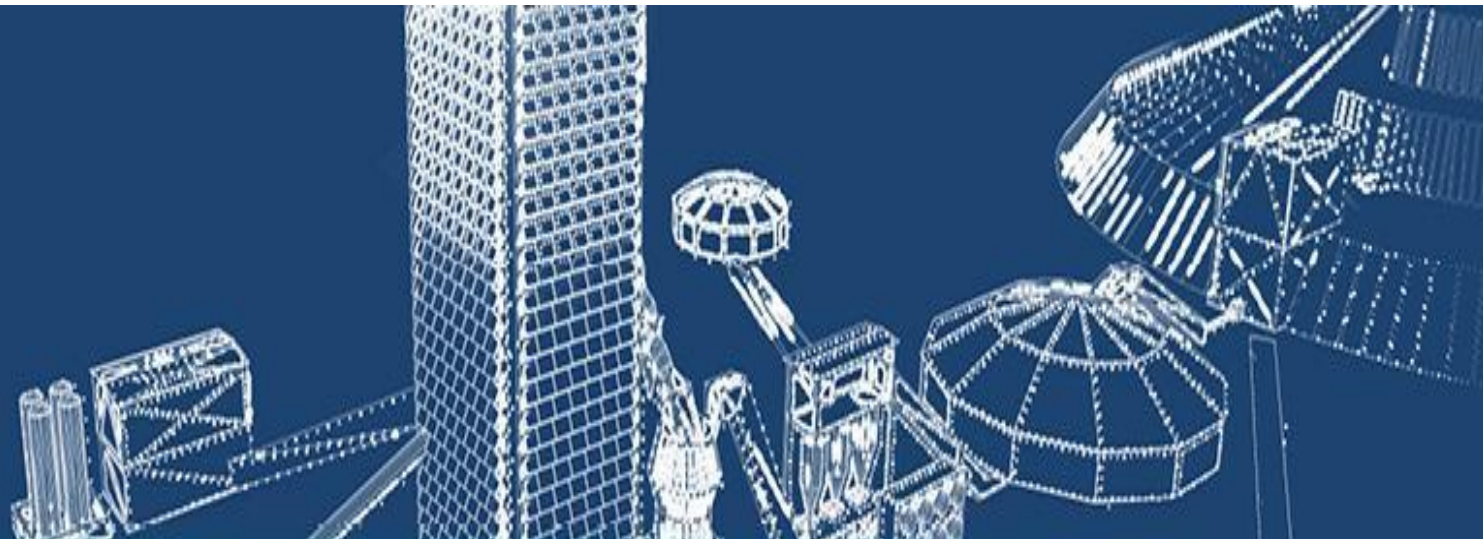


THE PLANTS OF TOMORROW



Plants of Tomorrow

September 2021

JORGE GAMARRA, GLOBAL DIGITAL MAINTENANCE GROUP EXPERT



GROUP OVERVIEW



~70
countries



~2,300
operating
sites



~72,000
employees



23.1
billion CHF
net sales
Like-for-like



ESG
Sustainalytics rating



Net Zero
pledge



SBTi
2030 climate targets
most ambitious in industry

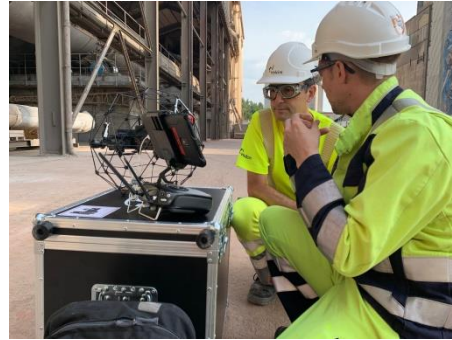
THE “PLANTS OF TOMORROW”: KEY ENABLER FOR ACCELERATING GREEN TRANSFORMATION



Ambition

Be the global leader in innovative and sustainable building solutions

world is shifting from linear to circular to preserve and replenish natural resources



Opportunity

Make our business smarter and greener:

automated and data-driven solutions, cutting across robotics, artificial intelligence, predictive process, maintenance and quality



Platform

Digitally connect our manufacturing processes with:

sales, sourcing and logistics, to improving our operational efficiency and CO2 footprint

THE “PLANTS OF TOMORROW”: FUTURE-PROOF OUR SITES AND PEOPLE

Basics



- Technical Information System (TIS)
- Online condition monitoring
- Advanced Process Control

Predictive Systems & Operations



- Maintenance and Production Inspections
- Predictive Operation
- Predictive Maintenance

Automation & Innovation



- Labor intense & high exposure activities
- In-bound Logistics
- Warehousing
- CCUS

Upskilling Our People



- Digital Twin
- Performance and Collaboration Tool (PACT)
- X-Change Proven Practice Solutions

M-PREDICT CONCEPT:

APPLYING AI TO EXISTING SENSORS INCREASES PREDICTABILITY OF FAILURES & REDUCES COSTS

Maintenance inspection alarm triggered

Maintenance Eng.
Warning

Potential failure predicted

AI*

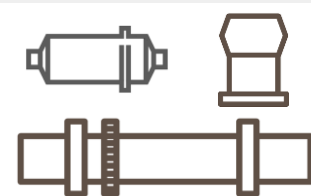
* artificial intelligence

Data is collected

Knowledge
Management Sys.

Sensors continuously monitor key equipment condition

(mills, kilns, fans, ...)



HOW:

1. Build Artificial Intelligence models analyzing existing data
2. Make a pilot in specific machine and use existing sensors
3. Develop & Test an MVP for specific equipment and Roll-out in the Group

M-PREDICT: FUNCTIONALITIES

Smart Condition Monitoring

- Monitoring health status of the sensors
- Analysis of the trend evolution of sensor data & forecasting time to failure
- Correlation between electrical & mechanical signals from the same element
- Send notification with the problem information

Diagnosis

- Correlation between electrical and mechanical signals from same machine and provide the health status of the complete machine
- Root cause failure analysis to determine the origin of the failure
- Improve the accuracy of time to fail base on mechanical & electrical parameters

Prediction

- Using the correlations and analysis of the diagnosis/ Smart condition monitoring in combination with process variables. The ML will be able to predict the specific time to failures adding the information about the operating condition which are influencing in the specific problem

Prescription

- The model shall use the root cause failure analysis and the prediction together with process variables to give recommendations how to operate the machine when a failure is taking place

Kujawy case - Separator shaft bearings replacement of Vertical Mill

Applying the M-Predict software to support the decision-making process

Challenge

The separator shaft bearings from the beginning of 2021 was showing an increase of temperature in the middle and end bearings and it is extremely difficult to perform an standard measurement to monitor them.

Using M-Predict software the plant personnel was able to detect a deterioration of the technical condition of separator shaft bearing.

With the upcoming increased demand for cement, it was necessary to assess whether the vertical cement mill would run through the peak of season.

The plant approach

Using the information provided from M-Predict application such the estimated time to failure (in days) The maintenance team was able to avoid unexpected stop and planned in advance the replacement of the bearings and order the spare parts.

As well with the constant monitoring of the M-Predict the plant could run through the seasonal peak of production without stop and avoiding the production loss.

Result

In 2017 the plant suffer from similar issues and the result was an unexpected stop which end with 10 days of overhaul and production loss.

In 2021 the constant monitoring of the separator shaft bearings using the M-Predict application was enable the plant to make a proper planning of the replacement avoiding the stop during the high season and consuming only 4 days this time.





HOLCIM

Jorge Gamarra



Jorge Gamarra, a dual citizen of Switzerland and Argentina, is the Global Digital Maintenance Group Expert based in Holderbank, Switzerland. He joined Holcim in 2006 as a Regional Project Manager in Bratislava, Slovakia.

Jorge began his career at Ericsson. During his nine year tenure, he led global projects focused on construction of telecom infrastructures in Latin America, Europe and Southeast Asia. During the past fifteen years at Holcim, he has held global roles of increasing responsibility in the areas of Automation and Maintenance.

In 2018, he created the blueprint for the “Plants of Tomorrow” initiative with the objective of moving the Group into automated and data-driven operations by rolling out innovative industry 4.0 solutions across our production sites worldwide.