BIG THINKING BIG RESULTS

A SELF-OPERATING MILL AT ELDORADO
Autonomous automobiles use a variety of techniques to gather data about their surroundings and feed this data to advanced control systems that interpret the inputs and identify appropriate navigation paths. The development of autonomous pulp mills using Metris OPP is following a similar path – and Eldorado Brasil Celulose is an early adopter of this technology. The results have had a quick economic payback.

Experiments began with automated operation back in the 1920s or even earlier. The first truly autonomous cars appeared in the 1980s. The development of autonomous mills is moving at a much faster pace thanks to smart sensors and tremendous computing power in small packages that are part of ANDRITZ’s Metris OPP (Optimization of Process Performance).

Metris OPP is a combination of sophisticated software and knowledgeable human experts. This system is aimed at improving production through data mining and control strategies, with the goal of reducing costs and increasing profits. It has been around in various forms for over a decade and is constantly evolving and improving. Metris OPP has been implemented in over 50 plants in 13 countries. Arguably the most impressive Metris OPP project is the autonomous mill at Eldorado Brasil Celulose near Três Lagoas (MS), Brazil.

**AUTOMATED OR AUTONOMOUS?**

“Autonomous implies acting independently,” explains Leonardo Soares Figueiredo, ANDRITZ’s OPP Project Manager at Eldorado. “Most of our work at Eldorado to date still has an operator in the driver’s seat, so perhaps ‘automated mill’ more accurately describes what we are doing today – with an eye towards autonomy in the future.”

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Carlos Monteiro, Eldorado’s Industrial Director, does not care whether it is autonomous or automated. Monteiro is focused on results. “I can tell you this,” he says, “the results in the first year have been impressive.”

An increase in operational efficiency from 89.2 to 93.5%, variable cost reduction of 7%, 3,800 admt production over the budgeted amount, AND controls in automatic mode 95% of the time.

**METRIS OPP**

Increasing operating efficiency by 3.8 %-points may not sound like a tremendous improvement, but in a mill currently producing 1.7 million t/a – an amount that is equivalent to millions of Brazilian real in the end. The fact that Eldorado operates sustainably at 13% above design capacity without any additional capital investments is proof of its efficiency.

But why would a mill already operating in the top tier choose a service like Metris OPP? “We are well managed and have tight cost controls,” says Leonardo Pimenta, Technical Control Manager at Eldorado and in charge of the OPP project. “But we can always improve our position. We focus on every detail to stay ahead of our competitors. Metris OPP is a tool that helps us stay ahead.”

**KPIs ARE MEASURED CONSTANTLY**

The three KPIs selected as being most critical are: 1) operational stability in the 90-93% range, 2) a reduction in variable costs versus budget, and 3) all the APC routines will be turned on at least 90% of the time.

Arthur Santos, OPP Technical Specialist at ANDRITZ, believes that the front-end work of analyzing control loops and then “tuning” each loop is responsible for helping achieve the results Eldorado is seeing today. “It all starts with reliable data, which comes from reliable instruments and sensors,” Santos says. “We

**STEP-BY-STEP TRANSFORMATION**

The high level of automation at Eldorado didn’t come overnight. All changes within the processes of the mill were and are done step-by-step and executed on a daily basis. The advantage of this approach is seen in the smooth, gradual integration of the process improvements without impacting daily mill routines.

“The key to us achieving results is the belief that processes are better controlled by automatic, advanced process control than by manual operator intervention,” says Pimenta. “Stability is essential. Every loop in automatic mode makes us money.”

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FACTS

- Company: Eldorado Brasil Celulose
- Location: Três Lagoas, Brazil
- Product: Bleached market pulp (1.7 million adt/a)
- Automation tool: Metris OPP

The control room at Eldorado is the action center for production control. OPP software resides in the DCS for advanced control of pipeline processes and also links process, maintenance, and asset management information into one network.
completed over 40 projects using combina-

tions of smart sensors, APC, loop tun-

ning, data mining, and so on, that created

the infrastructure and a standardized

way of operating.”

**ALMOST 100% AUTOMATED

CONTROL**

Today, the Eldorado mill runs in automatic

mode 97-98% of the time, enabling Eldo-

rado to progress from basic control to

“hands off” and even “eyes off” operation.

However, operators mostly still start and

stop the production process and take

over when malfunctions or breakdowns

occur, which accounts for the remaining

2-3% of control tasks.

For the rest of their shift, operators can

safely turn their attention away from mun-

dane control tasks. “By running in auto,

we can reassign operators to more highly lev-

eraged tasks,” Pimenta says. “If you think

about it, even the best operator in the

world can’t be alert and on duty 24/7/365.

**AUTOMATIC START-UP SEQUENCES**

At the bleach plant, an automatic start-

up sequence has been implemented

by the fiber line team and tested. “The

operators only have to press one button,

and the plant starts up by itself,” San-

tos says. “After the process has started,

Metris OPP takes over to control the

bleach production. The expansion of this

sequence within our autonomous mill has

reaped tangible rewards already, which is

why we are now developing similar start-

up control for the washing processes.”

**SUPPORT FOR RISK-BASED

MAINTENANCE**

Three reliability engineers are part of

the ANDRITZ-Eldorado team working on

the Metris OPP project. According to Luiz

Roberto Araujo, Eldorado’s Maintenance

Manager, these three are supporting the

mill’s culture of risk-based maintenance

(RBM) by centralizing information from

the process and the equipment in the

same database.

It sounds simple, but the amount of

work is quite challenging. ANDRITZ OPP

analysts have tapped into the mill’s

SAP maintenance planning software to

retrieve vital information on Eldorado’s

23,000 assets in the database and com-

bine this with process info from the DCS.

The whole team is working on making

this communication between the data-

bases mutual.

“This gives us a new level of knowledge

about our assets,” Araujo says. “Under-

standing the process is fundamen-

tal to understanding the health of our

mill. Identifying the risks early prevents

unplanned stoppages.”

Each asset has been categorized A, B, C,
or D, depending on the critical importance

of the equipment to the mill’s operations.

“We monitor the risks for each asset and

focus our attention on the highest-priority

risks to our most critical assets,” Araujo

explains. “One glance at a computer

screen shows us where to focus our efforts

to avoid unnecessary shutdowns.”

The result? “We’re operating at 95% over-

dall equipment availability,” Araujo says.

“That is an excellent result.”

**METRIS OPP MAKES A BIG

DIFFERENCE**

According to Monteiro, Metris OPP has

made a “big difference” in Eldorado’s

performance. “We have achieved excel-

lent results in just a short time,” he says.

“Every loop in APC makes us money. Self-

lessly, I would prefer if no other pulp mills

were to investigate Metris OPP. But even if

there are some who do, we intend to keep

pushing and to stay ahead.”

“I suppose there are some people who

believe that the Industrial Internet of

Things (IIoT) is just a marketing gim-

mick,” says Daniel Schuck, Vice President

of Technology for ANDRITZ APO. “Maybe

they said the same thing about trans-

mitters and the early distributed control

systems. But what we are doing is not

pie-in-the-sky fantasy. We are using new

tools to do traditional things – saving

mills millions of dollars a year.”

“We might have tried to do some of this

alone, but we chose to bring in an expe-

rienced partner with ANDRITZ,” Pimenta

says. “They have the tools and the expe-

rience to help us reach a much higher

level of performance faster. Our results

show that there is a lot to be gained by

extracting the hidden capacity from our

assets before having to make additional

capital investments.”
Leonardo Pimenta, Technical Control Manager, meets with the OPP team to discuss progress. The team consists of Eldorado process engineers, reliability engineers, and ANDRITZ OPP analysts working side-by-side.

ONGOING PROJECTS

Another project is currently underway to determine the best production mill balance at any given time. “Think of it as level control for the entire mill,” says Santos. “We are writing software to monitor all the tank levels in the mill and combine this info with key process variables. This software will be crucial in achieving a higher level of autonomy of the mill because then we will have a powerful tool that will manage production throughout the mill using real-time data.”

In addition, there are Metris OPP projects to optimize ash leaching, dissolving tank TTA, lime kiln energy efficiency, and other control strategies being developed. Creation of machine learning tools, automated data analytics to predict process disruptions, and two-way communication between Metris OPP and the SAP software of the mill are also in progress.

“PUT ALL OUR EFFORTS INTO THIS”

There are various “flavors” of Metris OPP in various plants. The one thing they have in common is that the work is performed in collaboration with mill personnel – operators, technical resources, and management. Eldorado is unique in that a joint team was formed – ANDRITZ and Eldorado personnel – from the very beginning and works together every day.

“You can find Eldorado process and maintenance reliability engineers and ANDRITZ OPP analysts in the same room,” Santos says. “We interact constantly, collaborating and solving problems together.”

“We have put all our efforts into the success of this project,” Monteiro says. “I don’t think there are other mills working this way with a team of committed resources on a full-time basis.”

According to Pimenta, when Eldorado decided to go with OPP, it did so in a big way. “We chose to apply all the concepts and all the technologies that OPP offers at the same time,” he says. “We didn’t want to do it in pieces, but all at the same time and as quickly as possible. That’s the Eldorado way.”

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