CYGNAS SOLUTIONS *INNOVATION AND EXCELLENCE IN ENGINEERING*

Asset Condition Monitoring

Reduce and prevent downtime. Make first-time fixes every time. Provide better assistance and strengthen customer loyalty. Remote monitoring and predictive maintenance for service is the best way to transform your business.

Implementing an IoT platform

Industrial companies face pressing challenges that require IIoT solutions. From remote monitoring and service to workforce efficiency and asset optimization, IIoT solves common challenges across different industries.

Digital Manufacturing

- Real-time Production Performance Monitoring
- Asset Monitoring & Utilization
- Connected Work Cell
- Digital and Augmented Work instructions

Maintenance

- Remote Service
- Field Technician/ Inspection Efficiency
- Data-Driven Maintenance
- Product Intelligence

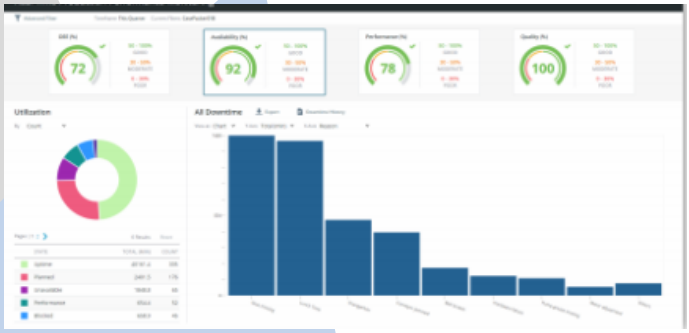
Real-time Production Performance Monitoring

- Provides a prescriptive way to capture, contextualize and visualize your Overall Equipment Efficiency (OEE) data with a template that is architected for speed to value, rapid scale and impact
- These insights drive identification of underperforming assets and allownew efficiencies to be identified and acted upon

5- 20%
Increase in OEE

2- 10%
Increase in yield

Gain a real-time, holistic view of your operational performance across your plants, lines and assets

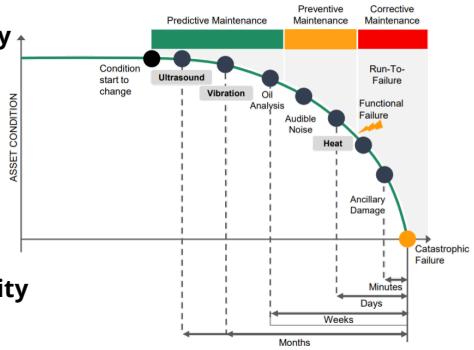


Dashboard overview

- In-Depth Availability Data
- Root Cause Analysis
- Export Raw Data
- Quality & Performance Data
- Automate Data Capture
- Reason Tree Configuration
- Alert Notification
- Key Performance Indicators

Maximise your Condition Monitoring with IoT

- **Improve Efficiency**
- **Reduce Costs**
- **Improve Quality**
- **Maximise Profit**
- **Maximise Flexibility**



Essential Steps for implementing IoT Condition Monitoring

1. Identify the assets that require monitoring
2. Identify the known and possible failure modes of those assets
3. Identify and install the sensors that will recognize these failures modes - and an IoT platform for monitoring and analysing the data
4. Define baseline limits that will determine when the system should alert the technicians

IoT based Condition Monitoring Case Study

CHALLENGES

Client had difficulty monitoring pumps that undergo cavitation intermittently, ultimately causing impeller wear and possible failure

RESULTS FROM IMPLEMENTING AN IOT PLATFORM

Improved profitability through remote monitoring and predictive maintenance of complex fluid control systems:

- Avoided a $16 million cavitation problem
- Reduced unplanned maintenance costs and emergency work orders
- Enhanced equipment availability & efficiency

An end- to- end Smart solution for Predictive Maintenance

A complete solution for real time monitoring of industrial equipment which includes 3 main components:

1. Multi Sensors Device (tri-axial vibration, ultrasound, temperature)

- Learn & Monitor
- Analyse before transmission

2. Network & cloud server

- Scalable Server Technology
- Secured, encrypted transmission

3. Monitoring Platform

- Visualisation
- Alert
- Set-up & configuration

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Use case: Industrial installations

A full solution to predict failures by monitoring equipment in the following industries and production lines without disturbing the environment :

Industries

- Water Treatment
- Renewables
- Oil & Gas
- Offshore
- Automotive
- Pharmaceuticals Chemicals
- Waste Management
- Metals & Mining

Production Lines

- Motors
- Valves
- Loader
- Milling
- Pipeline Leaks
- Compressors
- Agitator
- Centrifuges
- Crushers
- Decanters

Implementing a complete Predictive Maintenance solution

Smart Probe

- 360 Situational Awareness - (3- axis Vibration, Ultrasound & Environmental to sense machine vitals)
- Runs on AA batteries for up to 10 years
- Install within minutes in tight spaces and tough environments with advanced moisture and dust protection
- Machine Learning with Sensor Fusion for accurate prediction

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Connectivity

- IoT connectivity via LoRaWAN, to allow for long-range, the secured and encrypted transmission
- Long Distance Wireless and Network and Secured streams
- Open Architecture which allows flexibility for system integration
- Advanced diagnostics can be On-Cloud or On-Premise

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Visualisation

- Easy user interface for data and alert visualisation
- Full remote control for each smart probe
- In-depth data analysis and performance monitoring
- Integration with the current system
- RealTime alters and access to data from PC and mobile device

Dashboard Overview

1. The machine's ID & its location
2. The SMART section
3. The EXPERT section

SMART SECTION

- Expected Machine Conditions generated through Machine Learning
- Actual Machine Status

EXPERT SECTION

- Depth data required to analyse and understand the cause of the anomalous behaviour of the machine

A **complete solution** for **continuous real-time**, **24x7 monitoring** and **integrated multi-sensors data** to predict failure that's easily monitored remotely from any web-enabled device or alert via smartphone.

Preventive Condition Monitoring

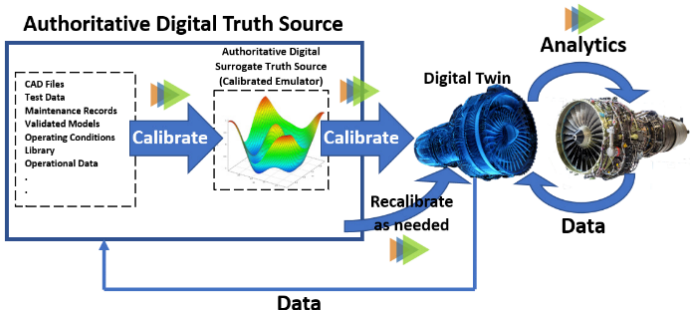
Sensitivity Analysis

Preventive Condition Monitoring reduces the time, cost, and risk of solving complex data and engineering problems from physical and simulation modelling to new Digital Engineering environments.

Engineering analytics tools play a significant role in providing real value, digital twins be being able to do three things:

- Integrate data from different sources
- Operate fast enough to run analytics as needed (i.e. real-time or faster than real-time)
- Provide a degree of confidence in predictions made using the digital twin.

Sensitivity Analysis tools can help take digital twins from a collection of models to a fast, accurate, validated truth source.



Machine Learning and AI tools for Optimisation

AI and machine learning can be applied to real-world sensor data and physics-based simulation data to produce accurate, predictive models of a product at efficient computing power levels. The combination enables faster, more efficient simulations of dynamic, multi-physics phenomena that fully characterise and understand real-world product behaviour. This insight enables engineers to explore the design space more extensively and interactively and improve next-generation products without prohibitive computing cost or time.

Machine learning and AI tools can provide you with off-the-shelf solutions to profit from modern data science technology, allowing for cost-effective digital twins applications in :

- Real-Time predictive modelling and optimization (CAE or test data)
- Image compression, identification, learning, prediction
- Fault prediction (Sensor data)