



QUARTER BY QUARTER: HOW AURELIA METALS TURNED A PLANT AROUND

Something needed to change at Aurelia Metals. Gold recovery rates were less than 75 percent and throughput low at the end of the fourth quarter of 2015. If Aurelia was going to survive, its Perth processing plant needed to increase its recovery rate to 85 percent. It also needed to increase cash flow and capital. When Peter Smith, Metallurgy Superintendent at Aurelia Metals, started his role on February 1, 2016, he had no idea of the task at hand. Two days later, when he was briefed on the state of the plant, he knew one thing: he needed the PI System to remove manual processes and gain the necessary visibility to implement process control.

“Data—the cats—were everywhere,” Smith said during the 2017 OSIsoft Users Conference in San Francisco. “We had this much data and this much opportunity, and putting it together was very slow. We’d pull it out of the... control system and stitch it all together.” Smith called Gavin Stack, founder of Convergio, a software consultancy servicing the mineral processing industry, and told him, “I need PI! I needed my data a place where I can use it!” By mid-March, the PI System was up and running, recovery rates and throughput were improving, and Aurelia’s stock was rising.

HIGHLIGHTS:



gold recovery rate
increased from
62.1% to 88.6%



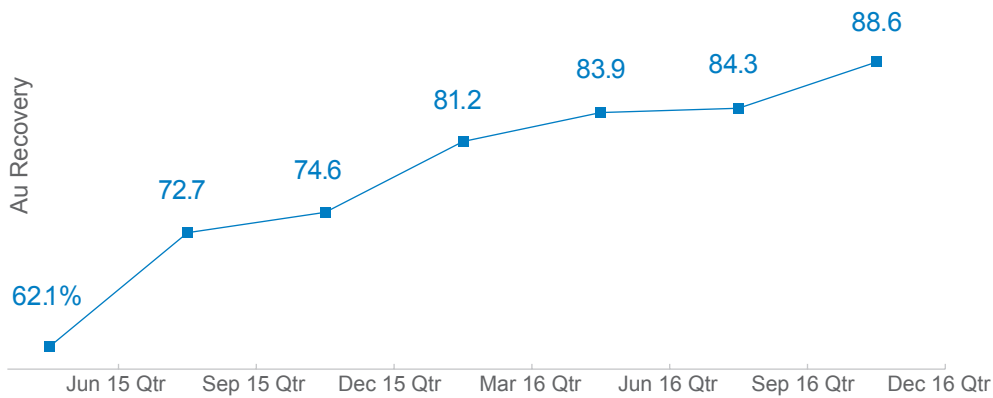
share price increased
145.5%



overall extraction price
decreased from
AU\$1153 to AU\$821

QUARTERLY GOLD RECOVERY

+1% Plant Gold Recovery = Approx. USD\$750,000 per annum



March 2016:

- Tune Comminution & Identify Code Issue
- Install PI (1000 tags)
- Install Assure (PI System Analytics)

June 2016:

- Replace Comminution Loop Code
- Tune Comminution Loops

August 2016:

- Flotation Tuning OSA into PI
- Additional PI (1000 tags)
- Install Infinitem (Loop Tuning Analytics)

December 2016:

- Filter Press Optimization

Aurelia Metals used real-time data to optimize their operational processes for gold recovery.

Q1: THE DAILY GRIND (WAS TOO MUCH OF A GRIND)

The first step was to optimize the grinding process. The grinding process is a critical first step to breaking up rocks and liberating the minerals trapped inside. "It's where you make or lose your money," Smith noted. "If you don't get it right here, it doesn't matter what you do downstream. Your particles aren't separated; your gold isn't liberated."

By gathering real-time data from the grinding circuit, the team improved the mill feed, discharge rate and cyclone feed rates, and the massive variance in the levels and flow had flattened out. By the close of the first quarter in March of 2016, the grinding circuit was running smoothly and the recovery rate had jumped to 81.2 percent.

Q2: BARELY FLOATING BY

Just downstream from the grinding process are the floatation circuits. Similar to giant bubble baths, the circuits separate the good metals from the bad. Quality gold floats to the top and the bubbles are skimmed off. The depth of the bubbles floating on top is important. If the depth of the bubbles is too small, poor quality materials get mixed in; if the depth is too large, bubbles pop and the quality product sinks.

Using real-time data from the PI System, the team retrained all of the float loops through basic controls. The rougher con flow and levels were stabilized, and the team waited for the results. By the end of the second quarter, gold recovery was up to 83.9 percent, while all-in sustaining cost (AISC) was down.

Q3: LEACHING FOR GOLD

Next up was the leach circuit, which is the location of cyanide control. Typical cyanide measurement runs around 100 parts per million, but at Aurelia, the concentration is much higher. With PPMs in the 1000s, control is paramount. However, if cyanide levels are too low, the extraction process is unsuccessful.

The team integrated the On-Stream Analyzer into the PI System and SCADA system to get real-time element measurement through the streams. Using OSIsoft's Asset Framework and analytics, they implemented a traffic light system that would allow them to quickly see which processes were running at optimal levels. Now, it was easier than ever to maintain control while ensuring the highest possible extraction.

In spite of plant changes and a planned shutdown in the third quarter, gold recovery levels still increased to 84.3 percent.

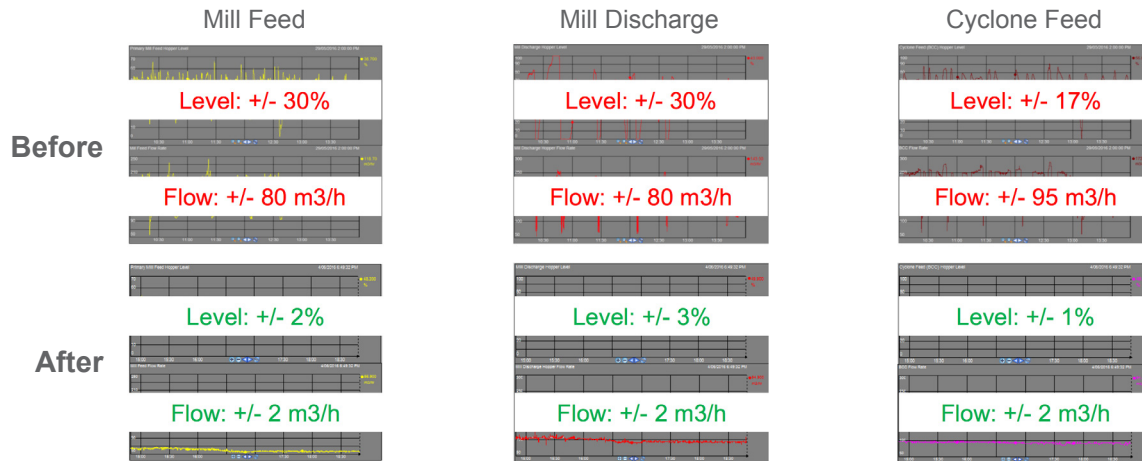
CONVERGIO



This is real information, this is what your plant is doing, this is your window into where the dollars are going."

— Gavin Stack,
Founder at
Convergio

GRINDING CIRCUIT OPTMIZATION RESULTS



With real-time data, Aurelia Metals was able to have more consistent levels and flows in their grinding circuit mill feeds, mill discharge, and cyclone feed.

Q4: PRESSING FOR CHANGE

In the fourth quarter of 2016, the team turned their attention to the filter press. Using filtering concentrate, gold and silver is precipitated out using zinc. If the process is unstable, the press is smashing up and down, which is hard on the pumps and eventually blows out the filter clogs, all of which diminishes the lifespan of assets.

In the SCADA system, there was little visibility into how the filter presses interacted with the systems around them. Using the PI System, the team created visualizations that helped them identify root cause and implement new controls to stabilize the presses and set operator benchmarks for future cycles. Before, filter press oscillation pressure variance was 450 kPa, and flow variance was 10m3/hr. With the help of the PI System, Aurelia decreased pressure variance to 40 kPa and flow variance to 1m3/hr.

By the end of the fourth quarter, the cumulative gold recovery rate was 88.6 percent.

SHARE PRICE INCREASES 145.5%

At the end of the fourth quarter of 2016, real-time data from the PI System had Aurelia's plant running far healthier than it was in February. Not only were AISC and debt down, the plant had dramatically increased throughput. The facility had originally been designed for 85,000 tons per month, yet by December of 2016 throughput was almost 100,000 tons. Overall, extraction price was down to \$821 AU per ounce, compared to \$1153 AU at the end of the first quarter. During that time, Aurelia's profit increased by \$7.5 million USD.

However, there was another massive benefit to installing the PI System: share price. When Smith started at Aurelia on February 1, 2016, shares were trading on the ASX at \$.055 AUD. On December 30th, 2016, shares closed at \$.135 AUD, a whopping 145.5 percent increase.

For more information about Aurelia Metals and the PI System, watch the full presentation [here](#).

PI System™ Components Used:

- PI Server™
 - Data Archive
 - Asset Framework
 - Event Frames
 - Analytics
- PI Vision™
- PI ProcessBook

Smith, Peter and Gavin Strack. "24K Magic — How Data Was Used to Improve Gold Recovery."
 <<https://www.osisoft.com/Presentations/24K-Magic---How-Data-Was-Used-to-Improve-Gold-Recovery/>>