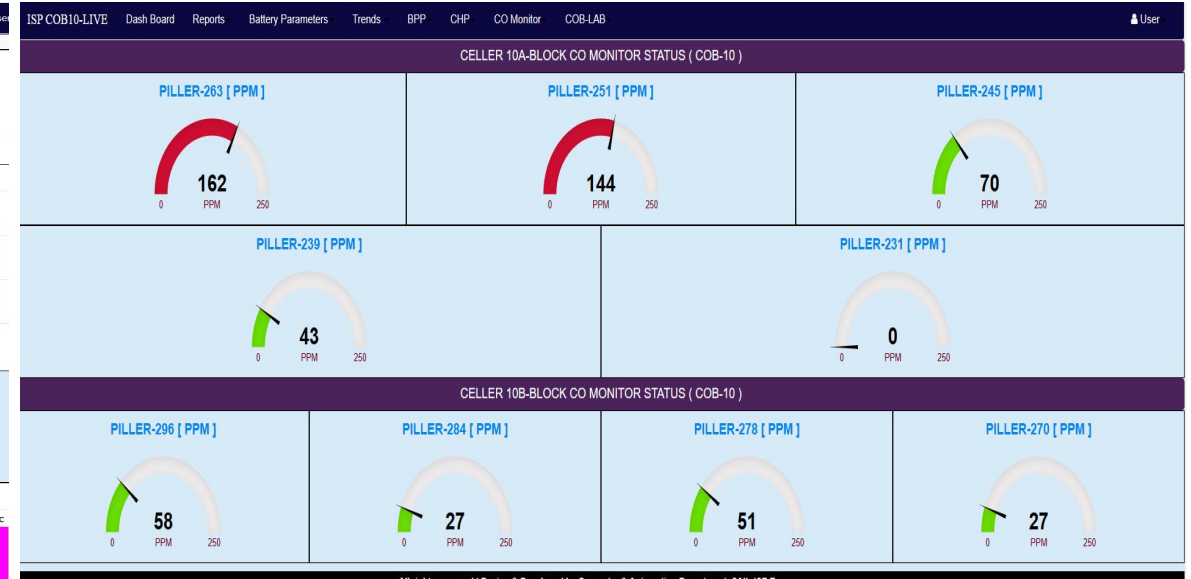
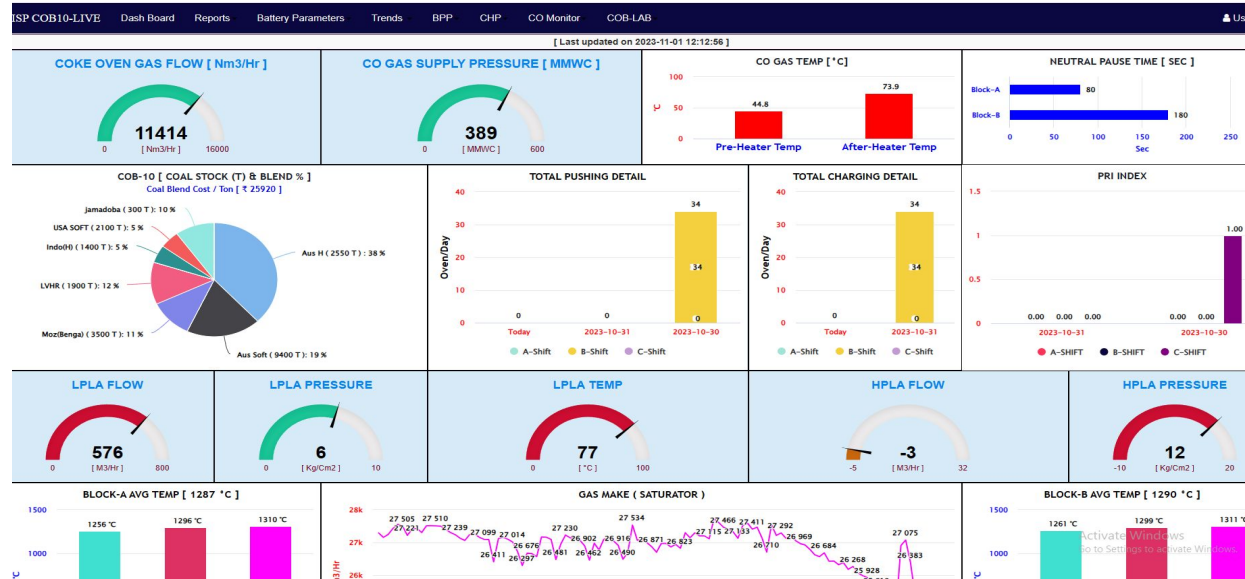
Propane

Activate Windows  
Go to Settings to activate Windows.

Developed by Computer & Automation Department



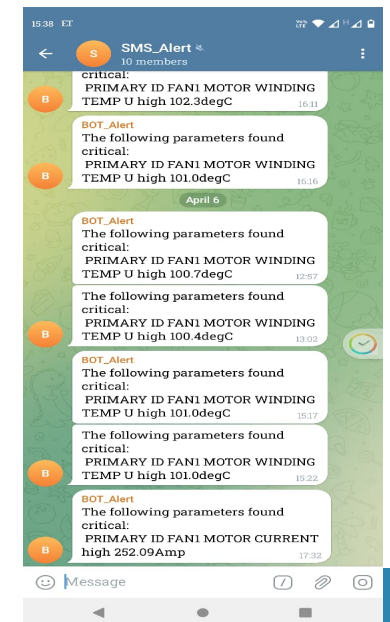
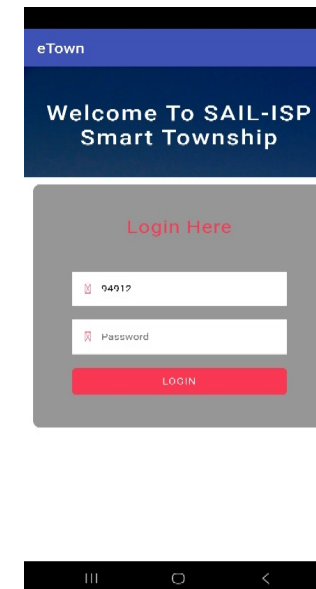
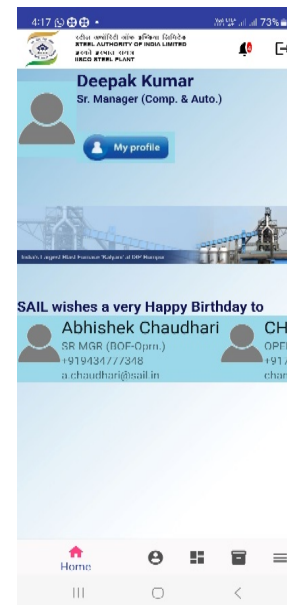
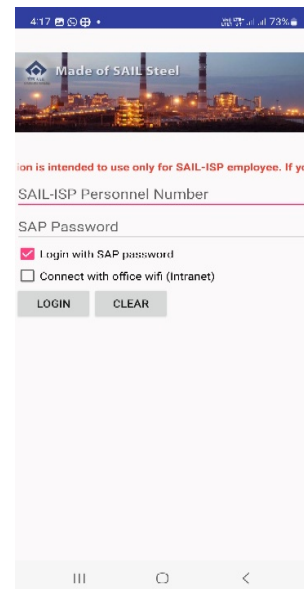
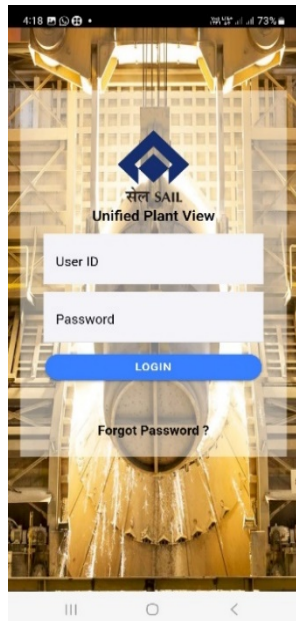
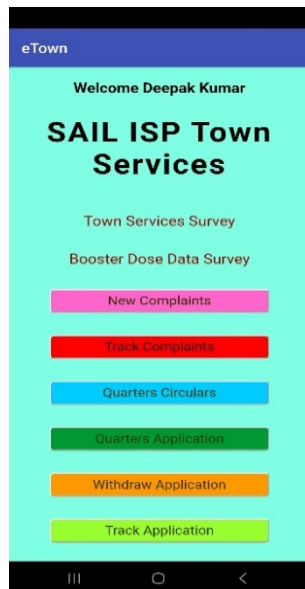
## In-house Developed Digital dashboards : Safety Parameters





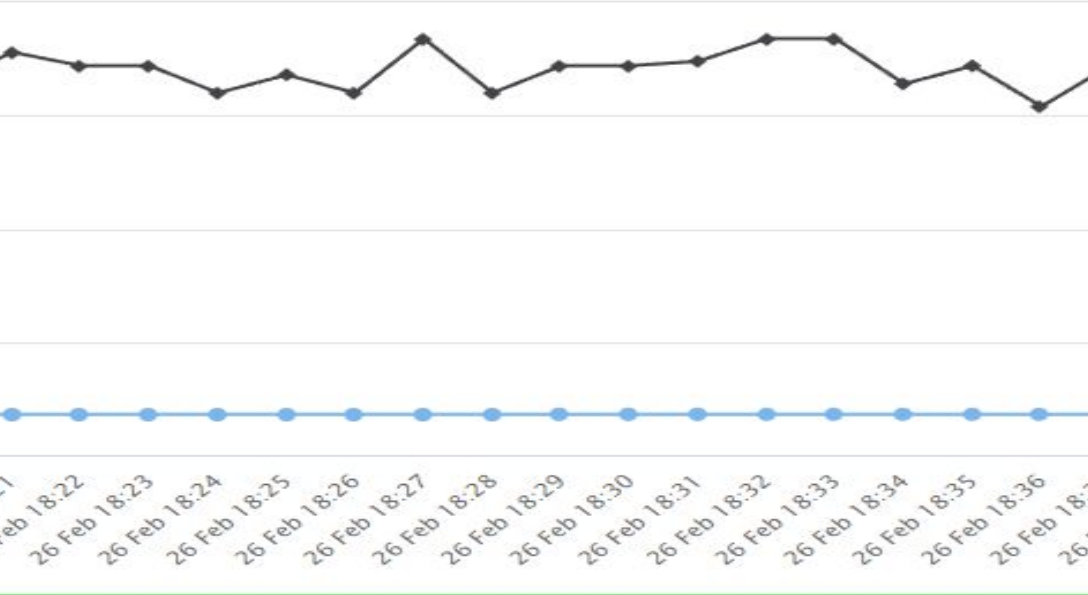
# MOBILE APPLICATIONS

- At ISP, mobile applications have been developed to cater process needs as well as many applications have been developed by IT service team to make ease of doing a task.
- Android based mobile apps for real time process monitoring system, Digital Dashboards, Town Complaint System, Online Hospital Lab report, Quarter Management System, Visitor Gate pass system are available at ISP.
- Telegram BOT have been developed to create alert against critical parameter monitoring.



# Major Digital Transformation Initiatives

Actual IGV vs Predicted IGV



Input Parameters						
Parameter	xD	SPEED[RPM]	DISCHARGE PR[KG]	SUCTION DP[MMWC]	BOV FB[%]	DISCHARGE FLOW[Nm3/min]
Value	-27.17	3998	0.47	931	12	136

Predicted Output Parameters			
Parameter	Actual IGV[%]	Predicted IGV[%]	Error
Value	47.84	48.64	0.80

## Model Calculator

Enter Desired Speed

Calculated IGV Percentage

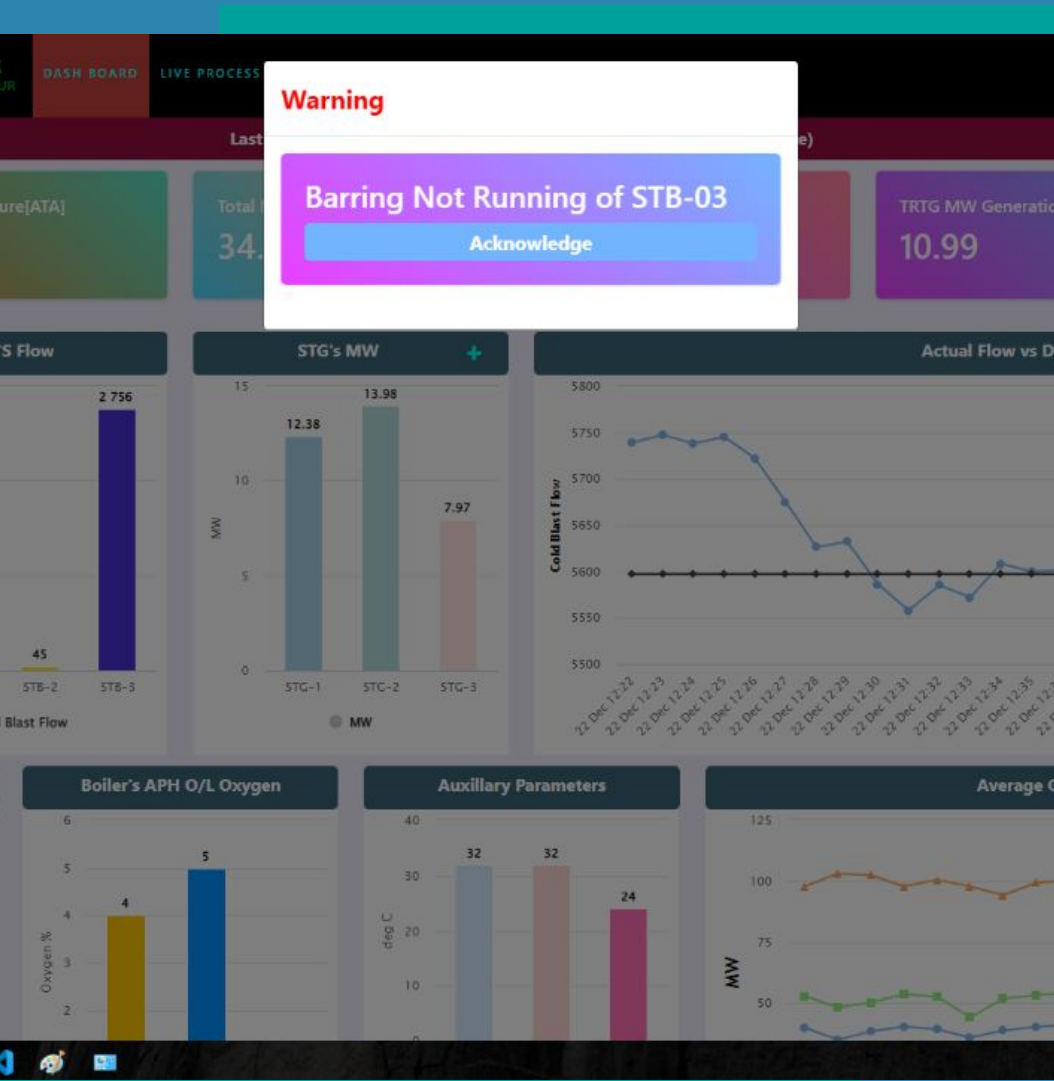
## Digitalization Projects

## Benefits

### Process Models Developed In-house

Inlet Guide Vane Model for Turboblenders in PBS which predicts IGV opening at current running situation. Deviation in IGV shifts the operating conditions, detecting it early will minimize the energy losses as well as improve the efficiency of STB. Stuck IGV when not detected early can also result in surge which can off load blowers which will hamper the cold blast flow to BF.

# Major Digital Transformation Initiatives



## Digitalization Projects

## Benefits

### Turboblowers Barring detection module

This module detects whether barring is running or not in blowers using vibration data of Turbine. This module will avoid the chances of hogging (bending downwards) or sagging (bending upwards) effect of the turbine rotors of blowers



# HEALTH MONITORING OF CONVEYOR SYSTEM

1

- Artificial Intelligence based tool for monitoring of conveyor belts in real time.

2

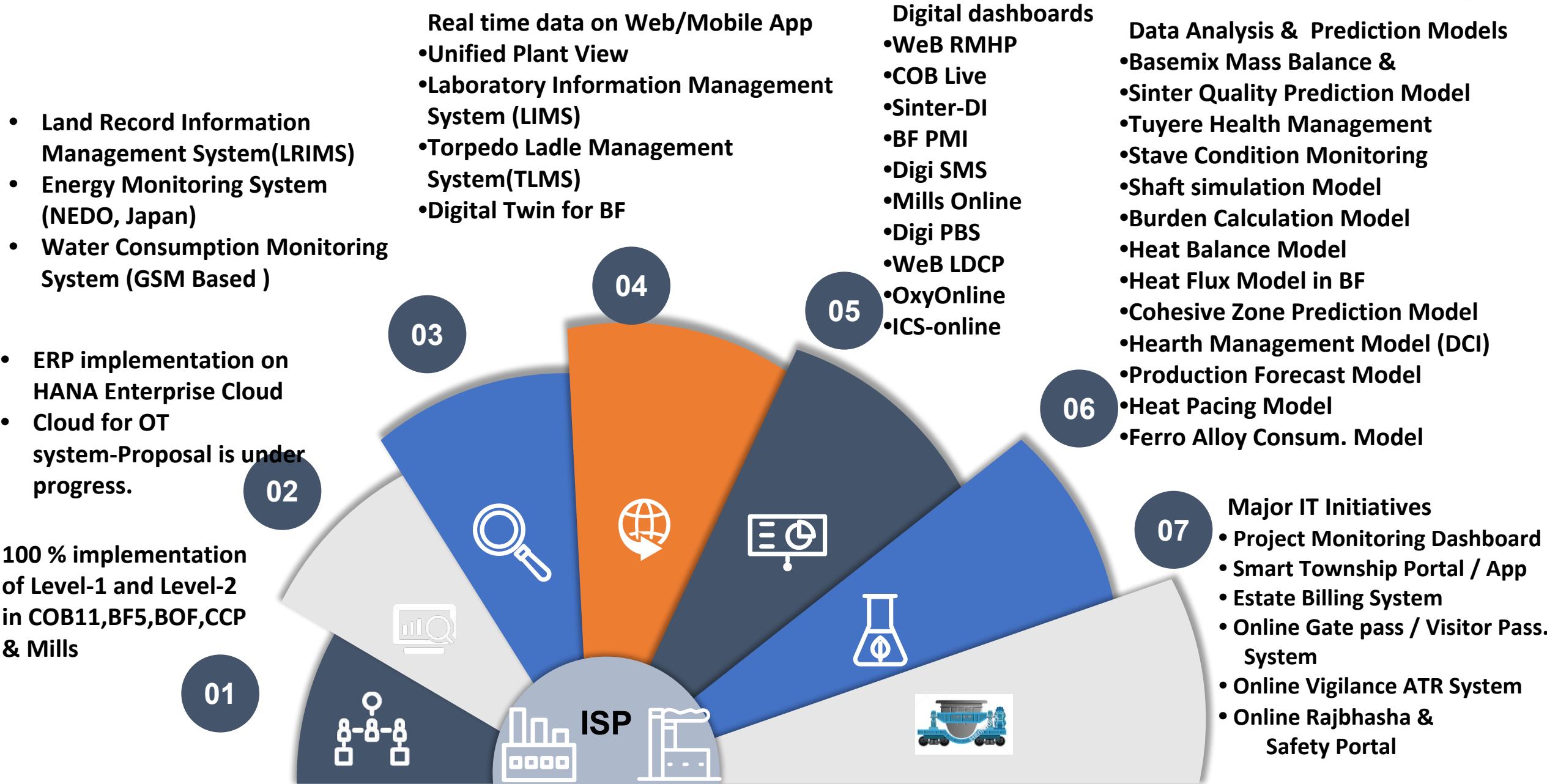
- Automated classification of transported materials like iron lumps limestone etc. with foreign objects detection and flagging

3

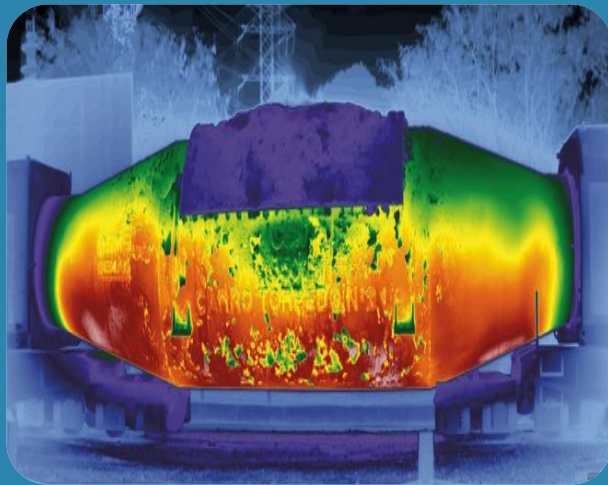
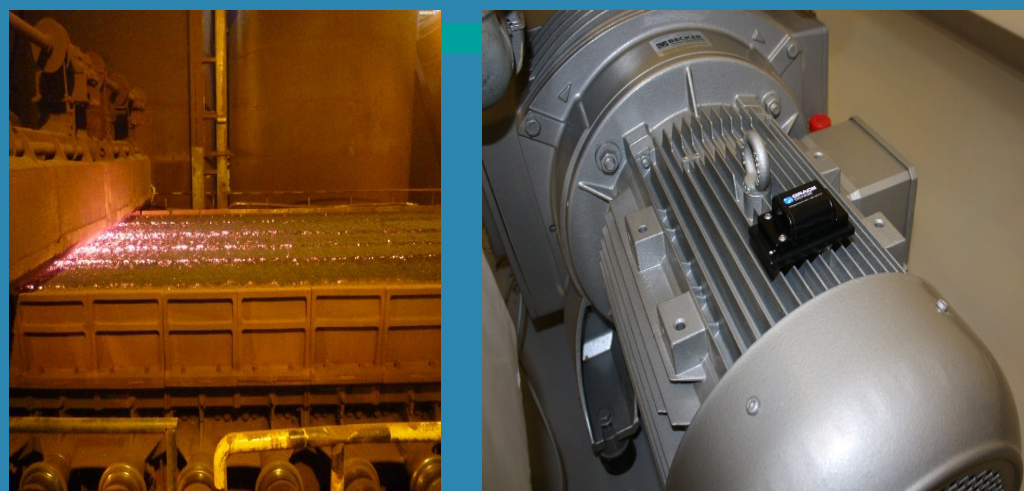
- Advance prediction of Operational anomalies like belt sway & belt tear.



# SAIL-ISP: Milestones Achieved



# On Going Projects



Digitalization Projects	Benefits
Torpedo Ladle Refractory monitoring and analysis by thermal scanning & GPS Tracking system at BF5	<ul style="list-style-type: none"> <li>Real time tracking of torpedo.</li> <li>Improvement in safety of equipment and personnel.</li> <li>Historical analysis of thermal profile</li> <li>visualization of Process</li> </ul>
In-House Development of Level-2 Systems in <ol style="list-style-type: none"> <li>1. Sinter Plant</li> <li>2. Coke Oven</li> <li>3. Blast Furnace</li> <li>4. SMS</li> <li>5. Mills Area</li> </ol>	In-house Developed Web & Application based Level-2 Systems
Installation of IIOT based smart sensors (in different shops total 600 nos.) for rotating equipment	Predictive Model to detect anomaly in Critical rotating equipment
Coal Yard Management System	Detection in mismatch in coke Placing & handling Management



## Future Projects



Digitalization Projects	Benefits
Intrusion Detection System for peripheral boundaries	<ul style="list-style-type: none"> <li>Perimeter Security Implementation using Sensor and CCTV live feed</li> </ul>
Application of Drones in process Analysis and Inspection	<ul style="list-style-type: none"> <li>Volumetric Measurement of stock piles in RMHP</li> <li>Inspection of Gas Lines of EMD/ODPL.</li> <li>Topographical survey and civil structure inspection</li> <li>Inspection of Chimney and Flare stacks.</li> </ul>
Wireless Online CO Monitoring System	<ul style="list-style-type: none"> <li>Display of Online CO Monitors Data of all areas in web &amp; mobile application with alarms and alerts.</li> </ul>
<ul style="list-style-type: none"> <li>Anomaly detection in critical parameters of Boilers, Turbines, Turbo blowers to detect any process variations. beforehand.</li> <li>Import/Export of Online Load Monitoring in PBS 2</li> </ul>	<ul style="list-style-type: none"> <li>Torpedo Ladle Refractory monitoring System</li> </ul>
<ul style="list-style-type: none"> <li>Installation &amp; Commissioning of Transformer</li> </ul> <p>Online Condition Monitoring and Asset Performance Management System</p>	<ul style="list-style-type: none"> <li>For condition monitoring and analysis of Transformer</li> </ul>

# Cultural Transformation

## Aarambh

Bi-Weekly Awareness Program on Digital Transformation & Industry 4.0 Initiatives in different deptts. covering executives and non executives.

## Techno-Udaan

A Weekly technical interaction program under aegis of CGM (I&A) on emerging technologies, Industry 4.0, Automation system etc. The wide range of topics from cyber security, Artificial intelligence & Cloud computing has been covered in the programs.

## Techno-Charcha

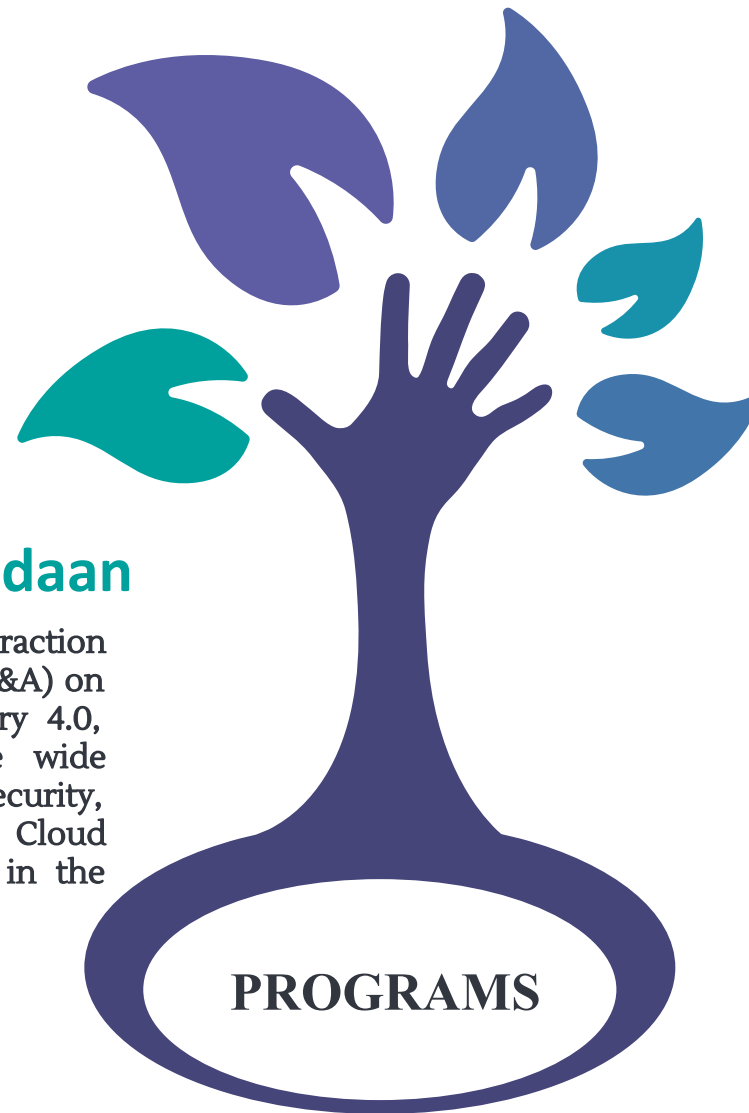
A Monthly technical presentation and interaction program highlighting the initiatives taken in individual shops in area of Automation & Industry 4.0 to the top management

## Bodhi-Gyan

A Weekly technical interaction program under aegis of CGM (I & A) on emerging technologies and the innovative measures taken / job done across the plant.

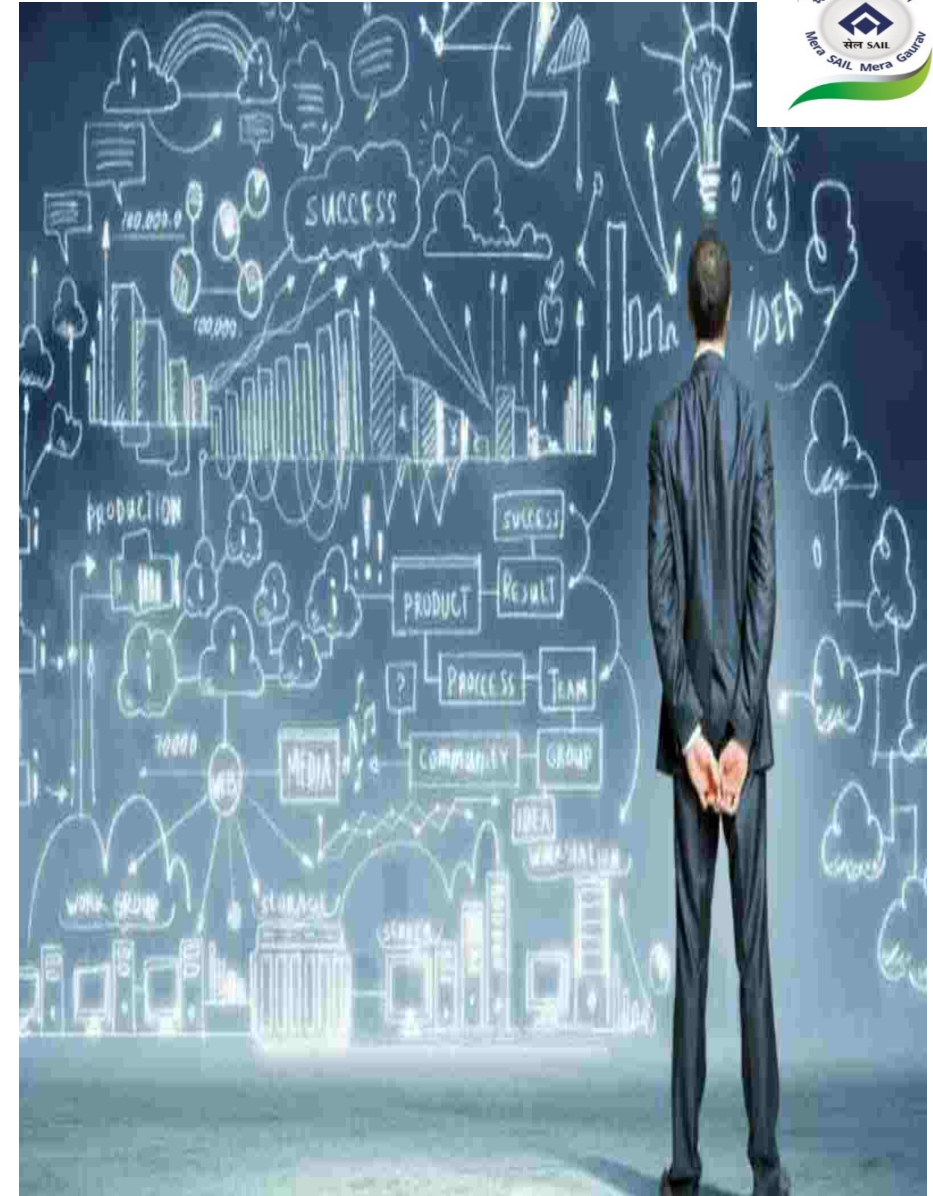
## E-Abhigyan

A Platform of MTI which provide online knowledge enrichment and resource sharing interactions between different units. HR Team of ISP has conducted multiple workshops and interaction programs with other units regarding digital transformation, industry 4.0 Initiatives in Iron & Steel making.



# Way Ahead.....

- Moving towards industry 4.0.
- Efficient handling of Big Data for the data analytics & Production Planning.
- Data Scientist program for training executives with Advance statistics, R & python for data analytics
- Data security strategy & Cyber Security Assessment
- Sustaining & Maintaining ISO 27001 Compliance
- Smooth coordination and ensure successful implementation of initiatives suggested by Dx Consultant (Coordinated Centrally for all SAIL units by SDTD, Ranchi) along with Digital Road map in ISP







**Thank  
You**