

11/16/2022

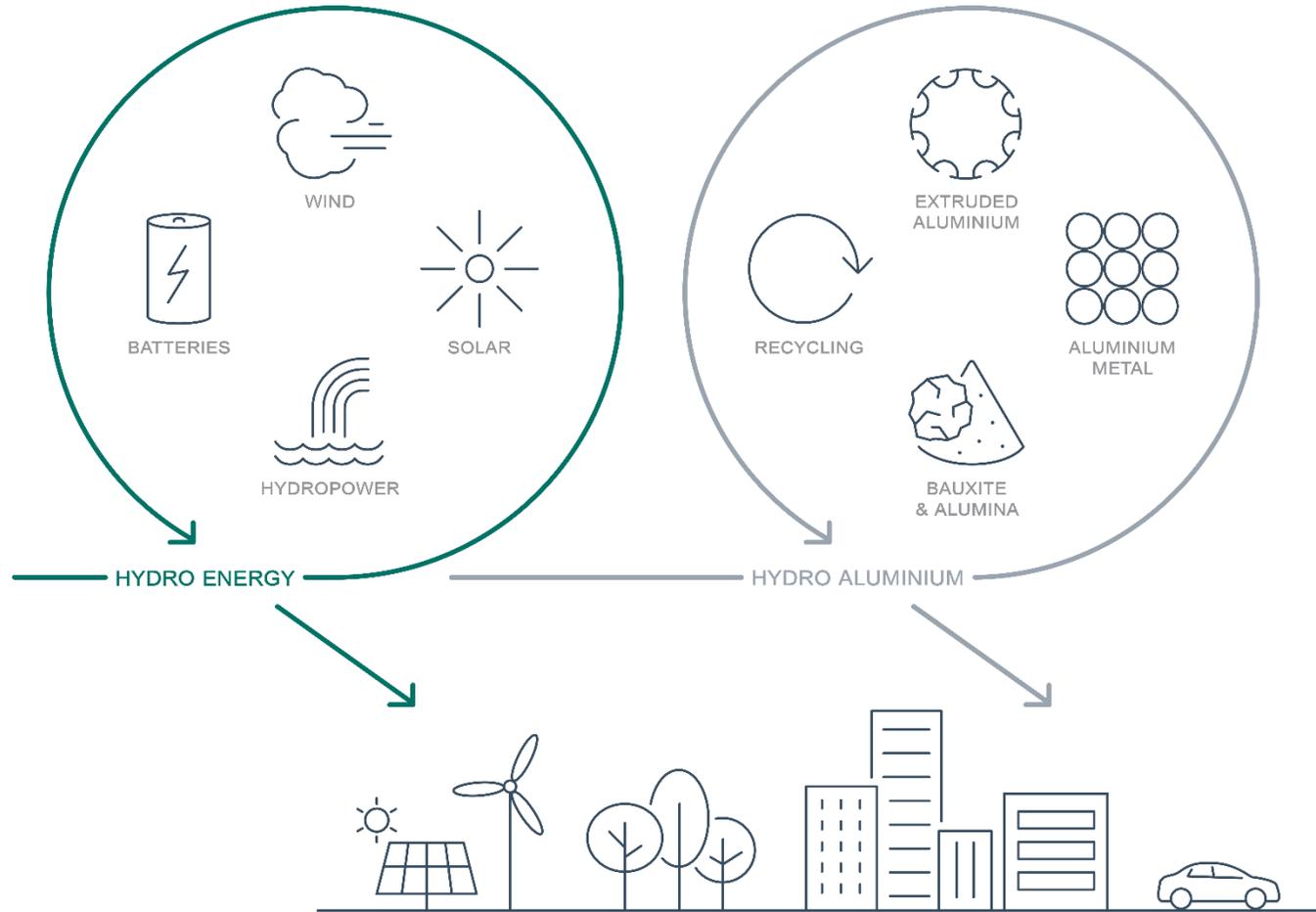
Norsk Hydro Alunorte: DMS - Daily Management System of Press Filter

SUBTITLE

Alexandre Freitas, Andre Ramos Thulio Magalhães

AVEVA

Global Performance – About Hydro



Hydro Bauxite & Alumina

- Bauxite mining and alumina refining as a raw material for aluminum production.
- We have one of the largest bauxite mines in the world and the largest alumina refinery outside of China, both located in the state of Pará, Brazil.
- More than 11,000 direct and indirect employees work at the Paragominas mine and alumina refinery in Barcarena
- We handle approximately 16 million tons of ore per year, producing approximately 11.4 million tons of bauxite annually
- Sale of alumina to external customers



Hydro Paragominas

- Paragominas – PA
- ~2.3 thousand direct and indirect employees.
- 100% ownership.
- Nominal capacity: 9.9 million tons.
- 2021 production: 10.9 million tons, up 26% from 2020.
- The flow of bauxite carried out by a pipeline is 244 km long and passes through seven municipalities in the state.
- MRN – Porto Trombetas, PA
- 5% ownership
- Guaranteed minimum purchase agreement for a 40% stake in Vale



Hydro Alunorte

- Barcarena – PA
- ~8.5 thousand direct and indirect employees
- 92% owned
- Nominal capacity: 6.3 million tons
- 2021 production: 6,3 million tons
- World's largest alumina refinery outside China
- Bauxite provided by Paragominas and MRN
- World-class conversion cost position
- Use of state-of-the-art filter press technology to process bauxite waste
- Plant optimization in preparation for extreme weather events





About ourselves in Alunorte

Digital transformation in Hydro Alunorte

- Alexandre began his career in 2017 at press filter and tailing área. At that time, all the operational/maintenance reports were Excel based linked with PI Process Book. The reports were sent as a PDF file at least 3 times a day.
- Andre began his career in 2018 at press filter and tailing area. But in Hydro Alunorte, he started in Alunorte in 2009.
- Thulio began his career in 2021 at automation team giving support to press filter área. Nowadays, he is working as system specialist at digital tranformation department.

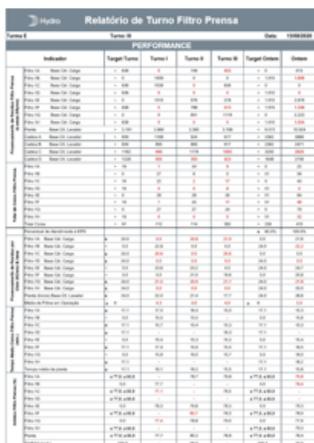
The addressed challenge

5 reports (DMS level 2 and 3, belt conveyor system, filters availability, pressure and cycle time)

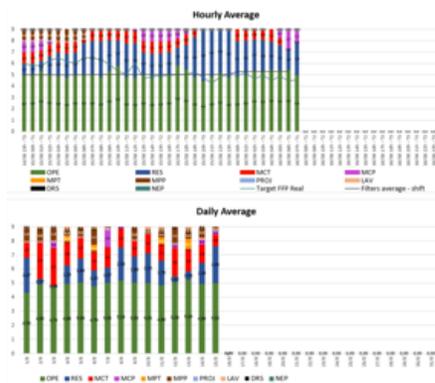
DMS Level 3



DMS Level 2



Filter Availability (Monthly, daily and hourly)



Stop Criterion (pressure profile and cycle time)



Belt Conveyor System

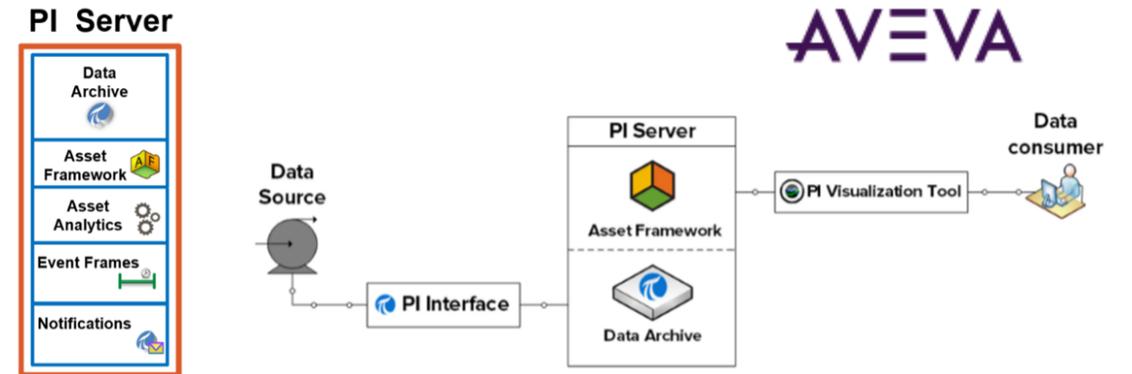
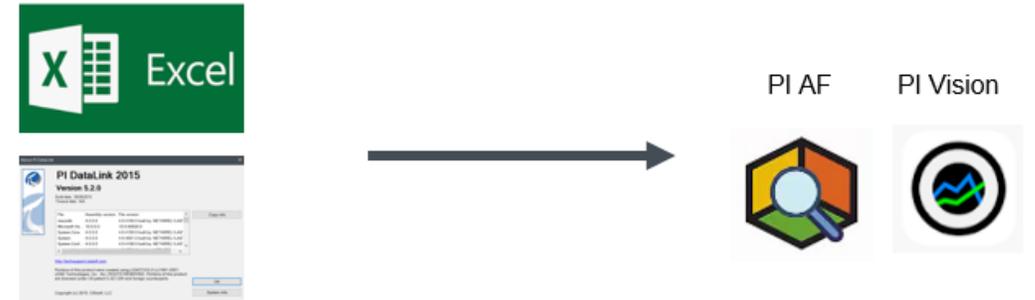


- Reports were sent during the day in specific times with Excel macro sub-routine for automatic e-mail sending (some indicators were extracted from PI tags and some were manually inputted).
- More than 350 calculations on Excel.
- High maintenance time due to calculations crashes and bugs in the reports.
- Delay on sending the information to operational, maintenance and engineering teams.
- Lack of information for decision making (press filter performance) impacting mud processing and press filter availability.

Operational insights

Better decisions with better data

- New tools to explore: asset analytics, event frames, notifications...
- Possibility to navigate between reports during the shifts (help to analyze).
- Created a reliable historical database, it can be used in a failures analysis or improvements.
- PI Vision and AF saved time, energy and turned the day of everybody more productive.



Implementation Details

How we make it real

- All KPIs calculation were reviewed.
- Calculation were migrated to PI AF – standard organized architecture of analysis/child elements (reducing data vulnerability).
- Dashboards were created in PI Vision (new interface) and tested with the team.
- Time of implementation: 6 months (first in Hydro Alunorte).

DMS Level 3



Filter Availability (Monthly, daily and hourly)



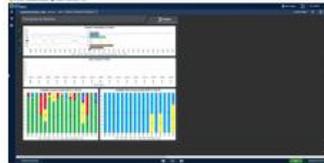
DMS Level 2



Belt Conveyor System



Stop Criterion (pressure profile and cycle time)



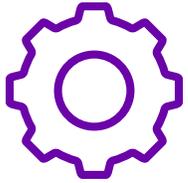
Impact of implementation

Avoided losses and gains

- Improved response time: increased reconnection speed between the shifts due to on-line monitoring reports related with pressure profile control and cycle time as example (higher synergy).
- Improved time of filter in high performance (availability and utilization).
- Report can be seen at mobile cell phones (access for all).
- Increased daily productivity and other KPIs: during shift change, the previous team deliver how much it was produced, how many filters were available for example. This was possible because the data/report were on-line and available, and it was an incentive to a healthy competition between the teams.
- Hydro Alunorte is implementing in other areas of the plant.
- Estimated avoided losses \approx USD 70k / year.
- PI Vision and AF supported full budget compliance.



How AVEVA improved our operations?



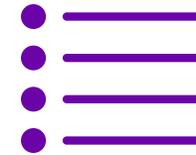
Challenge

- Provide a platform to monitoring 5 reports 24hrs a day, without crashing.
- To support the team to improve the control of mud filtration, transport system of the largest mud disposal area in the world.
- High maintenance time due to calculations crashes and bugs in the reports.
- More than 350 calculations were done to send the reports.



Solution

- Implementation the latest AVEVA PI System technology including PI AF and PI Vision as an advanced foundation for 24hrs of process monitoring.



Benefits

- Improved response time.
- Improved time of filter in high performance (availability and utilization).
- Increased daily productivity and other KPIs.
- Estimated avoided losses ≈ USD 70k / year.
- PI Vision and AF supported full budget compliance.

“Together we are stronger, be part of the challenge and be part of the solution”

Hydro Alunorte Team



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Questions?

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