CELEBAL TECHNOLOGIES

Plant Maintenance With Predictive Workbench

Business Value for Plant Maintenance with Predictive Workbench

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Business Challenge

- Prolonged reaction time to unplanned equipment breakdown
- Excessive cost incurred due to over-reliance on calendar based planned maintenance
- Lack of real-time visibility into asset health
- OT data on shop floor is underutilized and idle limiting actionable insights

Solution

A comprehensive solution to enhance maintenance efficiency and maximize operational effectiveness with our AI powered solution featuring predictive maintenance workbench, sensor data analytics, failure alerts, business analytics and playbook to provide real-time insights and persona-specific guidance empowering technicians and managers to transform equipment management across the organization

Persona Benefits and Value Creation

Maintenance Engineer

- Real time Sensor Analytics
- Proactive Asset Failure prevention with predictive alerts
- Quick information retrieval for decision making

Maintenance Manager

- Real time Asset Performance Monitoring
- Effective utilization of maintenance resources
- Visibility into Service Order Management

Solution Content

Predictive ML Model

- Logistic Regression
- KNN Classifier
- Decision Tree Classifier
- Random Forest Classifier
- SVM
- Ada Boost Classifier

Predictive Failure Alerts

- For proactive maintenance actions

Sensor Analytics

- Real Time Sensor Trend

Dashboards

- Equipment Efficiency
- Cost Analysis
- Maintenance Activity Performance
- Depreciation Analysis
- Spare Parts Management

KPIs

- OEE
- MTBF
- MTTR
- Total Downtime
- Total Spare Part Cost

Playbook Documents

- Machine Manuals
- Maintenance History
- Troubleshooting Manual
- Installation Guides

Customer Key Facts

Implementation Window
~ 13 -14 Weeks

Implementation Cost
~ $ 240k

ROI

- **10% to 20%** Reduction in Maintenance Cost
- **10% to 15%** Increase in Uptime of Machine
- **10% to 15%** Increase in Overall Equipment Effectiveness (OEE)

Predictive Workbench
Up to 6 ML models

Predictive Failure Alerts

Sensor Analytics

Dashboards (7) KPI's (40)

Playbook

Solution Packaging

Data Sources

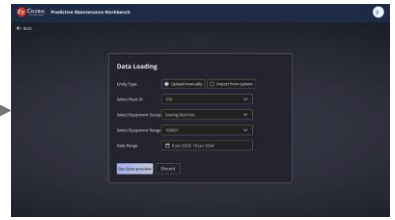
Data Lake

6 ML Models + Potential Failure Alerts

Predictive Workbench with alerts

Azure Stream Analytics

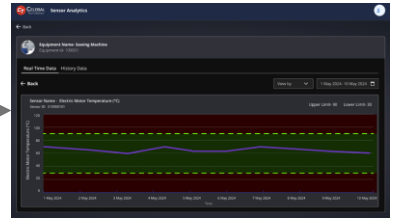
Azure ML Studio



SPC graphs + Threshold Indication

Sensor Analytics

Power BI with Copilot



Equipment Efficiency

Cost Analysis

Maintenance Activity Performance

Depreciation Analysis

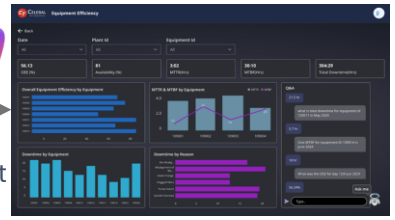
Procurement Performance

Supplier Performance

Spare Part Management

Preconfigured Analytics

Power BI with Copilot



Maintenance Manager + Maintenance Engineer

Playbook

Azure OpenAI

Azure AI search

Overview of Solution : Predictive Maintenance Workbench with Sensor Analytics

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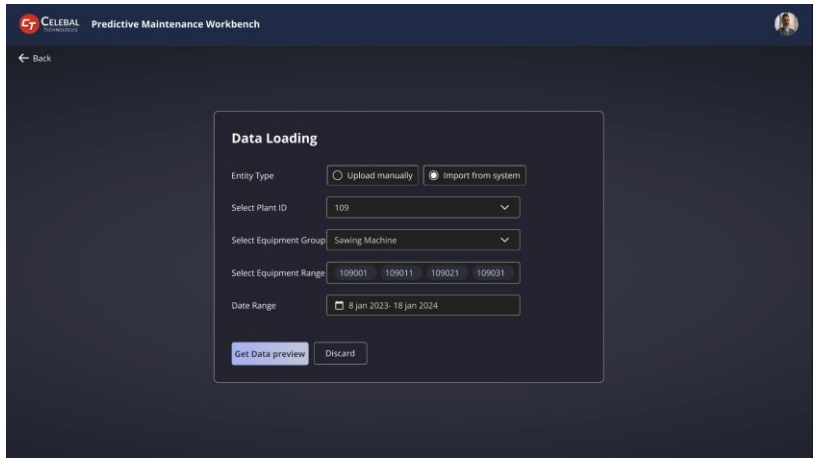
	Visualization	Solution	Technology	Values	Timeline	ACR	Implementation Cost	ROI
Predictive Maintenance Workbench with Failure Alerts	Web/MS Teams/Outlook Mobile Enabled	Azure ML powered Predictive Maintenance of Equipment	Azure ML Studio	• Easily train on up to 6 models via an intuitive interface with real-time evaluation metrics for model performance monitoring • Real time potential failure alerts enabling quick decision-making and targeted maintenance actions to prevent downtime	13 -14 weeks Assuming readiness as per prerequisites	$120K to $130K Per Month	~ $240K*	• 10% to 20% Reduction in Maintenance Cost • 10% to 15% Increase in Uptime of Machine • 10% to 15% Increase in Overall Equipment Effectiveness (OEE)
Sensor Analytics	Power BI/Web/MS Teams/ Outlook Mobile Enabled	Copilot Enabled Sensor Analytics for real-time monitoring of Equipment Performance	Azure ML Studio Power BI	• Enhanced Decision-Making with Data-Driven Insights • Indication of the threshold value for SPC				
Advanced Pre-configured Analytics	Power BI/Web/MS Teams/ Mobile Enabled	Copilot Enabled Pre-Configured Analytics for Maintenance Activities	Power BI	• Visibility into Maintenance Activities through Industry standard Dashboards/KPIs like Maintenance Activity Performance, Depreciation Analysis etc.				
Gen AI Powered Playbook	Web/MS Teams/ Mobile Enabled	Azure OpenAI powered chatbot for Maintenance Engineer & Manager	Azure AI Search Azure OpenAI	• Efficient Search & Retrieve key information from documents like manuals, troubleshooting guide, maintenance history etc.				

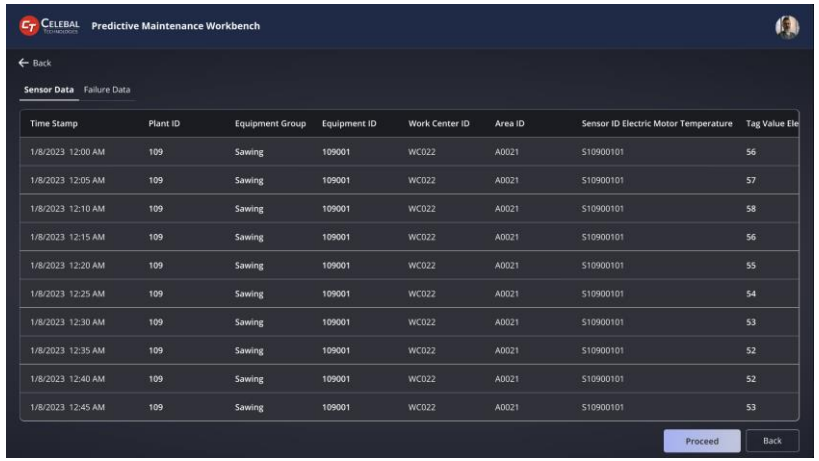
* Hybrid Delivery Resources

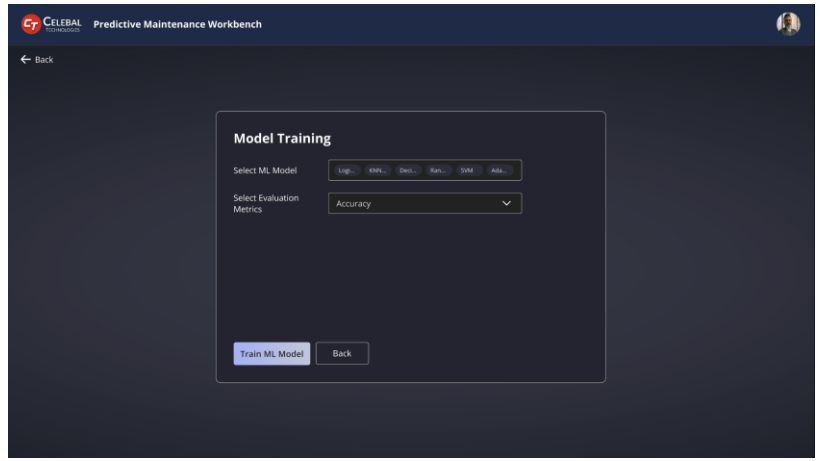
Predictive Maintenance Workbench

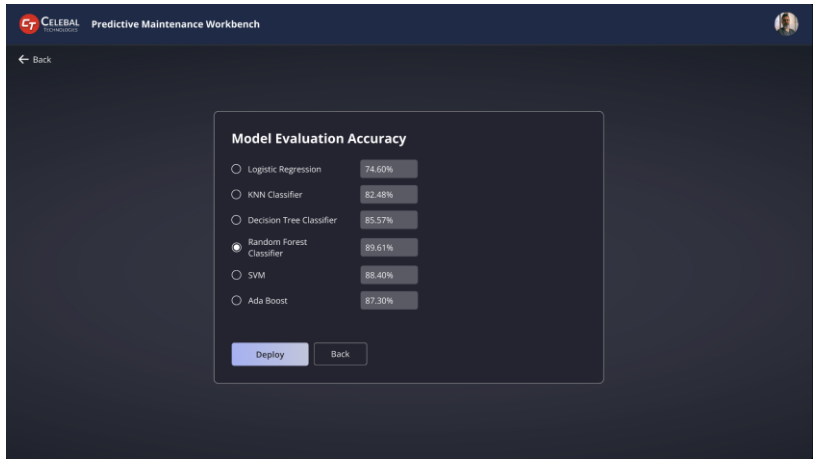
Value for Maintenance Engineer

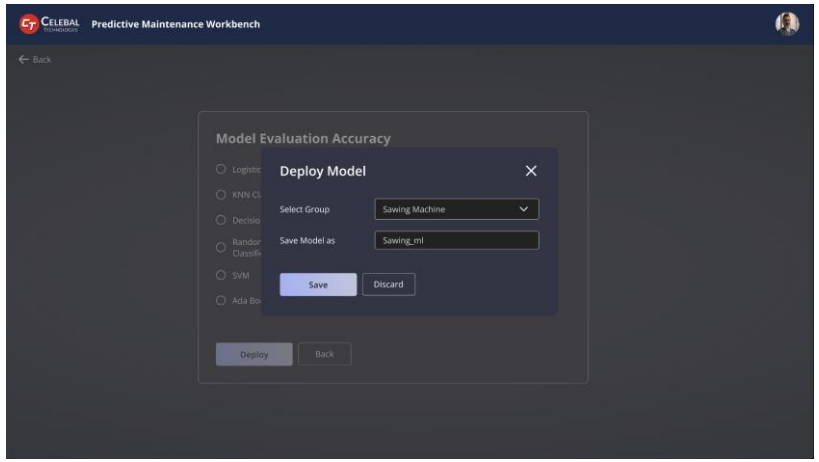
- User Friendly Model Training
- Model Comparison using Evaluation Metrics
- Easily Select Best Model
- Deploy Best Model by Equipment Group on live path

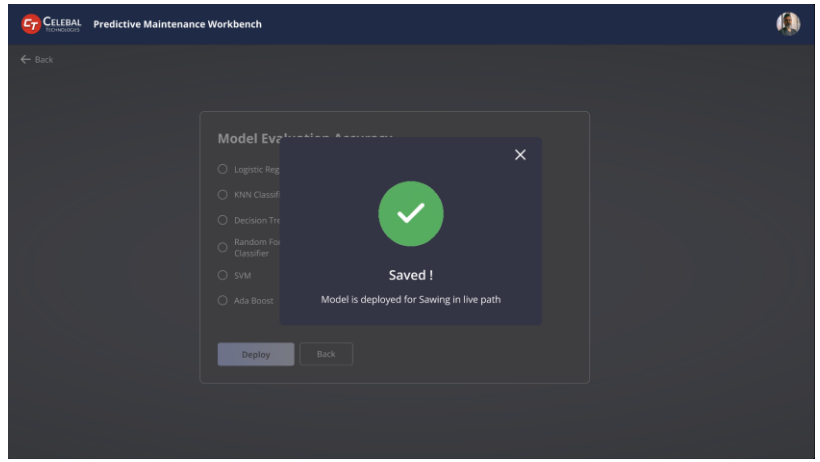








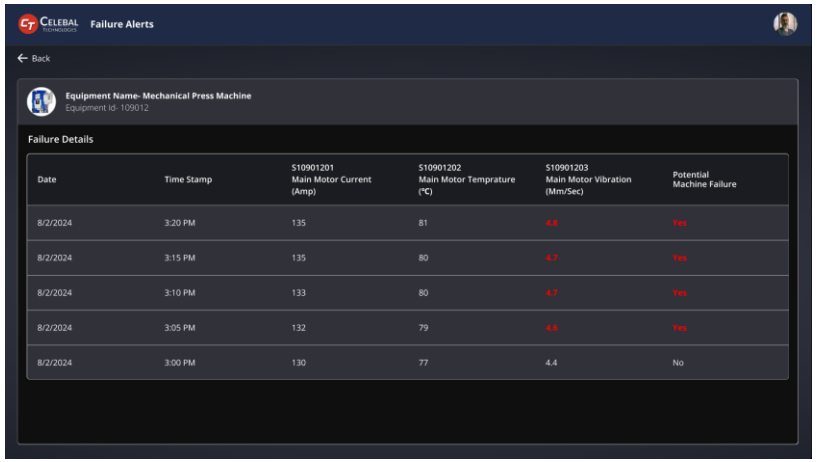


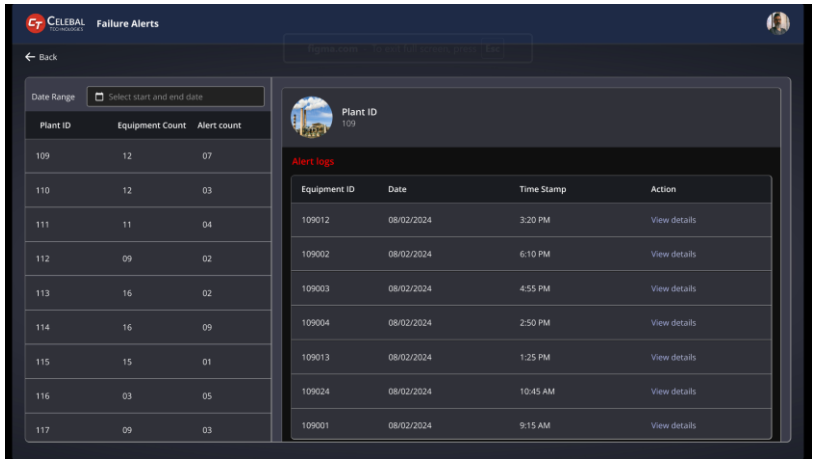


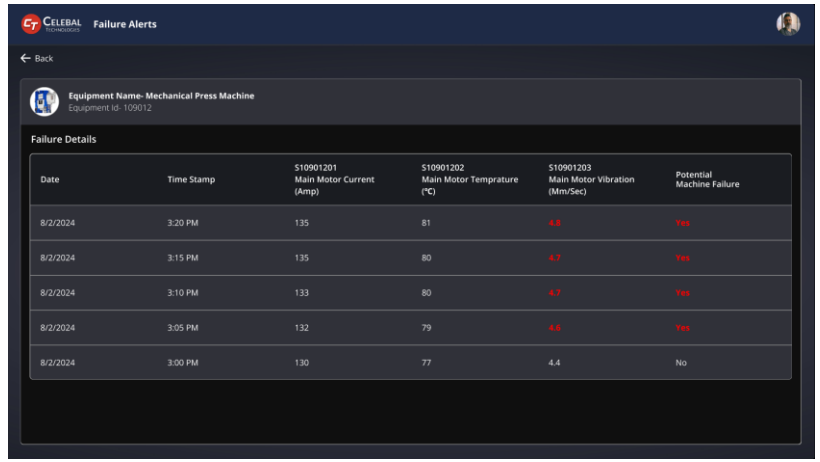
Predictive Failure Alerts

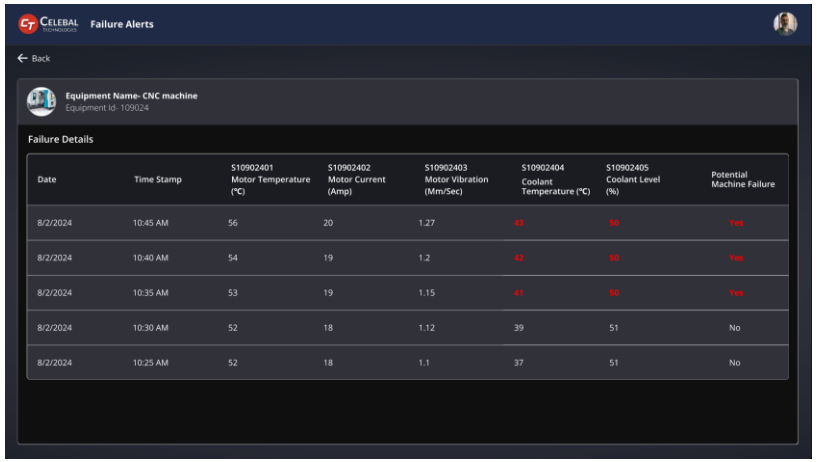
Value for Maintenance Engineer

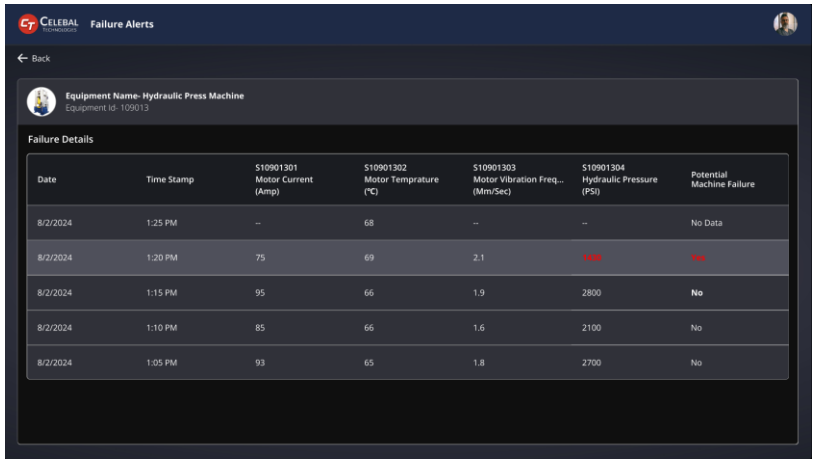
- Quickly address alerts to minimize equipment failure
- Improved Response Time
- Increase in uptime of Equipment
- Informed Decision Making

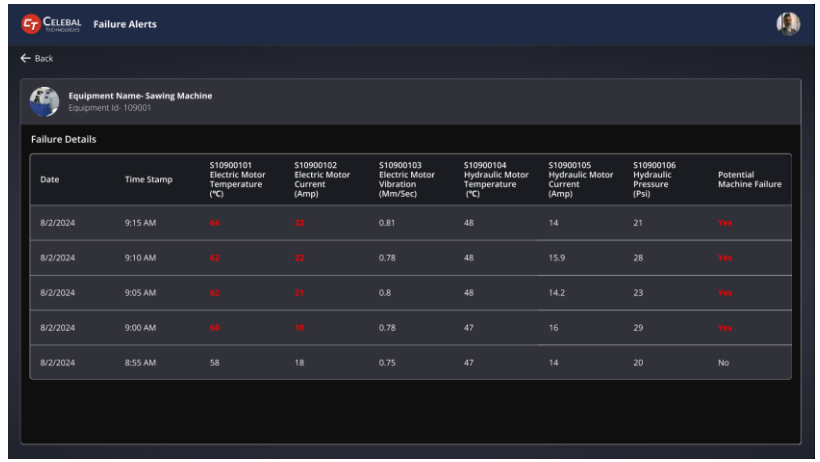








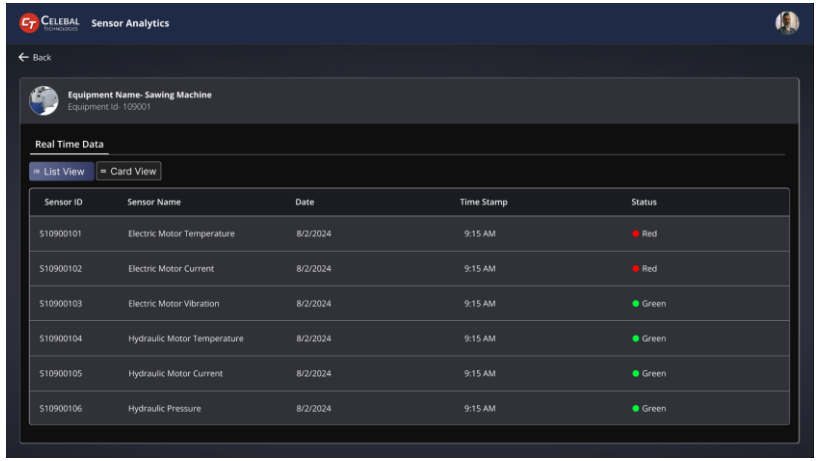


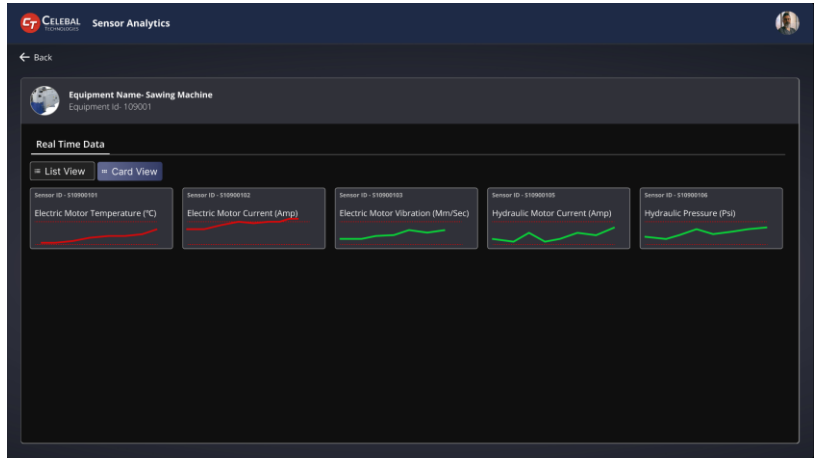


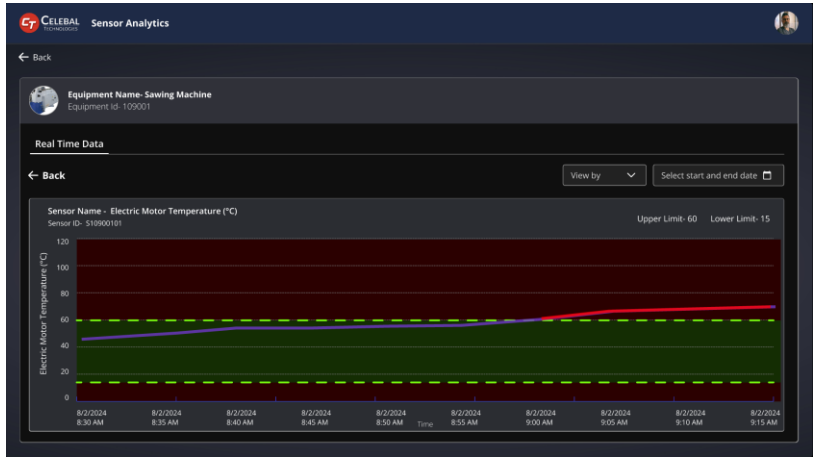
Sensor Analytics

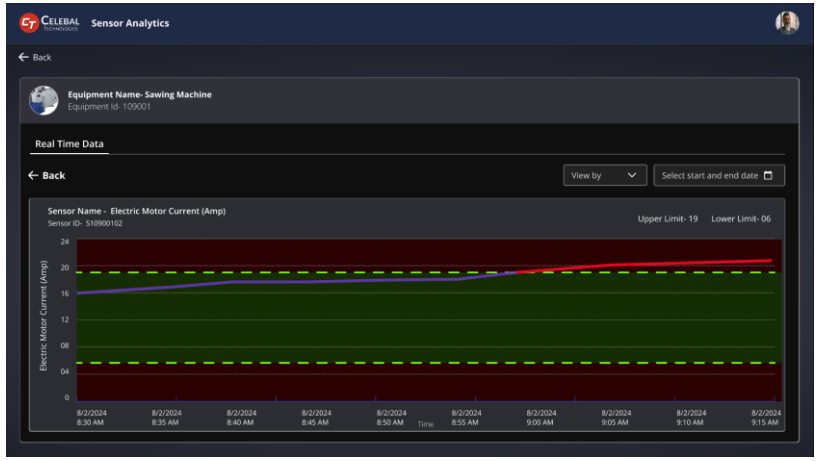
Value for Maintenance Engineer

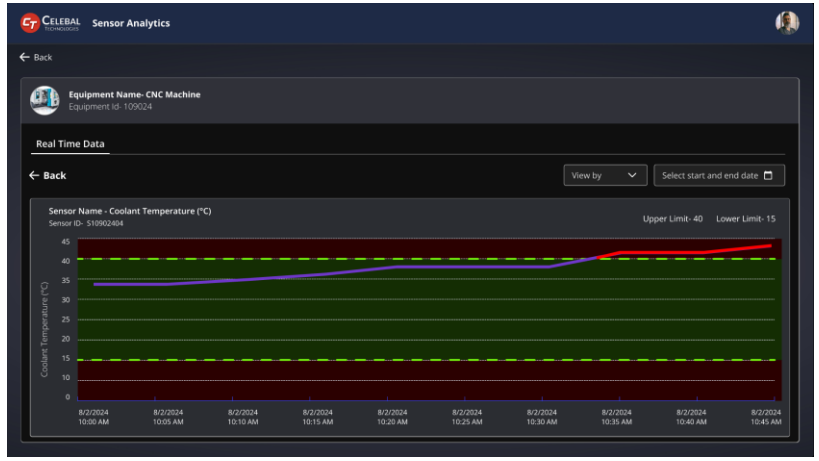
- Enhanced Equipment Monitoring
- Quick access to historical sensor data for Trend Analysis
- Early Detection for any potential issues
- Informed Decision Making











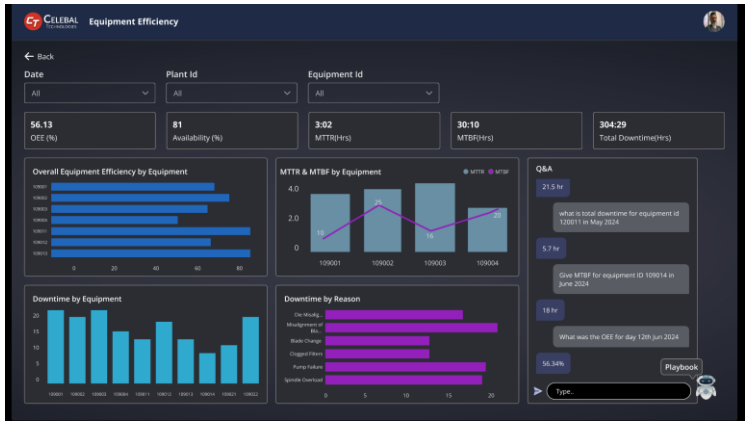
Pre-Configured Analytics

Analytics Value for Maintenance Manager

- Enhanced Maintenance Resource Utilization
- Informed Budgeting by Cost Control & Analysis

KPIs (40)

OEE	Total Maintenance Cost	Total No. of Service Orders by Equipment	PO Completion % by Equipment
Availability %	Labour Cost Vs Spare Parts Cost by Equipment	Planned Vs Unplanned Service Orders	Avg Order Cycle Time by Equipment (in Days)
MTTR (in Hrs)	Maintenance Cost by Equipment	Book Value by Equipment	Supplier Avg Lead Time
MTBF (in Hrs)	Total No. of Notifications	Accumulated Depreciation Cost by Equipment	Supplier Defect Rate
Total Downtime (in Hrs)	Total No. of Service Orders	Avg PO Cycle Time (in Days)	Supplier On Time Delivery (OTD) %
OEE by Equipment	Order Open %	Total POs	Defect Rate by Suppliers
MTTR & MTBF by Equipment	Order Completed %	Open POs	OTD Rate by Suppliers
Downtime by Reason	Pending Order due to Stock Out	PO Completion %	No. of Defects by Reasons
Total Labor Cost	Outstanding Notifications (OSNO) by Equipment	Open Purchase Requisitions (PR)	Avg Lead Time by Suppliers
Total Spare Parts Cost	Open Rate Vs Completion Rate by Equipment	Closed Vs Open POs by Equipment	Spare Part Inventory Value, Stock and Avg Lead Time



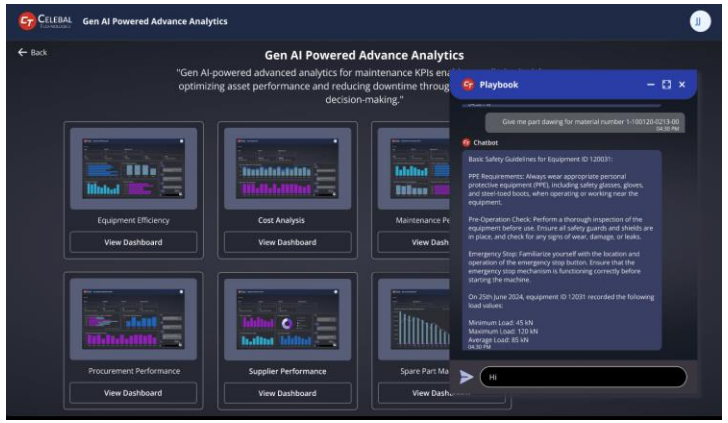
Playbook

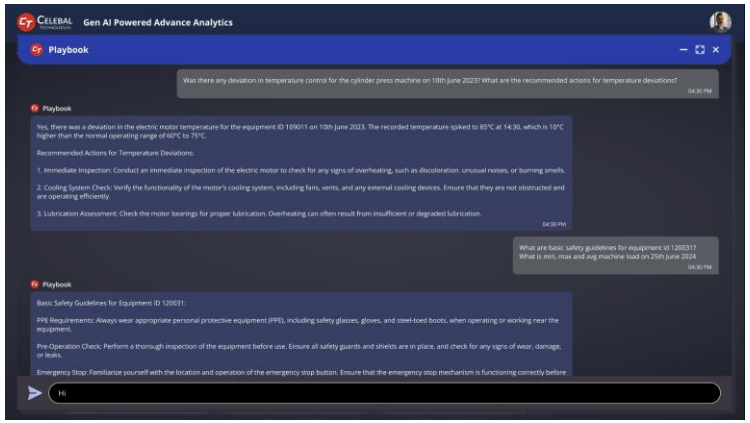
Playbook Value for Maintenance Engineer

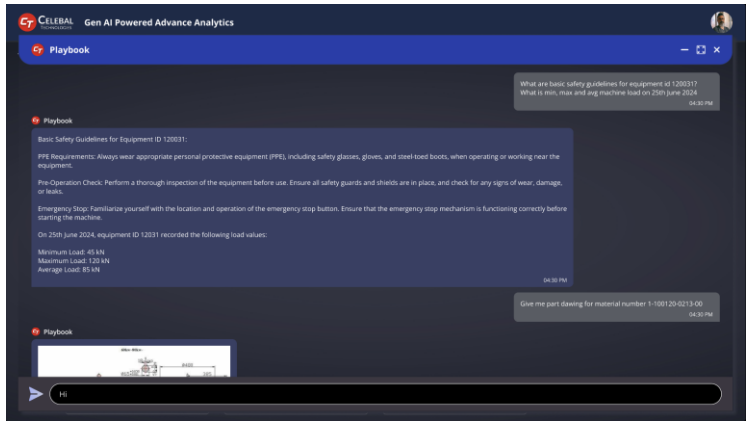
- Easy Access to Equipment Maintenance Guidelines
- Quick Access to Emergency Shutdown Procedures
- Assistance with Step-by-Step Troubleshooting
- Contextual Guidance for Repairs & Maintenance
- Efficient Search and Retrieval of Maintenance History

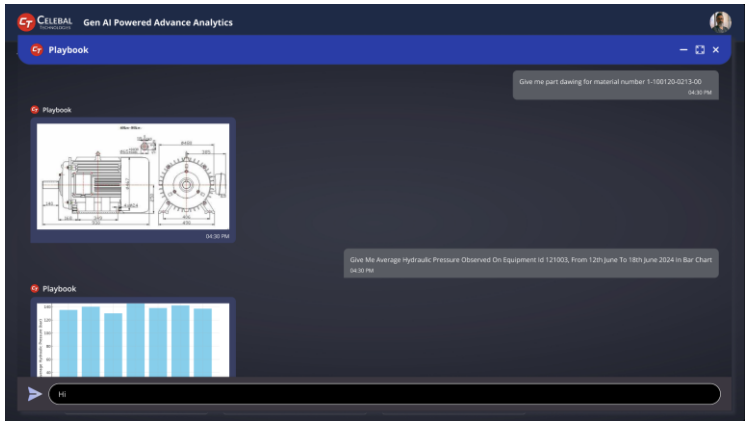
Documents (300)

- Machine Manuals
- Maintenance History
- Troubleshooting Manual
- Spare Parts Drawings
- Installation Guides









Data Model : Pre-configured Analytics

Tables (9)

AFRU
RESB
LFA1
QMEL
AFIH
AUFK
MARA
EKET
EQUI

AFIH
- Breakdown
- Planned Maintenance
- Unplanned Maintenance
- Total Maintenance cost

LFA1
- Supplier details

QMEL
- Notification

AFRU
- OEE calculation

AUFK
- Order type
- Order Category

MARA
- Spare parts stock availability
- Confirm Scrap
- Material Inventory

EKET
- Spare parts delivery details
- PR, PO dates
- PR, PO quantity

EQUI
- Equipment Number

RESB
- Raw material consumption

Data pipeline

Fabric One lake

Pre-configured Analytics

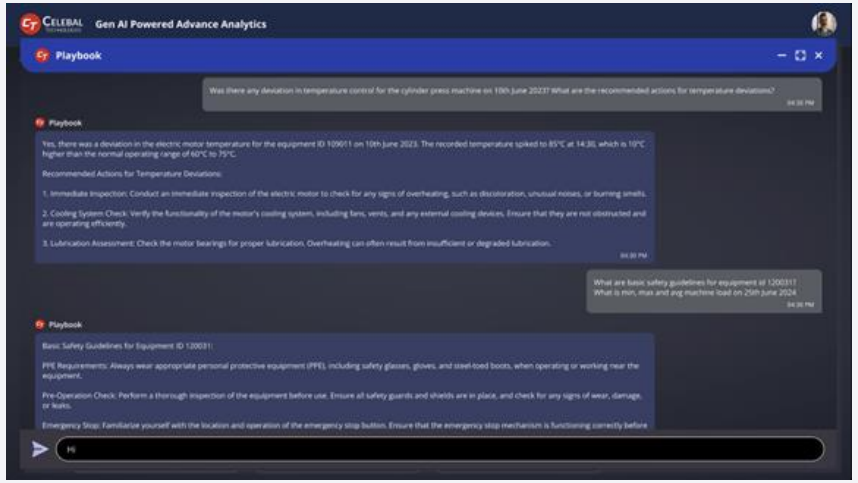
KPIs (40)

OEE	Total Maintenance Cost	Total No. of Service Orders by Equipment	PO Completion % by Equipment	MTTR (in Hrs)
Availability %	Labour Cost Vs Spare Parts Cost by Equipment	Planned Vs Unplanned Service Orders	Avg Order Cycle Time by Equipment (in Days)	MTTBF (in Hrs)

LLM : Playbook

- Equipment Maintenance Guidelines
- Machine Operation Manual
- Machine Operation Guidelines
- Equipment Cleaning and Sanitization Protocols
- Workplace Safety Policies
- Emergency Response Plans
- Installation Guide for Machinery
- Maintenance Schedule and Procedures
- Troubleshooting Manual
- Safety Instructions for Machine Operation
- Lubrication and Fluid Management Guidelines
- Electrical Wiring Diagrams
- Control Panel User Manual
- Software Interface Guide
- Machine Setup Instructions
- Emergency Shutdown Procedures
- Warranty Information and Service Contacts
- Regulatory Compliance Certifications and Documentation
- Spare Parts Drawings
- Maintenance History

Playbook



Vector Database

Gen AI

** Solution limits up to 300 documents from the above samples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Thank You