MAY 2022

Operational Transformation at Votorantim Cimentos

AVEVA PI World

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AVEVA

Agenda

- Votorantim Cimentos

- Business goals and challenges

- The road to asset excellence

- Savings and scalability

- Maintenance backlog reductions

- New ways of work

- Summary

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Votorantim Cimentos

- Brazilian company founded in 1933

- Global business with a presence on 11 countries: Argentina, Bolivia, Brazil, Uruguay, Canada, United States, Luxembourg, Spain; Turkey, Morocco, Tunisia

- Focus on construction materials

- Revenue of BRL 22.3 billions ($ 5B) and sales of 32.7 million tons of cement in 2021

Business goals and challenges

Goals

- Cut costs for corrective maintenance and maintenance (MRO) inventory

- Increase productivity through Predictive Maintenance

- Increase operational reliability and reduce downtime

- Quick return on investment while maintaining autonomy over the systems being implemented

Challenges

- Need for rapid implementation and a user-friendly interface

- Creating a sense of ownership allowing for future scalability without relying on a supplier

- Meaningful return on investment

- Adapting to COVID-19 Scenario, with 100% remote deployment

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The road to asset excellence

2018 Scenario

- Single source of reliable data and information with AVEVA PI System

- Centralized management of corporate assets

- Central PI Server Collects data from 33 sites in Brazil, 5 Sites in Spain, 4 in Turkey, 1 Morocco.

- Preventive Maintenance (calendar) and Condition based maintenance in place.

From PoC to Rollout

- PoC for 2 entire cement lines:
  - 1 old site with few sensors and less data
  - 1 mature site robust automation with lots of data
- 50 AI models deployed in 3.5 months (2 sites)
  - (our competition estimated 9 months for same scope)
- **1300 AI Models within the next 1 year**

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What we monitor

- VERTICAL MILL / BALL MILL
  - Process
  - Mechanical
  - Oil System
- MOTOR
- GRATE COOLER
- CRUSHER
- COMPRESSOR
- CONVEYOR
- ELECTRICAL ROOM
- ELEVATOR
- FAN

- FEEDER
- FILTER PROCESS
- HOT GAS GENERATOR
- KILN
  - Base
  - Motor
  - Process
- LIMESTONE CRUSHER
- SEPARATOR
- POWER TRANSFORMER

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Under the hood

Historical

Asset / Process Signature

- Applies combination of AI algorithms to create asset or process signature (Operational Profiles)
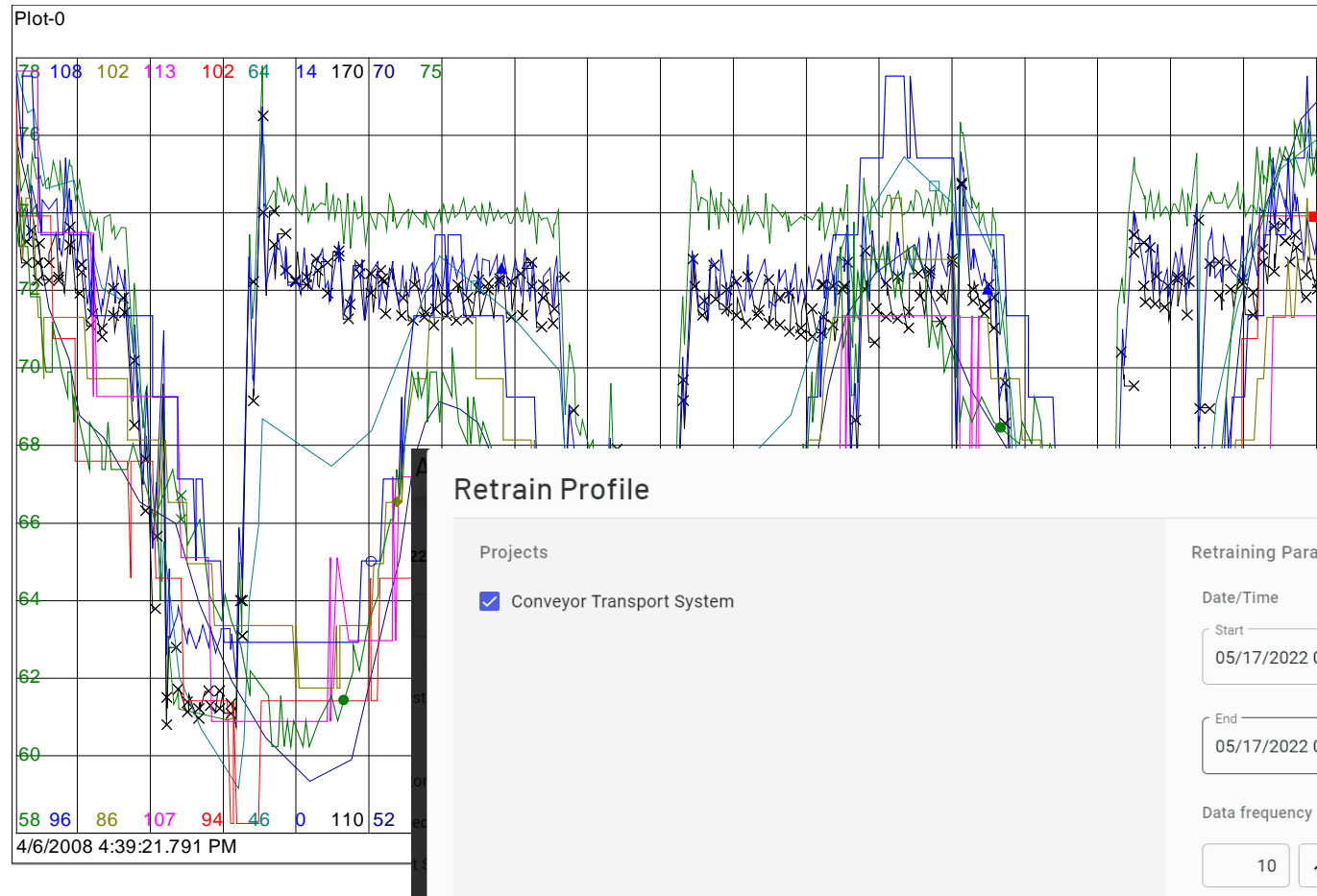
Real-Time

What's Happening

- Continuously compare real time data to it´s signature to detect deviations and predict future behaviors
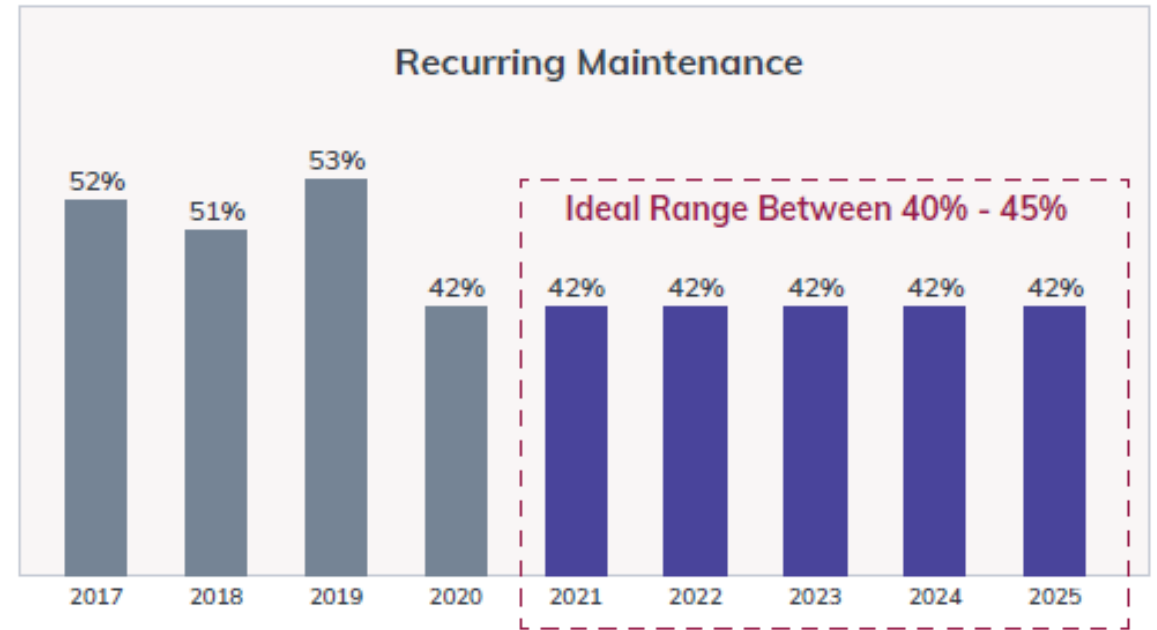
AI

Combination of Algorithms

- Machine Learning
- ICA
- Optics
  LSH
- KANN

Plot-0

78 108 102 113 102 64 14 170 70 75

58 96 86 107 94 46 0 110 52

4/6/2008 4:39:21.791 PM

Retrain Profile ✕

Projects

☑ Conveyor Transport System

Retraining Parameters

Date/Time

Start
05/17/2022 04:23 📅

End
05/17/2022 07:23 📅

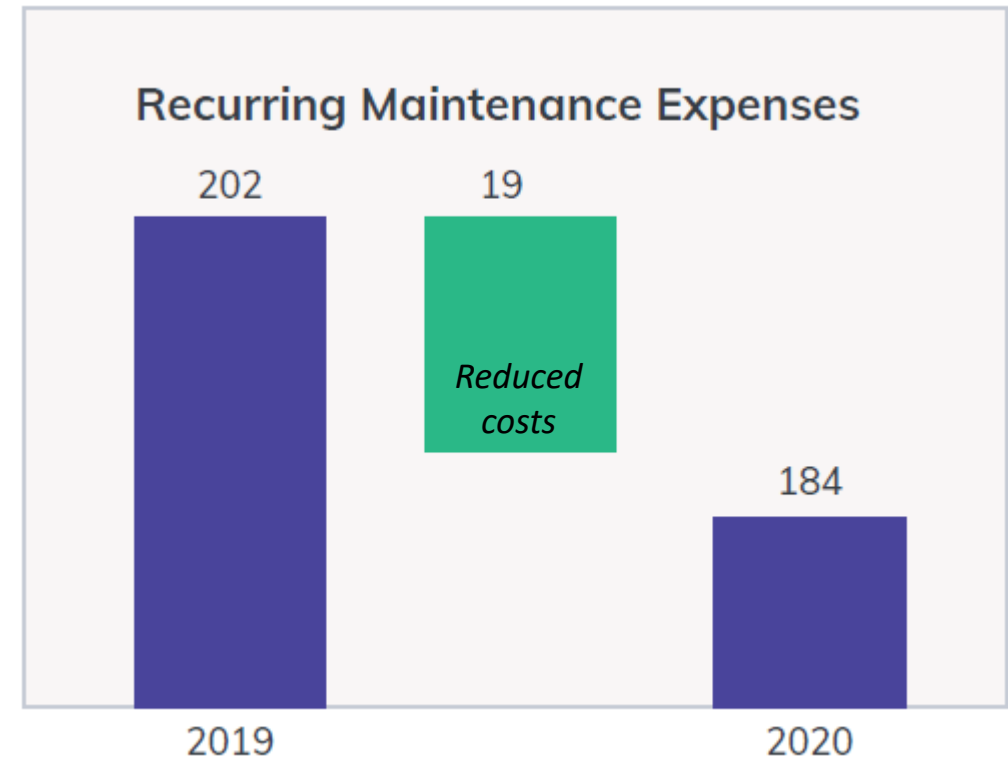Data frequency

10 ⌃ ⌄ Seconds ▾

Savings and scalability

- Quick and efficient implementation

- Almost immediate benefits: across six sites, predictive analysis-driven "catches" avoided BR$23 million expenditure in corrective maintenance costs per site in the first year alone.

- Unplanned maintenance costs achieved the desired target values after AVEVA Predictive Analytics.

Recurring Maintenance

Year	Value
2017	52%
2018	51%
2019	53%
2020	42%
2021	42%
2022	42%
2023	42%
2024	42%
2025	42%

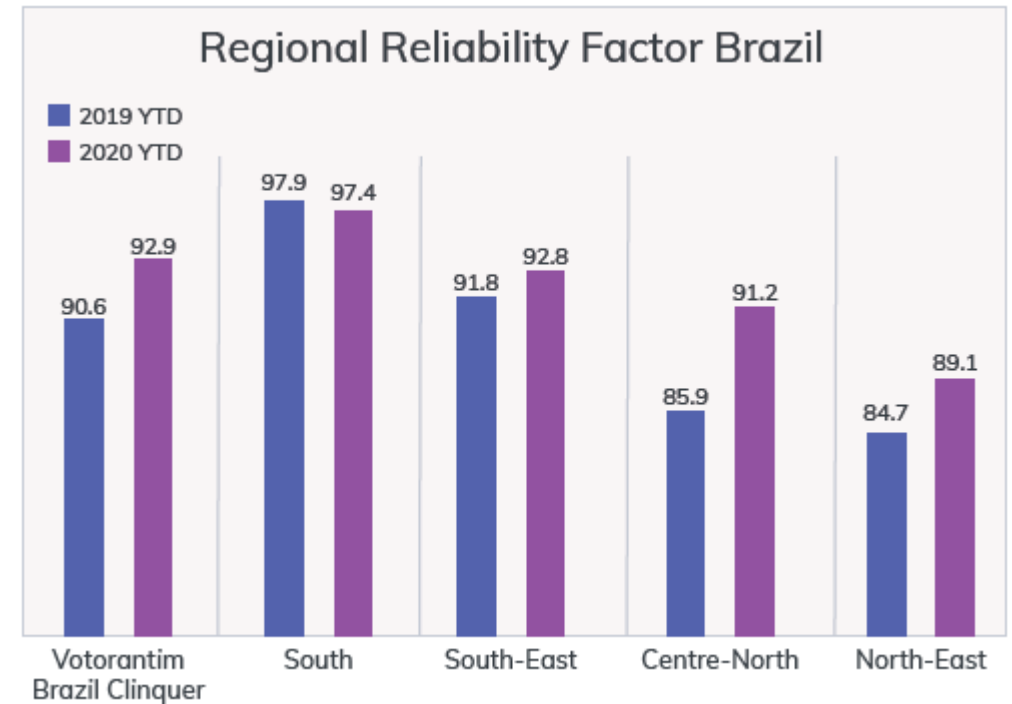Ideal Range Between 40% - 45%

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Maintenance backlog reductions

- Reduce maintenance costs by 10% (BR$ 19 million), and also cut the plant's maintenance backlog

- With better data the team was able to drive a 6% improvement in asset reliability.

- Manage immediate maintenance needs

- Plan and scale their processes as needed by using the cloud to execute operations remotely (critical during the COVID-19 pandemic)

- Manage and minimize operational risk and cut unscheduled downtime

Recurring Maintenance Expenses

202   19

Reduced costs

184

2019   2020

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New ways of work

Digital transformation is about more than just software!

- Change management and embracing new ways of working as part of a full connected worker vision

- Votorantim Cimentos' leadership led and successfully implemented a cultural change program to underpin the new digital maintenance strategy

- Achieved closer, more frequent collaboration across its maintenance workforce

- Standardized best practices to boost safety and elevate performance across multiple sites using intelligent, data-led operating models

Regional Reliability Factor Brazil

Legend:
- 2019 YTD
- 2020 YTD

Region	2019 YTD	2020 YTD
Votorantim Brazil Clinquer	90.6	92.9
South	97.9	97.4
South-East	91.8	92.8
Centre-North	85.9	91.2
North-East	84.7	89.1

Avoided costs at one of the 16 sites

Legend:
- Saving/month
- Cumulative Saving

Month	Value
Jan	87
Feb	376
Mar	1.385
Apr	104
May	1.211
Jun	672
Jul	1927
Aug	894
Sep	1658
Oct	4772
Nov	3882
Dec	6707
Total	23.625

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Votorantim Cimentos testimonials

"We selected AVEVA because of the quality of their software and the quality and experience of their team. We knew they had the capabilities we needed, but more importantly they had the knowledge and expertise to help us implement quickly and achieve ROI on the project within months. Now, our team has embraced digital ways of working we simply can't imagine going back to the way we worked before."

-
Marcio Krasinski
Technical Board at Votorantim Cimentos

"Using AVEVA predictive analytics we wanted to realize a vision of our next-generation plant operations, using data to shape our decision-making. Because AVEVA's software is agnostic we were able to click in the systems within days, and see benefits within weeks, driving unparalleled optimizations that spanned our entire operations and our network of plants."

-
Fabio Eduardo Scarlassari
Global Maintenance General Manager at Votorantim Cimentos

"At heart, digital transformation is about people being able to embrace new ways of working and truly become data-led experts in all that they do. Working with AVEVA we were able to make that shift in our thinking and the benefits for our team have been truly transformational. We have elevated our performance and now we can operate with greater efficiency and operational agility than ever before."

-
Fabio Eduardo Scarlassari
Global Maintenance General Manager, Votorantim Cimentos

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Operational Transformation at Votorantim Cimentos

Challenge

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Solution

- AVEVA PI System

- AVEVA Predictive Analytics

Benefits

- 10% of reduction in recurring maintenance compared to previous years (see recurring maintenance chart)

- Savings of BRL23M per site, equivalent to US$5.5M savings per site and a total of US$88M savings in total

- Reliability boosted by 6%, achieving target values of 85.9% to 91.2%

- Reduced unplanned maintenance from 52% to 42% for global maintenance costs, achieving targets

- Implemented successful change management strategy, improving collaboration

- Improved asset transparency, enabling comparative analysis between plants and sharing of best practices

- Improved instrumentation quality

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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.

Learn more at www.aveva.com

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