

# Renata - IIT/IIM Team

IoT, AI and Automation

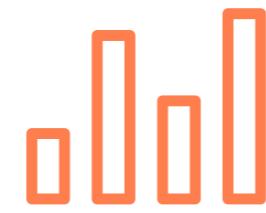
# Solutions

IoT, AI and Automation



## AI Driven

- Machine Vision based Defect Inspection, Product Count, OCR, Barcode, Child-part check
- CCTV Based Safety, Compliance
- Statistical Analysis + AI Recommendations



## Industry 4.0

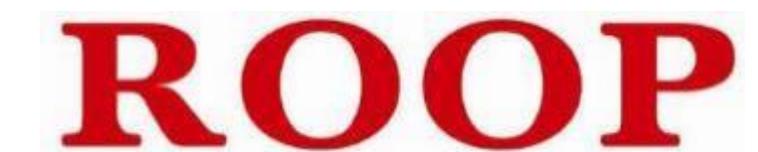
- After Sales Machine Monitoring
- Machine Productivity
- Manpower Productivity
- Raw Material Productivity
- Product Traceability
- Process & SOP Adherence



## Industrial IoT

- Utilities – Grid supply, Solar, Fuel, PNG, Water, Gases, Compressed Air
- Environmental Sensors – Temperature, Humidity, Pressure,
- Machine Health Monitoring - Vibration, Noise, Load etc.
- Industrial Appliances – Boiler, Compressor, UPS, Transformer etc.

# Customers



# Vision Based Defect Inspection

# Requirement Definition

**Background:** Customer's customer wanted quality inspection on the product sticker

All barcode stickers checked for legible print quality

## Process:

- Barcode scanned first
- This activated the picture capture
- AI software identified the quality of printing
- OK or NG status identified and correlated to the barcode
- Status and barcode stored in a local database (cloud-based data backup)



# Solution Overview

## Solution Architecture

- Device Tag quality analysis
- Quality Limit Adjuster
- OCR Technology
- Barcode Scanning
- Barcode wise tracking

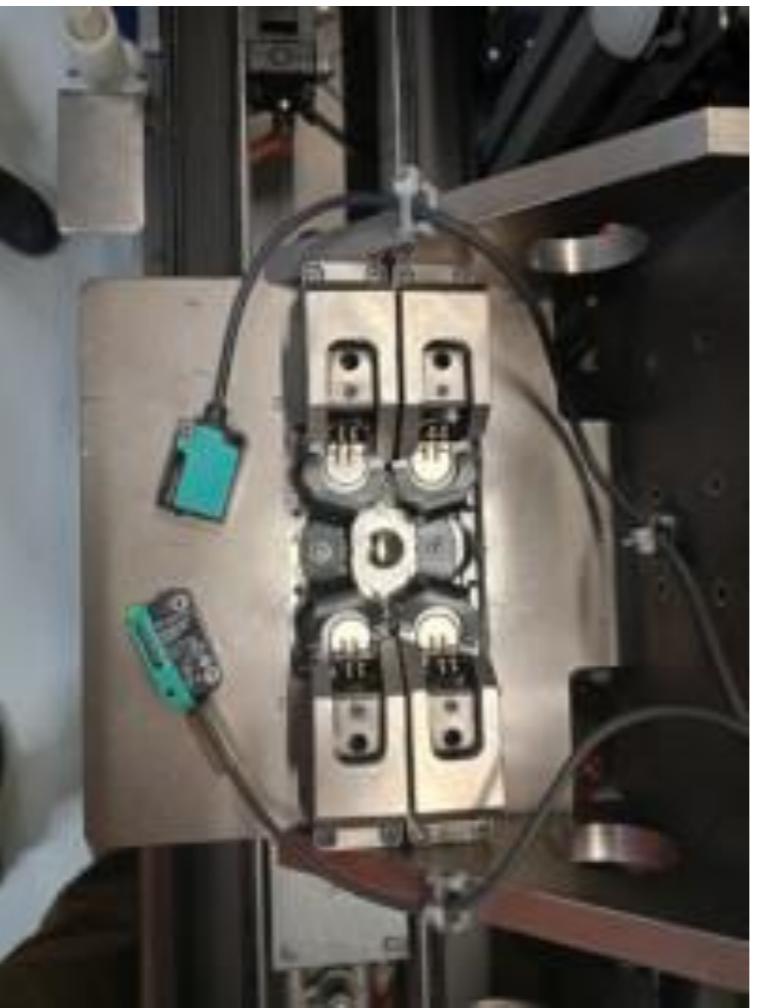
## Solution Components:

- PC
- Workstation
- Barcode scanner
- Camera
- HMI Screen with integrated PLC for status and operator intervention if required
- Normal display screen for image capture
- AI Software with database

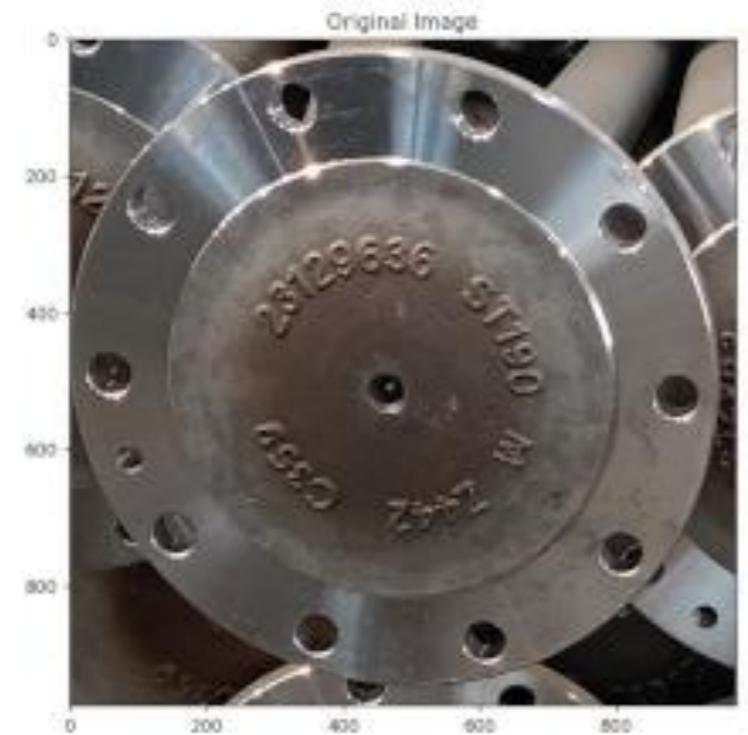


# Other Use-cases

- Detection if the contact pins are bent or straight



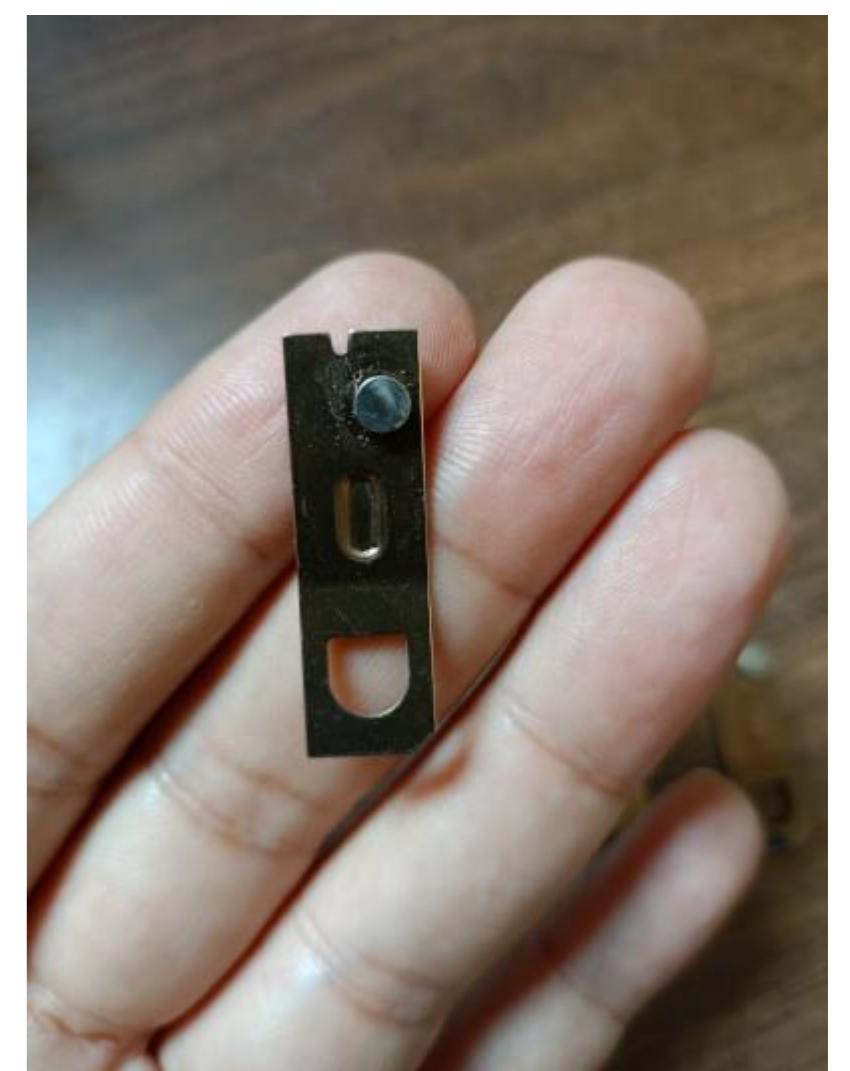
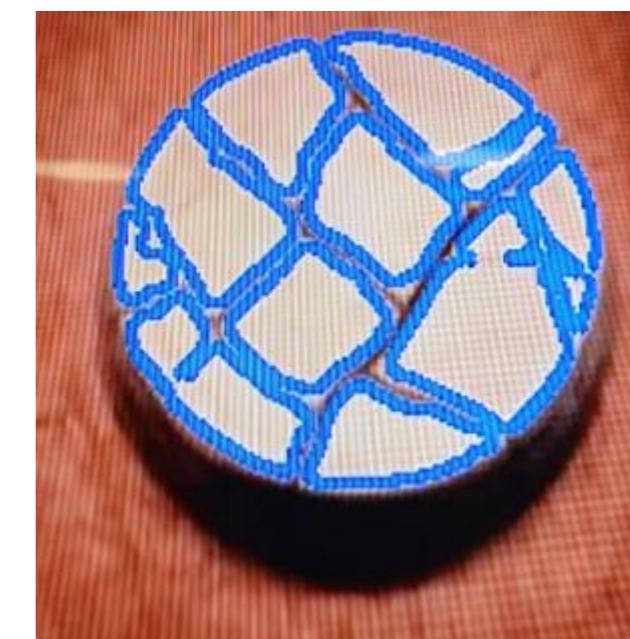
- Feature counting
- Child part presence



- Checking coloured O-ring overlap detection to prevent leakage in the seam



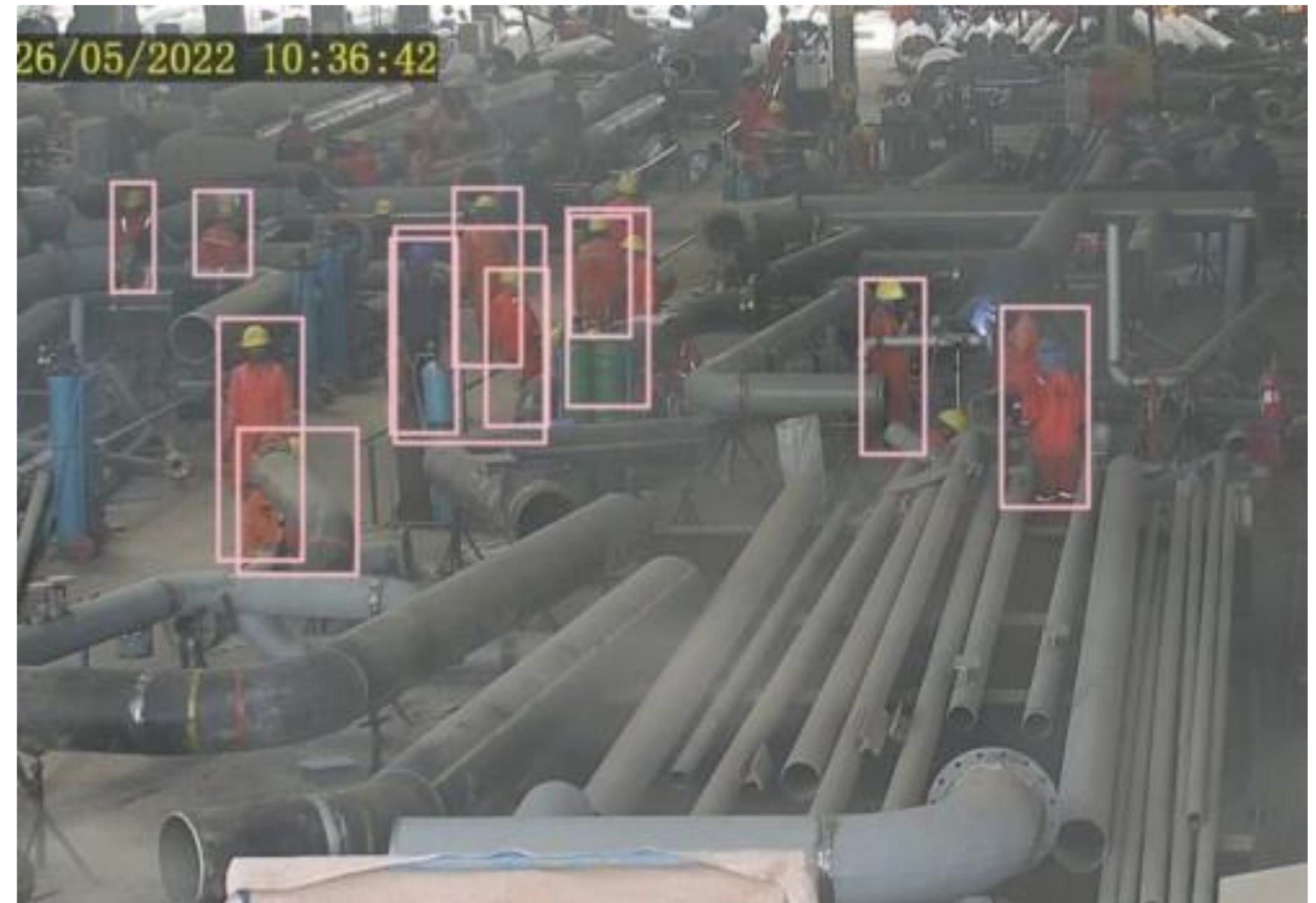
- Detection of cracks in metallic parts



# Vision Based Object Detection

# Object Counting on CCTV Feed

- *Object detection:* Used to determine the presence of a type of object, which leads to object recognition. These objects or entities include people or vehicles and may be used for fire and smoke detection
- Done for a construction site in Madhya Pradesh.
- Counting of no. of workers done on live CCTV camera feed over internet.
- Hourly report created.



# Industry 4.0 Solution

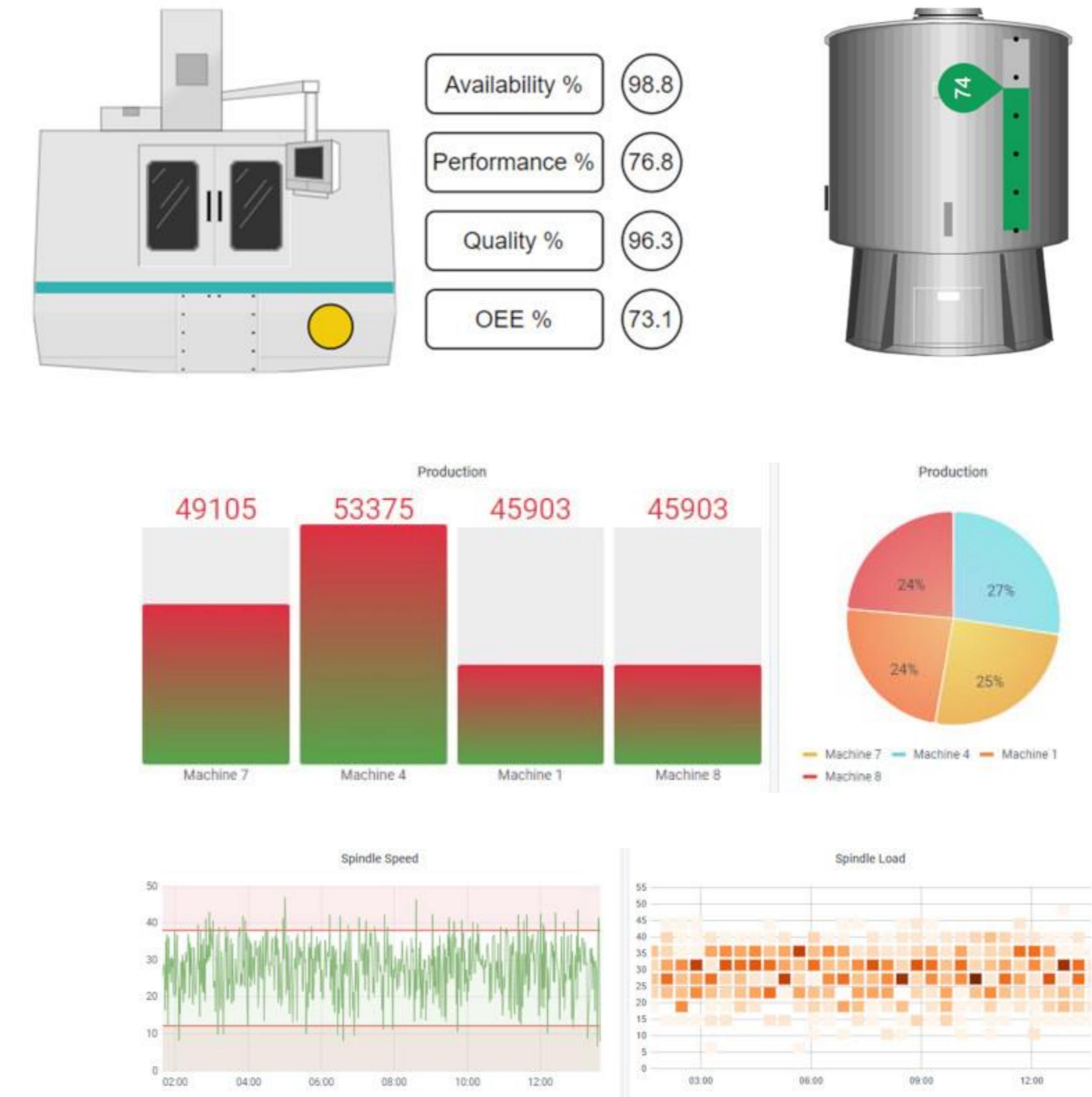
# Industry 4.0 – Smart Manufacturing

Data-driven smart manufacturing

## Benefits

- Lower **downtime** by 5%-20%
- Lower **maintenance cost** by 10%-15%
- Increased **asset availability** 5%-20%
- Increased **productivity** by 10%-20%
- Improved **quality**
- Increased **process stability**
- Better **traceability** – product, component, defect, process
- Automated **data collection** and **analytics**
- **Real-time shop floor visibility**
- **Shop-floor alerts** and notifications
- **Seamless integration** with other systems
- **Modular implementation** and scalability

**Related Features:** Raw Material Tracking, Man Power Productivity, Andon

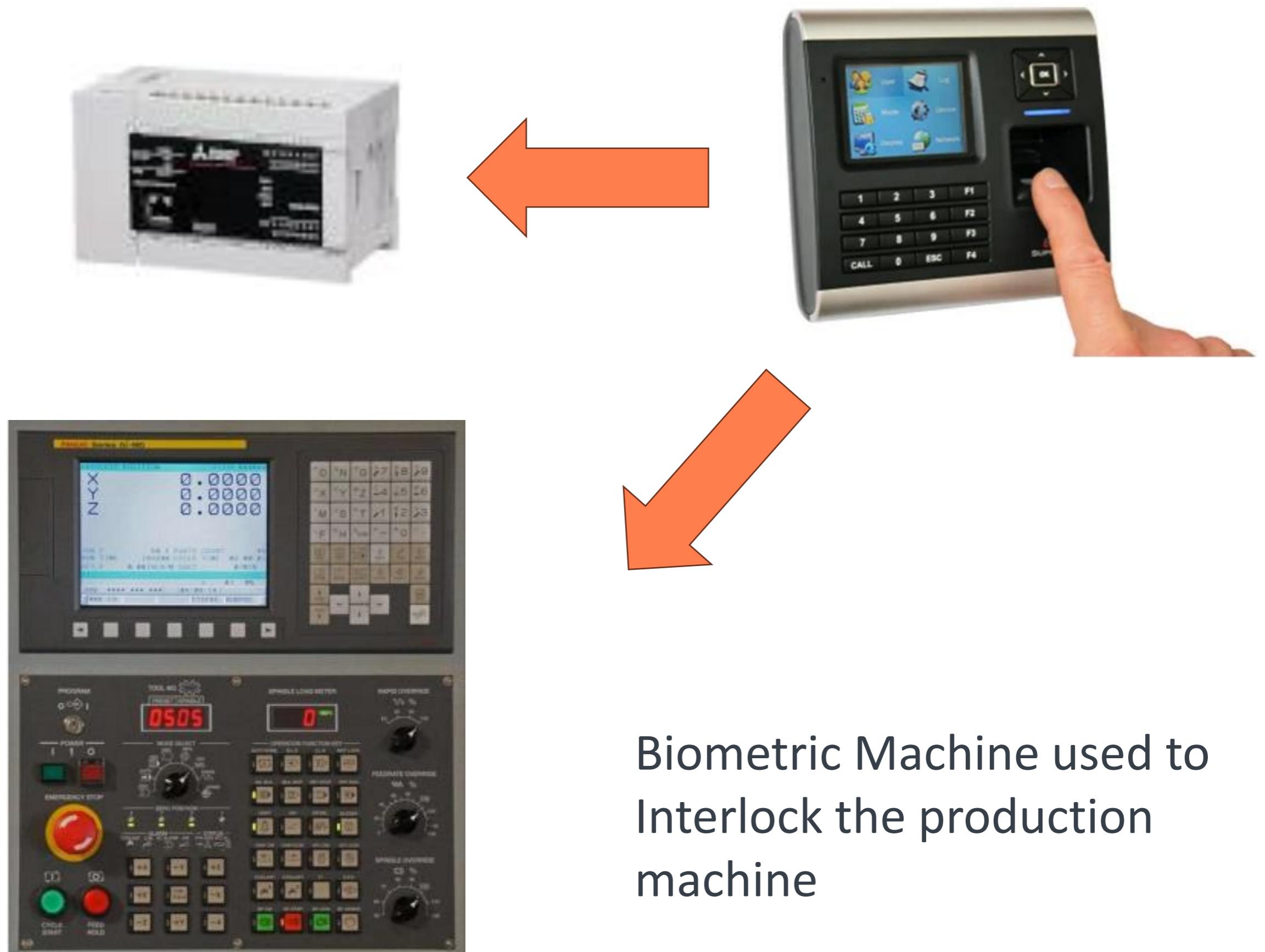


# Manpower Productivity

Data-driven smart manufacturing

## Benefits

- Operator productivity linked to machine productivity
- Trace which operator worked on which machine when
- Enable operator to enter idle time and downtime reasons as mandatory
- Enable access for only the skilled operators for the respective machines
- Enable operators to inform the maintenance teams of the breakdowns
- Enable only maintenance team to authorize machine restart after breakdown resolution
- Faster SMS notification to maintenance teams and faster resolution
- Lower downtime



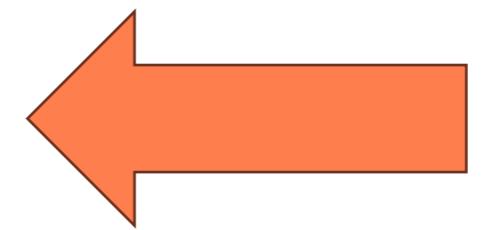
Biometric Machine used to Interlock the production machine

# Material Productivity

Data-driven smart manufacturing

## Benefits

- Track raw material usage from **inventory to production**
- Track **weight of FG products**
- Track **weight of NG products**
- Track **weight of scrap**
- Perform **end-to-end reconciliation** of raw material weight
- **Minimise material loss** through clear visibility



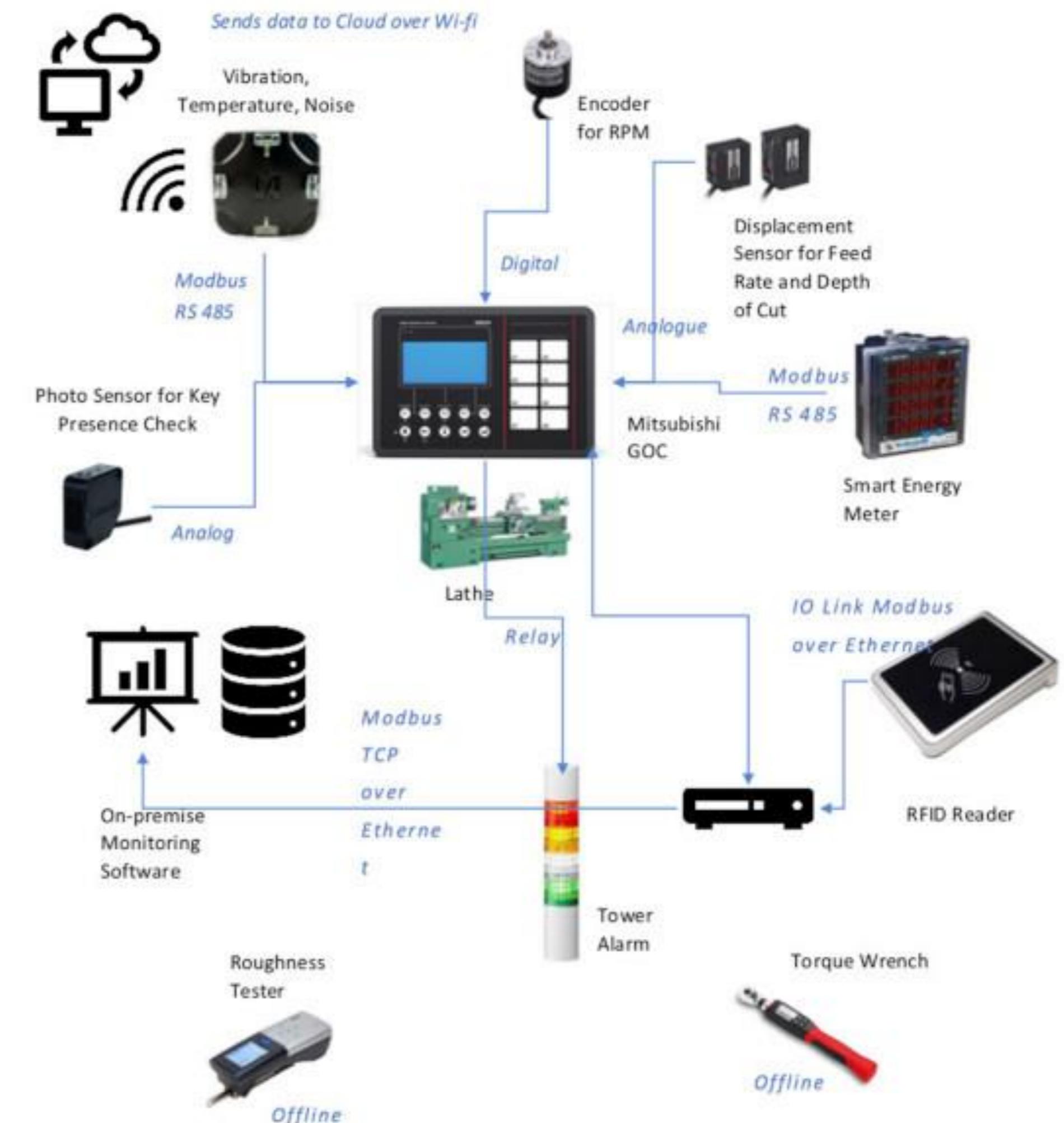
Weighing Machine used to track weight of material used in FG and NG products

# Data Analytics built on Essential Machine Automation

Data-driven smart manufacturing

## Benefits

- Various **sensors** and **actuators** installed on:
  - **Manual machines** like Lathe, Shearing, Drilling etc
  - **Semi-automatic machines** with PLCs
  - **Fully automatic CNC machines** including drilling, milling, honing etc
- Sensors installed depending on the **core operations** of the machine, the **preventive maintenance** and **safety** requirements
- Data collected in **PLC**, processed through relevant **programing** and sent to **cloud** for relevant **analytics** and **notifications**



Including sensors for quality inspection

# Digital Display - SOP and Training Videos

Data-driven smart manufacturing

## Challenge

- Training your manpower on your products and processes.
- Different orders from your customers for different products.
- Your manpower also keeps changing.

## Solution

- You can centrally change SOPs (Standard Operating Procedures) and training videos.
- Separate digital screens on individual stations.
- Changeover will be through a single click of a button.
- Easier to change production multiple times in a day
- Manpower will still know exactly what they have to do even on changing products



# IoT Platform and Technology

Relevant for PLC controlled appliances like Machines, HVAC, Boilers, Lifts etc.

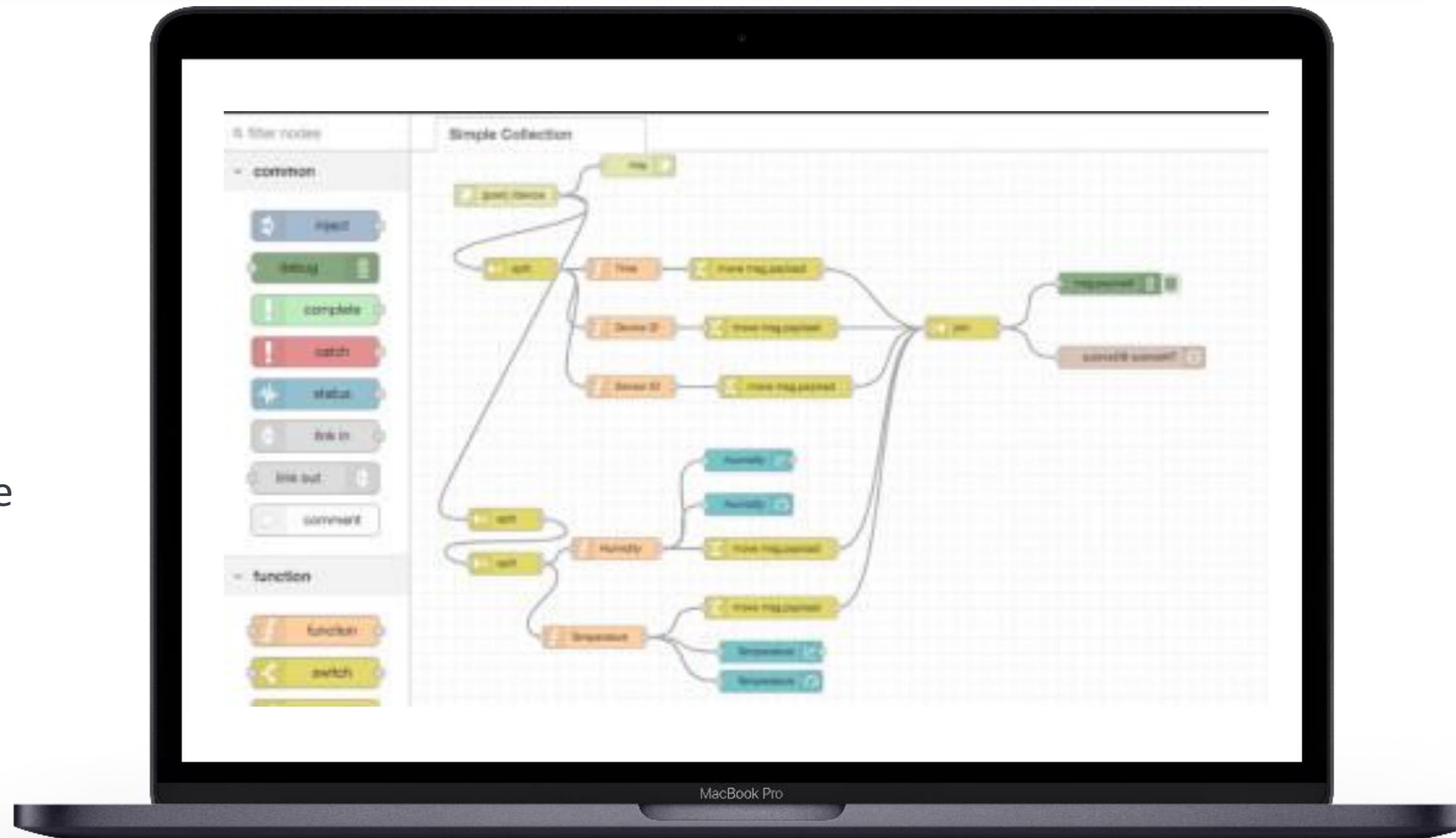
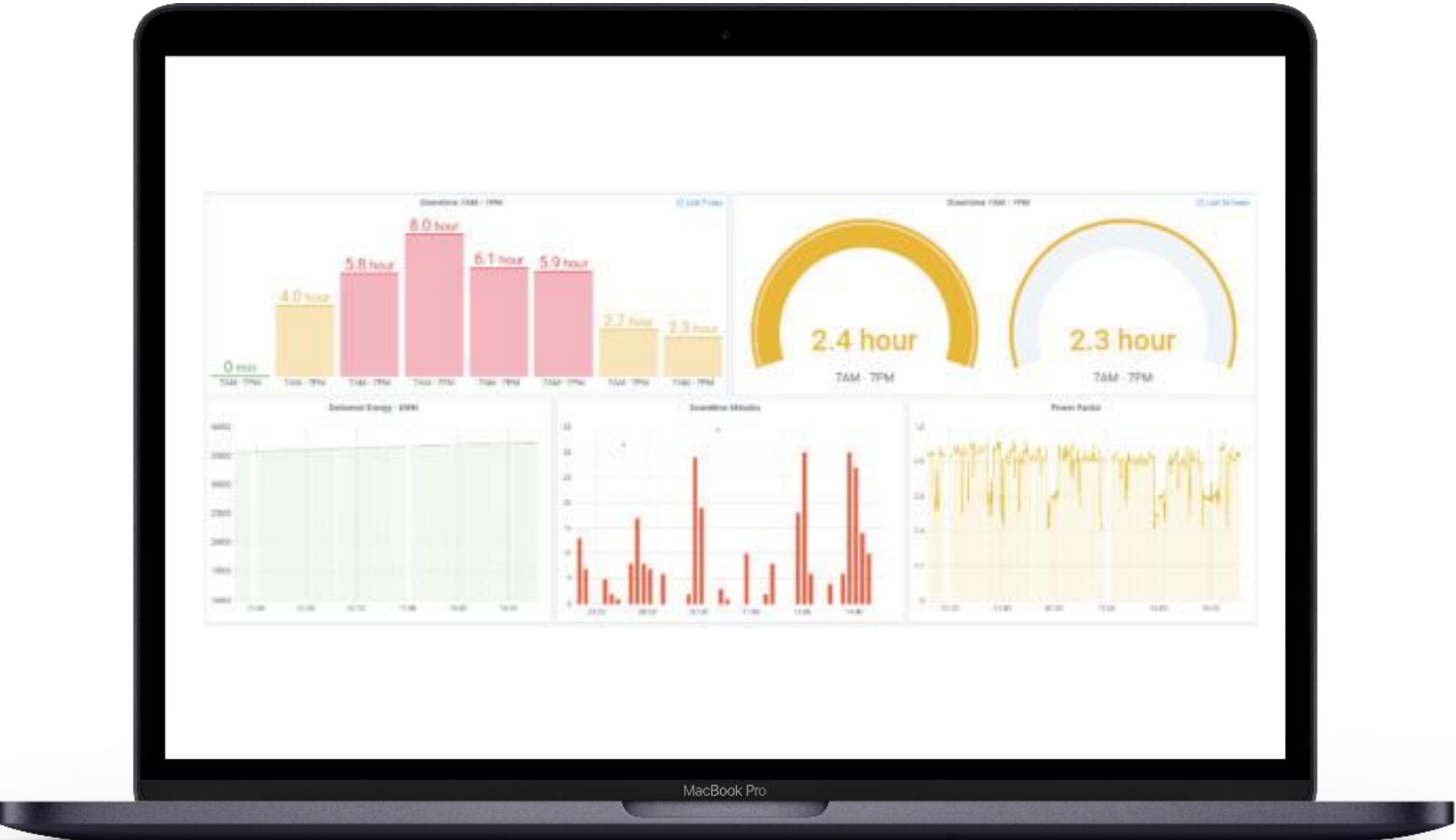
Remote Monitoring

# Cloud Platform

- User friendly analytics
- Low-code based flexible platform
- Fast to deploy
- Secured data communication over https/mqtt
- Notifications for threshold cross for any parameter
- Distinct but tightly integrated data capture, processing and dashboard layers
- New generation time series influx database to store big-data

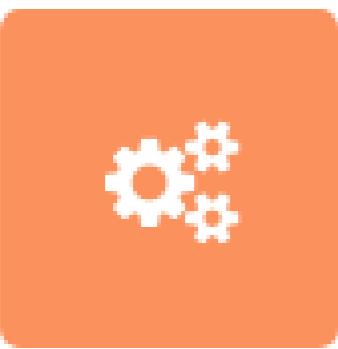


Technology based on Internet of Things based Node and Javascript framework for flexible connectivity and complex data processing



Offered by Us

# Technology Elements



**Process Automation**



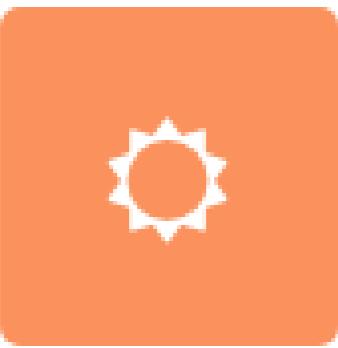
**PLC Programming**



**CNC**



**SPM Special Purpose Machines**



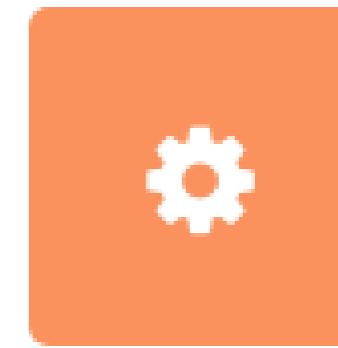
**Sensors**



**Analytics**



**Software Development**



**ERP Integration**

# Industrial 4.0 Solution- ATPL (Injection Molding)

# ATPL – Injection Molding Industry 4.0



## Background

ATPL is an **Injection Molding** contract manufacturing company based in Noida. We have implemented Industry 4.0 solution at their production unit.

## Benefits

Management is able to get a clear view of:

- The shop floor operations,
- Production levels,
- Machine efficiency,
- Operator efficiency,
- Tracking of manhour, machine-run and raw material cost

Resulted in

- Better product profitability,
- Prevention of energy wastage,
- Timely delivery to the end-customer,
- Better manpower productivity

Machine 3 - Status	Machine 2 - Status	Machine 5 - Status	Machine 4 - Status
<b>Machine 3</b>	<b>Machine 2</b>	<b>Machine 5</b>	<b>Machine 4</b>
Machine 3 - Mold <b>TOY GUN SMALL</b>	Machine 2 - Mold <b>BUCKET SMALL GZB</b>	Machine 5 - Mold <b>OKHLA ROUND BOX</b>	Machine 4 - Mold <b>TOY GUN BIG</b>
Machine 3 - Operator <b>DEWAN SINGH</b>	Machine 2 - Operator <b>SANTPAL</b>	Machine 5 - Operator <b>RAHUL</b>	Machine 4 - Operator <b>RAHUL</b>
Machine 3 - Current Production <b>2356</b>	Machine 2 - Current Production <b>172</b>	Machine 5 - Current Production <b>2825</b>	Machine 4 - Current Production <b>1928</b>
Machine 3 - Cycle Time Cycle Time <b>39</b>	Machine 2 - Cycle Time Cycle Time <b>391</b>	Machine 5 - Cycle Time Cycle Time <b>29</b>	Machine 4 - Cycle Time Cycle Time <b>84</b>
Target <b>20</b>	Target <b>90</b>	Target <b>30</b>	Target <b>22</b>



# ATPL – Solution Overview



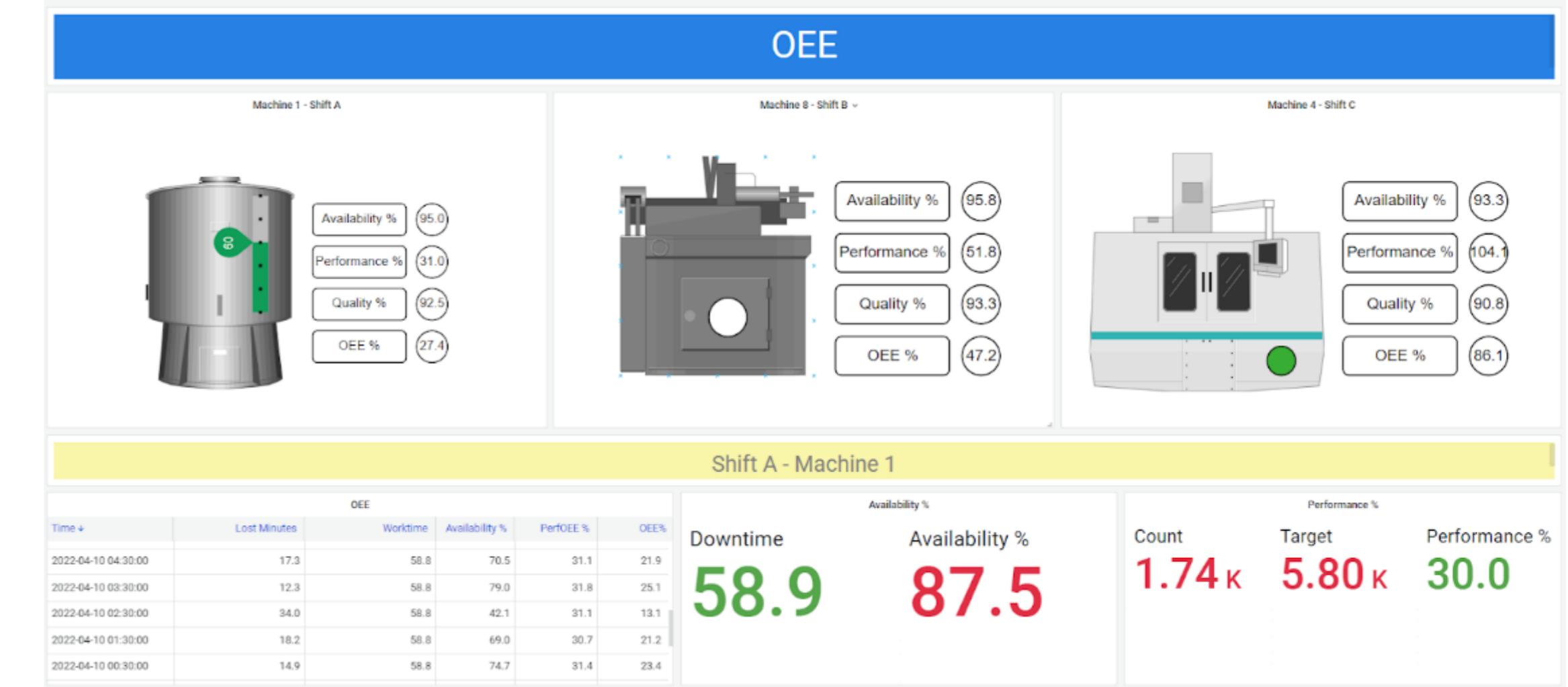
## Solution Architecture

Data is collected directly from the machine itself through couple of signals which signify production of a single unit and cycle time.

Data is also collected from the energy meters.

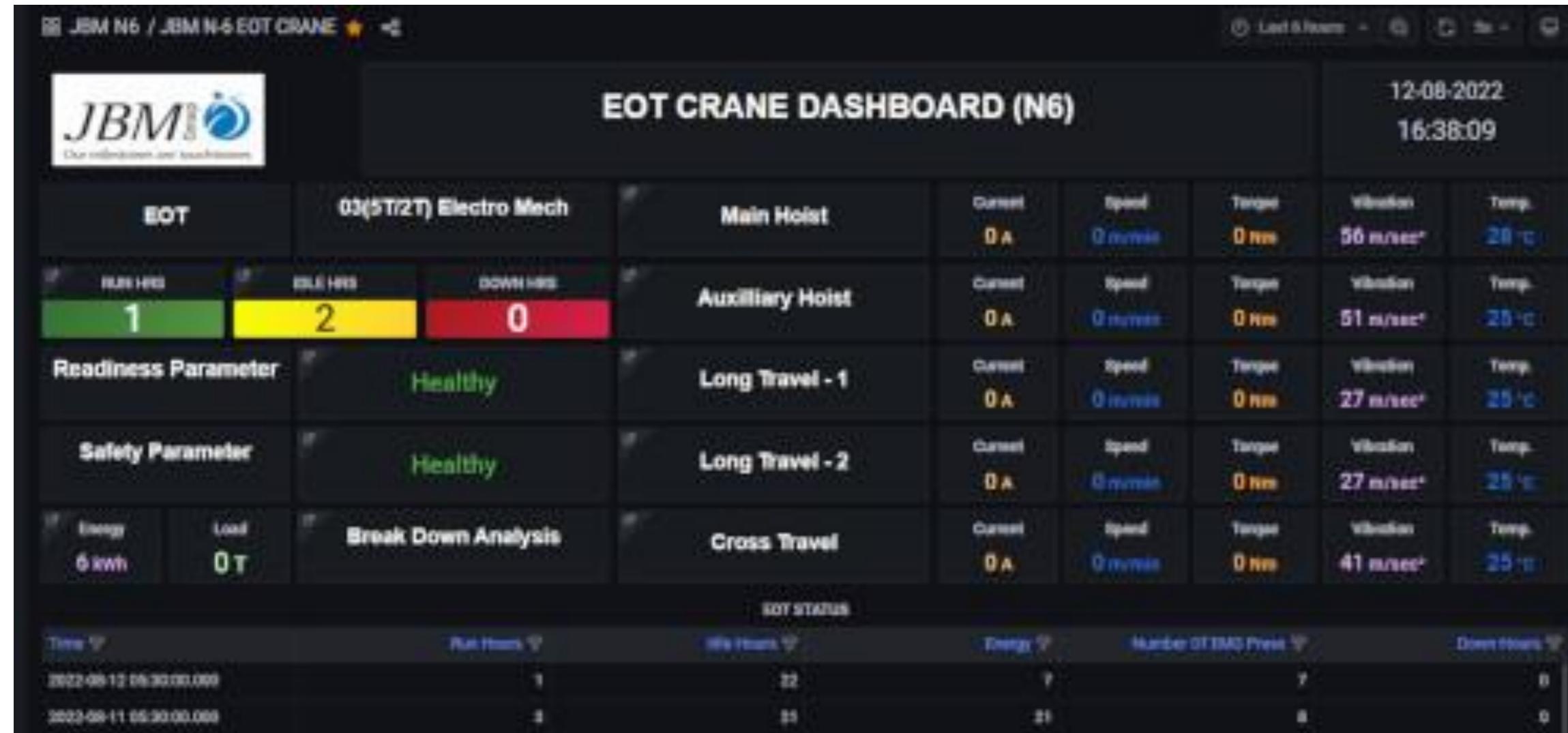
Operators are able to enter data over a tablet for the machine operator start along with mold and operator name.

Data is then sent to a cloud application where historical data is maintained. Real-time notifications (SMS/email) are sent to the user for reporting, anomalies, and workflow management etc.



# Machine Health Monitoring - JBM

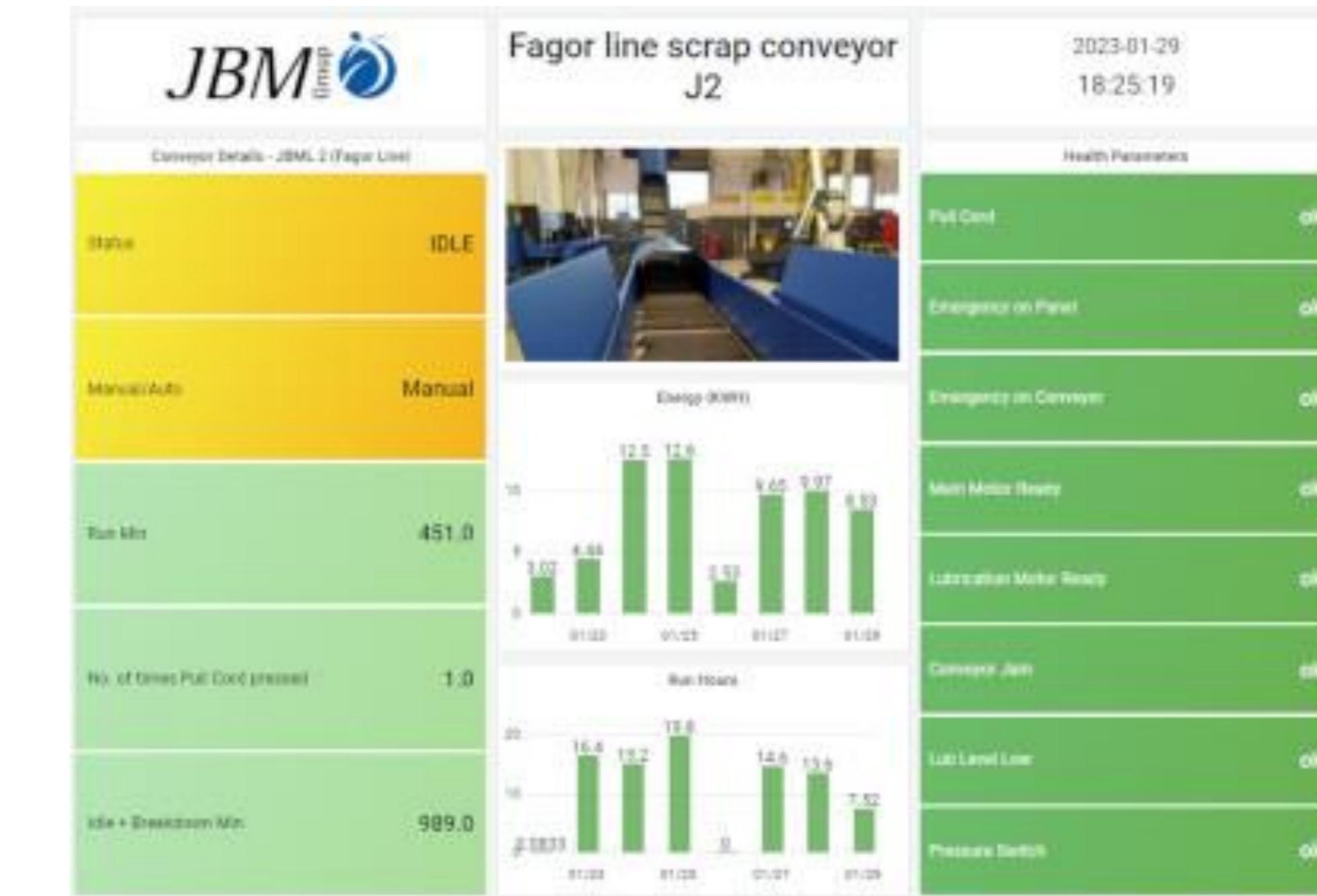
# EOT Crane Health Monitoring



- Parameters:**
- Run Hours
  - Idle Hours
  - Breakdown Hrs
  - Temperature
  - Vibration
  - Current
  - Torque
  - Speed
  - Readiness

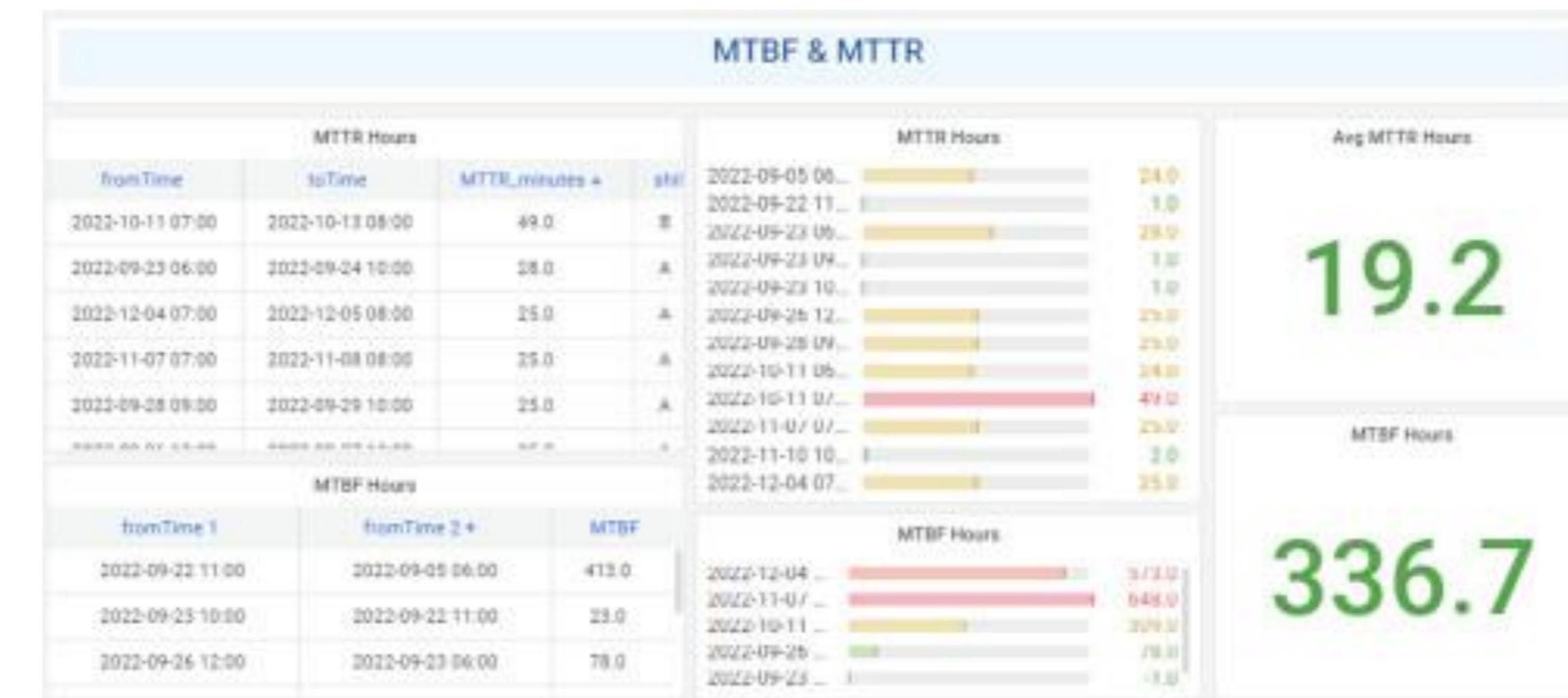
# Conveyor Belt Health Monitoring

JBM Group



## Parameters:

- Run Hours
- Breakdown Hours
- Temperature
- Vibration
- Current
- Torque
- MTTR
- MTBF



# Traceability- Ashimori (Seat Belts for Maruti)

# Ashimori – Car Seat Belt Barcode Traceability



## Background

Ashimori is a Japanese seat belt supplier to Maruti India, based in Neemraana Rajasthan. We have implemented a Traceability solution for their products.

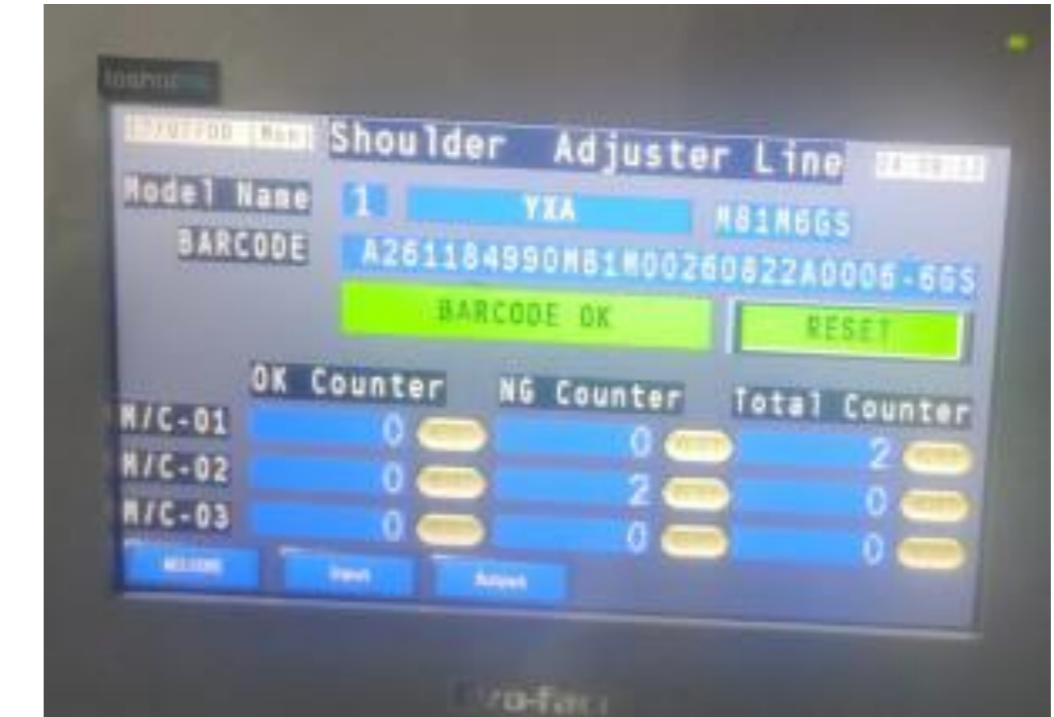
## Benefits

Customer is able to:

- Maintain a historian of the product barcodes
- Get a view of the barcode defects like incorrect model, incorrect date, duplicate barcode
- Perform quality management

Resulted in

- Internal and customer compliance
- Ability to trace defects back to the barcodes & prod. time
- No dependency on machine manufacturer for traceability
- Open solution – no vendor lock-in
- More reliable product delivery
- Ability to assist the customer track a product recall



# Ashimori – Solution Overview



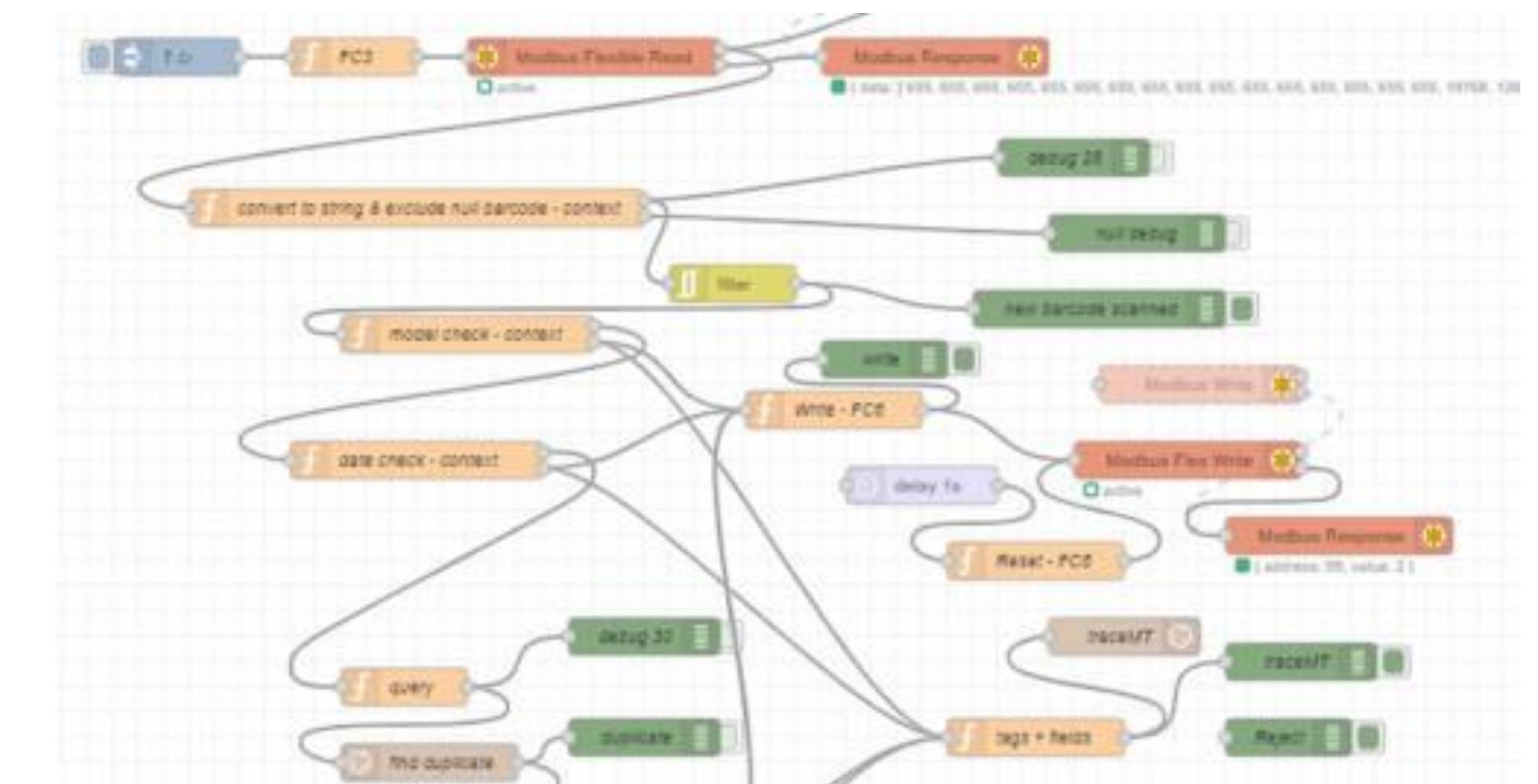
## Solution Architecture

Solution included integration of barcode scanner, PLC, HMI and an industrial on-premise PC. Software included the real-time traceability database along with a user-friendly reporting interface.

It was an on-premise solution with options to take regular database backups.

Solution was fast, reliable, user-friendly and vendor-independent

General / Trace Data Belt					
Model	All	Status	All	Today's Products	
Time	Barcode	Date	Model	Serial No.	Status
2022-08-26 12:31:29	A261184990MB1M00260822...	260822	M81M6GS	0001	Duplicate
2022-08-26 12:32:27	A261184990MB1M00260822...	260822	M81M6GS	0001	Duplicate
2022-08-26 12:32:56	A261184990MB1M00260822...	260822	M81M6GS	0020	OK
2022-08-26 12:33:37	A261184990MB1M00260822...	260822	M81M6GS	0019	OK
2022-08-26 12:33:49	A261184990MB1M00260822...	260822	M81M6GS	0018	OK
2022-08-26 12:34:05	A261184990MB1M00260822...	260822	M81M6GS	0020	Duplicate
2022-08-26 12:34:50	A261184990MB3P00260822...	260822	M83P6GS	0006	invalid Model
2022-08-26 12:35:23	A261184990MB1M00260822...	260822	M81M6GS	0014	OK
2022-08-26 12:40:06	A261184990MB1M00250822...	250822	M81M6GS	0020	invalid Date
2022-08-26 12:40:35	A261184990MB1M00250822...	250822	M81M6GS	0020	invalid Model



# Productivity/Utilization - (Advance Valves)

# Advance Valves – Productivity Tracking

## Background

Advance Valves is a global market leader in making valves for the Oil & Gas, LNG & Cryogenic, Chemicals & Fertilizers, Power, Steel & Mining etc. They wanted to digitalize their manufacturing processes and increase productivity

## Benefits

Customer is able to:

- Digitalise across conventional machines, welding, VMCs, CNCs, Paint Shop, Shot Blasting, Utilities

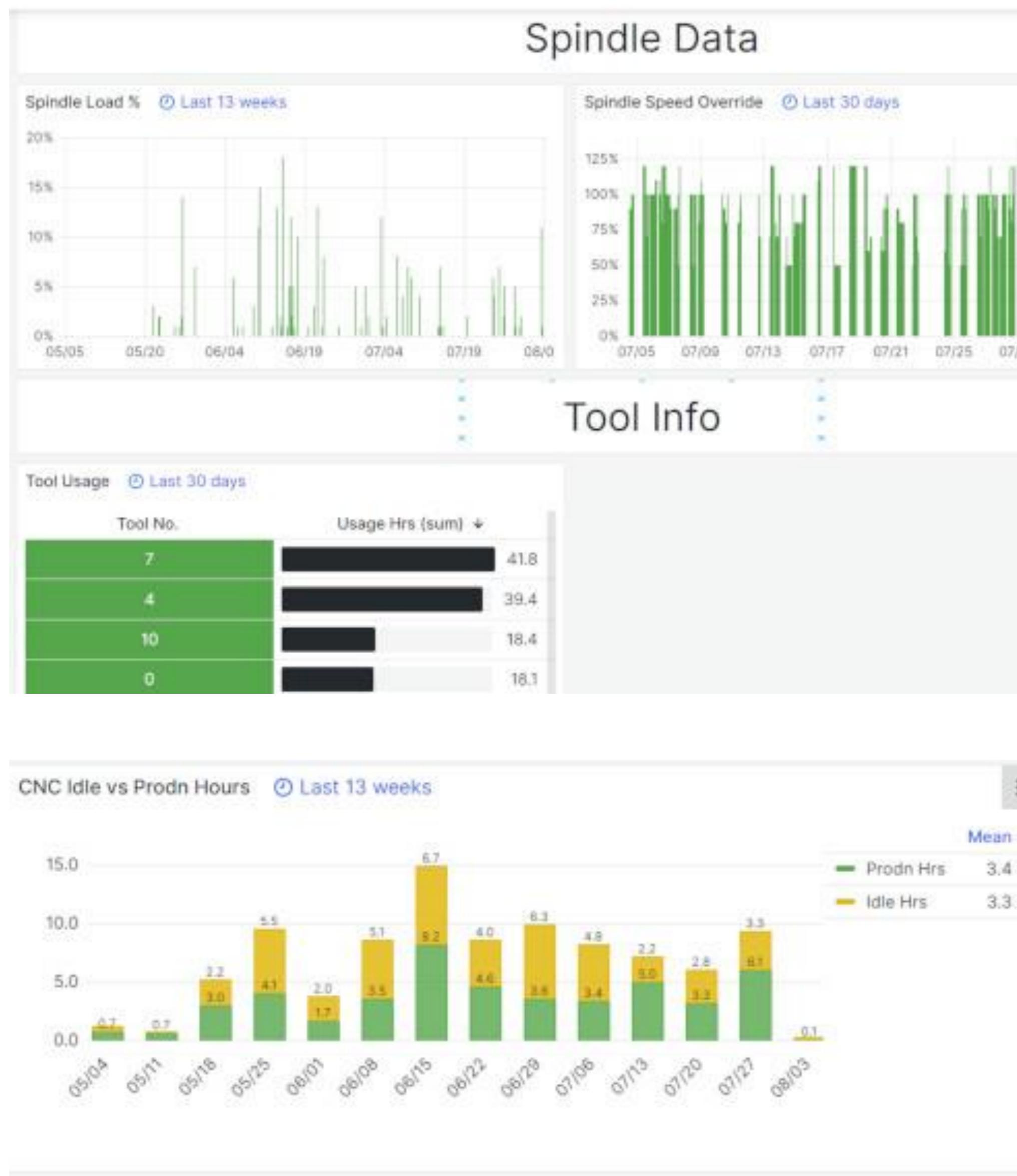
Resulted in

- Increased machine utilization and hence production
- Productivity culture with self-drive and correction based on real-time feedback

## Mig/Semi Auto Weld M/C

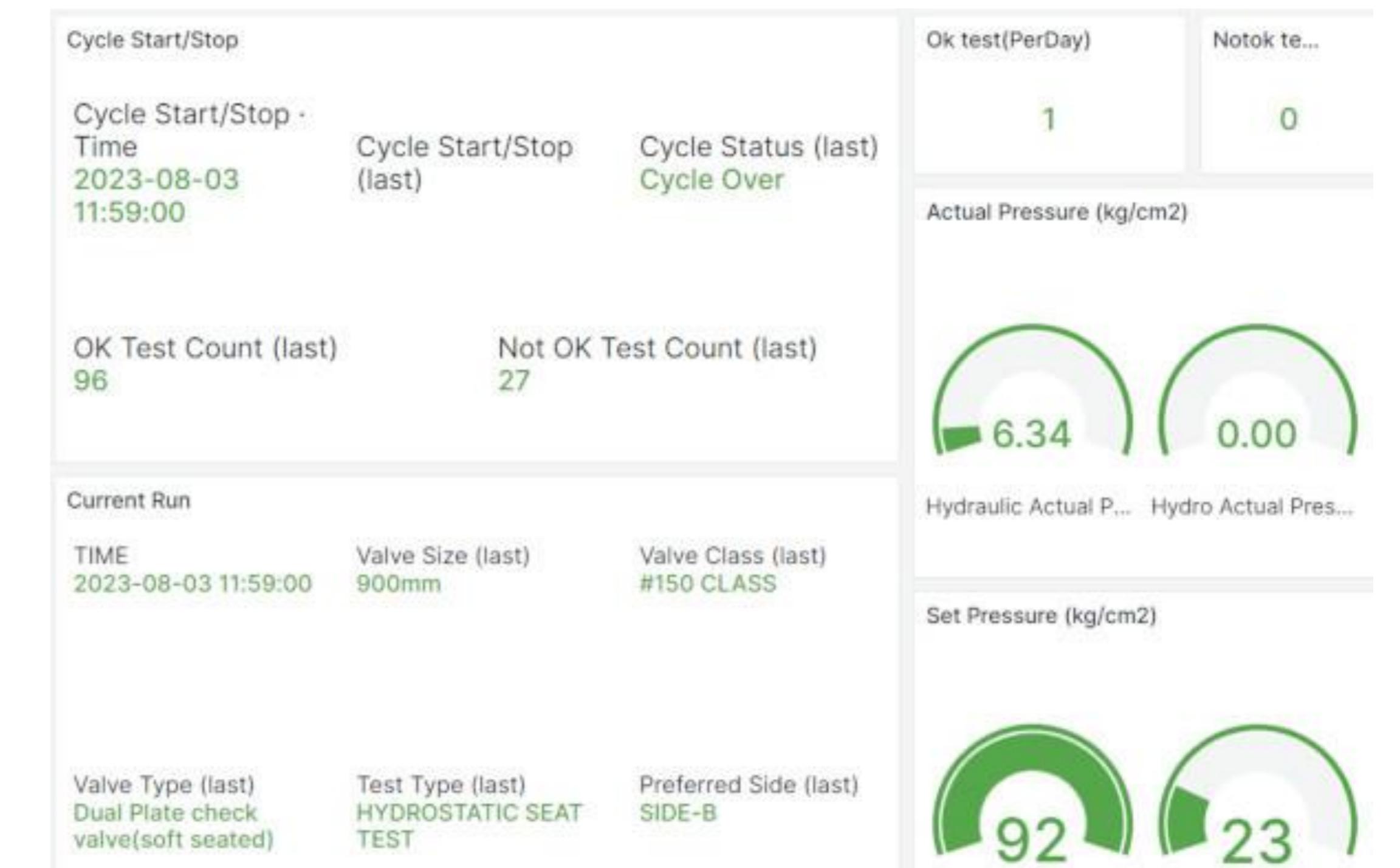
PARAMETERS									
Time	Spool Batch/Lot No.	HeatNumber	Spool Num	Job Item	Overlay Material	Unique Tag	Product Type	Weight	
2023-08-03 05:5...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01
2023-08-03 06:0...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01
2023-08-03 06:5...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01
2023-08-03 08:0...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01
2023-08-03 09:1...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01
2023-08-03 09:2...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01
2023-08-03 09:3...	w2300531_5	5000	1	Seal ring	Sta5.21erocr-Alercoocr-Elat21...	000900mm150	23 ...	Butterfly triple offset valve	001.01

# Advance Valves – Solution Overview



## Solution Architecture

- Solution included digitalisation across conventional machines, welding, VMCs, CNCs, Paint Shop, Shot Blasting, Utilities



# Productivity Increase - Usha Siam (Steel Wire Ropes, Thailand )

# Ushasiam – Steel-wire Industry 4.0



## Background

Ushasiam is a **steel-wire** manufacturing company based in **Thailand**. When faced with new orders, they had to decide whether to go for a new highly expensive machine or increase productivity on the existing one.

## Benefits

Management is able to get a clear view of:

- Machine downtime
- Energy efficiency

Resulted in

- High savings from not investing in a new machine
- Higher machine productivity
- Higher production
- Energy cost savings



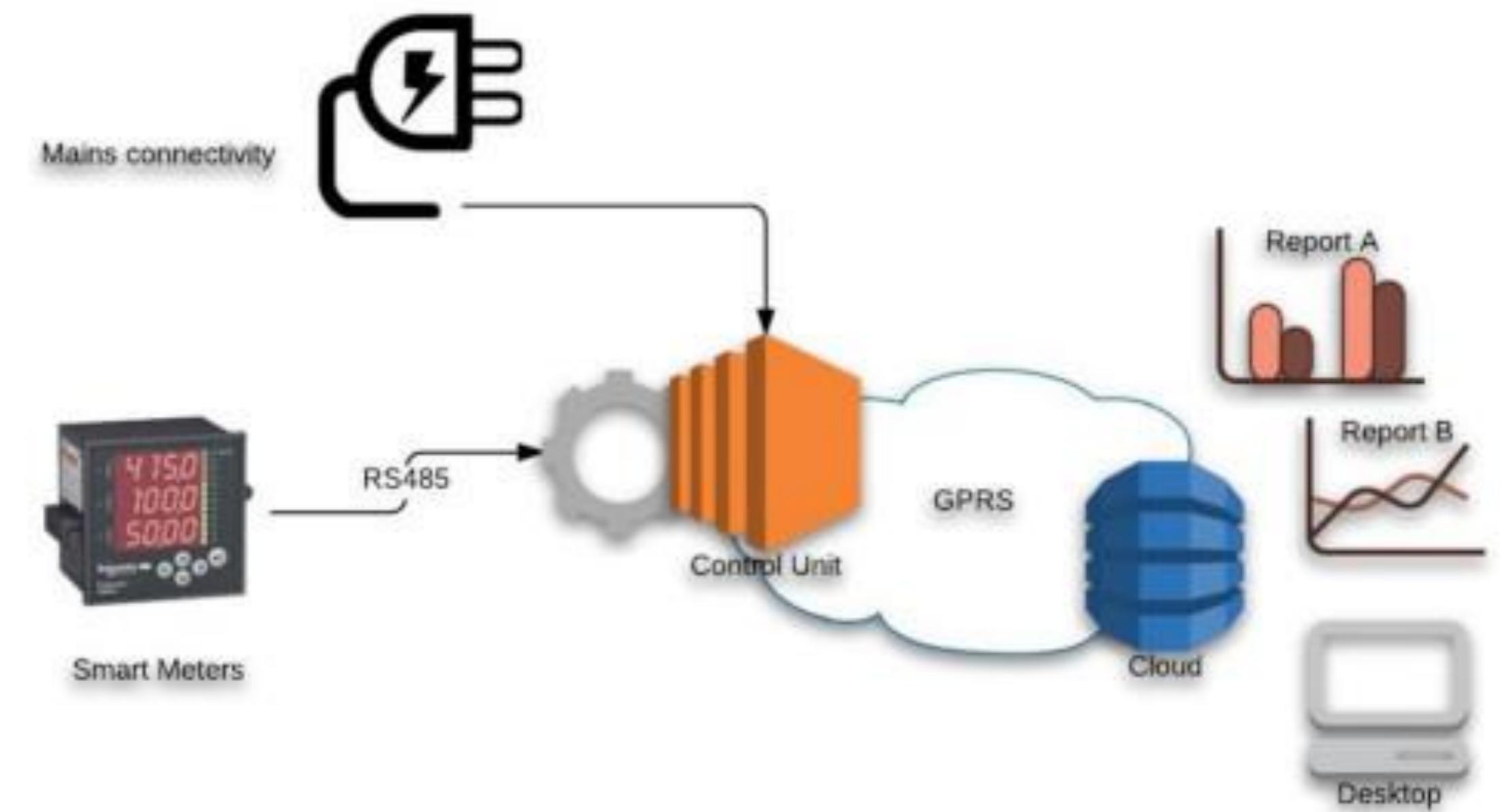
# Ushasiam – Solution Overview



## Solution Architecture

Machine downtime tracking was done through a simple tracking of machine operations through an energy meter. No complexity of PLC integration but still clear view of the machine uptime and the energy and efficiency levels of the machine.

Data was sent to a cloud application which displayed machine run-hours on the shop-floor through a big real-time display for clear visibility



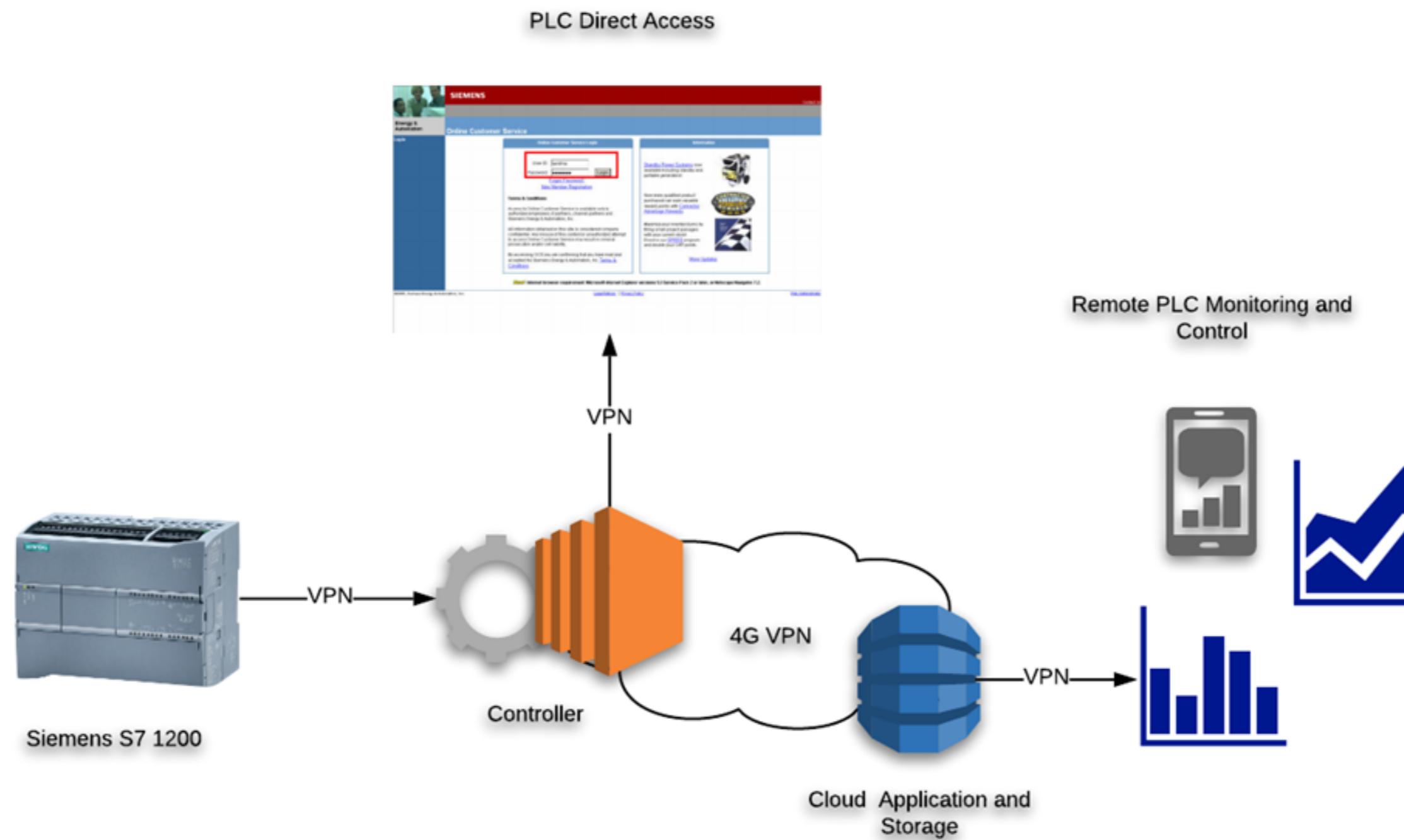
# Industrial IoT Solutions

Remotely monitor and control your compressors from anywhere, anytime from your laptop or mobile



# IoT Scada - Remote Compressor Monitoring and Control

Data-driven smart Remote Operations Management



- Save time to respond and reduce machine downtime
- Save manpower cost and travel cost
- Have better control over operations
- Create ease of operations
- Have better end-customer satisfaction
- Strengthen brand differentiation through digitalisation

PLC Direct Access

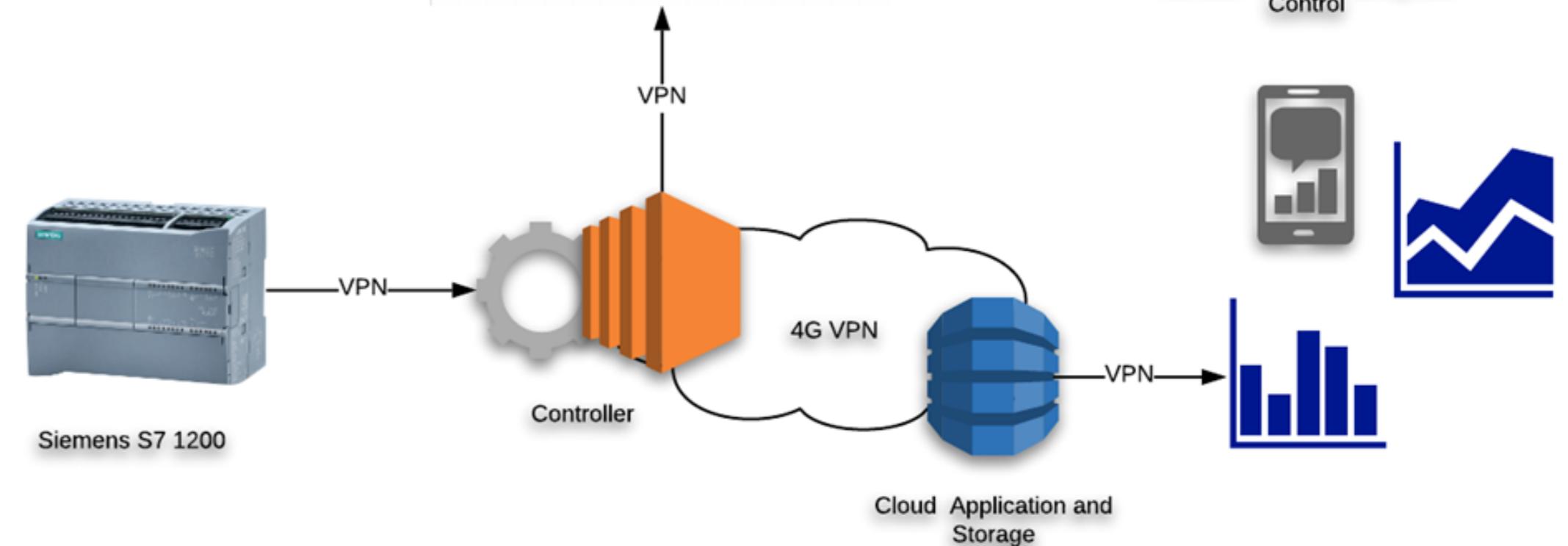
# IoT Scada - Remote Boiler Monitoring and Control

Data-driven smart Remote Operations Management

- Save time to respond and reduce machine **downtime**
- Save manpower cost and **travel cost**
- Have **better control** over operations
- Create **ease** of operations
- Have better end-customer **satisfaction**
- Strengthen **brand differentiation** through digitalisation



Remote PLC Monitoring and Control



Remotely monitor and control your boilers from anywhere, anytime from your laptop or mobile

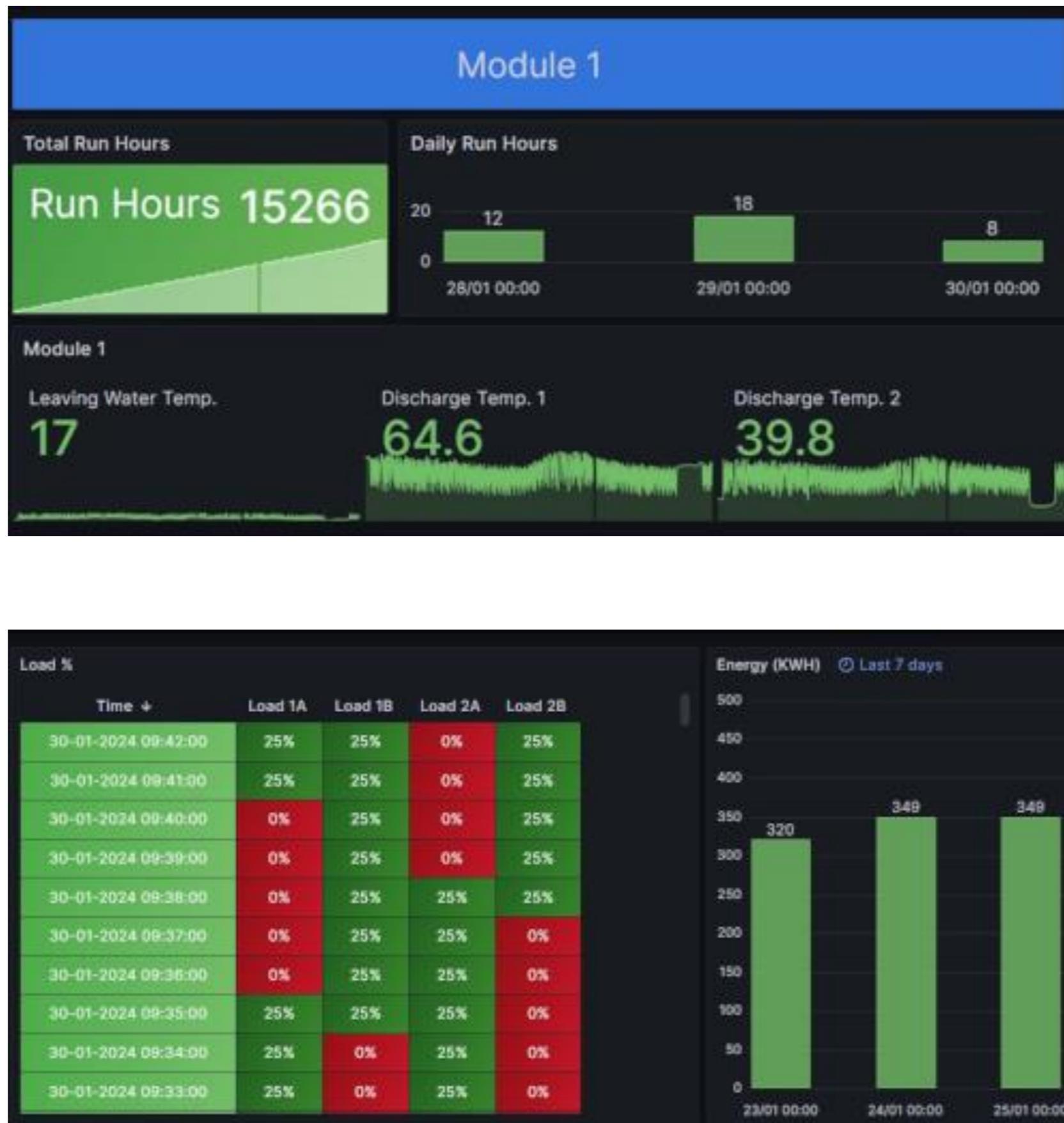


Remotely monitor your Chiller from anywhere, anytime from your laptop or mobile



# IoT Scada - Remote Chiller Monitoring and Control

Data-driven smart Remote Operations Management



Save energy and reduce operational downtime? Monitor your key energy guzzlers and take action much before the operational issue occurs.

Chiller Monitoring -

- 👉 Maintain correct temperature levels
- 👉 Arrest abnormal behaviour
- 👉 Get notified of the system faults in real-time
- 👉 Get a visibility of the load
- 👉 Prevent unnecessary energy consumption

## Remote Energy Monitoring

# Energy Monitoring

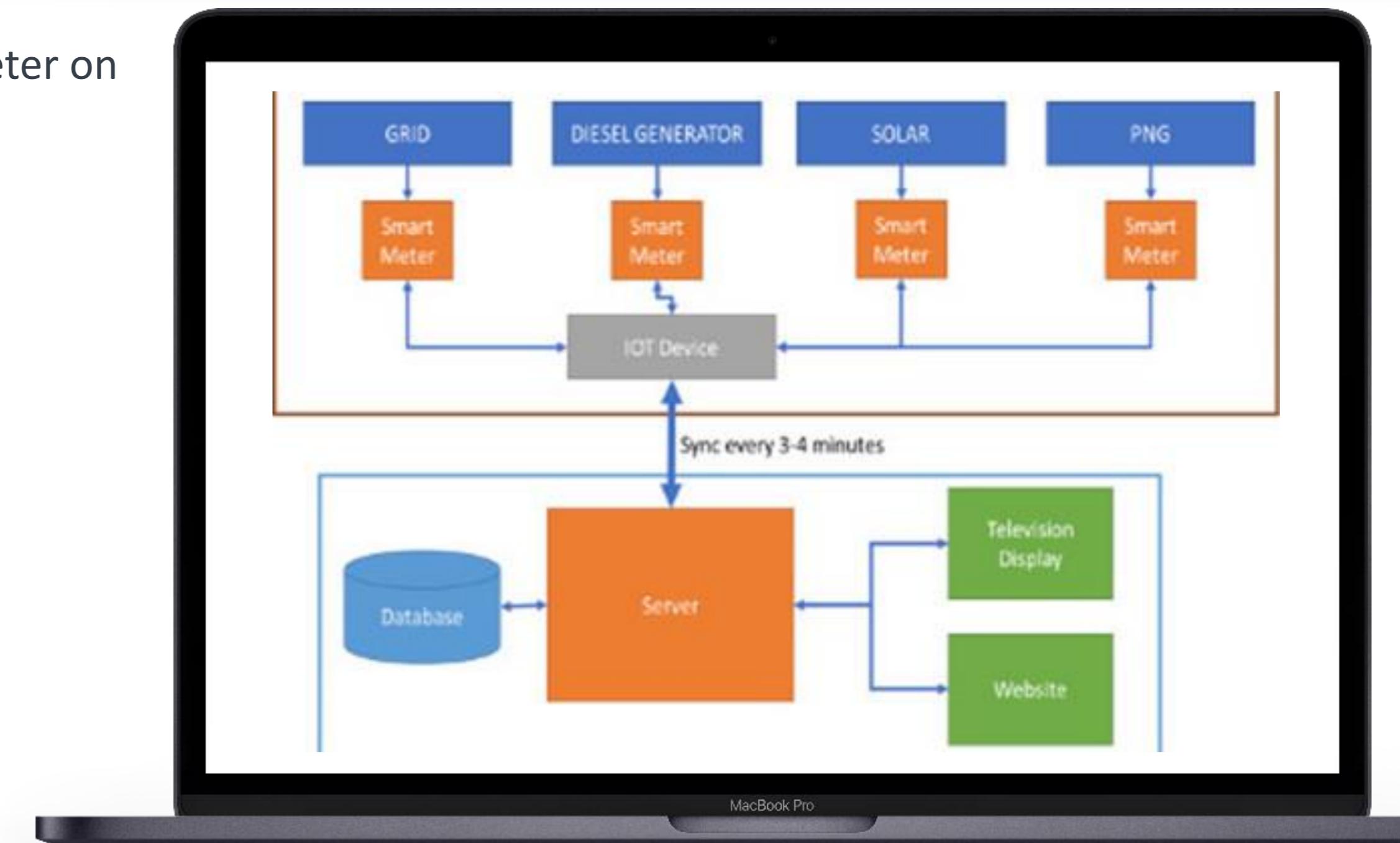
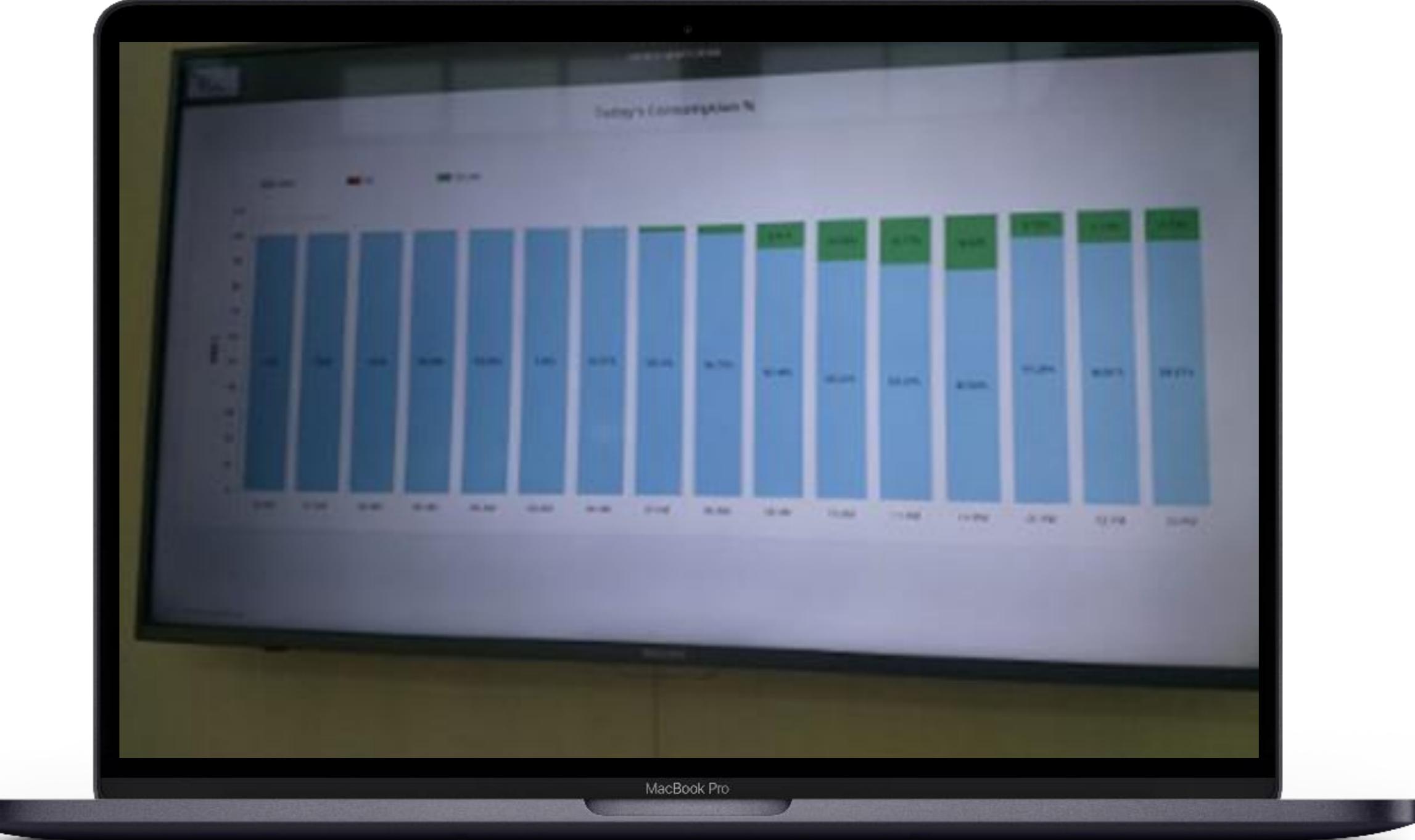
- Remote electricity monitoring for – Grid, Solar and DG
- Prevent energy losses - ensure equipment health
- Reduce operational risks and unplanned downtime
- Lowering maintenance costs – predict failures
- Monitor shutdown hours
- Prevent penalties
- Predict energy demand for energy bidding to save more
- Notifications for threshold cross for any electrical parameter on smart meters



Grid, Solar, DG, PNG, Water etc. all parameters can be monitored on the same platform for a single view



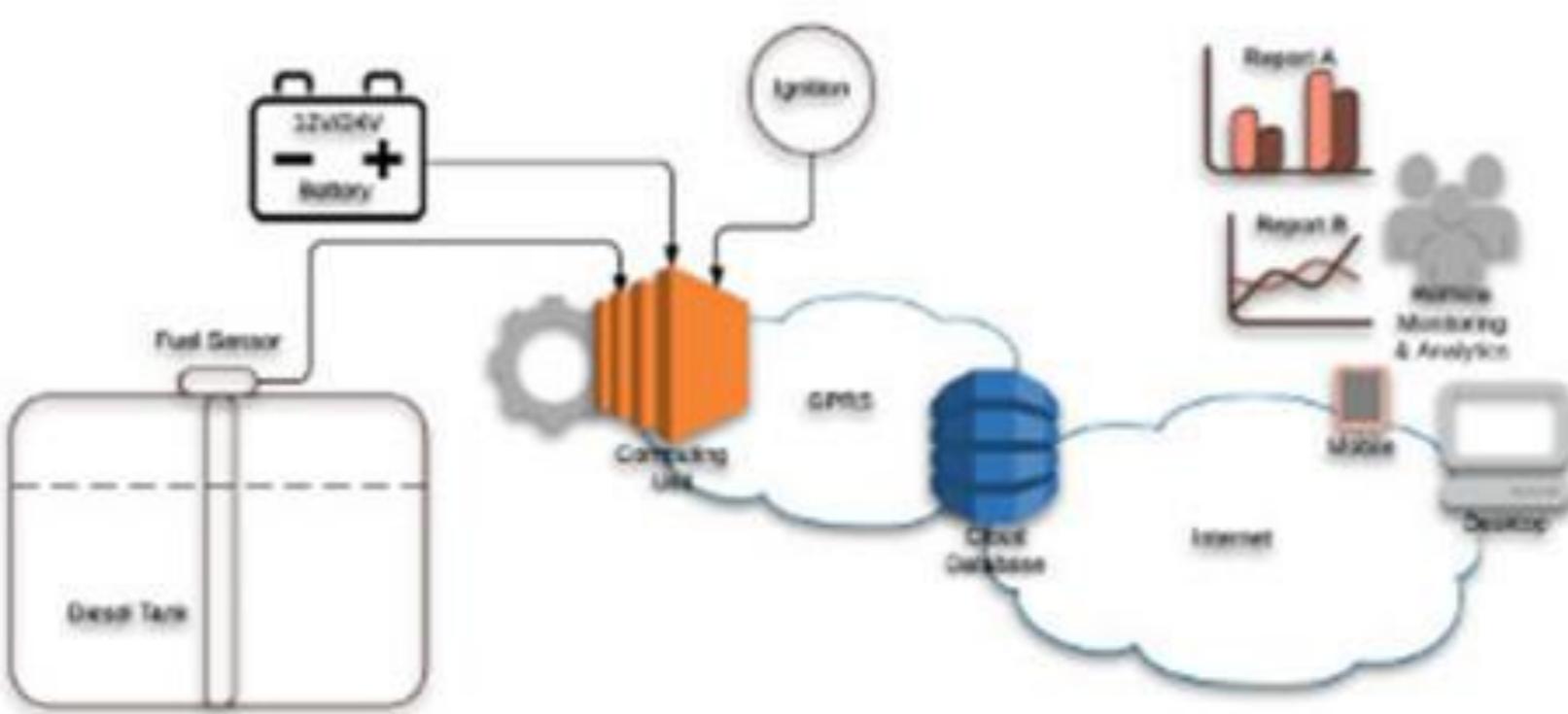
Both cloud based and in-premise solutions are available



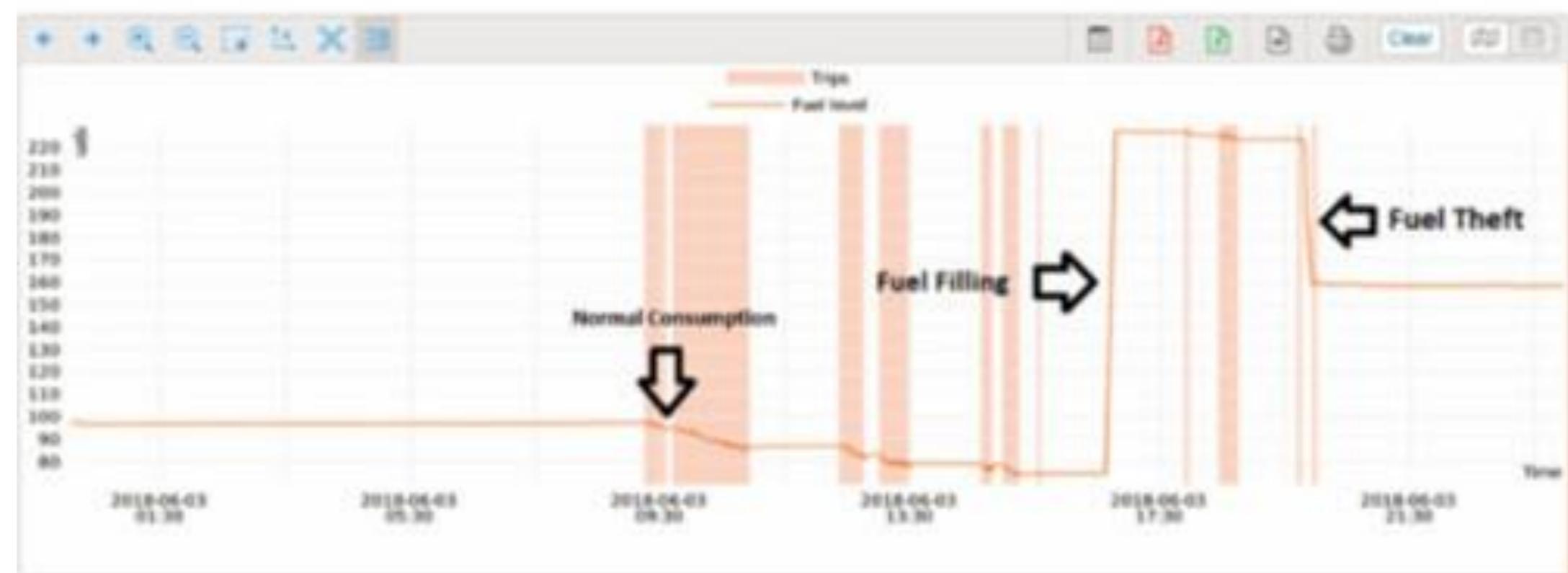
## Fuel and Load Monitoring



Near real time information of fuel volume present in tank



Pilfered fuel volume (if any), with date, time, location



- Real-time accurate data anytime anywhere
- Ensure complete 3rd party re-conciliation
- Prevent fuel pilferage
- Be in control of fuel cost – filling, consumption, fuel taken out
- Monitor asset efficiency
- Manage load optimally
- Reduce overall fuel consumption

# UPS Monitoring



Real-time  
information on UPS  
operations

- Get **notified** about any UPS malfunction in real-time
- Make sure that you achieve high level of **uptime**
- **Reduce revenue losses** due to power cuts to the plant shop-floor
- Ensure **business continuity**
- Prevent any future failures through relevant **analytics** about UPS downtime



Maintain business  
continuity

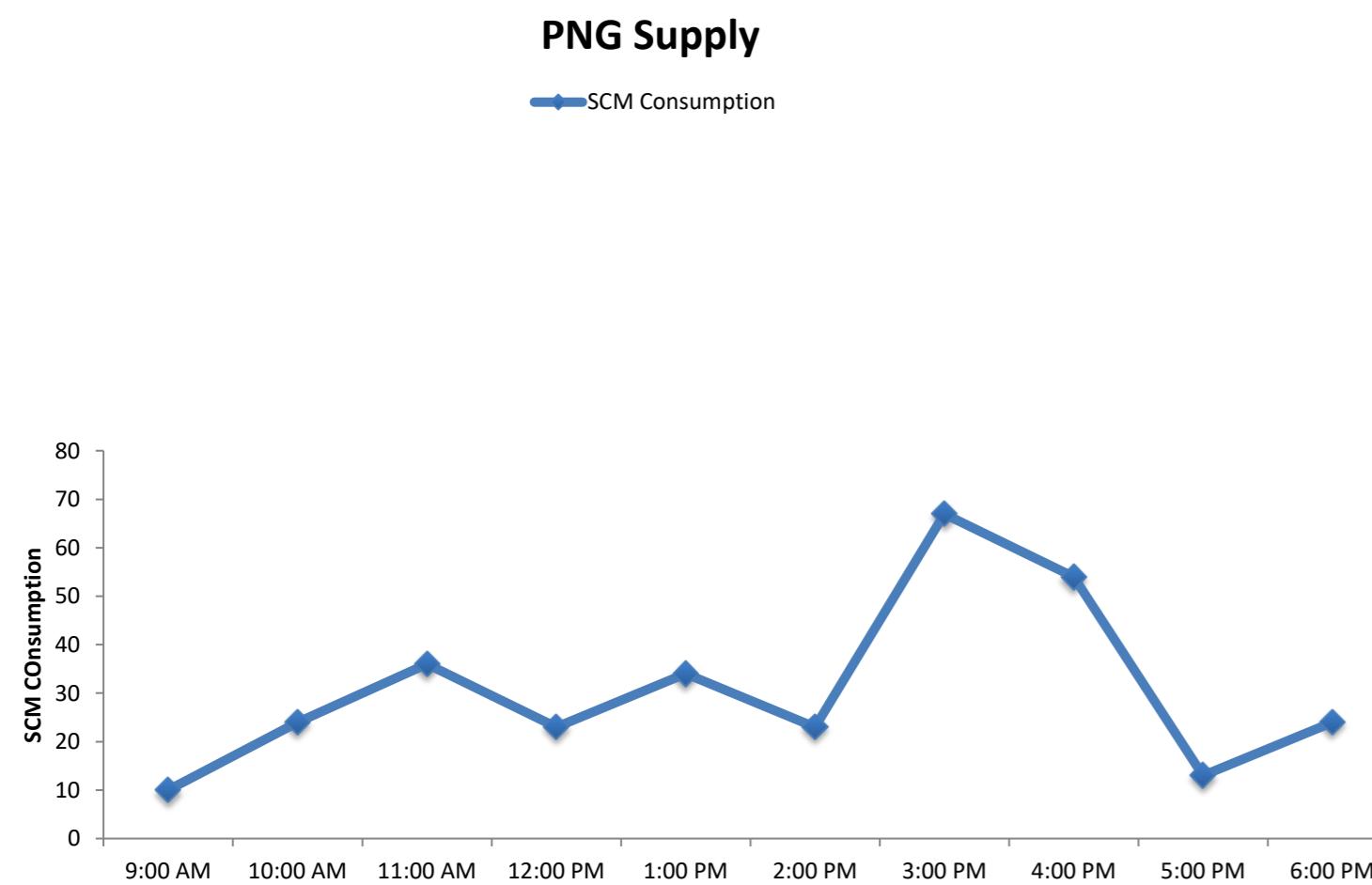


# Remote Gas Monitoring

- SCM (Standardized Cubic Meter)
- Pressure
- Flow rate
- Temperature



SCM Volume  
Converter



PNG Consumption  
Meter

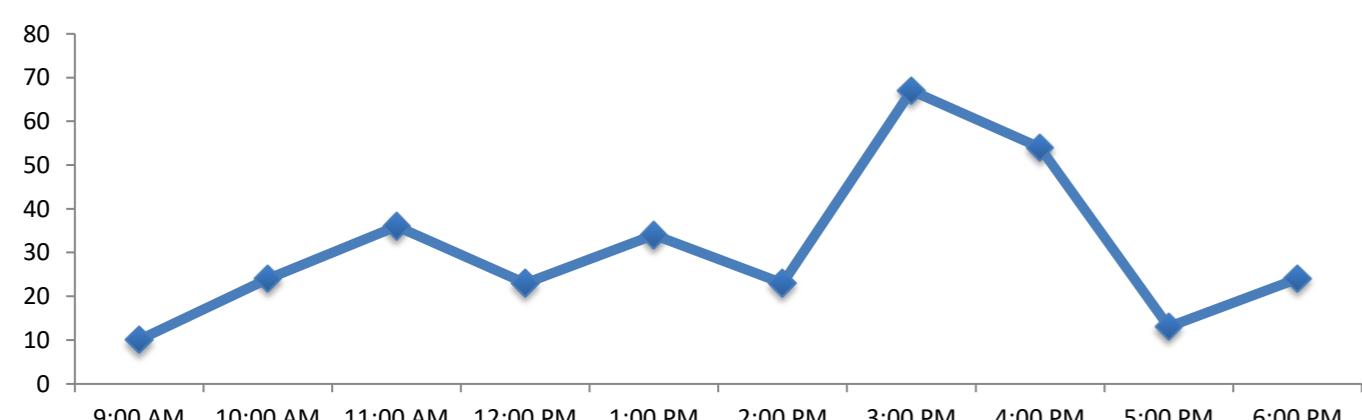
## Remote Water Monitoring

- Water consumed
- Flow rate



Water Data  
Converter

Water Supply (Lt)



Water Flow Meter

## Compressed Air/Gas Leakage Detection

- Flammable or non-flammable gases
- High accuracy
- Online pressure / temperature measurement
- Wide range of flow rate
- High velocity measurement
- Maintenance-free without moving parts



Remote Data Available



Gas Flow Meter



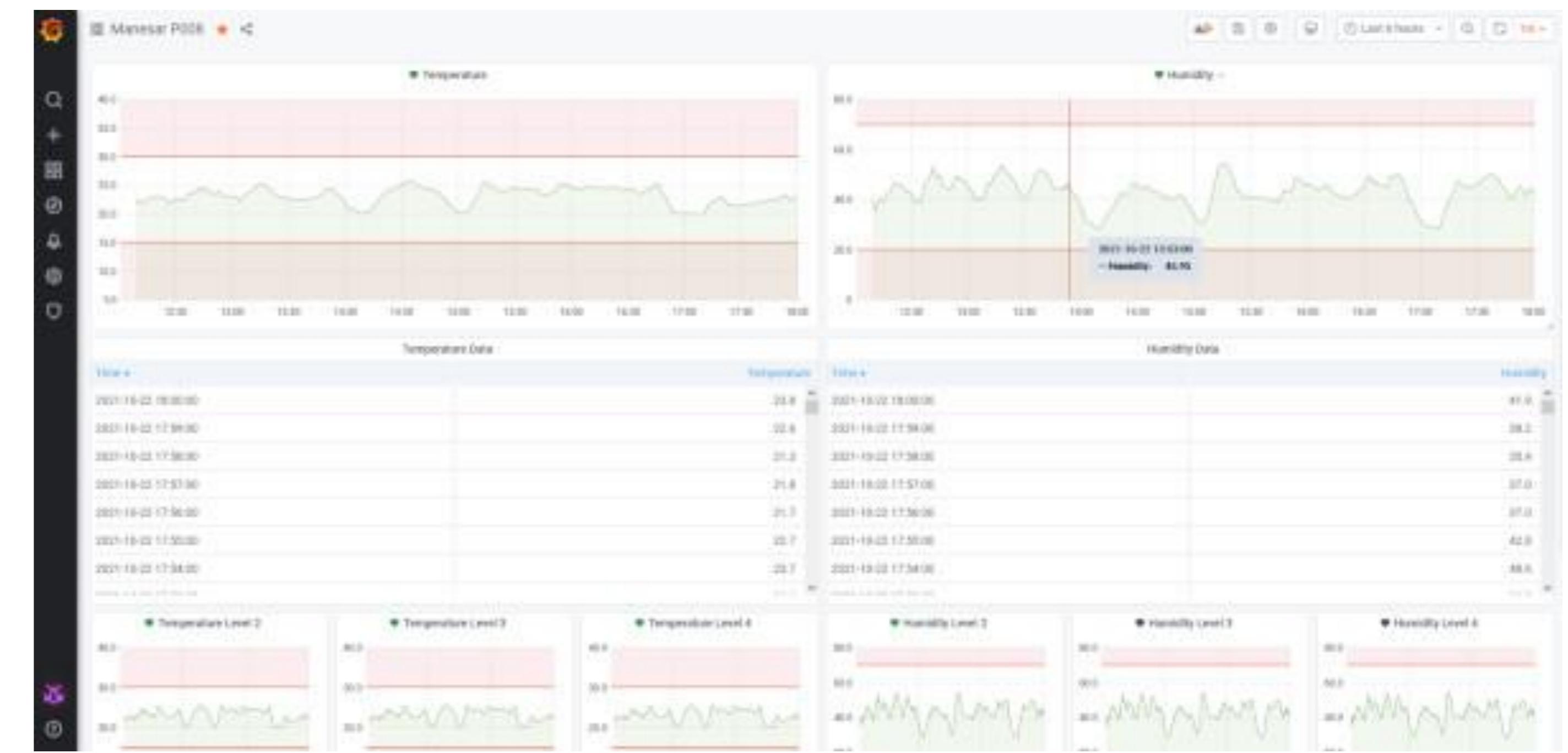
## SOLUTION

- Temperature
- Humidity
- Multiple sensors can be connected to same IoT Gateway within 300m
- Email and SMS Alerts
- Access from desktop
- Access from mobile
- Access on User Authentication
- Modbus RS485 Communication
- 4G connectivity (use own SIM)

## SENSOR

- Temperature Range:-40°C~60°C
- Temperature Precision:+/-0.5°C
- Temperature Resolution:0.1°C
- Humidity Range:0%RH~80%RH
- Humidity Precision:+/-3%RH
- Humidity Resolution:0.1%RH
- Work Temperature:-40°C~85°C
- Work Humidity:0%~95%RH

# Remote Temperature Humidity Monitoring



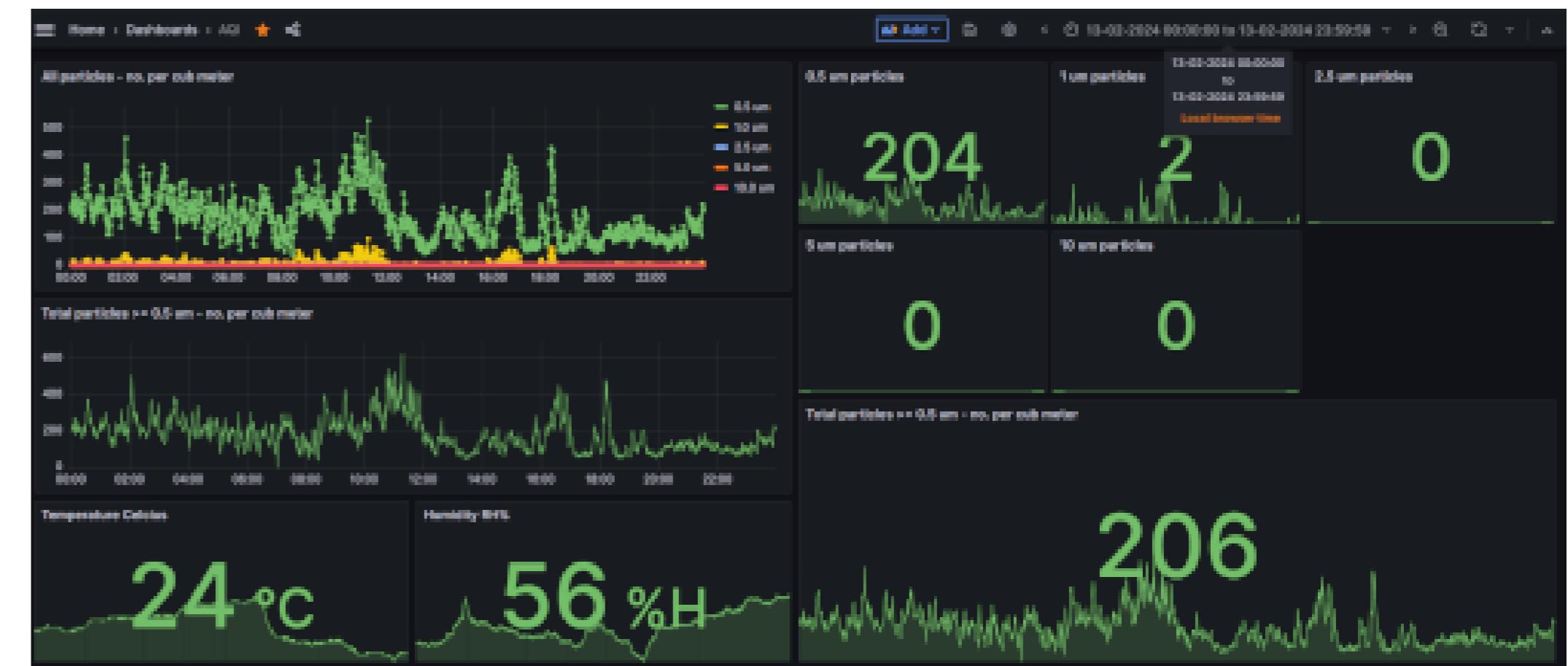
Sensor

Web Dashboard

# AQI – Air Quality Index Monitoring

✓ Choose the parameters that you would like to monitor

✓ Add other parameters or sensors that are relevant for you



## Parameters

- PM 10
- PM 2.5
- CO<sub>2</sub>
- CO
- SO<sub>2</sub>
- NO<sub>2</sub>
- NH<sub>3</sub>
- O<sub>3</sub>





# Remote Datacenter Monitoring

## BENEFITS

- Real-time alerts enabling business continuity
- Historical view for trend analysis
- Single platform for end-to-end monitoring
- Display on a single screen
- Monitoring across multiple datacenter sites



## Aspects Monitored

- Temperature & Humidity
- Corrosion
- Water Leakage Detection
- Access Control & Monitoring
- Fire Alarm Status (existing system integration)
- CCTV (existing system integration)
- UPS
- Energy
- Any other relevant items



## Pump Control



## Cooling Line Control



## AHU Damper Control



## Other Items

- Customer-wise energy Monitoring
- Lighting and chiller timer as per contracted office hours
- Ammonia monitoring in toilets
- Room temperature monitoring

# Building Management System



## SMARTWORKS

# Value Added Services

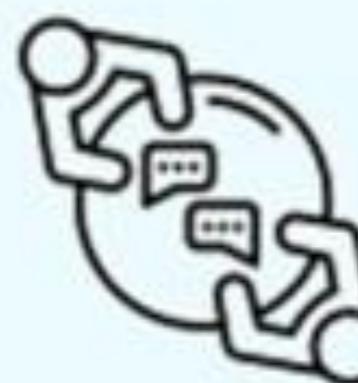
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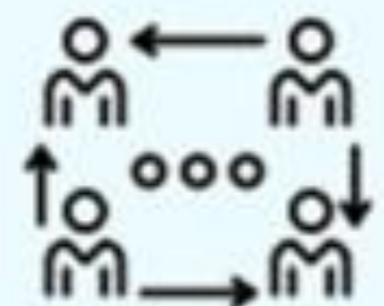
**Training & Knowledge Transfer**



**AMC Included**



**Consulting**



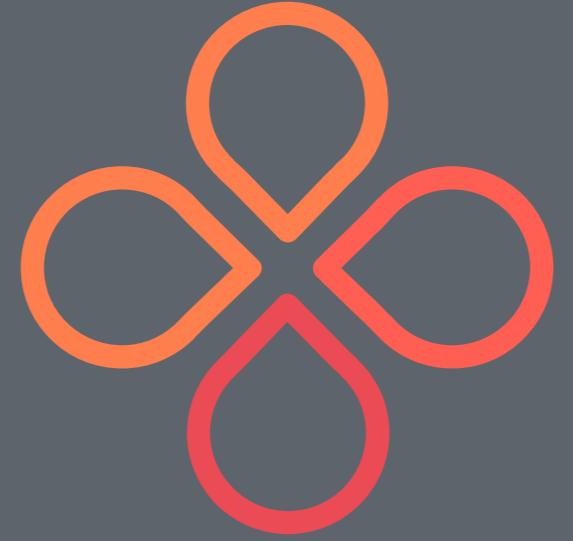
**Single Platform for all Solutions**



**Proactive Analytics & Insight Reporting**



**~20% Customization**



# THANK YOU

RENATA IOT PRESENTATION

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