NOVEMBER 16TH, 2022

Algoma Steel Inc.
Cold Mill Digital Journey

John Gardner and Michael McCracken

John Gardner

Senior Analyst/Programmer

- Algoma Steel Inc.
- John.Gardner@Algoma.com
- https://www.linkedin.com/in/john-gardner-4b1b2a161/

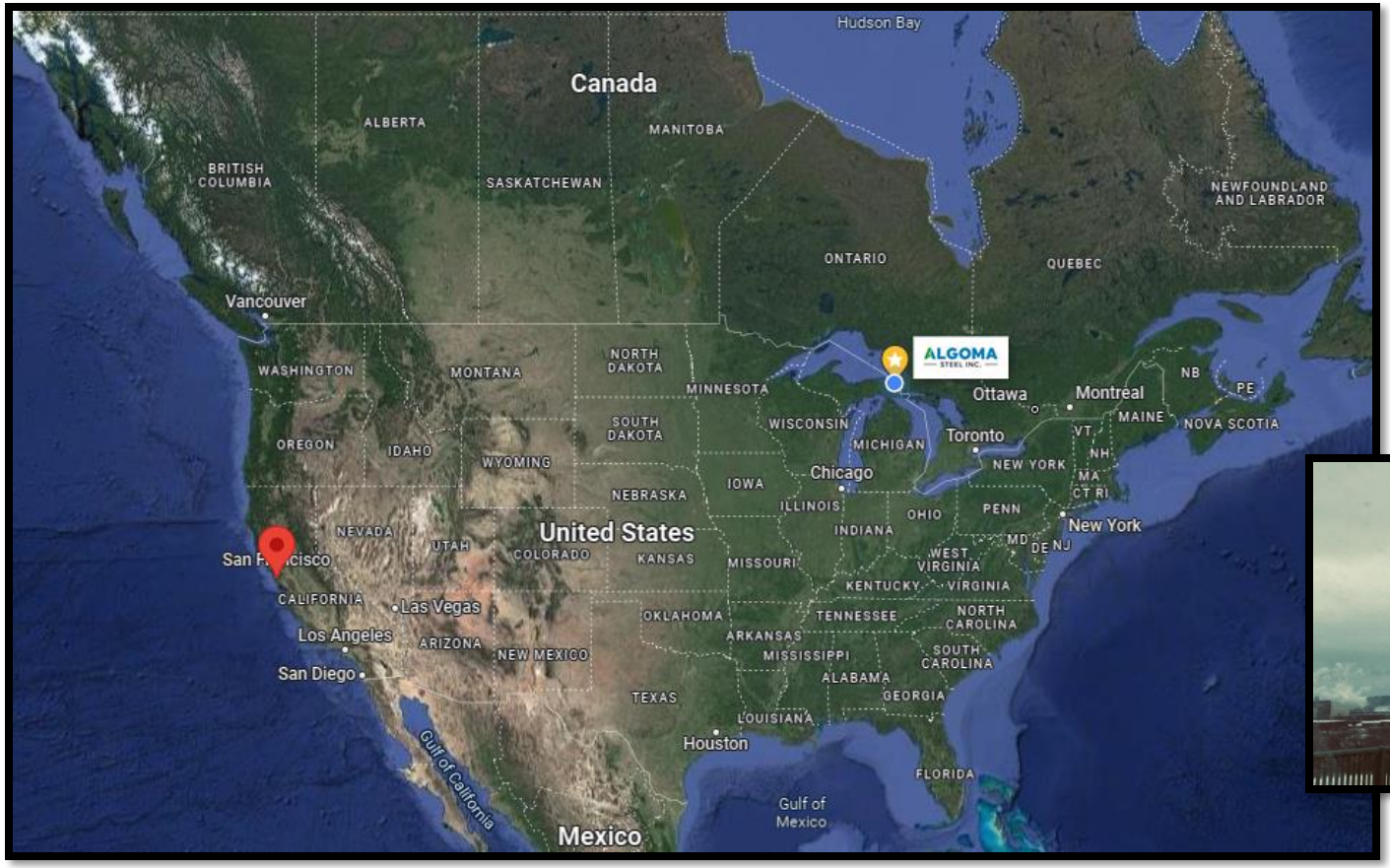
Michael McCracken

Process Specialist

- Michael.McCracken@Algoma.com
- https://www.linkedin.com/in/michael-mccracken-96352375/

ALGOMA STEEL INC.

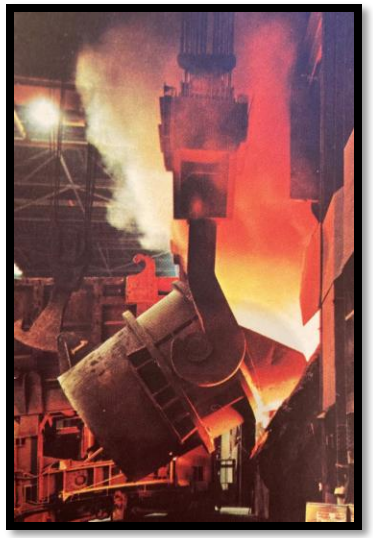
- Algoma Steel is a fully integrated steel producer based in Sault Ste. Marie, Ontario.
- We're committed to continuing our rich 121-year steelmaking tradition.
- 1,700 acre site located at the border of United States and Canada



AVEVA

ALGOMA STEEL INC.

- Our Direct Strip Production Complex (DSPC) is the newest facility of its kind on the continent. It transforms liquid steel to a finished coil in minutes.

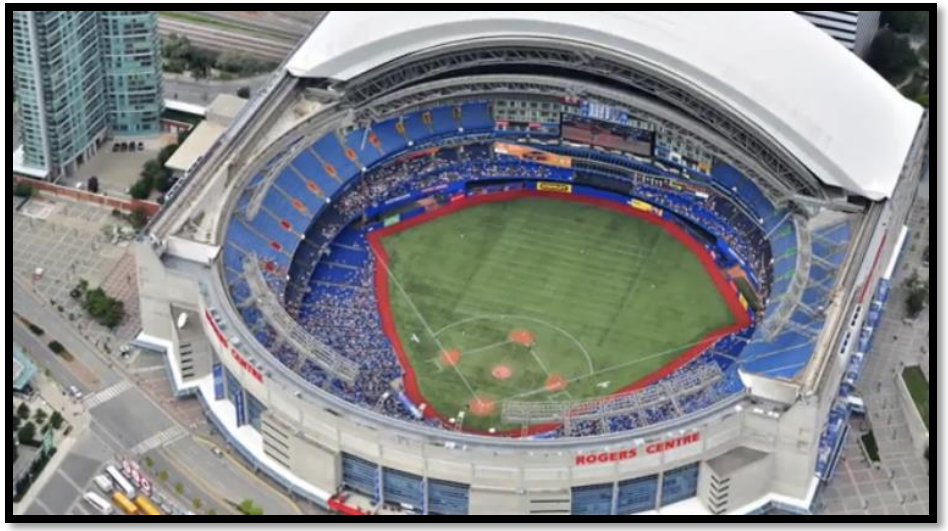


- Our highly versatile plate and strip complex produces a full range of as-rolled and heat-treated plate and some of the widest coils available.


AVEVA

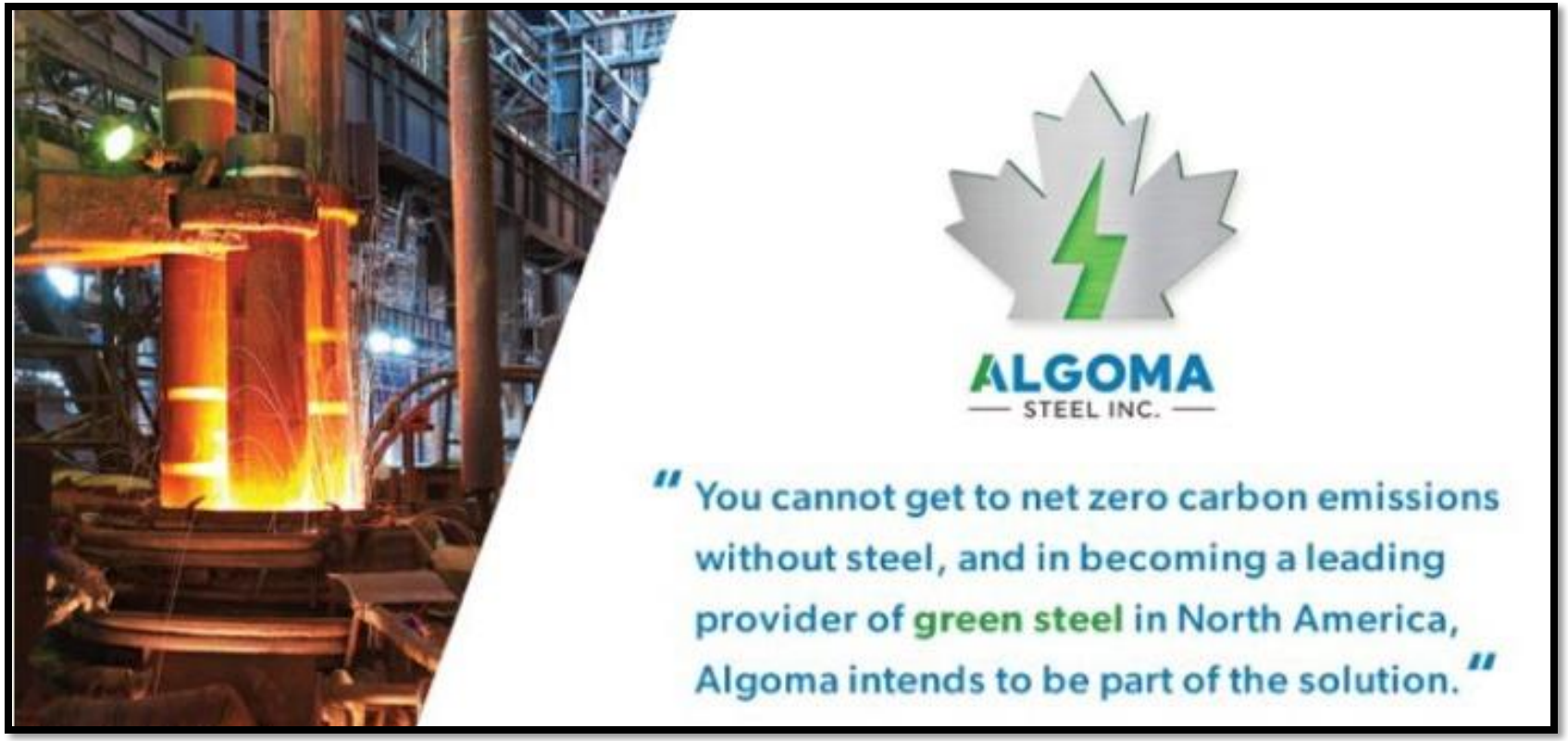
ALGOMA STEEL INC.

- Algoma Steel's quality products meet and exceed international industrial performance standards for numerous sectors including; manufacturing, automotive, construction, infrastructure, energy, transportation and military applications.

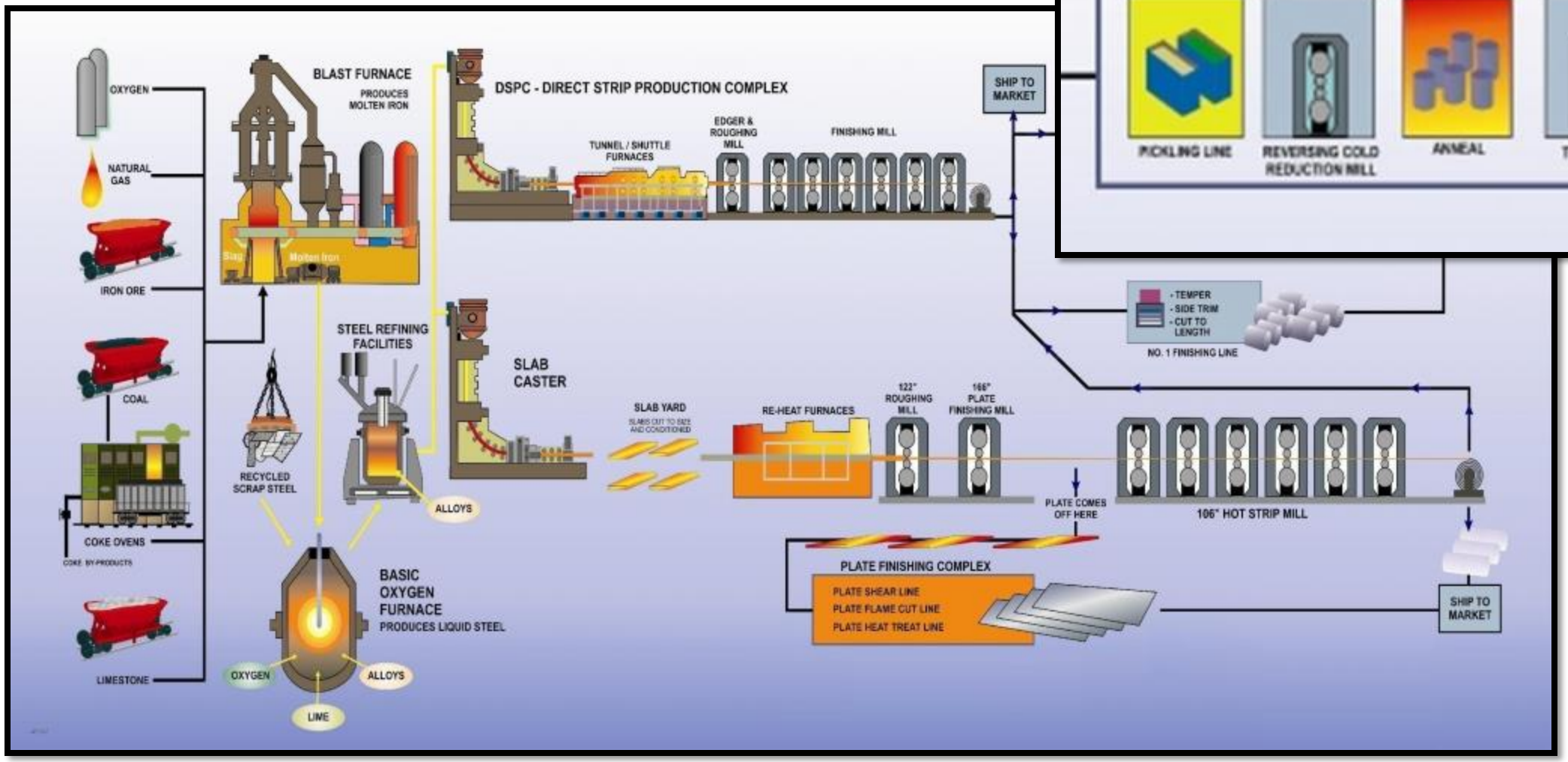


AVEVA

- Algoma Steel Group Inc. (NASDAQ: ASTL; TSX: ASTL), a leading Canadian producer of hot and cold rolled steel sheet and plate products, recently announced that its Board of Directors has authorized the ***construction of two new state- of-the-art electric-arc-furnaces (EAF)*** to replace its existing blast furnace and basic oxygen steelmaking operations.
- ***The $700 million transformation is expected to reduce Algoma's carbon emissions by approximately 70%.***

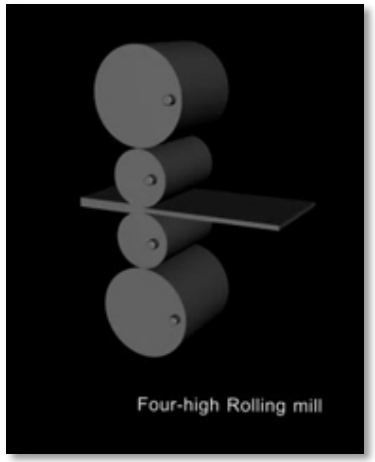


Algoma Steel - Operational Areas



Algoma Steel's Cold Mill is a 400,000 sq. ft Complex

- Operating Units
  - 100" Continuous Pickle Line
  - 80" 4-high Reduction Mill
  - Anneal Facility
  - 80" 4-high Temper Mill
  - 74" Slitting Line
  - Coil Wrap Line



AVEVA

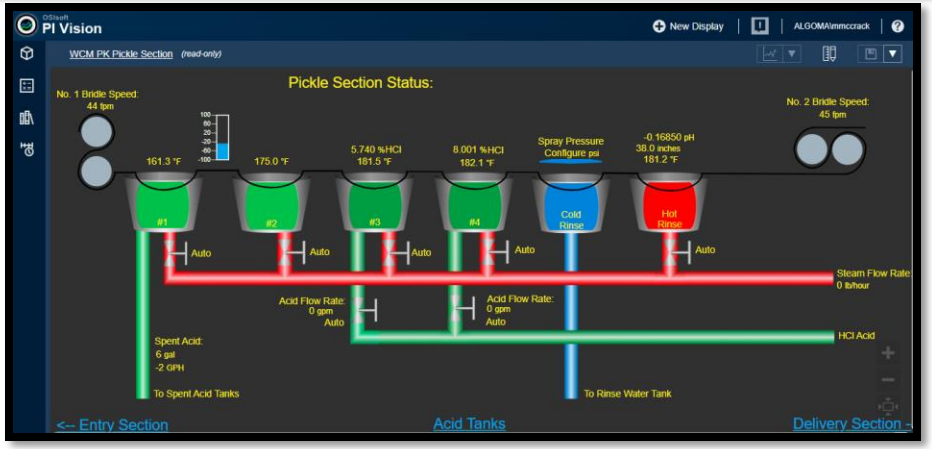
“PI Vision gives me a snapshot of our mill at my fingertips 24/7.”

“PI provides us the means to continuously monitor operations as well as control our manufacturing rates.”

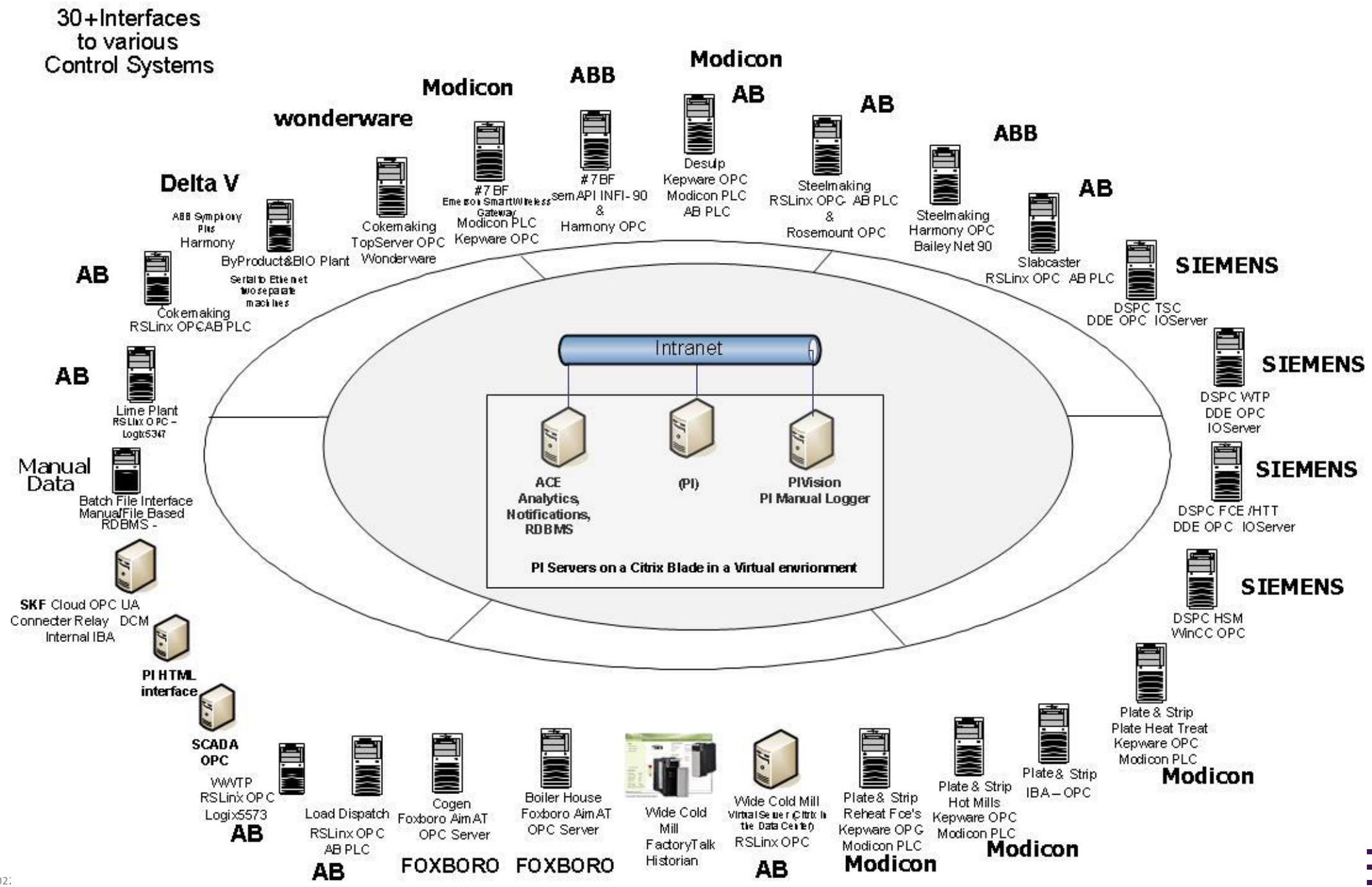
“Steam alarms allow us to react to low steam pressure to mitigate downtime while increasing production.”

Chad Leask
Superintendent – Cold Mill Operations
Algoma Steel Inc.

Brief history of the AVEVA PI System



- Algoma started it's OsiSoft PI journey beginning in 1995 with the first archives in January of 1996.
  - It was initially purchased to help monitor and store Ironmaking Blast furnace sensor data.
- The initial Archive size was 64 MB and the data collected would not fill the prior to a 90 day (quarterly shift).
- The initial growth was steady and in 2007 a 1024 MB archive would fill every 10 days.
- In 2015 we upgraded to a 64-bit virtual environment for our Main PI Servers (Data archive, PIVision, and AF/Ace)
  - The previous PI servers were 32 bit servers that were over 10 years old.
- We are now running the latest AVEVA PI Server, PI AF, and AVEVA PI Vision.
- We now have over 50,000 tags
- Our 2048 MB archives fill every 3 days.
- We have around 12,000 ProcessBook and 1500 AVEVA PI Vision screens.


30+Interfaces to various Control Systems
Modicon
ABB
Modicon
AB
AB
wonderware
ABB
Delta V
AB
AB
SIEMENS
SIEMENS
SIEMENS
SIEMENS
AB
Manual Data
SCADA OPC
AB
FOXBORO
FOXBORO
AB
Modicon
Modicon
Modicon
Intranet
ACE Analytics, Notifications, RDBMS
(PI)
PIVision PI Manual Logger
PI Servers on a Citrix Blade in a Virtual enviornment
#7 BF Emerson SmartWireless Gateway
Modicon PLC Kepware OPC
#7 BF semAPI INFI-90 & Harmony OPC
Desulp Kepware OPC Modicon PLC AB PLC
Steelmaking RSLinx OPC- AB PLC & Rosemount OPC
Steelmaking Harmony OPC Bailey Net 90
Slabcaster RSLinx OPC AB PLC
DSPC TSC DDE OPC IOServer
DSPC WTP DDE OPC IOServer
DSPC FCE /HTT DDE OPC IOServer
DSPC HSM WinCC OPC
Plate & Strip Plate Heat Treat Kepware OPC Modicon PLC
Plate & Strip IBA – OPC
Plate & Strip Hot Mills Kepware OPC Modicon PLC
Plate & Strip Reheat Fce's Kepware OPG Modicon PLC
Wide Cold Mill Virtual Server (Citrix in the Data Center) RSLinx OPC
Wide Cold Mill FactoryTalk Historian
Boiler House Foxboro AimAT OPC Server
Cogen Foxboro AimAT OPC Server
Load Dispatch RSLinx OPC AB PLC
WWTP RSLinx OPC Logix5573
Desulp Kepware OPC Modicon PLC AB PLC
Harmony
ByProduct&BIO Plant
Serial to Ethernet two separate machines
Cokemaking TopServer OPC Wonderware
Cokemaking RSLinx OPC AB PLC
Lime Plant RSLinx OPC – Logix5347
Batch File Interface Manual File Based RDBMS -
SKF Cloud OPC UA Connecter Relay DCM Internal IBA
PI HTML interface

Cold Mill Limited Digital Footprint

Limited Digital Footprint

ALGOMA STEEL INC.

Challenge

- Very Reactive with lack of urgency
- No Automated Equipment monitoring and feedback
- Lack of Data availability and visibility
- Lack of PI interest and understanding

Solution

- Implemented Key KPI's that would send PI - Notifications
- Equipment/system fault Notifications to critical parties.
- Focused on adding additional tags with PI AF and AVEVA PI Vision understanding to maximize value
- Moved off of Processbook completely with AVEVA PI Vision screens focused on Operations.
- Created a Bi-weekly meeting
- Focused training to Key personal

Benefits

- This helped introduce an urgency towards repairs and uptime.
- One of the many AVEVA PI System notifications prevents coolant waste saving ($100K/year)
- Increases response time, gives us historical review options
- Increased engagement from the shop floor to Management level.
- Everyone is now engaged in building and monitoring
- Change is being driven by many people now.

AVEVA

Challenge in The Anneal: We did not have adequate, live monitoring in place to ensure statistical process control.

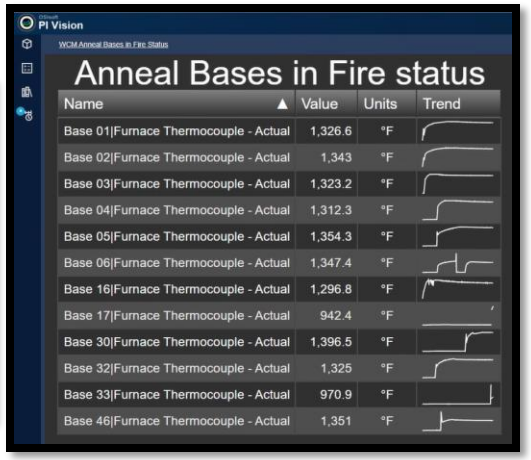
"Annealing an imperative and critical operation in our Cold Roll process to meet the metallurgical demands of our different products."
Michael McCracken, Process Specialist

ALGOMA STEEL INC.

AVEVA

ALGOMA STEEL INC.

- Annealing is a heat treatment process that alters the microstructure of our steel to increase its ductility and reduce its hardness.
- Changing these mechanical properties through annealing is important to improve formability, machinability and to remove residual stresses that may cause the steel to crack.
- Each base charge consists of 3 coils (65 tons) stacked on top of each other.
- Charges controlled by Computerized Annealing Processing Software (CAPS)

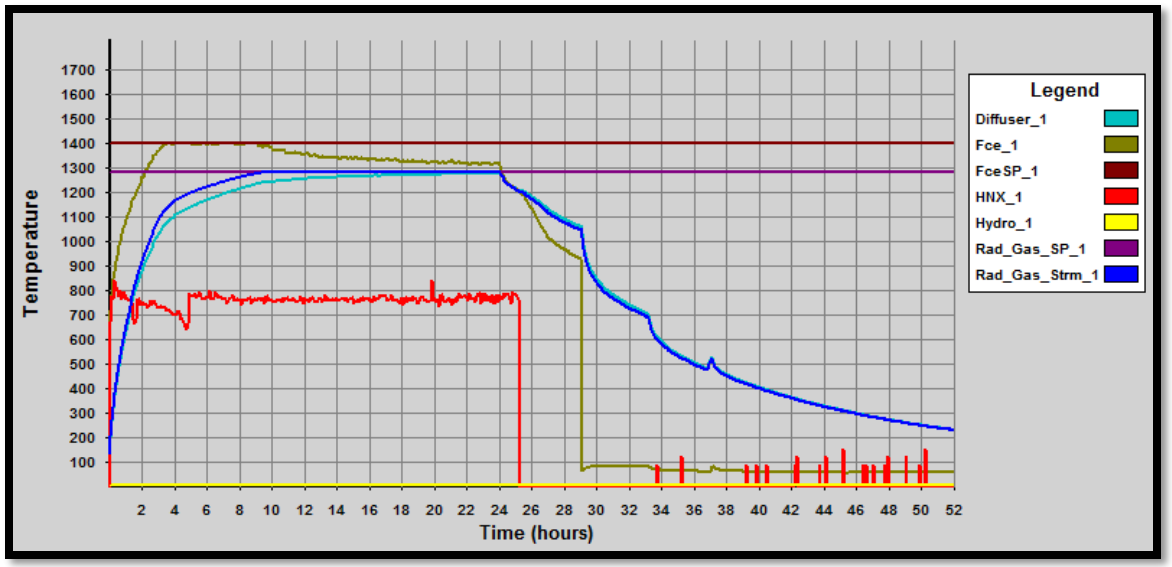


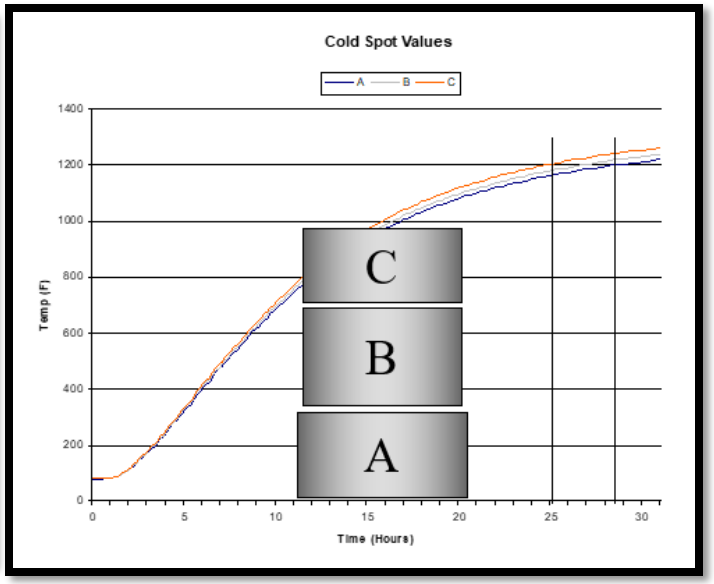
AVEVA

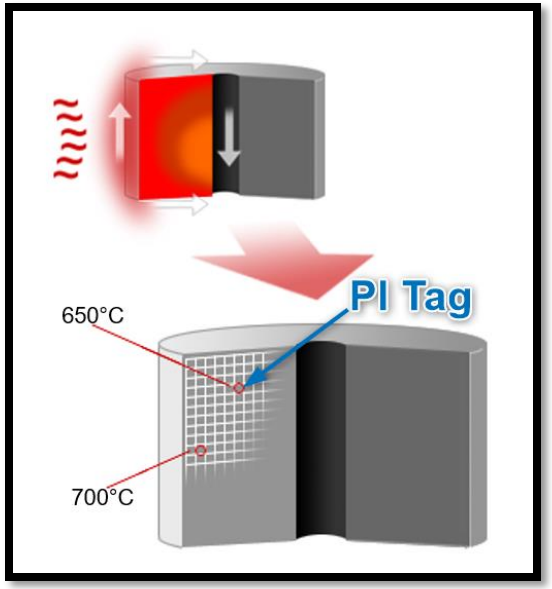
ALGOMA STEEL INC.

3 main stages of annealing are;

- **Recovery:** Furnace raises temperature to relieve internal stresses
- **Recrystallization:** Steel heated above recrystallization temperature but below its melting temperature causing new grains to form. To ensure the steel has been heated to the correct temperature and duration, the CAPs model predicts the cold spot temperature of each coil.
- **Grain Growth:** Once all 3 coils have achieved the minimum **required heating cold spot**, the model will automatically shut the furnace off, begin cooling and the grain growth stage.



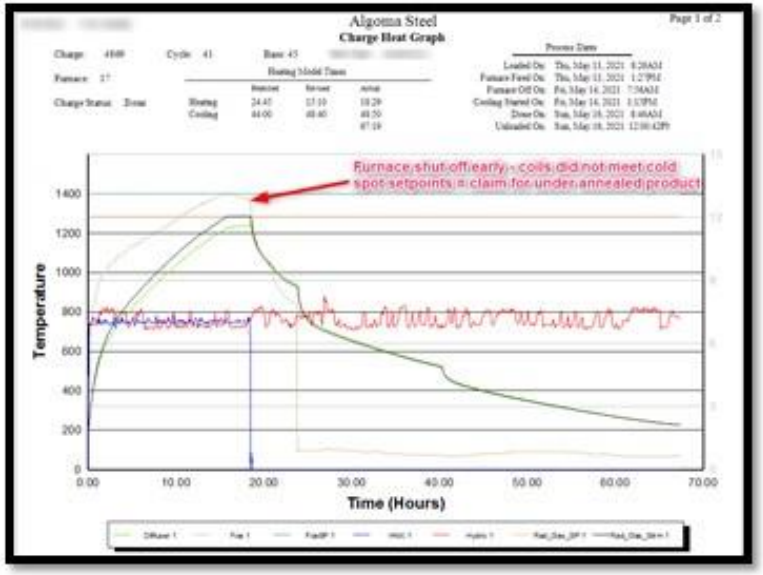


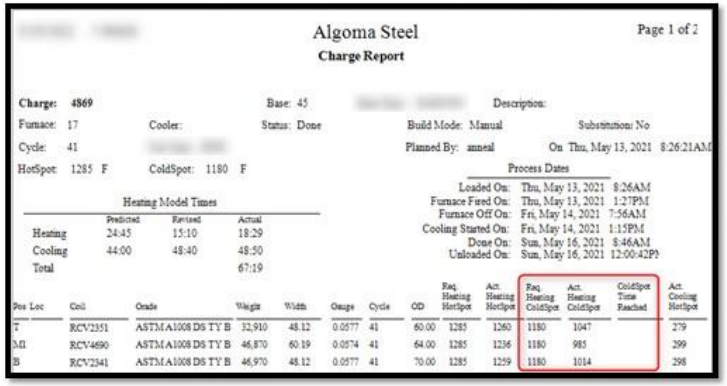


AVEVA

Before PI tag and alarms:

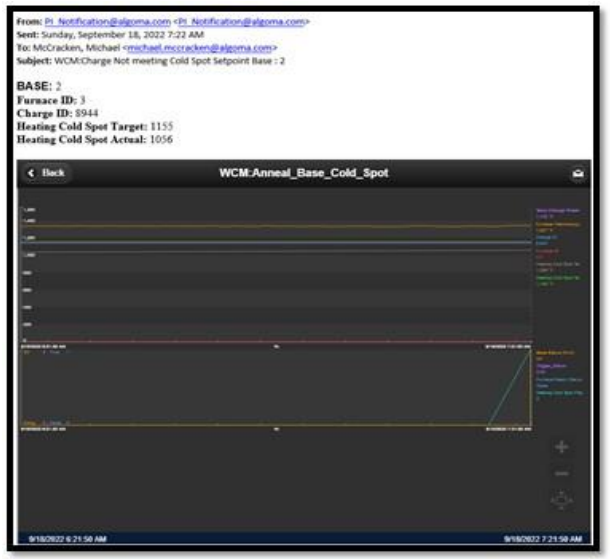
- Model failure(s) caused the furnace to shut off prematurely.
- Although the report indicated the coils did not meet their required cold spot, operations was not aware that the steel was under annealed without manually reviewing each charge.
- Volume of monthly production (250 charges and $15 million product value)
- More than $250,000 in claims and internal rejects annually.

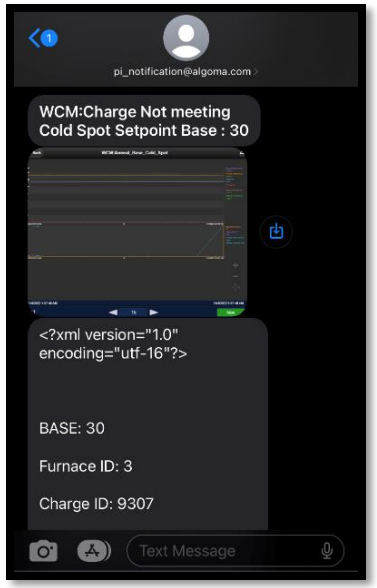




After Implementing PI tag and alarm: "WCM: Charge Not meeting Cold Spot Setpoint"

- Model and furnace failure captured in AVEVA PI System.
- AVEVA PI System notification sent to operations, maintenance, quality assurance and the technical team.
- Preventing unnecessary handling, further processing of material, delayed shipments to customer, rejects, and non-conforming product from leaving the anneal.
- RCA initiated and resolved for model and furnace failures – more PI alarms implemented
  - Natural Gas Pressure and Flow
  - Maxon Valve Function
  - Critical Temperatures





Communication Challenges impact the Cold Mill.

Communication Challenges impact the Cold Mill.

ALGOMA STEEL INC.

Challenge

- Poor interdepartmental Communication
- Slow Reaction Time
- Unplanned downtime
- Lack of information
- Maximizing waste flow to the WWTP while coordinating with other departments

Solution

- PI Notification trigged when the pressure is below limit for 45 minutes.
- The notification is triggered and sent to all required parties.
- Incorporated data from 5 departments and passed to PLC
- Passed Control data to PLC based data from other departments in different V-lans

Benefits

- Operations is running smother
- Better interdepartmental communications.
- Faster Response to operational issues.
- Improved accountability and data access for review.
- Since inception (2years) we have had multiple events with zero process failures.
- Maximized cost savings due to increased data and control

AVEVA

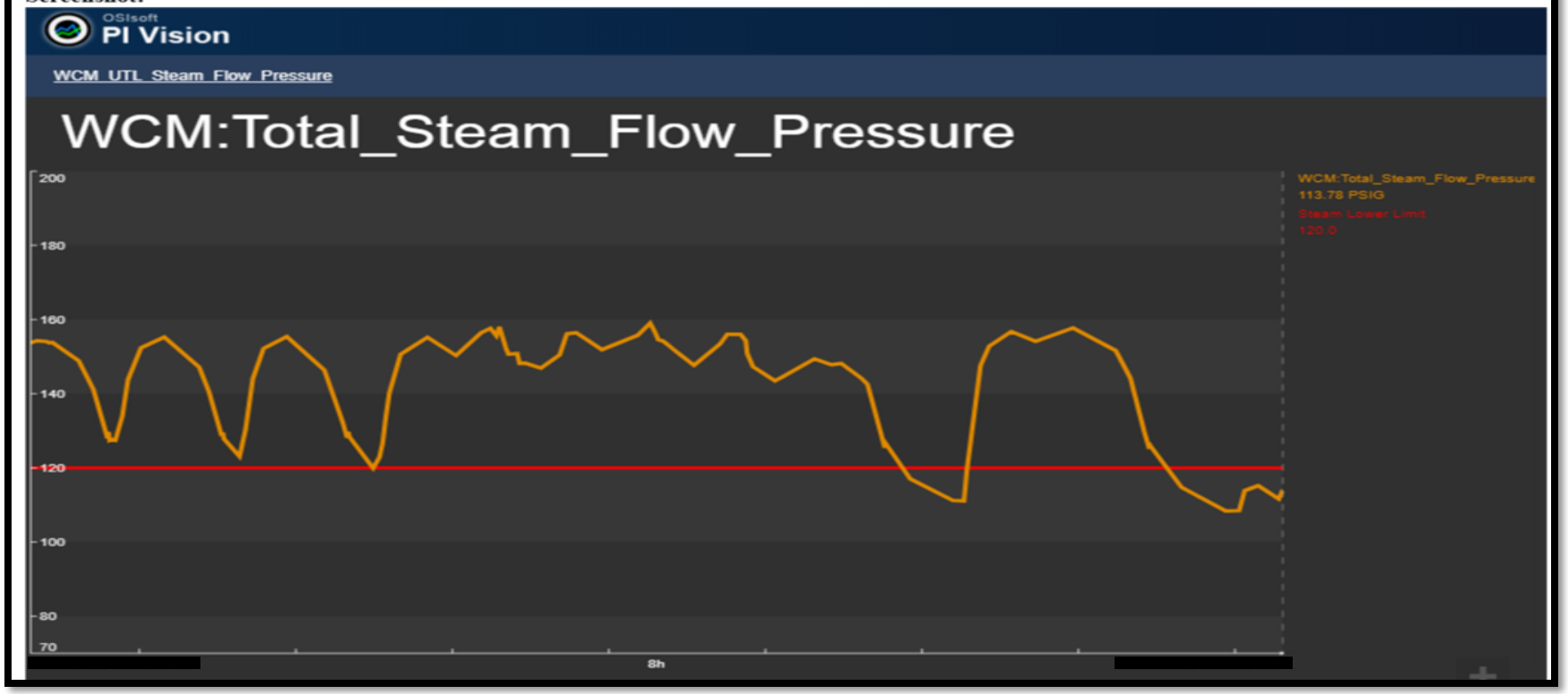
Easily build Email Notifications and imbed PIVision

PI_Notification@algoma.com ⊞ DL-OSIPI-WCM-UTL-Alerts

WCM:Total_Steam_Pressure Under 120psi for 45 Minutes

Cold Mill Steam Pressure has dropped **below 120psi for 45 minutes, PLEASE ADDRESS!**
Review trend and operating conditions, if required, open smart valve bypass.

Trigger Time:
Tag: WCM:Total_Steam_Flow_Pressure = 113.78
Link:http://pivision/Pivision/#/Displays/92810/WCM_UTL_Steam_Flow_Pressure
Screenshot:



Example of Departmental Coordination in an analysis

Determining if Our SM department is running and passing that to the PLC

Name	Expression
FCE4	`if TimeEq('SM:BOF FCE4 O2 BLOWING','-45m','*',"NO") > 2500 then 0 else 1`
FCE5	`//Was 2699 seconds, changed to 2500 seconds temporarily due to time sync issue.` `if TimeEq('SM:BOF FCE5 O2 BLOWING','-45m','*',"NO") > 2500 then 0 else 1`
SMO2_Blowing	`//Was 2699 seconds, changed to 2500 seconds temporarily due to time sync issue.` `if FCE4 = 0 and FCE5 = 0 then 0 else 1`

Data cleanse and pass control information to the PLC

Expression

```
if 'SPP No.1 Thickener PH' = "Bad" then 0
else if 'SPP No.1 Thickener PH' = "No Data" then 0
else if 'WCM:PK Waste Acid Tank Level' = "Configure" then 0
else if 'WCM:PK WPL Dosing Flow' = "Configure" then 0
else if TimeGE('WCM:PK Waste Rinse Tank Level','-30m','*',78) = 0 then 0
else if 'SPP No.1 Thickener PH' >= 14 then 0
else if 'SPP No.1 Thickener PH' >= 11.4 then 12
else if 'SPP No.1 Thickener PH' >= 11.3 then 11
else if 'SPP No.1 Thickener PH' >= 11.2 then 10
else if 'SPP No.1 Thickener PH' >= 11.1 then 9
else if 'SPP No.1 Thickener PH' >= 11.0 then 8
else if 'SPP No.1 Thickener PH' >= 10.9 then 7
else if 'SPP No.1 Thickener PH' >= 10.8 then 6
else if 'SPP No.1 Thickener PH' >= 10.7 then 5
else if 'SPP No.1 Thickener PH' >= 10.6 then 4
else if 'SPP No.1 Thickener PH' >= 10.5 then 3
else if 'SPP No.1 Thickener PH' >= 10.4 then 2
else 0
```

Future Outlook

- Exciting opportunities and deeper expansion in all Cold Mill areas.
- Move towards paperless reporting.
- Looking to incorporate SAP and PI Data.
- Implementing some Condition Based Maintenance.
- Exciting opportunities in expanding to the EAF.
- Better communication and coordination between:
  - IT, Management, Automation, Supervisors, Operators, Departments

Key Point

- You don’t need a major Capex project and investment
- You don’t need a large group of people
- What is required is ongoing focus and small gains leading to huge changes
- Focusing on keeping momentum and continuous improvement

John Gardner

Senior Analyst/Programmer

- Algoma Steel Inc.
- John.Gardner@Algoma.com
- Feel free to contact me on Linked in as well

Michael McCracken

Process Specialist

- Michael.McCracken@Algoma.com
- Feel free to contact me on Linked in as well

Questions?

Please wait for the microphone.

State your name and company.

Please remember to…

Navigate to this session in the mobile app to complete the survey.

Thank you!

AVEVA

This presentation may include predictions, estimates, intentions, beliefs and other statements that are or may be construed as being forward-looking. While these forward-looking statements represent our current judgment on what the future holds, they are subject to risks and uncertainties that could result in actual outcomes differing materially from those projected in these statements. No statement contained herein constitutes a commitment by AVEVA to perform any particular action or to deliver any particular product or product features. Readers are cautioned not to place undue reliance on these forward-looking statements, which reflect our opinions only as of the date of this presentation.

The Company shall not be obliged to disclose any revision to these forward-looking statements to reflect events or circumstances occurring after the date on which they are made or to reflect the occurrence of future events.

linkedin.com/company/aveva

@avevagroup

ABOUT AVEVA

AVEVA is a global leader in industrial software, sparking ingenuity to drive responsible use of the world's resources. The company's secure industrial cloud platform and applications enable businesses to harness the power of their information and improve collaboration with customers, suppliers and partners.

Over 20,000 enterprises in over 100 countries rely on AVEVA to help them deliver life's essentials: safe and reliable energy, food, medicines, infrastructure and more. By connecting people with trusted information and AI-enriched insights, AVEVA enables teams to engineer efficiently and optimize operations, driving growth and sustainability.

Named as one of the world's most innovative companies, AVEVA supports customers with open solutions and the expertise of more than 6,400 employees, 5,000 partners and 5,700 certified developers. With operations around the globe, we are headquartered in Cambridge, UK and listed on the London Stock Exchange's FTSE 100.

Learn more at www.aveva.com

AVEVA