



## Overview

Country or Region: Quebec, Canada

Industry: Metals and Mining

### Customer Profile

Located on the North Shore of the St. Lawrence River, Aluminerie Alouette has 594 smelting pots that produce 550,000 tons of primary aluminium per year. In 2005, Aluminerie Alouette became the largest smelter in the Americas.

### Business Situation

A \$1.4 billion project to increase the production capacity of the Aluminerie Alouette plant called for the plant's automation technology to be replaced. The challenge was to maintain all production controls while replacing data processing capabilities.

### Solution

All production data is now integrated and processed using the PI System — which interfaces with the MES system. The project implemented the PI System, PI API, PI ACE and MCN Health Monitor. without adversely

### Benefits

- Greater visibility of plant floor operations
- Access to information to facilitate improvements in plant processes and operations
- Ability to troubleshooting equipment which directly contributed to fast and efficient start-up of smelter expansion

## Installation of the PI System at Aluminerie Alouette facilities

### Increased data-processing capacity without disrupting production

“A \$1.4 billion project to increase the production capacity of the Aluminerie Alouette plant called for the plant's automation technology to be replaced. The challenge was to maintain all production controls while replacing and substantially increasing data processing



capabilities. Thanks to the PI System provided by OSIsoft, we met this challenge without adversely affecting production. We maintained the capacity for processing a data stream of 70,000 items per second in real-time!”

Robert Pelletier, Computer Specialist, Automation & Production Systems, Aluminerie Alouette Inc.

Located on the North Shore of the St. Lawrence River, Aluminerie Alouette is an independent aluminium producer\*. With 900 employees, Aluminerie Alouette has 594 smelting pots that produce 550,000 tons of primary aluminium per year, valued at US\$1.5 billion per year.

The Sept-Îles plant has been producing primary aluminium since 1992. Ultra-modern facilities, advanced technology, and highly skilled, versatile employees make Alouette one of the world's top performers in terms of aluminium production. Overall, it ranks at the head of a worldwide class of aluminium producers, in terms of productivity, innovative management style, energy efficiency, safety, and environmental protection.

\* \* The Aluminerie Alouette consortium is made up of five shareholders: Alcan (Canada, 40%), Austria Metall (Austria, 20%), Hydro Aluminium (Norway, 20%), SGF (Québec, 13.33%), and Marubeni (Japan, 6.67%)

### Alouette's Growth Requires New Systems

Since its founding in 1992, Aluminerie Alouette had used a diverse set of systems to collect and process data with VXL running on VMS. This infrastructure was not capable of handling the increase in production capacity at the expanded plant.

In the spring of 2003, Aluminerie Alouette embarked on a process to double the production capacity of its plant in Sept-Îles, Québec. The CA\$1.4 billion investment was expected to increase the annual production of aluminium from 245,000 tonnes to 550,000 tonnes.



Aluminum production at Aluminerie Alouette. The metal is extracted from alumina by an electrolytic process. The process takes place in pots, and the aluminium is then put into ten ton crucibles. The crucibles go to the casting centre, where the metal is poured into 650-kg sows to form blocks, or cast as 25-kg ingots

### The Solution

Together with consultants from the SNC-Lavalin Hatch consortium, the company in charge of the plant expansion, the Alouette team carefully reviewed the products that were available on the market using the following criteria:

#### **Ability to sustain 24/7 plant operation**

Since Alouette's plant is running 24/7, it is essential that the process managing systems never stop. It's one of the elements of the OSIsoft vision that enormously appealed to Alouette's executives.

#### **Robust data processing capable of producing 70,000 data items per second**

Within the context of the plant expansion, Alouette's Automation and Production Systems Department required a robust, dependable system capable of processing more than 70,000 data items per second.

#### **Easy to install and maintain**

The system had to be easy to install and capable of handling the company's future needs. "Because our system runs non-stop, and must be capable of meeting our needs one, two, or three years down the road," observed the Manager, Automation and Production Systems.

#### **A reliable system from a well-established company**

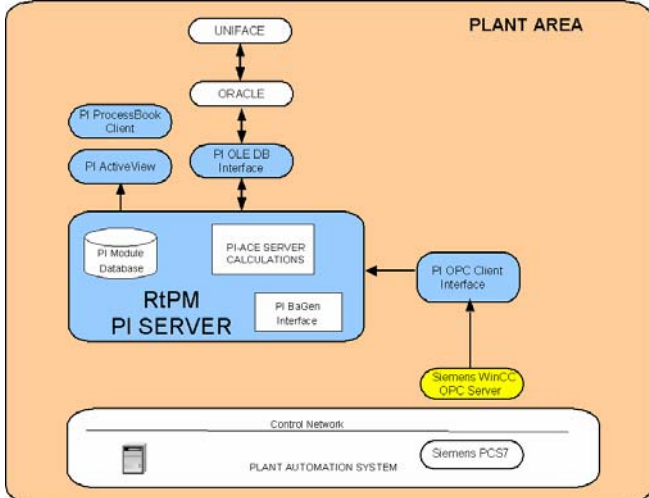
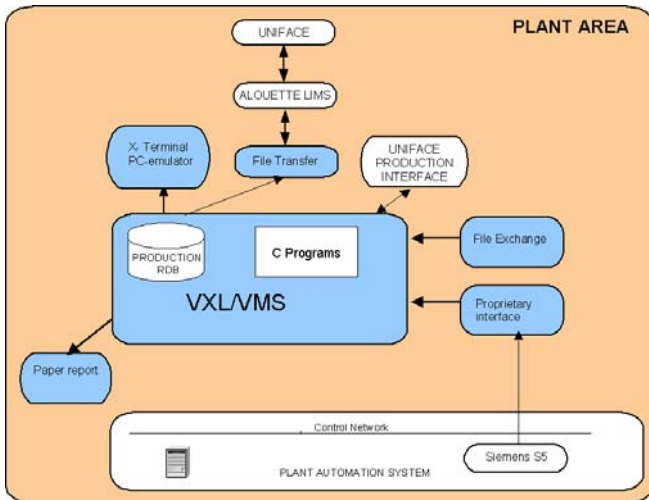
One of the most important criterion proposed by SNC-Lavalin Hatch officials was selecting a tool that was already well established worldwide. The PI System has been around for decades, and is used throughout the world. The fact that OSIsoft has staff based in Montréal gave the PI System a substantial edge. SNC-Lavalin Hatch knew they could easily get a support team to come to the Aluminerie or that they could go to Montreal, to participate in a training session.

Provencher believes that the PI System solution is well designed for a raw materials production environment, such as Aluminerie Alouette. In his view, the PI System is not only very reliable, but will remain so for a long time to come.

### Installing the PI System While Maintaining Production

From the outset, the Automation and production systems team at Aluminerie Alouette had to process data that was output from the old databases (SCADA interface running VXL on VMS Alpha) in tandem with the new PI System to ensure continuity of production. At the same time, it integrated data from the new equipment, as it gradually came on line. The processing had to occur without production managers noticing changes.

# Installation of the PI System at Aluminerie Alouette facilities



Past and present architecture of Aluminerie Alouette's production data management systems.

"Installing the PI System went very smoothly," says Pelletier. "We set up a temporary interface between the old systems and the new PI System. As the new systems were phased in, we redirected the data sources without any impact on production. This was clearly the stage at which problems were likely to arise. Even though everything didn't work as expected right off the bat, on the whole, installation went smoothly and no data was lost."

## The PI System in Operation

Today, all production data at the Aluminerie Alouette plant is integrated and processed by the PI System. The operating network includes:

- 4 PI servers of 20K tags each;
- 7 data acquisition nodes;
- Data collection interfaces used: OPC, CSV file loader and MCN Health Monitor.

The graphical pages for routine needs were developed using PI ProcessBook, and can be accessed through an intranet using PI ActiveView.

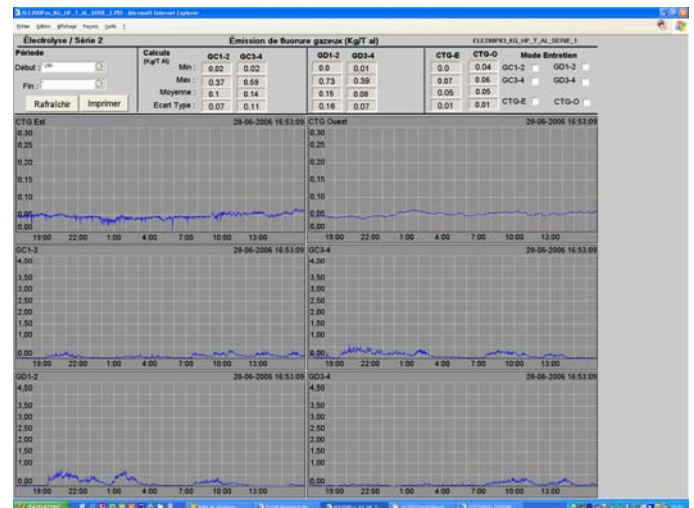
The in-house production system (Manufacturing Execution System, or MES) is also interfaced with PI through PI API and PI ACE. "Because of the PI System's high degree of connectivity, adapting communications between our MES and the PI System was very easy", says Pelletier.

On the plant floor, operator stations display trend graphs in real-time. These trends give the operators a real-time view of operational progress on personal computers. They have a graphic display of each event, with green and red lights indicating the status of each production node.

But, the data is not stored on the PCs. Rather, it is stored on the PI System, which generates graphic and historical production summaries. Tens of thousands of readings are stored, making it possible to create trend curves and keep track of everything during the process of making aluminium.

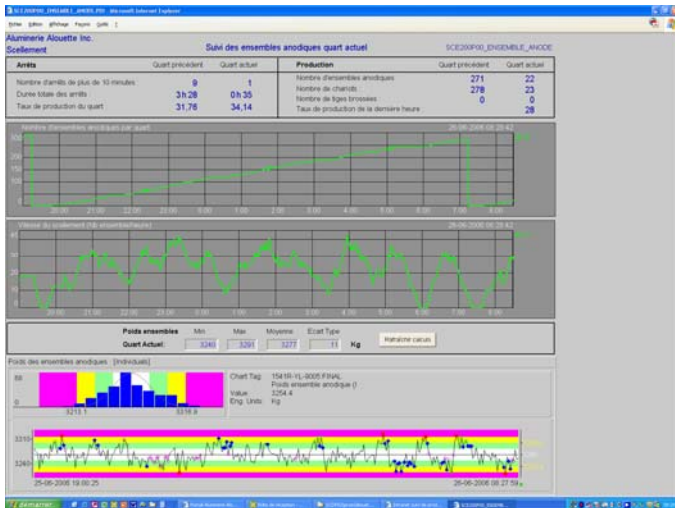
"In the past, we used VXL, which was not capable of storing much historical data", said Pelletier. "With the PI System, we can archive huge amounts of data extending over long periods. For instance, thousands of daily readings can be taken over years. The old system was not capable of that kind of performance."

In addition, when a problem arises, operators and technicians can recreate the sequence of events, and see what was happening when the problem occurred. This feature is especially valuable for solving intermittent snags.



Control screen

# Installation of the PI System at Aluminerie Alouette facilities



Historical graph

Aluminerie Alouette officially inaugurated Phase II of its plant on September 20, 2005. Completed three months ahead of schedule, on budget, and generating great economic benefits, the mega-project became the largest construction site in Québec in recent years.

Even more remarkable is the fact that, during the two and a half years of construction, aluminium production at the existing facilities not only carried on without interruption, but actually set a new record. "I am especially proud of the way we were able to combine the construction work with our daily operations. It was a colossal challenge, but our team pulled it off in true style!" noted Lombard.

Completing the smelter expansion three months ahead of schedule has meant tens of millions of dollars in extra production, and boosted output from 245,000 tonnes to 550,000 tonnes even faster than planned. The PI System made a direct contribution to this success by enabling trouble-shooting on the various pieces of equipment as they came on line.

## The Environmental Challenge

A major concern of Aluminerie Alouette is protecting the environment, so that aluminium production does not cause air pollution. In the course of expanding the facilities, a series of steps were taken to minimize emissions of fluoride, which is a pollutant that is released in the process of smelting alumina.

"One very interesting application of the PI System is in the environment area. One of the things that we monitor most closely is the fluoride emissions.

This is a very critical application – environmental monitoring – and a very important one for our company," observed Joe H. Lombard, President and CEO.

The PI System plays a crucial role by monitoring fluoride emission readings through a set of sensors that are installed throughout the plant and operated by PI monitor conditions in real-time. If an abnormal emission is detected, an alarm is triggered and a team responds.

"We specifically added the alarm concept to the system so that certain controllers see a signal displayed on their monitor when fluoride emissions reach a certain threshold," says Provencher.

In addition, each pot room has a board that displays emission levels in real-time. If anything abnormal occurs, the on-site personnel can respond swiftly. "In the past, before PI was installed, we were incapable of monitoring these emissions so closely and in real-time," says Pelletier.

Following external audits by SGS in the fall of 2005, Aluminerie Alouette earned ISO 14 001: 2004 certification for its environmental management system.

## Benefits of the PI System

The main benefit provided by the PI System is real-time monitoring of each event at all Aluminerie Alouette facilities, which allows swift action.

"The PI System is a powerful tool that helps to focus our organization and to visualize data and track our progress in whatever direction we choose to go. We use it to analyse trends on all of the aspects of production and facilities. It's a very powerful tool for doing that!"  
*Joe H. Lombard, President and CEO*

Users and operation managers describe some of the benefits that they have seen since the PI System was installed:

### **Better information in order to facilitate process improvement and operations. Better control of the different plant process variables**

The process of casting aluminium in 600-700-kg sows and 25-kg ingots is closely monitored using the PI System's real-time measuring instruments. In the past, this stage was impossible to monitor. The watch makes it possible to calibrate the size of the products, and the casting rate is regularly adjusted in order to avoid excessive irregularity in sows and ingot size.

### **The PI System assists management in the decision-making process**

With the PI System, every manager can now view any segment or stage of production in real-time from their workstation, which makes decision-making much easier. They can also keep track of inventory changes in real-time, and plan or adjust maintenance operations, etc.

### **Facilitates problem resolution by providing real-time information**

The PI System continuously oversees the production equipment, and sends a signal using icons or audible alarms when a problem occurs. In addition, the detailed information provided by the system enables the team of experts to take swift and effective action.

### **PI helps tune and optimize processes and equipment**

By closely monitoring production processes, the PI System makes it possible to see where and how production can be improved. Many measurements and programs are in place to optimize the various stages of aluminium processing.

“The overall benefits that we see from using the PI System are clearly real-time process monitoring,” says Provencher. “It’s awesome! We can monitor production in real-time, and therefore, react and respond faster. This enables us to be increasingly proactive, because we see the process trends.”

### **Outlook**

In the future, Aluminerie Alouette plans to put the PI System solution to a variety of uses, particularly in the area of detailed performance controls.

“We will continue to introduce systems right into floor level that will give us key performance indicators in the plant”, explains Joe H. Lombard, president and CEO of Aluminerie Alouette. “We will also use PI to help us to track and visualize data that help us to focus the organization. There are also the issues of maintenance programs, where we want to put a lot of focus, and continuing improvement programs.”

For the Alouette Automation and Production Systems team, these major projects are already in the works. Ultimately, the company will be able to simultaneously measure the plant’s overall performance and the performance of each piece of equipment. As a result, the PI System will be used to collect data coming directly from equipment to generate real-time analyses for assessing the performance of each production component. The fact that this system ensures the

communication between the automation and computer systems has saved the company a great deal of time and money.

Subsequently, other types of equipment, and particularly information systems, will be monitored with the same precision. This means closely tracking the performance of every system in order to optimize them and prevent failures.