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IoT Vibration Monitoring System interfacing with PI System

Mining asset reliability

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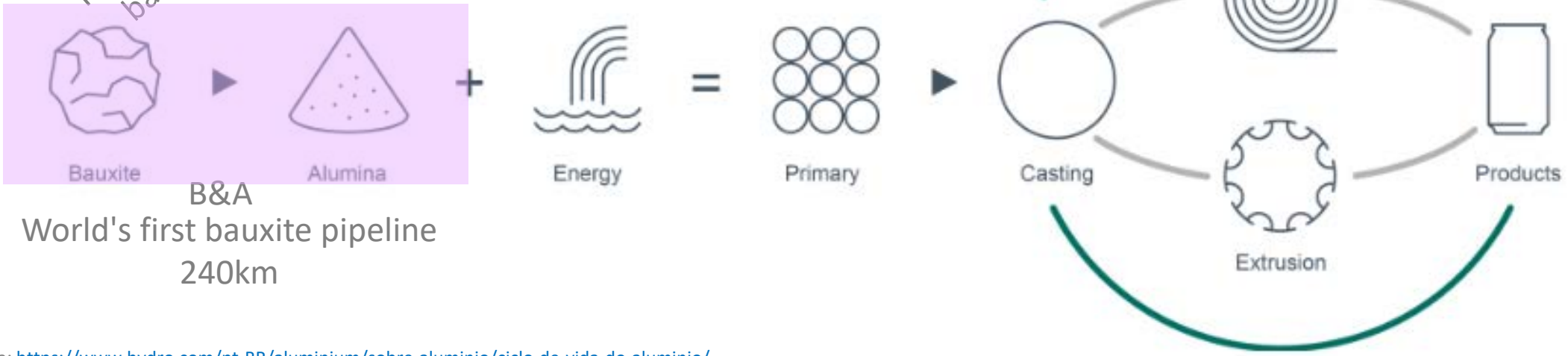
Aluminum Production Chain

Responsible for producing 85% of the bauxite for the largest refinery

Largest alumina refinery outside of China

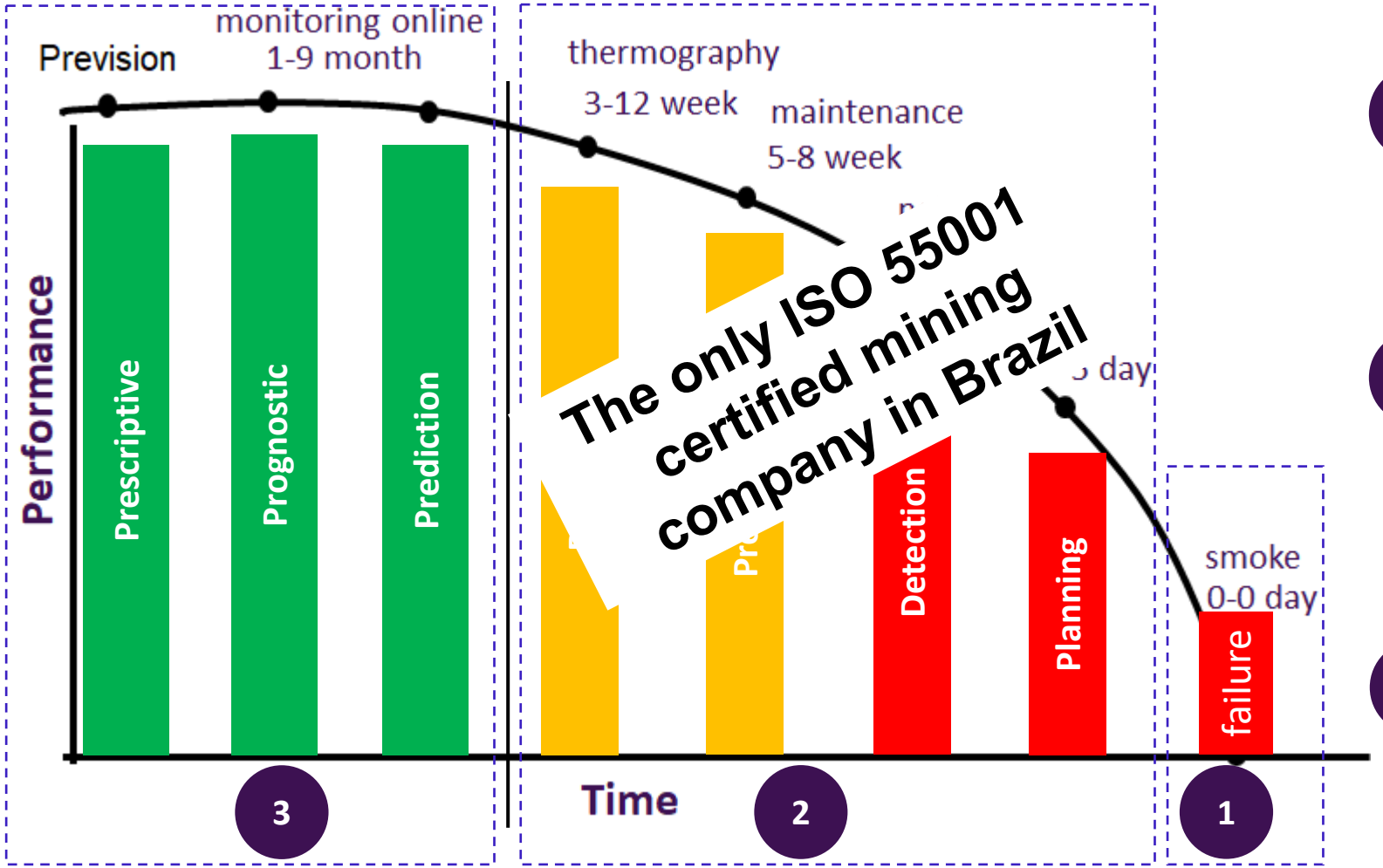


B&A
World's first bauxite pipeline
240km

Source: https://www.hydro.com/pt-BR/aluminium/sobre-aluminio/ciclo-de-vida-do-aluminio/

Improved Machine Analysis and Diagnostics

Curve P-F → Reliability Centered Maintenance (RCM)



The only ISO 55001 certified mining company in Brazil

1. FUNCTIONAL FAILURES WITH LARGE PRODUCTION LOSSES AND HIGH MAINTENANCE COSTS
2. APPLICATION OF RELIABILITY ENGINEERING IN PURSUIT OF WORLD CLASS MAINTENANCE
3. MONITORING IOT ONLINE, PI SYSTEM AVEVA, ANALYTICS, NOTIFICATION AND APPLICATION DATA SCIENCE (AI AND ML)

GET TO KNOW HYDRO IN BRAZIL

- short version

Get to Know Hydro in Brazil

Summary

World-class upstream operations

Hydro

Challenges

- Online vibration monitoring with real-time analysis and diagnostics for critical assets of a Norsk Hydro ore beneficiation plant in Brazil

Solution

- Online vibration IIoT devices with diagnostic electronics connected directly to the PI System and use all its tools.

Benefits

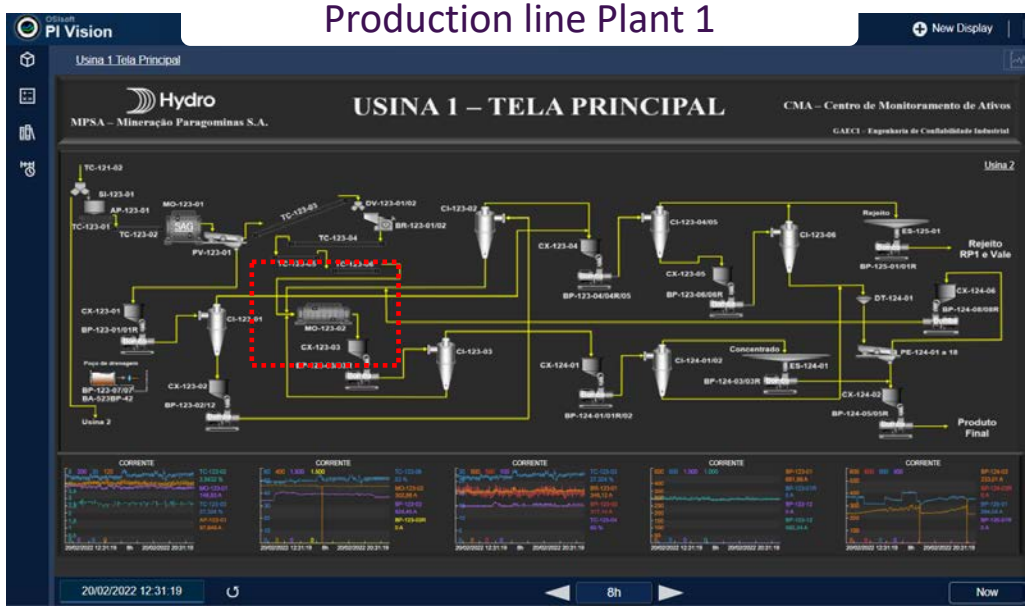
- Possibility of creating automatic, analytics, notification and opening of maintenance order in the ERP, enabling the correction of potential failures before a functional failure.

AVEVA

Challenges – Manual vibration collection takes time to analyze and diagnose

Critical Asset with High Added Value

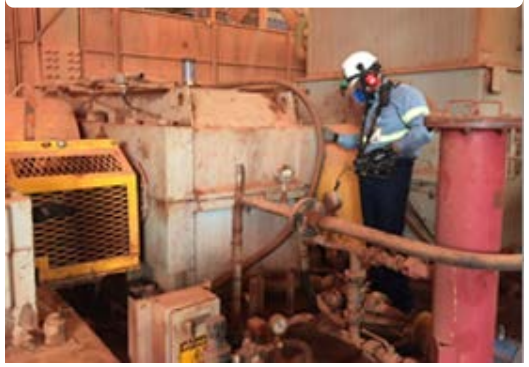
Production line Plant 1



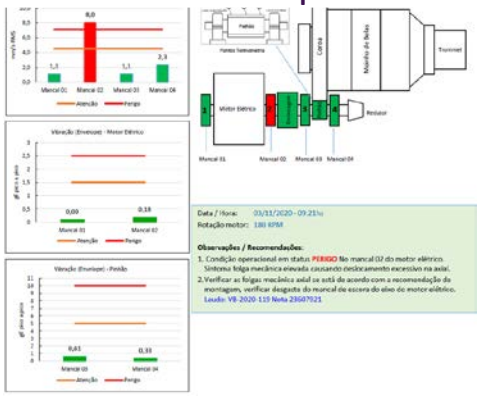
Ball Mill Motor - 13.8kV/9200HP

- Production line dependent on this critical asset
- Manual vibration collection only every 15 days
- Employee exposure to rotating equipment
- Time-consuming fault analysis and diagnosis
- Taking action for sometimes late correction
- Difficulty in interpreting the collected graphics
- Fully manual report generation

Manual vibration collection



vibration report



Solution – Vibration IIoT Electronics
AVEVA PI System

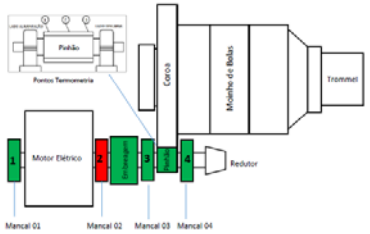
Realtime IIoT Vibration Analysis with Diagnostics

Hydro

Monitoring with AVEVA PI System

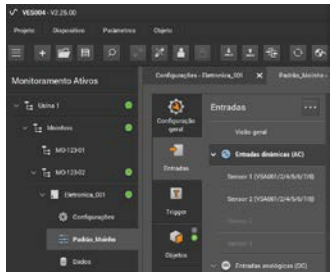
1 Sensor Vibration

Ball Mill

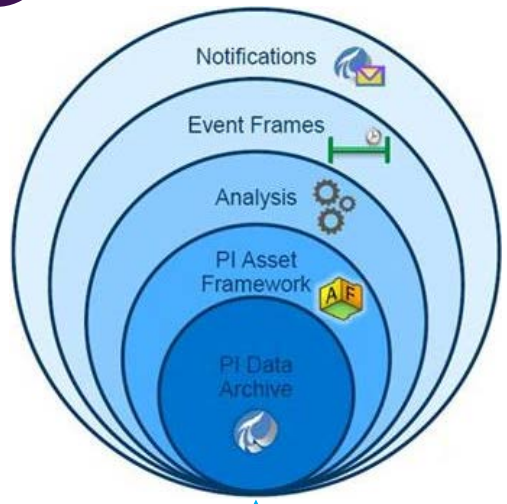


2 Electronics Diagnosis

Objects Configuration



3 AVEVA PI System



OPC Server

1 INSTALLATION OF VIBRATION SENSORS IN BALL MILL MOTOR BEARINGS

2 INSTALLATION OF DIAGNOSTIC ELECTRONICS AND OBJECT CONFIGURATION AVAILABLE VIA OPC SERVER FOR PI SYSTEM

3 INSTALLATION AND CONFIGURATION OF PI SYSTEM OPC CONNECTOR COMMUNICATION AND CREATE PI POINT'S OBJECTS

AVEVA

Details - Installation of devices in the field

Installation of Devices in the Field

Ball mill motor

1. Location chosen was Plant 1 of ore beneficiation
2. The critical equipment chosen was the ball mill MO-123-02
3. The monitored asset was the 13.8kV, 9200HP motor
4. The real-time vibration monitoring component were the motor bearings
5. Monitored radial and axial vibration of the motor axle
6. Existing panel used near the mill;
7. The diagnostic electronics were installed in one of the DCS panels

AVEVA

Location and Benefits - Basic project components and overall results

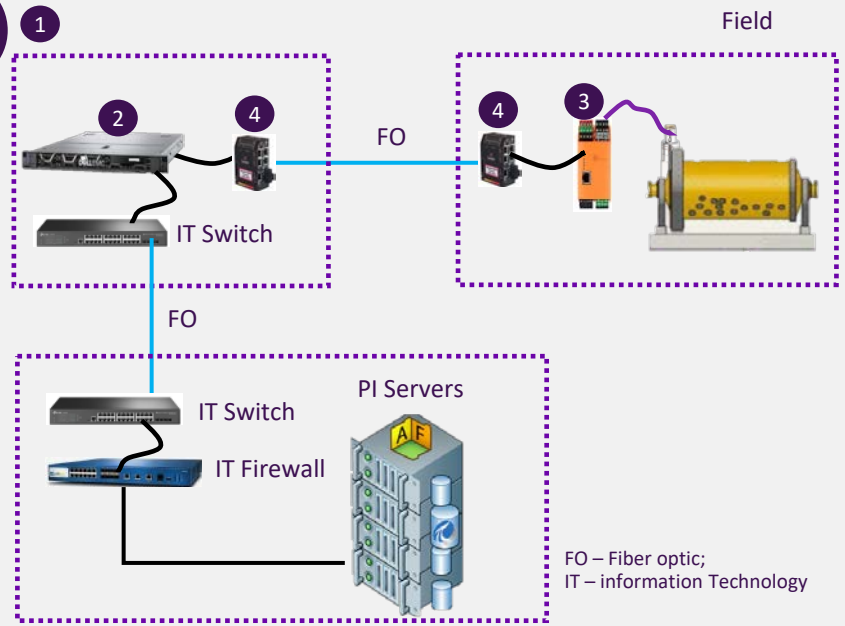
1

2

3

4

5



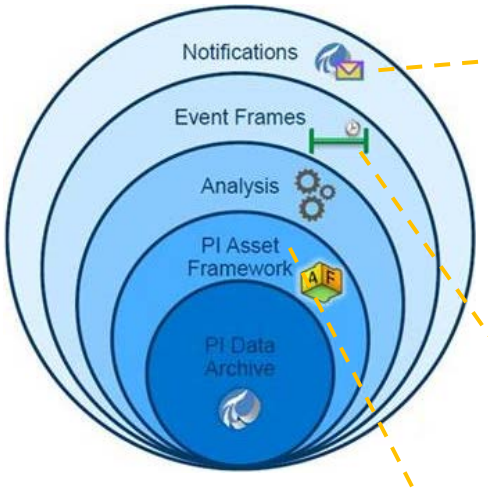
Physical Infrastructure

1. Automation Server Room;
2. DELL Server;
3. Diagnosis Electronics;
4. Electric Optical Switches;
5. Interconnection Drawing

Real-Time IIoT Vibration Analysis Via PI System

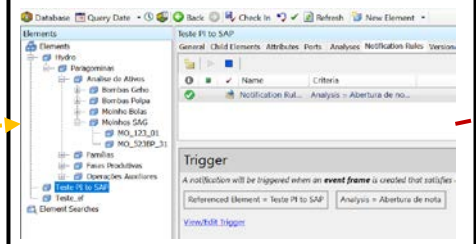
Monitored by the AVEVA PI System

1 AVEVA PI System

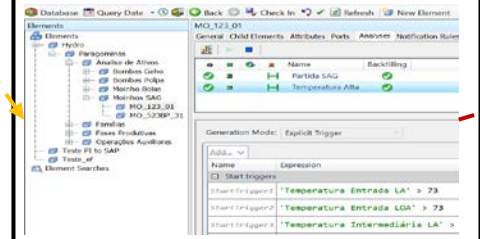


OPC Server

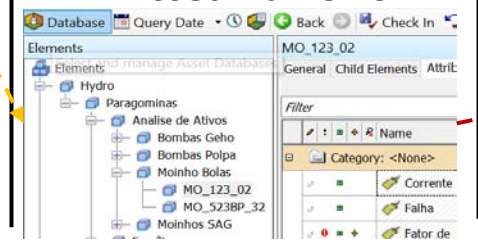
2 Notifications



Event Frames

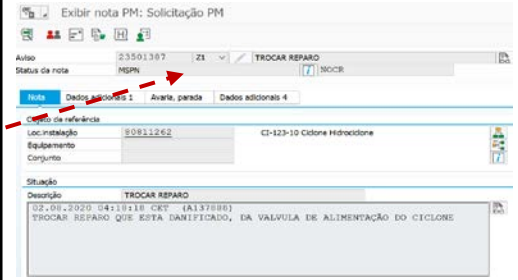


PI – Asset Framework



3 Email list

ERP - Maintenance notes



AVEVA PI Vision - Dashboard

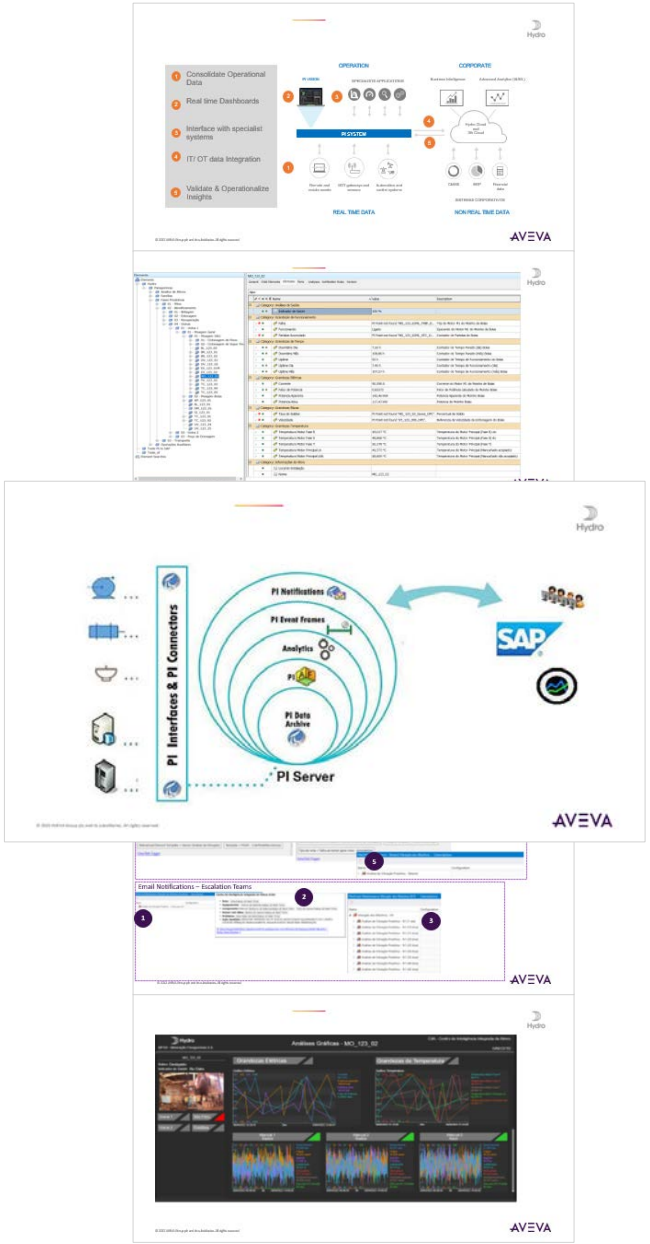
1 THE CHOICE FOR THE OPC PROTOCOL:

- EASY DATA INTEGRATION;
- SIMPLE CONFIGURATION.

2 MODIFICATION OF THE CURRENT AF;
EVENT FRAMES DEFINITIONS;
CREATING THE NOTIFICATION RULES.

3

- AUTOMATIC ALERTS VIA E-MAIL;
- AUTOMATIC NOTIFICATIONS IN THE SAP SYSTEM
- AVAILABILITY OF SCREENS BY AVEVA PI VISION

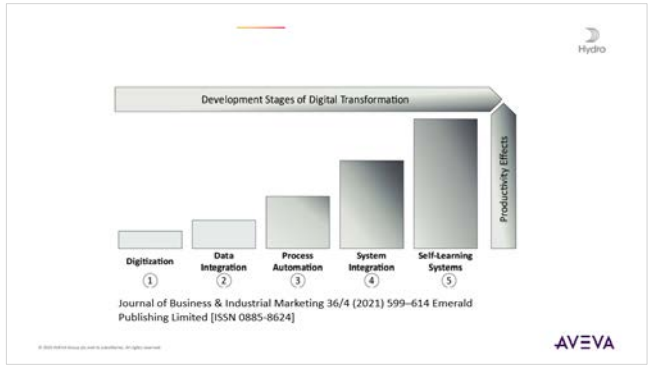


Resources

Tools and resources used from PI System

1. PI Data Archive as the centralized industrial data storage infrastructure of the Integrated Asset Integrated Intelligence Center on Hydro;
2. PI AF hierarchy to enhance the data context from assets;
3. PI Analysis as the engine to calculate:
    1. The reliability indicators from assets (uptime, downtime, MTBF, MTTR, others);
    2. The alerts generation to apply CBM concept;
    3. The trend analysis through Linear Regression.
4. PI Notifications as the messaging solution to:
    1. Send email according to the rules of CBM created or prediction results generated through Linear Regression;
    2. Open maintenance notifications on ERP of Hydro automatically;
    3. Send periodically reports to the managers with reliability indicators and asset status;
5. Dashboards to online monitoring on PI Vision:

Outcomes



Impacts

Outcomes already achieved on PoV:

1. Decreasing insurance policy price;
2. Reducing by 50% the human risk exposure;
3. Saving 50% human time spent in data collection and analysis;

The outcomes expected and that are being measured on PoV :

1. Decreasing Downtime – Target 10%;
2. Increasing Asset Reliability – Target 10%;
3. Increasing Mill Capacity – Target 3%;
4. Saving maintenance costs – Target 20%;

“Data is the new oil. It’s valuable, but if unrefined it cannot really be used. It has to be changed into gas, plastic, chemicals, etc to create a valuable entity that drives profitable activity; so, must data be broken down, analyzed for it to have value.”

Clive Humby

Questions?

Please wait for the microphone

- State your name and company

Please remember to…

Complete the survey!

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ABOUT AVEVA

AVEVA is a global leader in industrial software, driving digital transformation and sustainability. By connecting the power of information and artificial intelligence with human insight, AVEVA enables teams to use their data to unlock new value. We call this Performance Intelligence. AVEVA's comprehensive portfolio enables more than 20,000 industrial enterprises to engineer smarter, operate better and drive sustainable efficiency. AVEVA supports customers through a trusted ecosystem that includes 5,500 partners and 5,700 certified developers around the world. The company is headquartered in Cambridge, UK, with over 6,500 employees and 90 offices in over 40 countries.

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