think7

manufacturing. redefined.

PREPARING FOR THE FUTURE

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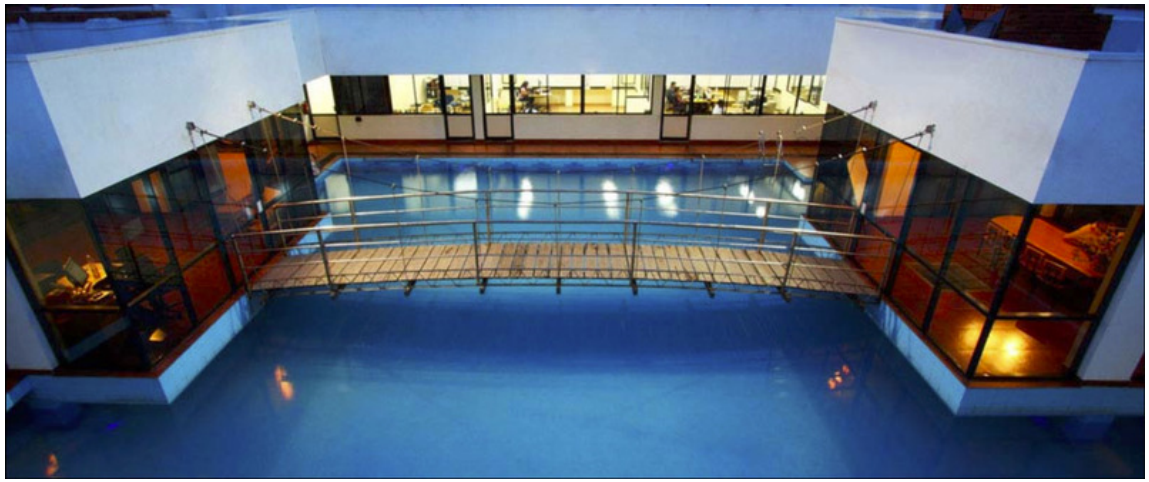
the who?



Making the road to Smart & Connected Factories simple

Founded in 2013 and based out of Bangalore with teams located in Delhi, Pune & Chennai

20 years of manufacturing domain experience + 25 years of IT Product experience

Full stack solution tailored for Automotive Industry with seamless integration of hardware & software

our journey

150 Factories across the country

4500+ Machines connected

15000+ unique Part Numbers

2.4 Million Quality checks carried out

575 Million operations monitored

1.8 Billion data points analysed

CNC Machining, Pressure Die Casting, Stamping & Fabrication, Forging, Plastic & Rubber Moulding, Assembly & Testing

TEL TURBO ENERGY

AMARA RAJA

STL FASTENERS

TVS

Steelbird INTERNATIONAL

SHRIRAM PISTONS & RINGS LTD.

AIP PISTONS & RINGS

HARSHA ENGINEERS

alicon

ENDURANCE

S.M.AUTO

Industry 4.0

INDUSTRIAL REVOLUTION
manufacturing. redefined.

INDUSTRY 1.0

Machines
Steam &
Water Power

INDUSTRY 2.0

Mass
Production
& Electricity

INDUSTRY 3.0

Automation,
Electronics & IT

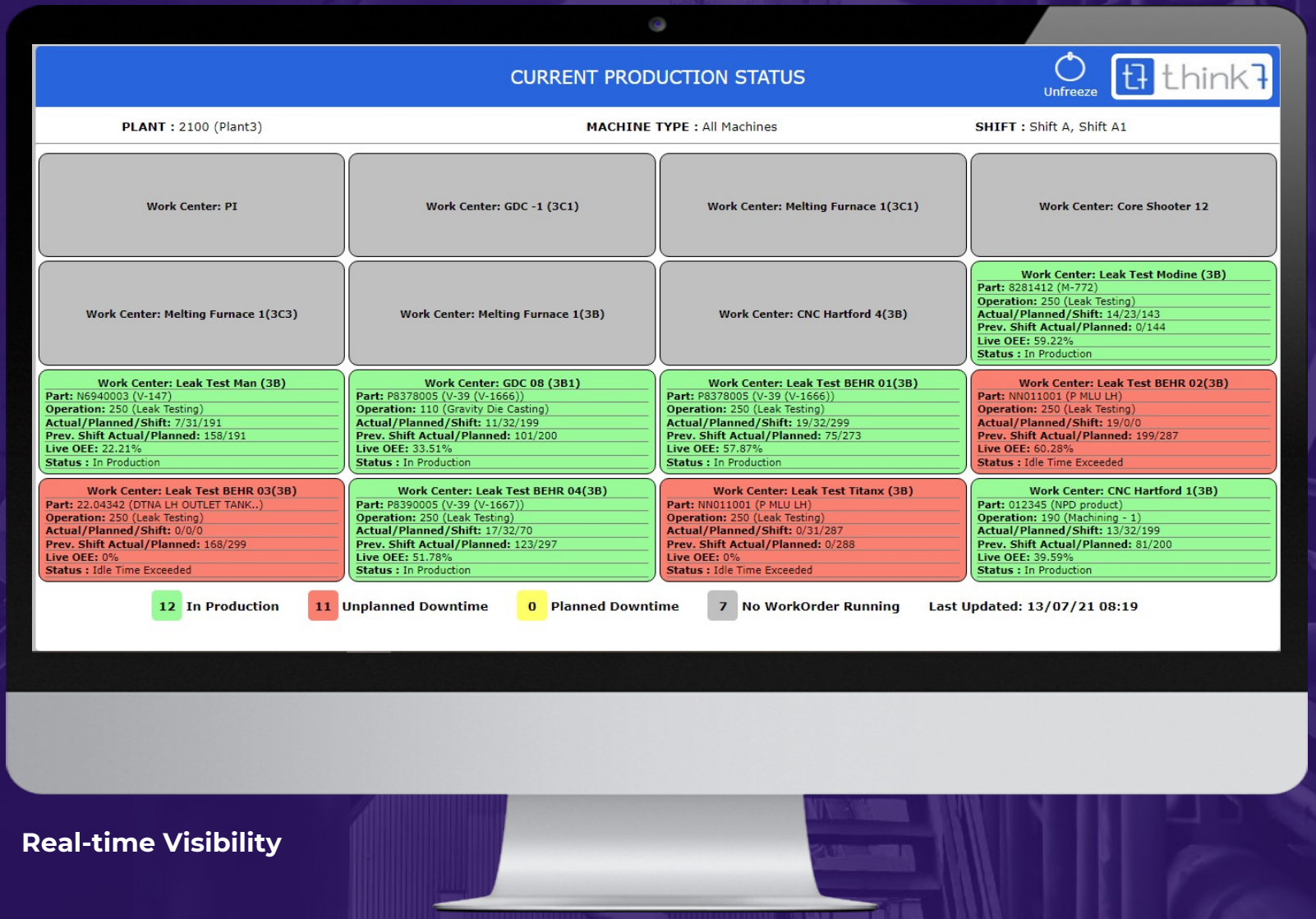
INDUSTRY 4.0

Cyber Physical
systems,
Digital Twin

JOURNEY

Real-time Visibility

JOURNEY



Real-time Visibility

JOURNEY

Real-time Visibility

OEE

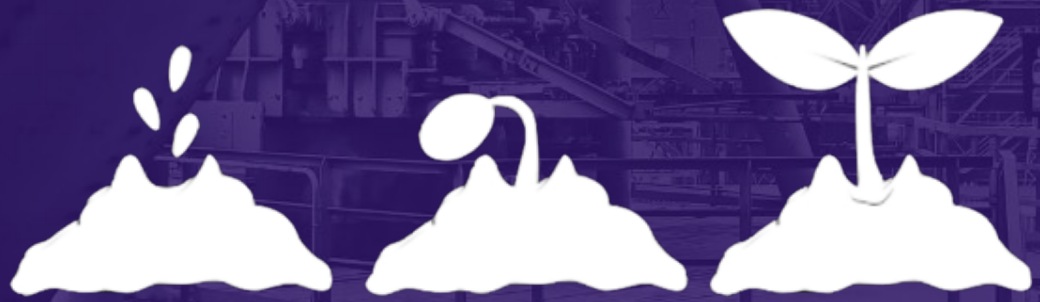
Capacity Utilization

Cycle-time Optimization

JOURNEY

OEE
Capacity Utilization
Cycle-Time Optimization

JOURNEY



Real-time Visibility

OEE

Capacity Utilization

Cycle-time Optimization

Quality Improvement

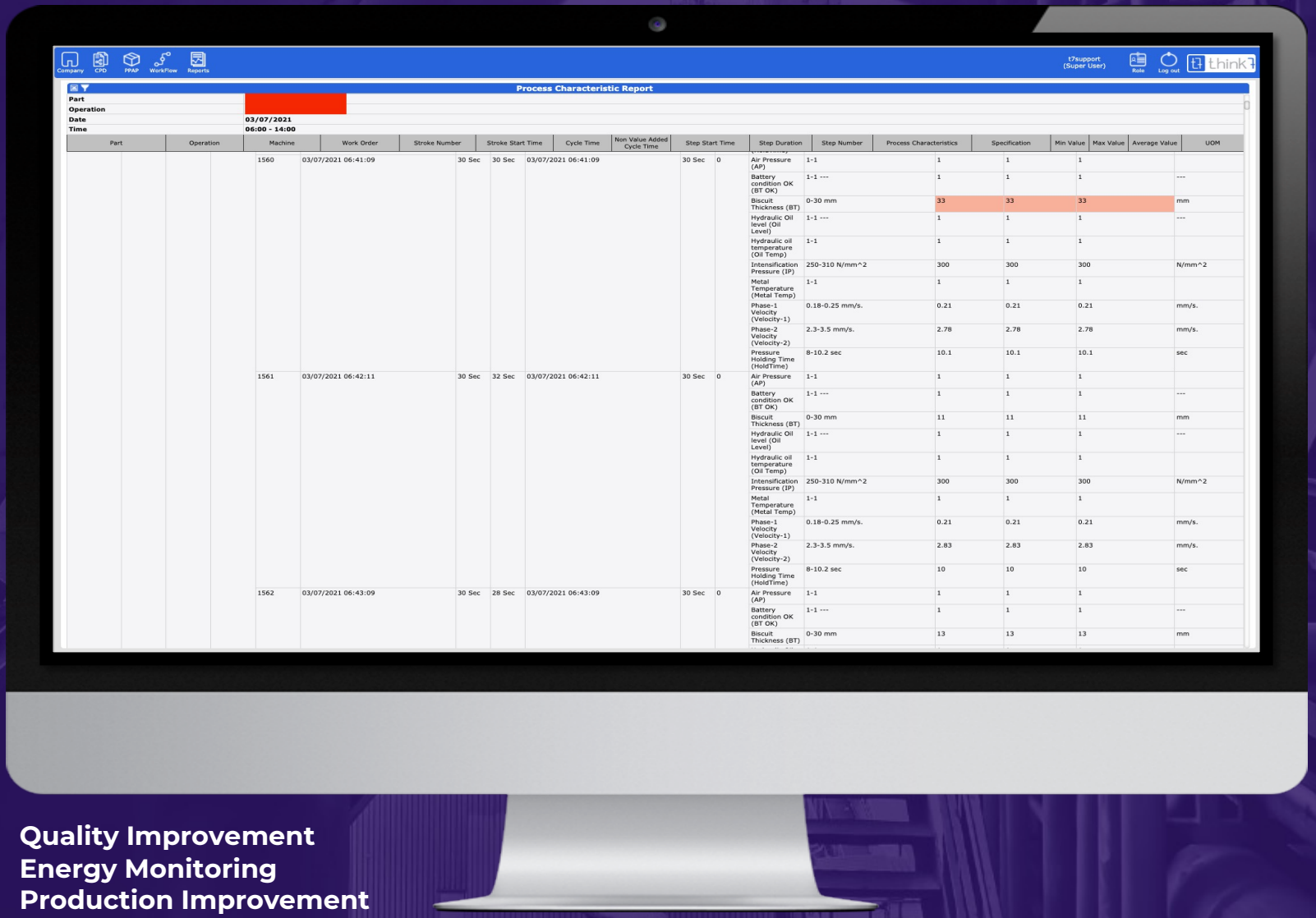
Energy Monitoring

Production Improvement

JOURNEY

Quality Improvement
Energy Monitoring
Production Improvement

JOURNEY



Quality Improvement
Energy Monitoring
Production Improvement

JOURNEY

Real-time Visibility

OEE

Capacity Utilization

Cycle-time Optimization

Quality Improvement

Energy Monitoring

Production Improvement

Downtime Reduction

Planning

Control Plan & P-FMEA Optimization

JOURNEY

PROCESS ADEQUACY

LIVE LINK

PROCESS ADHERENCE

PFD, P-FMEA, WI/SOP, DIGITAL CHECKSHEET

CONTROL PLAN

Operation
Machine
Tool/Jig/Fixture
Product/ Process Char.
Measurement Technique
Sample Size/Frequency

DAQ (Data Acquisition)
Real-time Visibility
Real-time OEE
Capacity Utilization
Cycle-Time Optimization
Production Improvement
Energy Monitoring
Quality Digitization

Downtime Reduction
Planning
Control Plan & P-FMEA
Optimization

Process Knowledge Directory

JOURNEY

Real-time Visibility

OEE

Capacity Utilization

Cycle-time Optimization

Quality Improvement

Energy Monitoring

Production Improvement

Downtime Reduction

Planning

Control Plan & P-FMEA Optimization

End-to-end Traceability

Autonomous Process Control

Supply Chain Integration

JOURNEY

Op10,20 – RM Receipt & Storage

Op30 – First Operation

Op40 – Second Operation

Op50 – Marking [DPM/Laser]

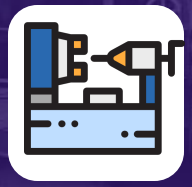
Op60 – X Ray Inspection

End-to-end Traceability : Process Validation & Process Control with Interlocks

Op70 – Third Operation

Op80 – Fourth Operation

Op90 – Fifth Operation



Op100 – Sixth Operation

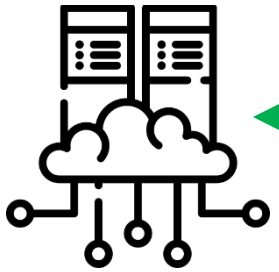
End-to-end Traceability
Autonomous Process Control
Supply Chain Integration

Labels: Scanner | Windows based PC | Think7 Piston

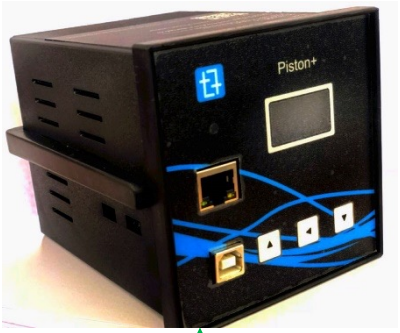
APPROACH

Think7 Architecture

Think7 FMS Server



T7 Proprietary Protocol



Digital (24V DC), Analog (0-10V DC or 4-20mA), MQTT, OPC/UA, MODBUS TCP, MODBUS RTU

Traditional Architecture based on Industry 3.0 technology

LAYER 3
Business Applications
(SAP, Oracle, Infor, MS Navision, etc)

LAYER 2
SCADA / MES
(Supervisory Control And Data Acquisition)

LAYER 1
Controller 1
(PLC, CNC, Relay Logic, etc)

LAYER 1
Controller 2
(PLC, CNC, Relay Logic, etc)

LAYER 1
Controller 3
(PLC, CNC, Relay Logic, etc)

LAYER 0
Machine Tool
(Relays, Motors, Pumps, Mechanicals, etc)

APPROACH

Process Parameter PLC Logic

Machine PLC to Think7 PLC

Linear Encoder

Temperature Sensors

Pressure Transducers

Proximity and Limit Switches

1. In this method of data communication, Think7 will communicate directly with Machine PLC storing the data.
2. Communication protocol could be Modbus TCP, OPC/UA, Profinet. Communication can also be via direct PLC drivers (certain PLC models supported) and machine PLC must be able to communicate over Ethernet TCP/IP or RS232 Serial.

Think7 FMS

Machine PLC

Machine HMI

PLC for T7 Monitoring

Legend:
1. → Electrical Wiring/ connections.
2. → Network/ LAN/ Ethernet connections.

FEATURES

Advanced Document Management

Online Process Control based on pre-defined rules

Real-time Production and Quality Monitoring

Compatibility with all types of machines

Instant SMS and Email Alerts and Notifications

OEE, Advanced Analytics and Insights

Predictive & Preventive Maintenance

Remote Asset Monitoring & Control

Product Traceability

BENEFITS

- Real-time Visibility
- OEE & Capacity Utilization
- Downtime Analysis
- Production & Productivity
- Quality Management
- Predictive Quality
- Condition Based Monitoring
- Maintenance
- Energy Monitoring
- End-to-End traceability

USE CASE 1

GLOBAL MANUFACTURER OF AXLES, DRIVESHAFTS & DRIVE TRAIN PRODUCTS

Challenge

- End to end traceability
- Prevent Part Mixup
- Monitor & Control Quality

Solution

- RFID & Barcode integration for product identification and traceability
- Multi gauging integration with auto tool-offset compensation
- SAP integration for picking, packing and despatch

Achieved 100% Production Identification and Traceability for all products moving thru' the factory floor from Incoming material to final despatch out the gate.

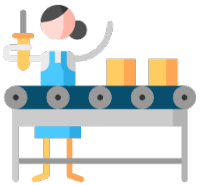
USE CASE 1

Op10
Laser Marking

2D Matrix/Barcode Marking

Op20
Machining

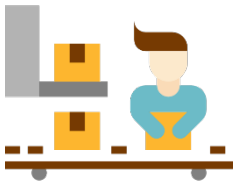
Machine OEE Monitoring
Barcode Traceability and Validation
100% Inspection
Tool Offset Correction



Op30
Assembly

Barcode Traceability and Validation
Child Part Traceability
100% Inspection

USE CASE 1

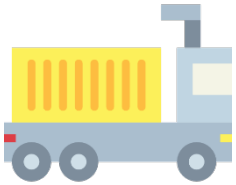


Op40
Packing

Serial Number/Barcode Traceability
Box Traceability

Op50
Invoicing &
Dispatch

Integration with SAP
Auto Invoicing based
on Loading
Dispatch Reports



Shipment

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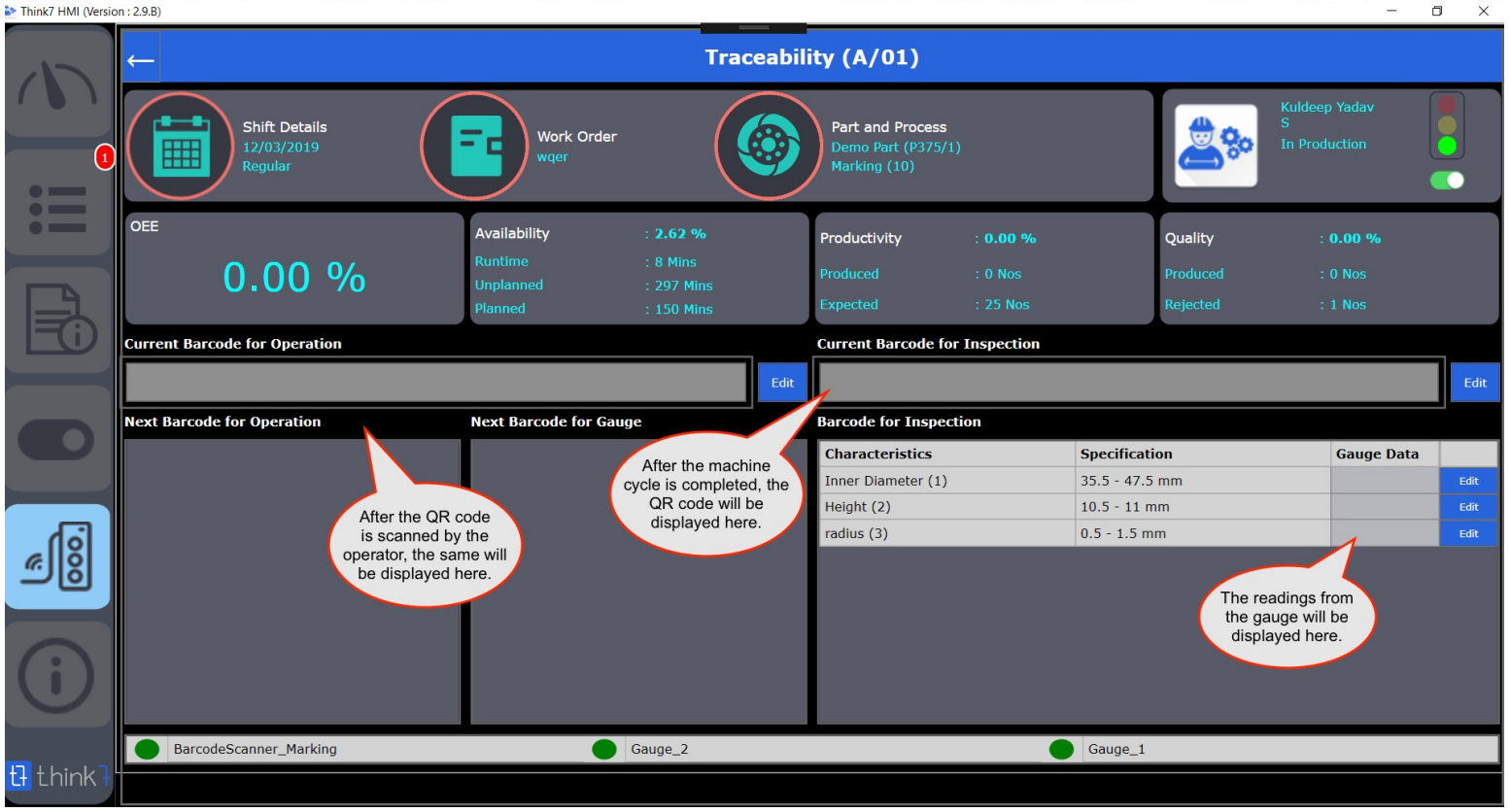
USE CASE 1



USE CASE 2

INDIA'S LARGEST ALUMINIUM DIE CASTING PARTS MANUFACTURER

Challenge

- To get accurate OEE
- To monitor production output in real-time
- Traceability
- Monitor Inventory Levels

Solution

- Real time production monitoring with Think7 Piston Pro
- Auto Downtime capture
- Integration with SAP Inventory module
- Auto capture of Process Parameters

Achieved 100% visibility for real-time production monitoring resulting in accurate inventory management in SAP.

USE CASE 2

Connectivity Options

- **Analog & Digital Signals**
- MQTT
- OPC/UA
- MODBUS RTU

High Pressure Die Casting (HPDC)

- Injection Velocity Phase 1 (V1)
- Injection Velocity Phase 2 (V2)
- Biscuit Thickness
- Injection Pressure
- Accumulator Pressure
- Toggle Lubrication
- Plunger Lubrication
- Auto Spray Air Pressure
- Die Coat Pressure
- Metal Temperature
- Oil Temperature
- Die Lock Force
- Auto Mode Interlock
- P-Rise

Low Pressure Die Casting (LPDC)

- Metal Temperature
- Injection Pressure
- Cycle Time

Gravity Die Casting (GDC)

- Tilting Angle
- Tilting Time
- Solidification Time
- Metal Temperature

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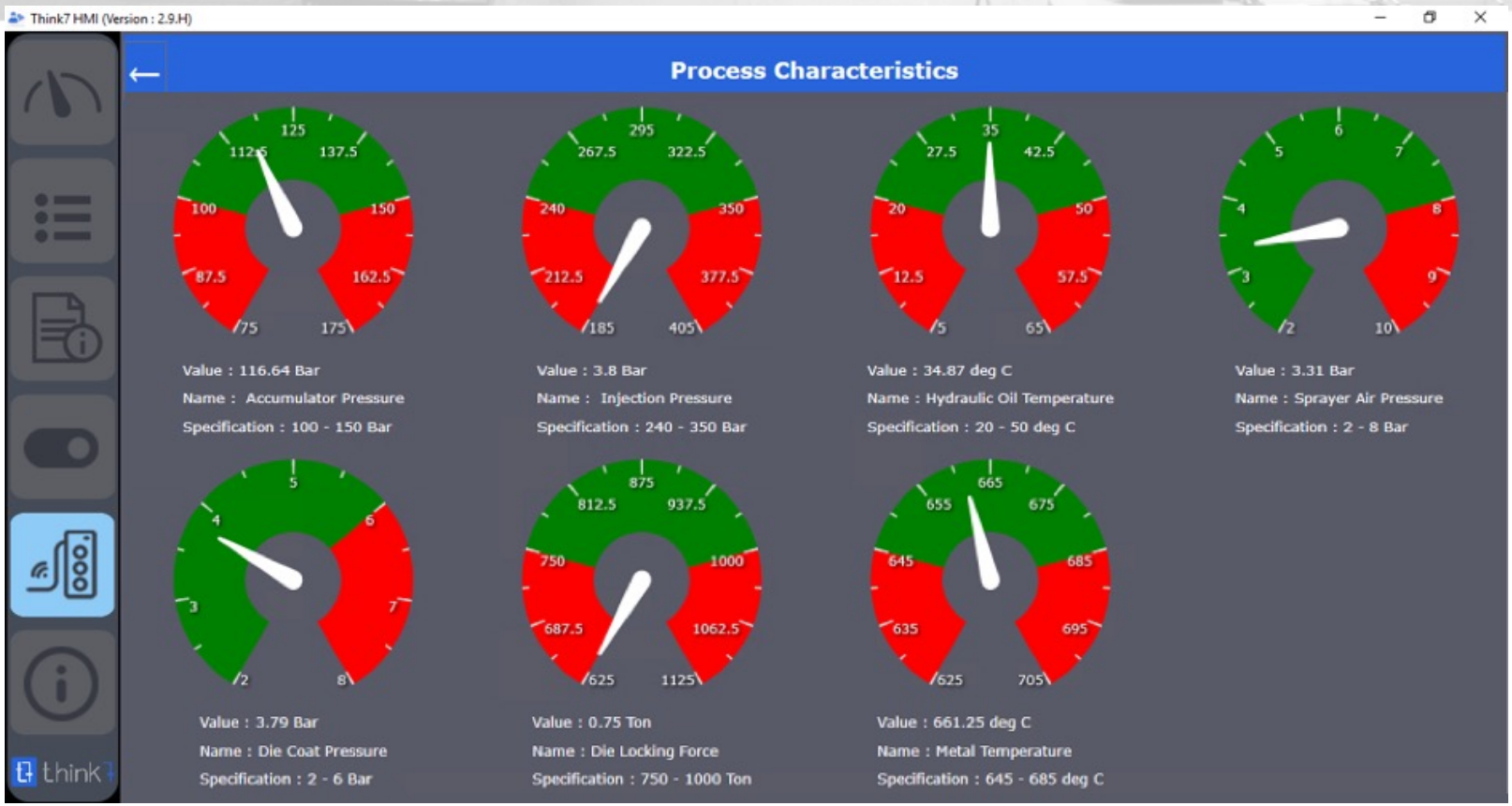
USE CASE 2

USE CASE 2


Think7 HMI (Version : 2.9.H)
Process Characteristics
Value : 116.64 Bar
Name : Accumulator Pressure
Specification : 100 - 150 Bar
Value : 3.8 Bar
Name : Injection Pressure
Specification : 240 - 350 Bar
Value : 34.87 deg C
Name : Hydraulic Oil Temperature
Specification : 20 - 50 deg C
Value : 3.31 Bar
Name : Sprayer Air Pressure
Specification : 2 - 8 Bar
Value : 3.79 Bar
Name : Die Coat Pressure
Specification : 2 - 6 Bar
Value : 0.75 Ton
Name : Die Locking Force
Specification : 750 - 1000 Ton
Value : 661.25 deg C
Name : Metal Temperature
Specification : 645 - 685 deg C

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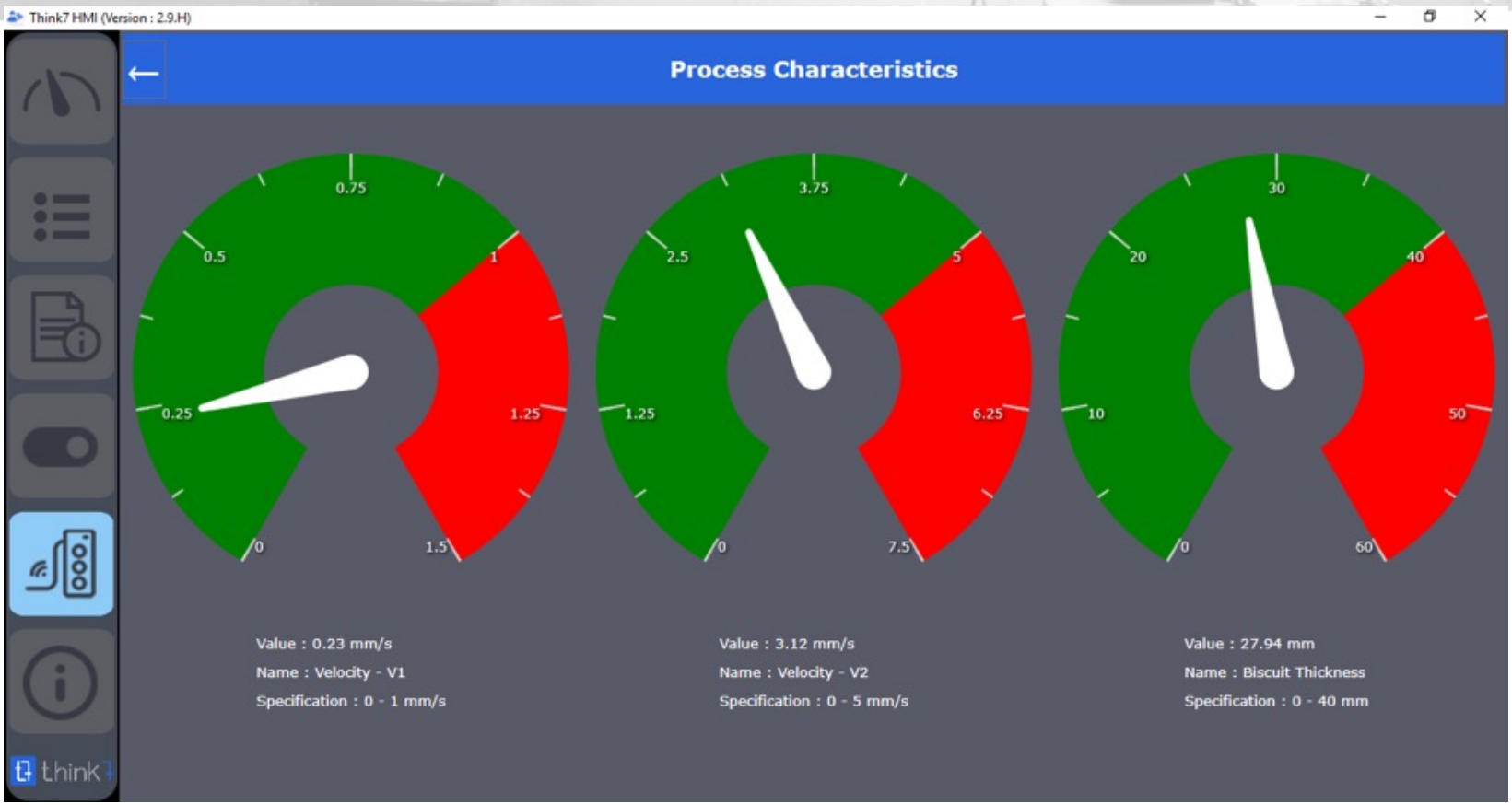
USE CASE 2



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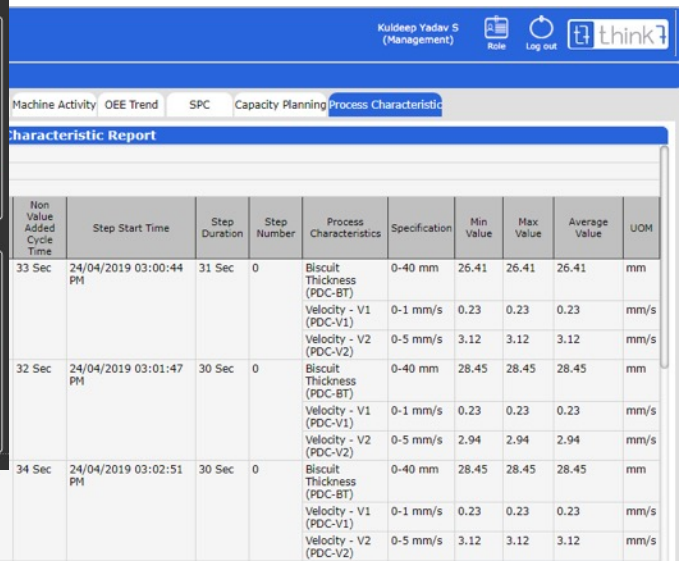
USE CASE 2



Non Value Added Cycle Time	Step Start Time	Step Duration	Step Number	Process Characteristics	Specification	Min Value	Max Value	Average Value	UOM
33 Sec	24/04/2019 03:00:44 PM	31 Sec	0	Biscuit Thickness (PDC-BT)	0-40 mm	26.41	26.41	26.41	mm
				Velocity - V1 (PDC-V1)	0-1 mm/s	0.23	0.23	0.23	mm/s
				Velocity - V2 (PDC-V2)	0-5 mm/s	3.12	3.12	3.12	mm/s
32 Sec	24/04/2019 03:01:47 PM	30 Sec	0	Biscuit Thickness (PDC-BT)	0-40 mm	28.45	28.45	28.45	mm
				Velocity - V1 (PDC-V1)	0-1 mm/s	0.23	0.23	0.23	mm/s
				Velocity - V2 (PDC-V2)	0-5 mm/s	2.94	2.94	2.94	mm/s
34 Sec	24/04/2019 03:02:51 PM	30 Sec	0	Biscuit Thickness (PDC-BT)	0-40 mm	28.45	28.45	28.45	mm
				Velocity - V1 (PDC-V1)	0-1 mm/s	0.23	0.23	0.23	mm/s
				Velocity - V2 (PDC-V2)	0-5 mm/s	3.12	3.12	3.12	mm/s

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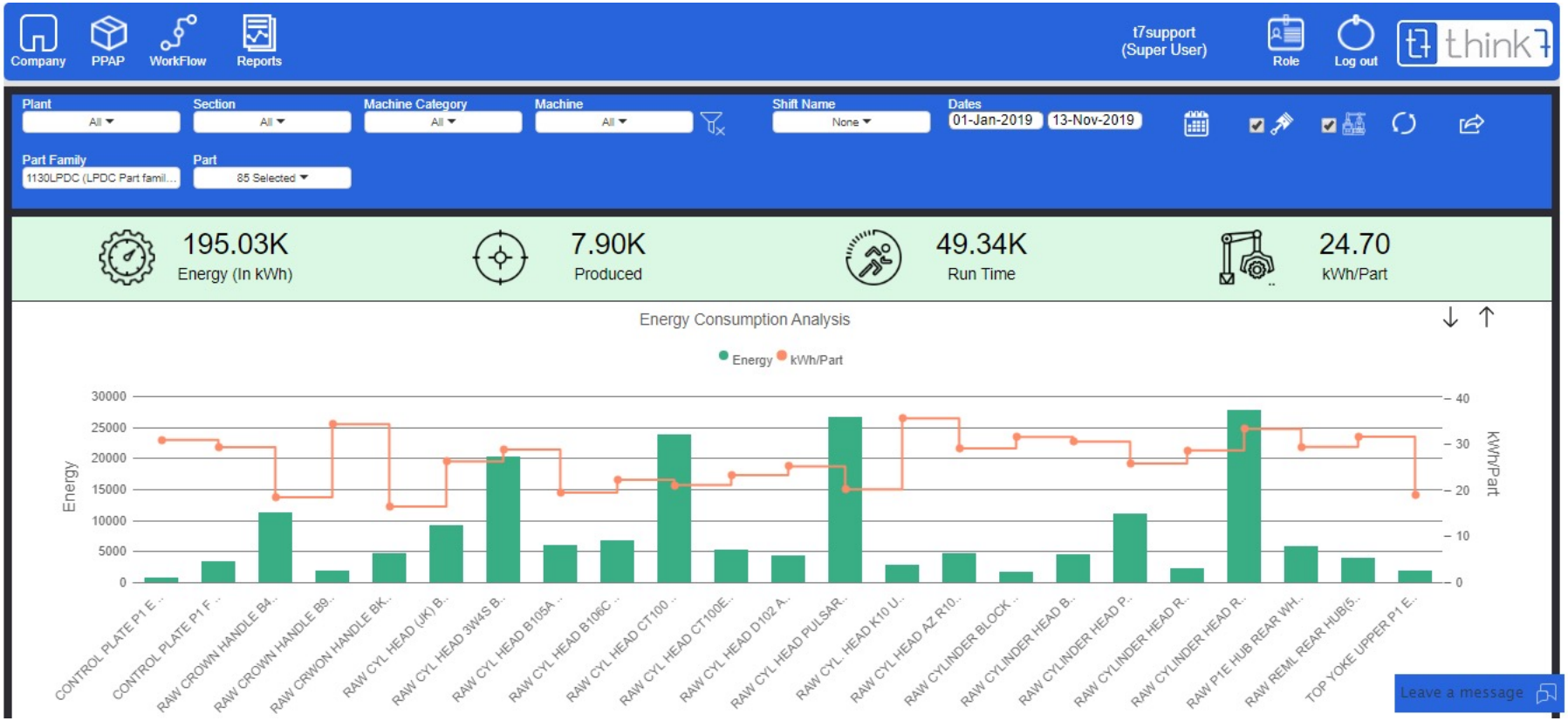
USE CASE 2



USE CASE 3

LEADING TURBO CHARGER MANUFACTURER

Challenge

- Standardisation of documentation and processes
- Digital and Paperless shopfloor
- Track Operator Efficiency

Solution

- Integrated Think7 QMS & FMS
- Think7 Piston+ connected to 350+ machines to ensure discipline
- RFID based operator authorisation

Achieved 100% system compliance with complete Operator Traceability resulting in increase in OEE by 25%. Currently monitoring 350+ machines across all units. Plans now in place to replicate this success across group companies.

USE CASE 4

MANUFACTURER OF CONNECTIVITY AND SENSORS AND ELECTRONIC COMPONENTS

Challenge

- Prevent over-production on Injection Moulding Machines
- Paperless shop-floor
- Live Production Monitoring

Solution

- Think7 Piston+ integrated with Injection moulding machines
- Kiosk based task manager
- ANDON for live machine status and production monitoring

Prevented over production to the tune of 6% resulting in additional free capacity. Currently deployed across all moulding machines with plans to horizontally deploy across other manufacturing processes within the organisation.

USE CASE 5

LEADING MANUFACTURER OF FASTENERS FOR AUTOMOTIVE INDUSTRY

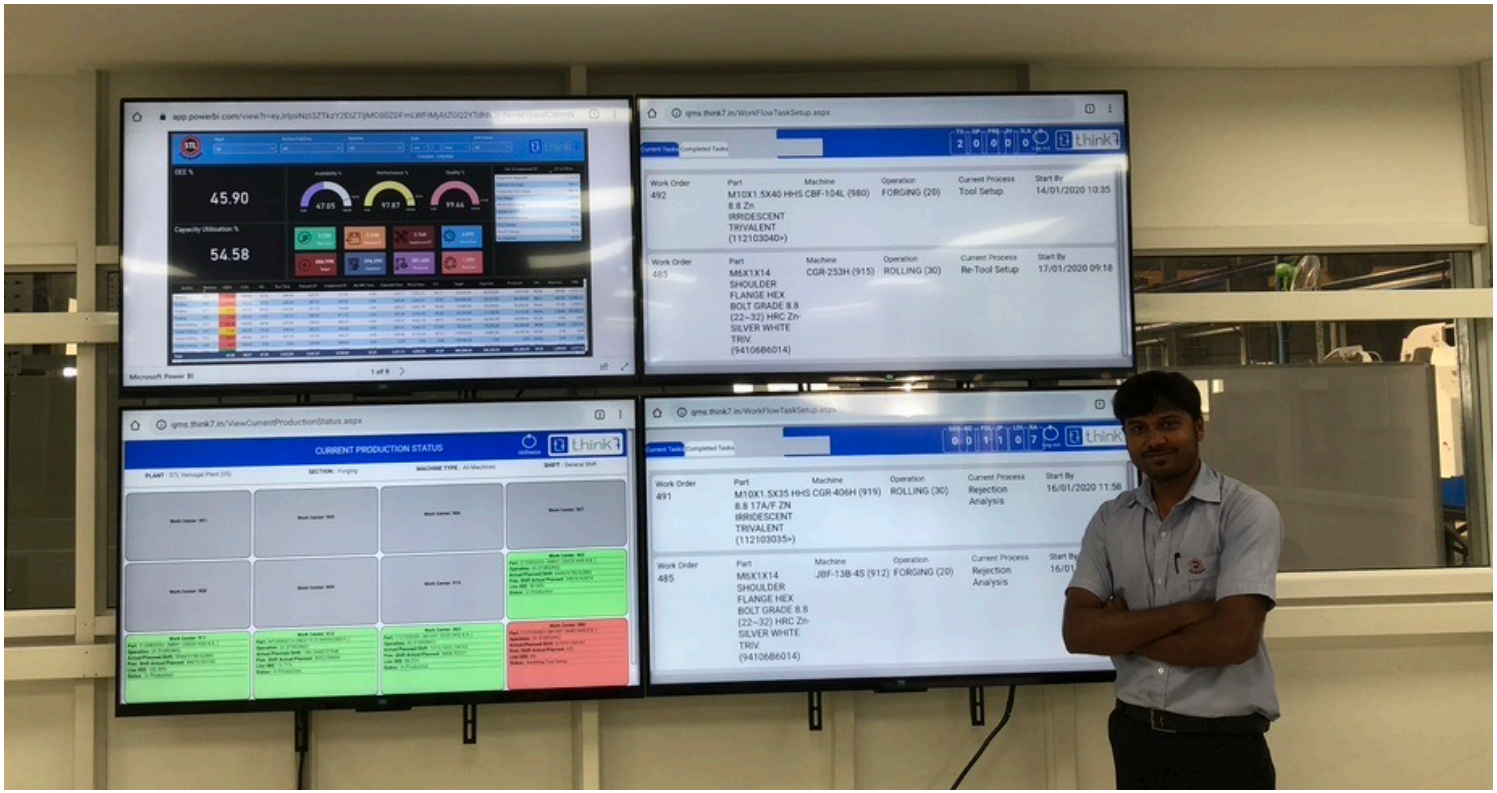
Challenge

- Track & Trace
- Reduce In-process Inventory
- Standardise quality documents for thousands of SKUs

Solution

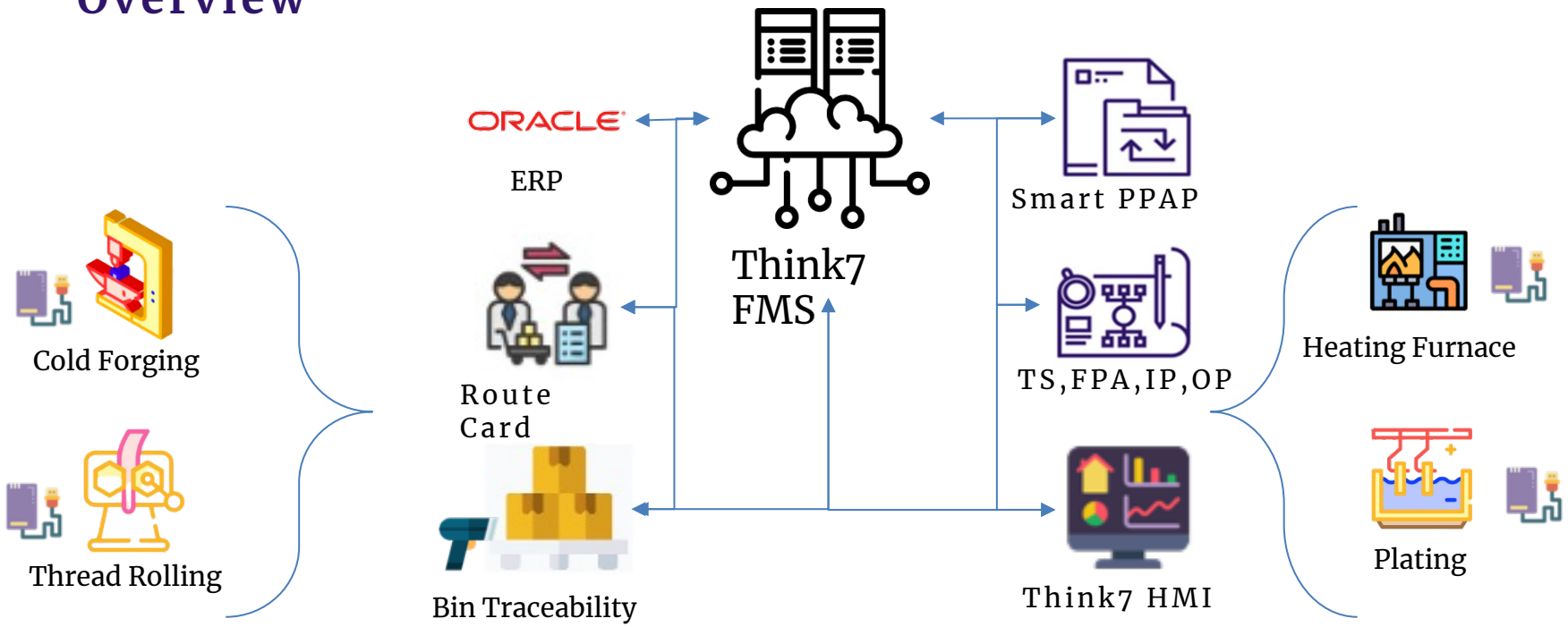
- Live tracking of WIP Inventory at every stage
- Production ANDON
- Digital Work Instructions & checksheets with Instrument/Gauge integration
- Batch traceability from RM to FG

USE CASE 5


45.90
54.58
CURRENT PRODUCTION STATUS
Work Order
492
Part
M10X1.5X40 HHS 8.8 Zn IRRIDESCENT TRIVALENT (112103040>)
Machine
CBF-104L (980)
Operation
FORGING (20)
Current Process
Tool Setup
Start By
14/01/2020 10:35
Work Order
485
Part
M6X1X14 SHOULDER FLANGE HEX BOLT GRADE 8.8 (22~32) HRC Zn- SILVER WHITE TRIV. (9410686014)
Machine
CGR-253H (915)
Operation
ROLLING (30)
Current Process
Re-Tool Setup
Start By
17/01/2020 09:18
Work Order
491
Part
M10X1.5X35 HHS 8.8 17A/F ZN IRRIDESCENT TRIVALENT (112103035>)
Machine
CGR-406H (919)
Operation
ROLLING (30)
Current Process
Rejection Analysis
Start By
16/01/2020 11:58
Work Order
485
Part
M6X1X14 SHOULDER FLANGE HEX BOLT GRADE 8.8 (22~32) HRC Zn- SILVER WHITE TRIV. (9410686014)
Machine
JBF-138-4S (912)
Operation
FORGING (20)
Current Process
Rejection Analysis

USE CASE 5

Approach & Shopfloor Overview



USE CASE 6

LEADING FABRICATOR FOR 2 WHEELERS CHASSIS FRAME

Challenge

- Production Monitoring
- Monitoring Poka-Yoke
- Monitoring Process Parameters like current, gas flow and voltage
- Jishu-Hosen, 3 Layer Audit, In Process Inspection, Operator Inspection, etc.

Solution

- Live tracking of welding process, monitoring process parameters and poka-yoke per cycle basis
- Digital Checksheet for JH, 3LA, IP, OP, etc.
- Process Parameter and Poka-Yoke parameter monitoring per part basis

USE CASE 6

CBM

Poka-Yoke

USE CASE 6

Process Parameter Monitoring

Operator Efficiency Report

USE CASE 7

For an OEM to Track, Trace & Monitor their Vehicle Assembly Line

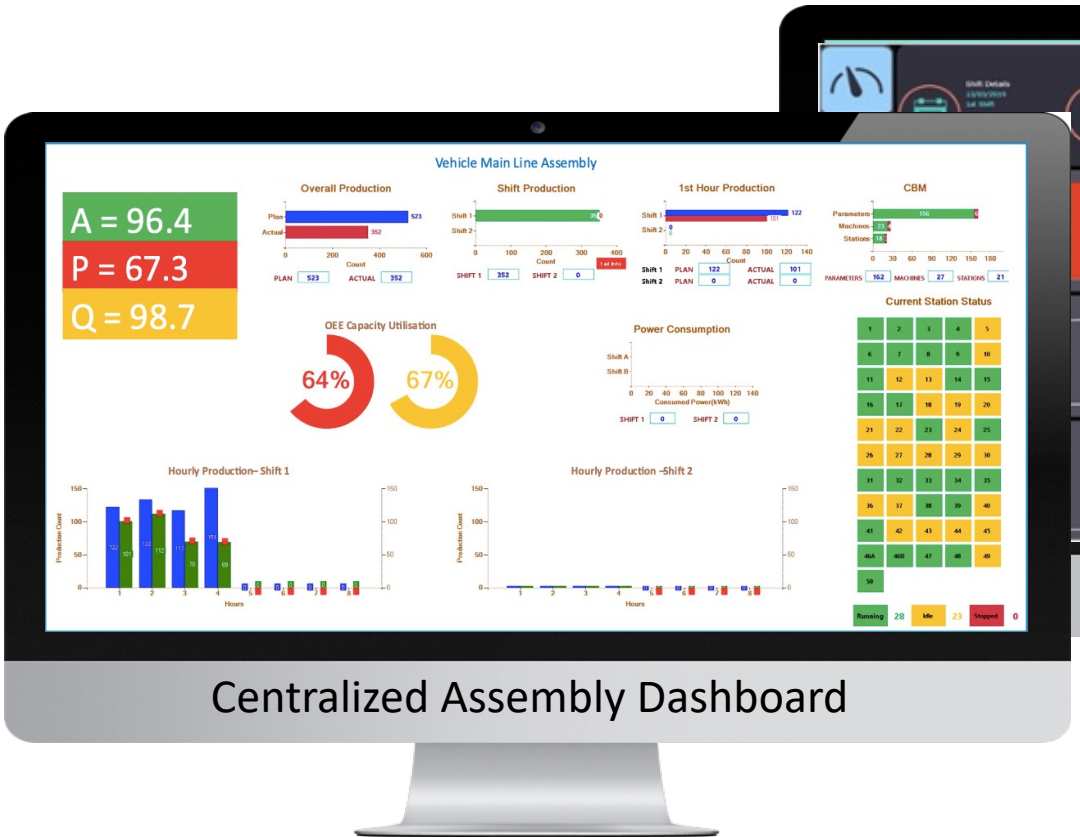
Challenge

- Capturing of Real-Time Machine & Process Related Datapoints like Parameters (Part), CBM, Gauges & Testing machines data, etc. on the vehicle line
- Jishu-Hosen, 3 Layer Audit, In Process Inspection, Operator Inspection, etc.
- Traceability

Solution

- Once the barcode is scanned, the data from the machine gets registered to it in Think7
- Escalations in case of discrepancy in the data from the Control Plan data.
- Digitize Checksheets for tasks like Preventive Maintenance, JH, etc.
- Track Assembly of sub-item

USE CASE 7

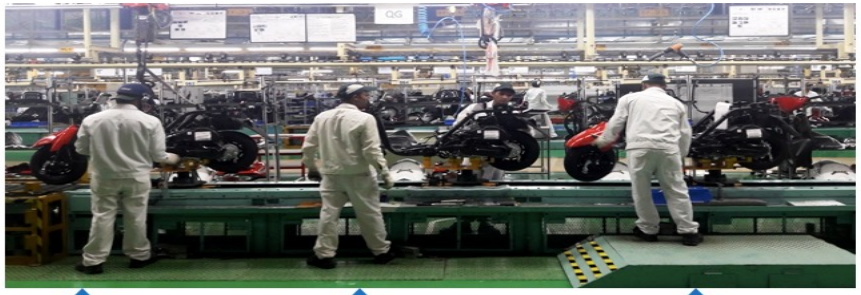


Centralized Assembly Dashboard

Operator Dashboard

USE CASE 7

Architecture



Barcode Scanner

DC Tools, PLCs, Pressing Machines, etc

Gauges & Testing Machines

RS232

MODBUS RTU / RS485 / TCP

MODBUS RTU / RS485 / TCP

Think7 FMS Server

MPLS Network

Network Switch

TCP/IP (Ethernet / RJ45)

TCP/IP (Ethernet / RJ45 / WiFi)

Think7 Piston App
(Operator Station for Loss Capturing, Dashboards, barcode scanning etc.)

Unit Server / Gateway
For redundant connectivity between Piston & FMS Server)

TCP/IP (Ethernet / RJ45)

Think7 Piston

Hard-wired

Network cable

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