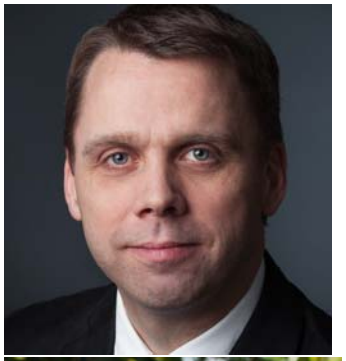
# Using PI Asset Framework to Achieve Predictive Maintenance ROI in 6 Months and Enterprise Scale

Árni Páll Einarsson
Alexander Hill


# Speakers



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# Introduction Alcoa

BAUXITE

- World's second largest bauxite miner, with a first quartile cost position
- Long-lived assets with low-cost growth opportunities

ALUMINA

- Largest alumina refiner and largest long position, outside of China
- Low cost, global network of refineries with a first quartile cost position

ALUMINUM

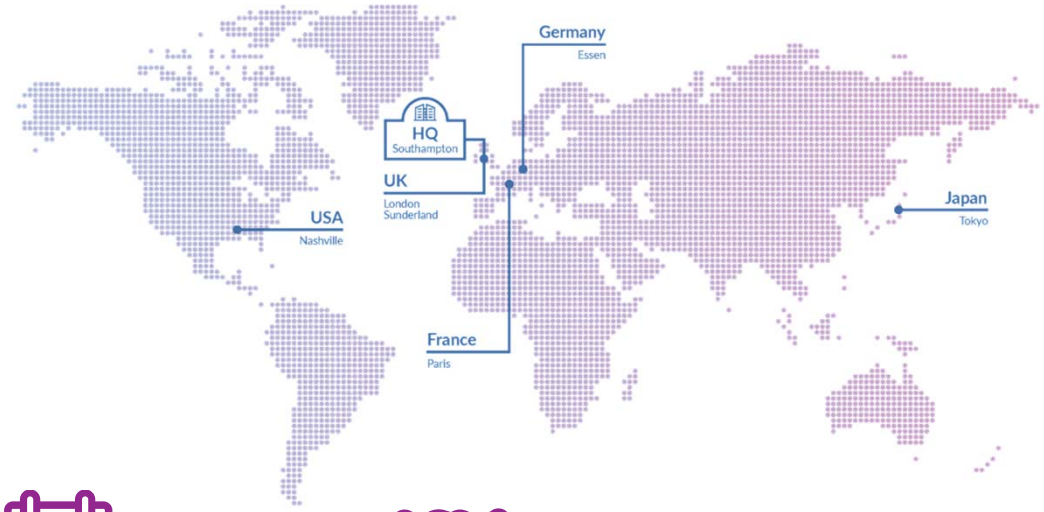
- Top 10 global aluminum smelter
- Segment includes Warrick rolling mill and Brazilian energy assets

- Founded the aluminum industry in 1888
- Launched as an independent company in November 2016, focusing on bauxite, alumina and aluminum
- Values of "Act with Integrity, Operate with Excellence and Care for People"
- Global network of aluminum industry assets; low cost position in bauxite and alumina
- Operations in 10 countries with approximately 14,000 employees
- 2018 revenue: $13.4 billion

# Senseye Overview

*Derived from 'Sensei' (先生) signifies guidance and authority.*

*Senseye is the leading Automated Predictive Maintenance product.*




**2014**
Established

**Industrial & Technology Partners**

IIOT, Historian, CMMS/EAM, APM, CMMS, Cloud

OSIsoft. PI World SAN FRANCISCO 2020

Massive vertical and horizontal scalability.

Category leading ROI.

Deep expertise from the aerospace sector, delivered into the industrial space.

Customers include Nissan, Schneider Electric, Ford, Guardian, AngloAmerican and Alcoa.

*Stats*
*4 Co-founders*
*5 Years old*
*6 Office locations*
*65 employees*

# Why Alcoa Deployed Predictive Maintenance?

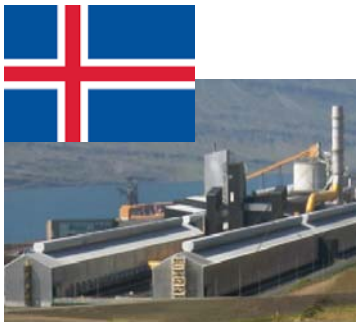

OSIsoft

ORACLE
Eam

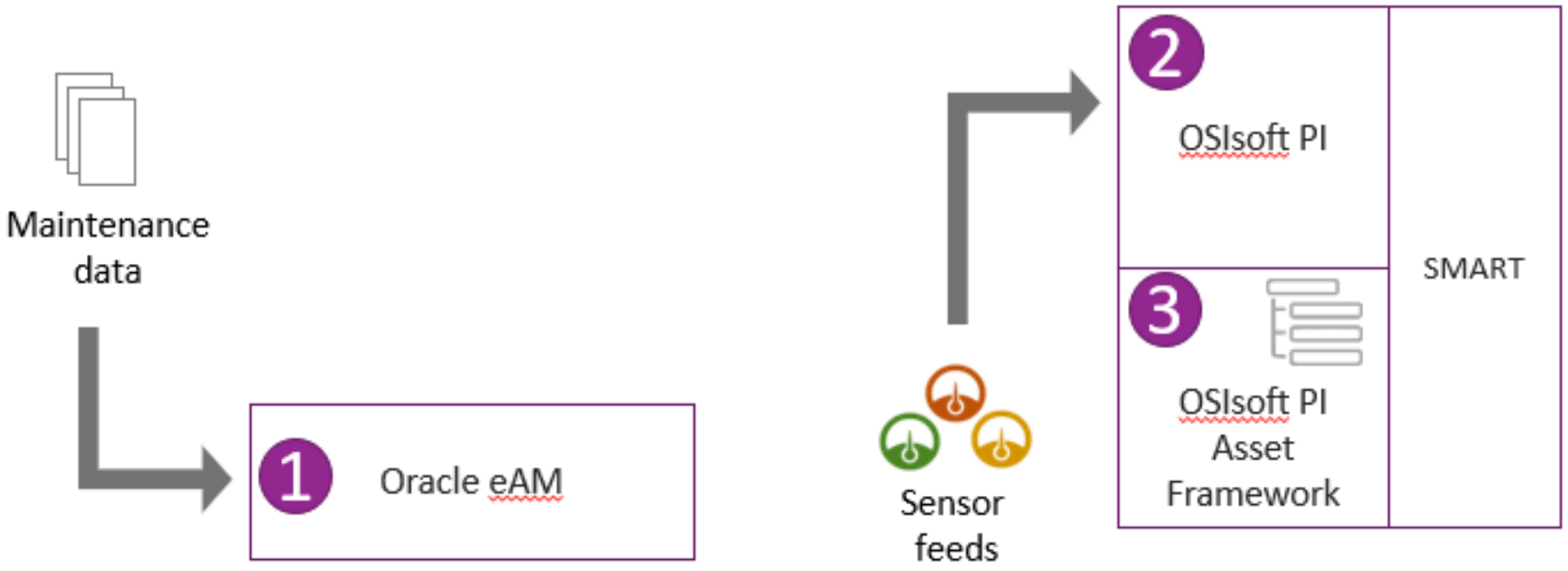
# Project Roadmap

Market Research → Vendor Selection → Asset selection → POC → Scaling

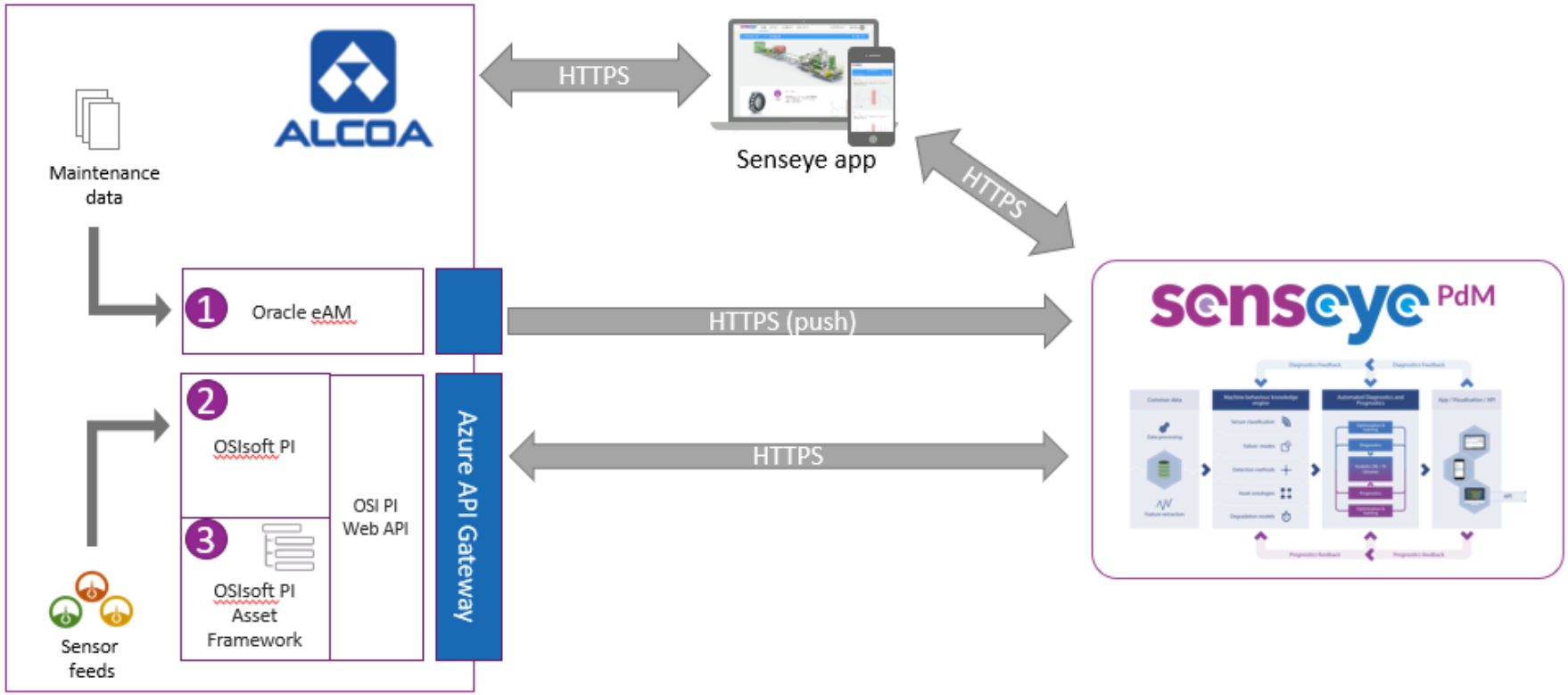

senseye



# Alcoa Fjarðaál Existing Digital Ecosystem

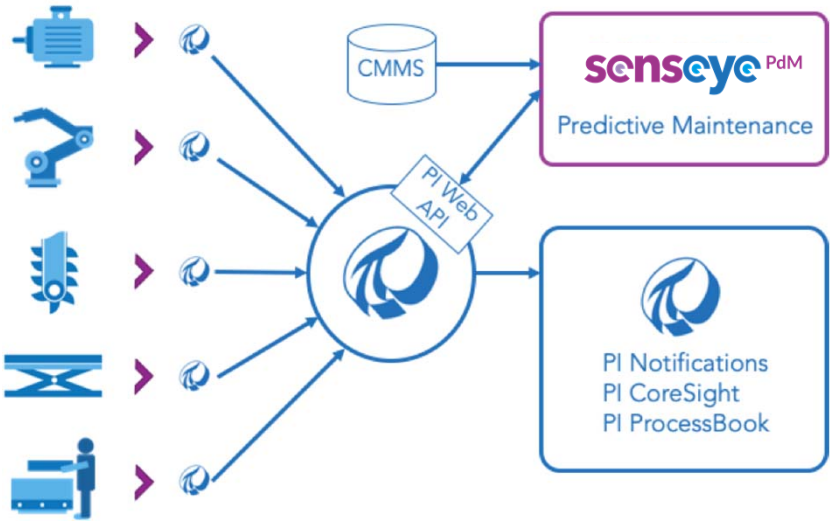


# Alcoa Fjarðaál Unified Digital Ecosystem

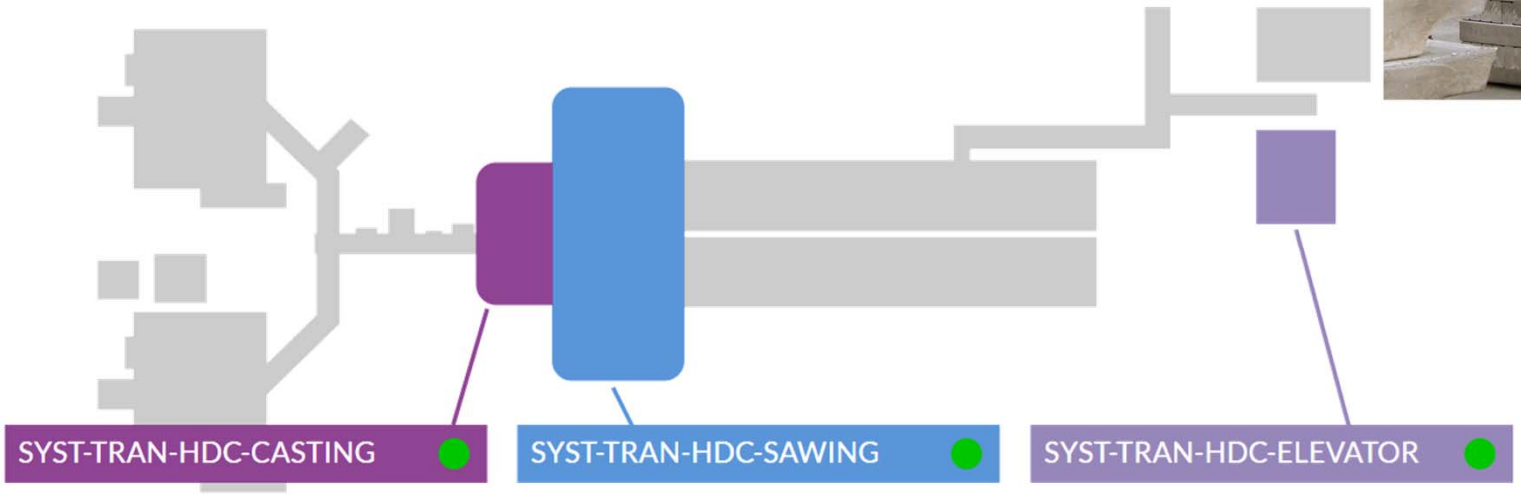


# Senseye Connector for OSIsoft PI System

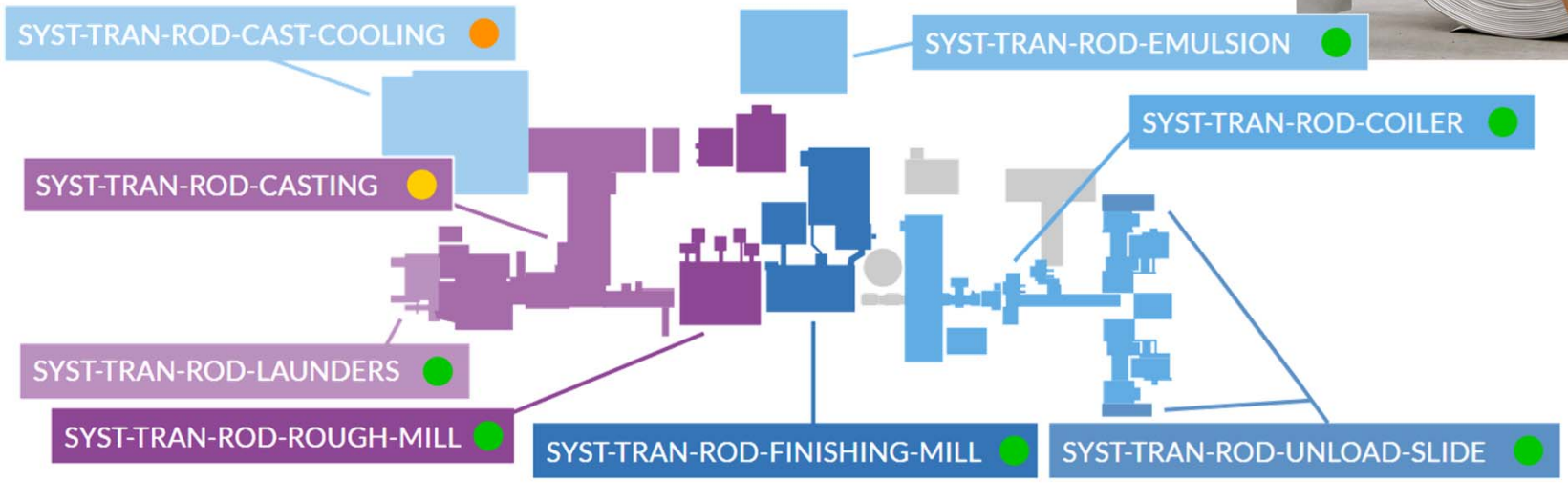
- Enable Senseye to access machine data in your existing OSIsoft PI System™
- Rapid access to current and historic data for all your connected machines
- Utilizes OSIsoft PI Web API – a API – a core part of the OSIsoft PI OSIsoft PI System product suite System product suite



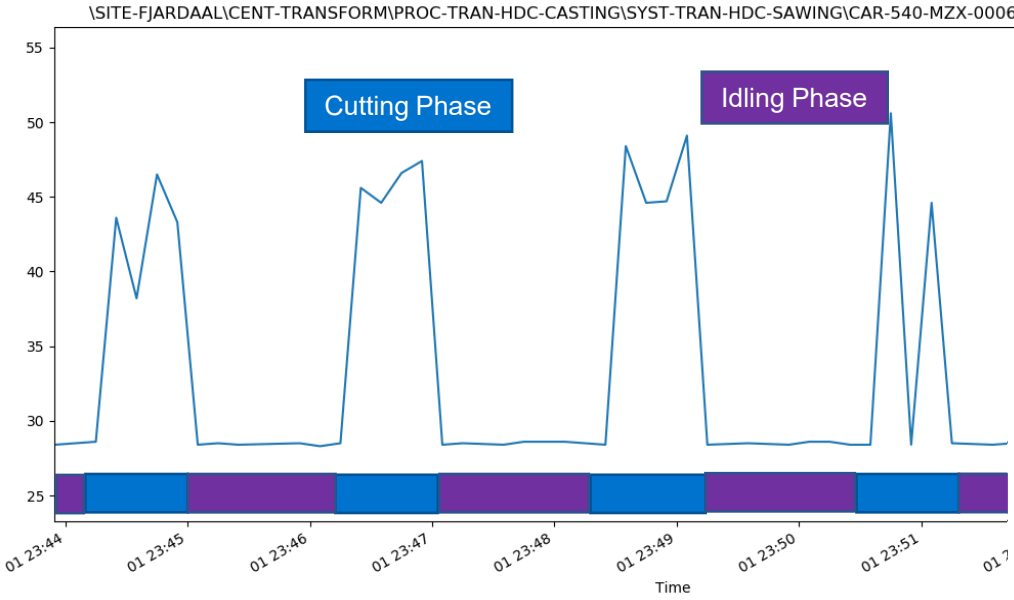
# Horizontal Direct Caster – Annotated Schematic

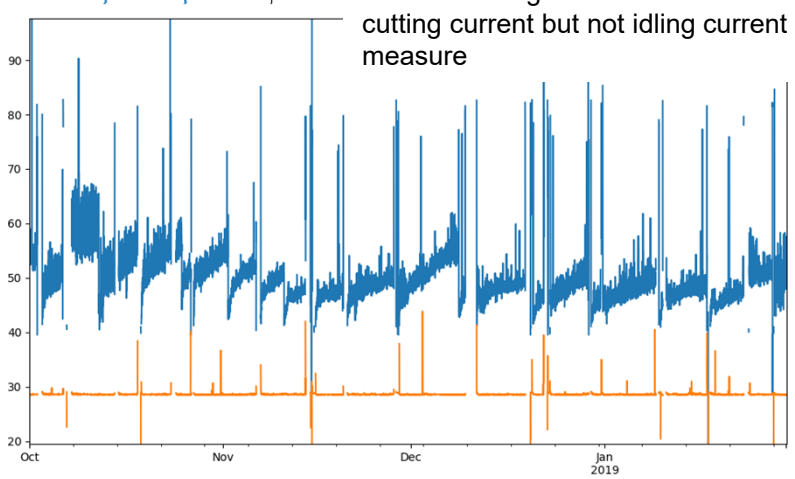


# Rod Mill – Annotated Schematic



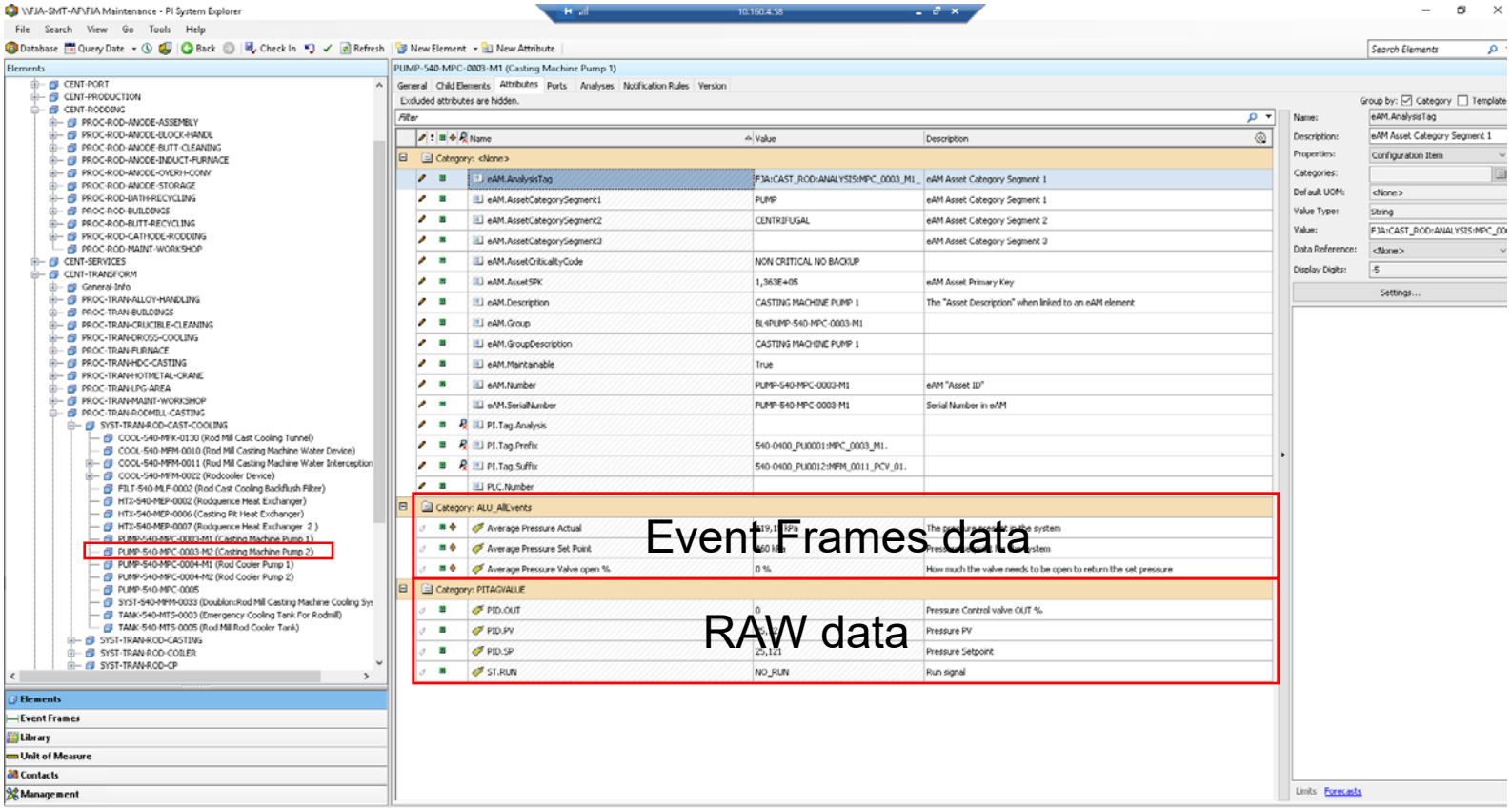
# HDC Saw Motor–Derived current measure features



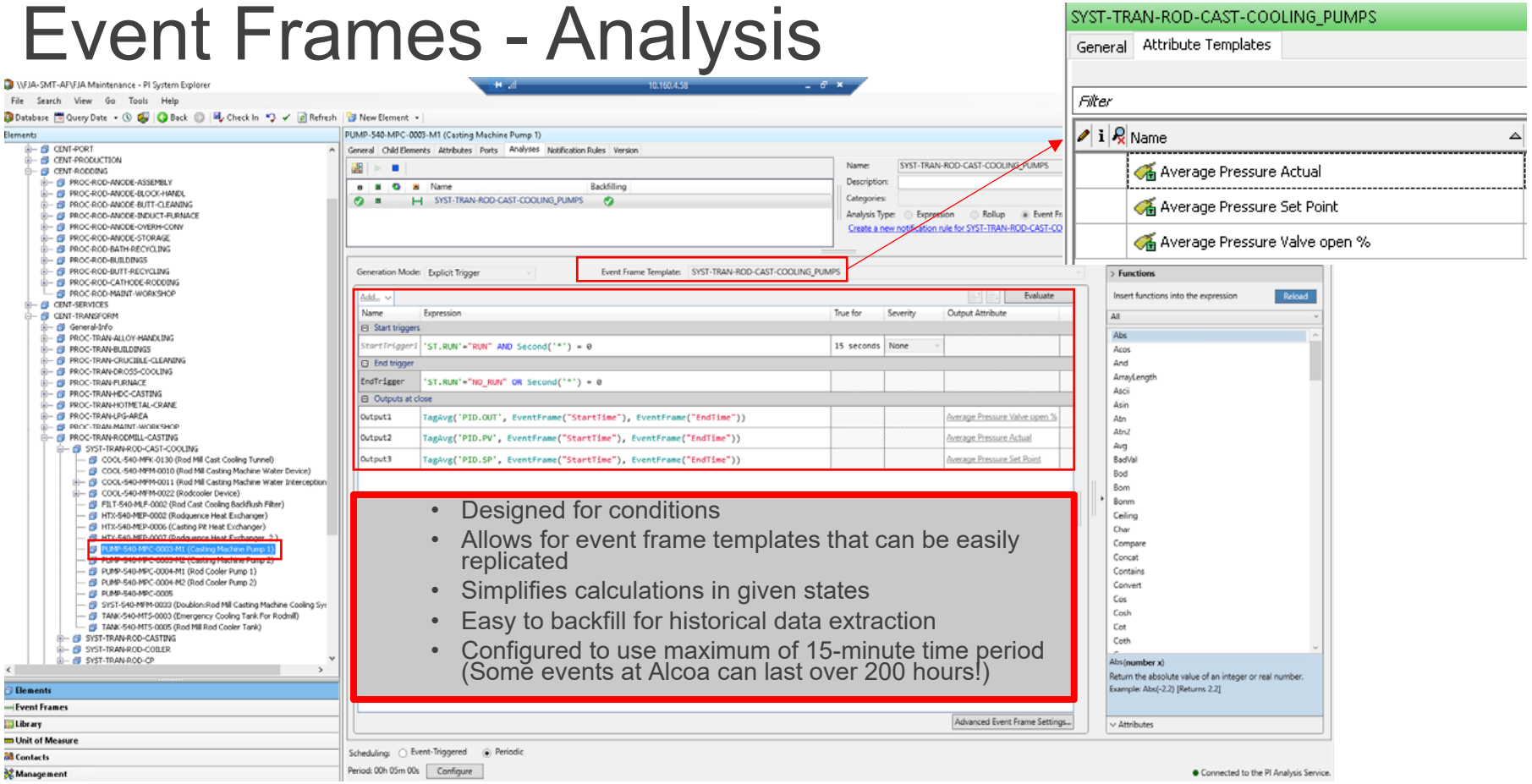




Saw blade degradation visible in cutting current but not idling current measure

# Event Frames – Element template



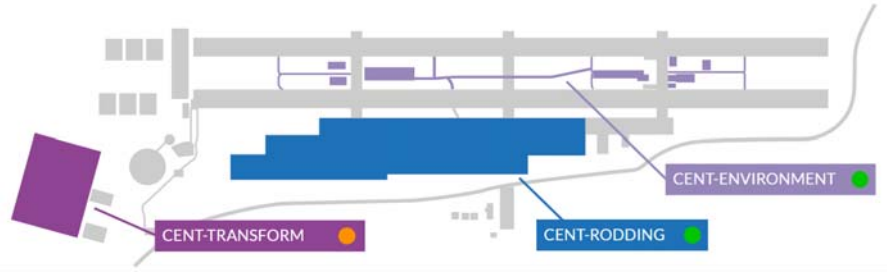
# Event Frames - Analysis

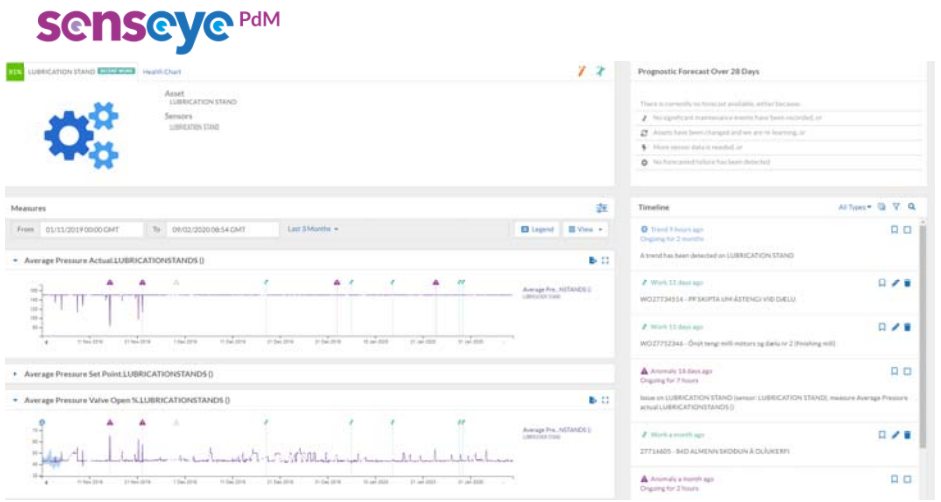



- Designed for conditions
- Allows for event frame templates that can be easily replicated
- Simplifies calculations in given states
- Easy to backfill for historical data extraction
- Configured to use maximum of 15-minute time period (Some events at Alcoa can last over 200 hours!)

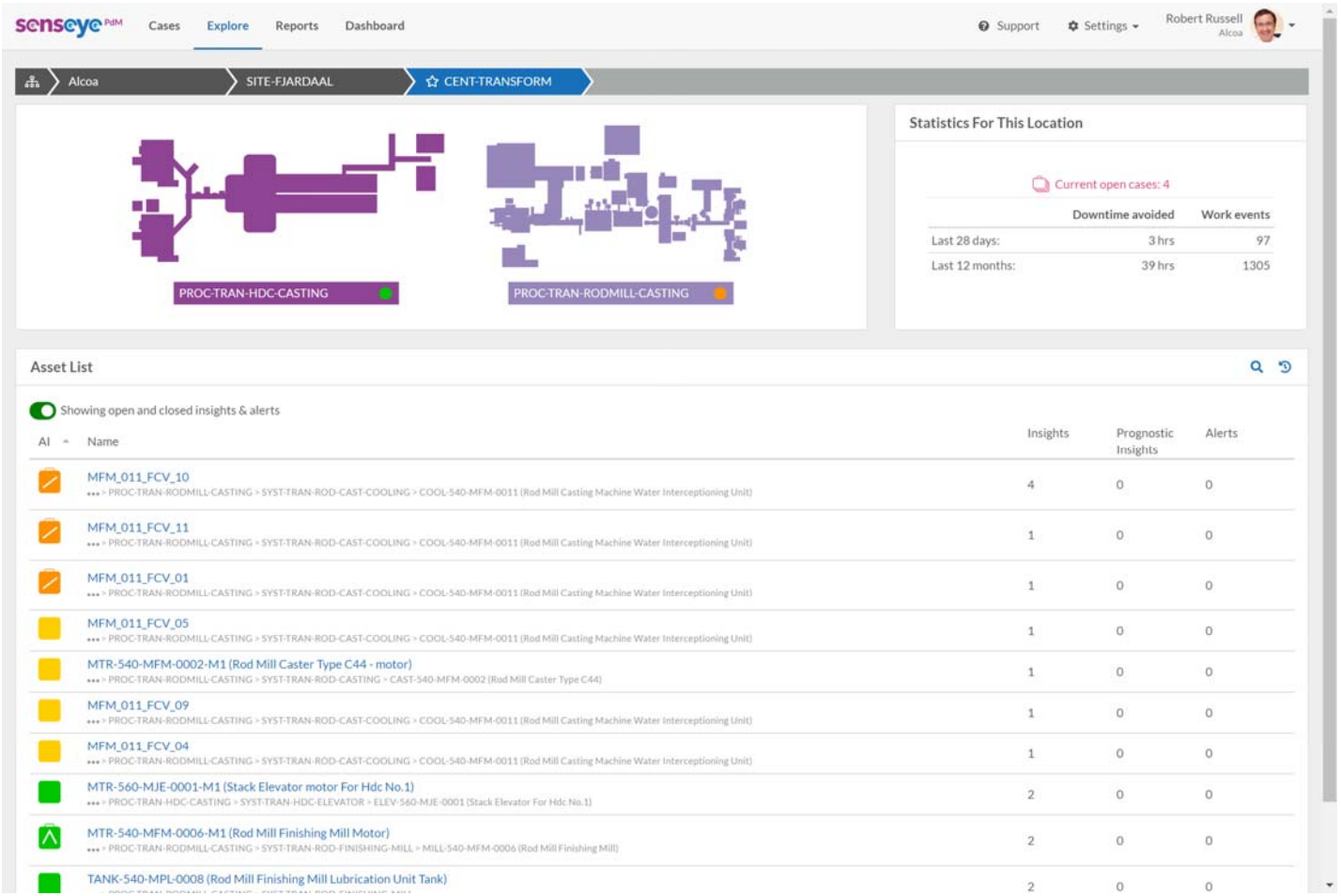
# Senseye PdM in use

- Senseye PdM implemented
- Senseye PdM provides focus for people on the floor
- Multiple examples of hidden failures detected
- Reliability engineer monitors system
- Equipment unplanned downtime tracked and reported
- Maintenance work hours used on the system

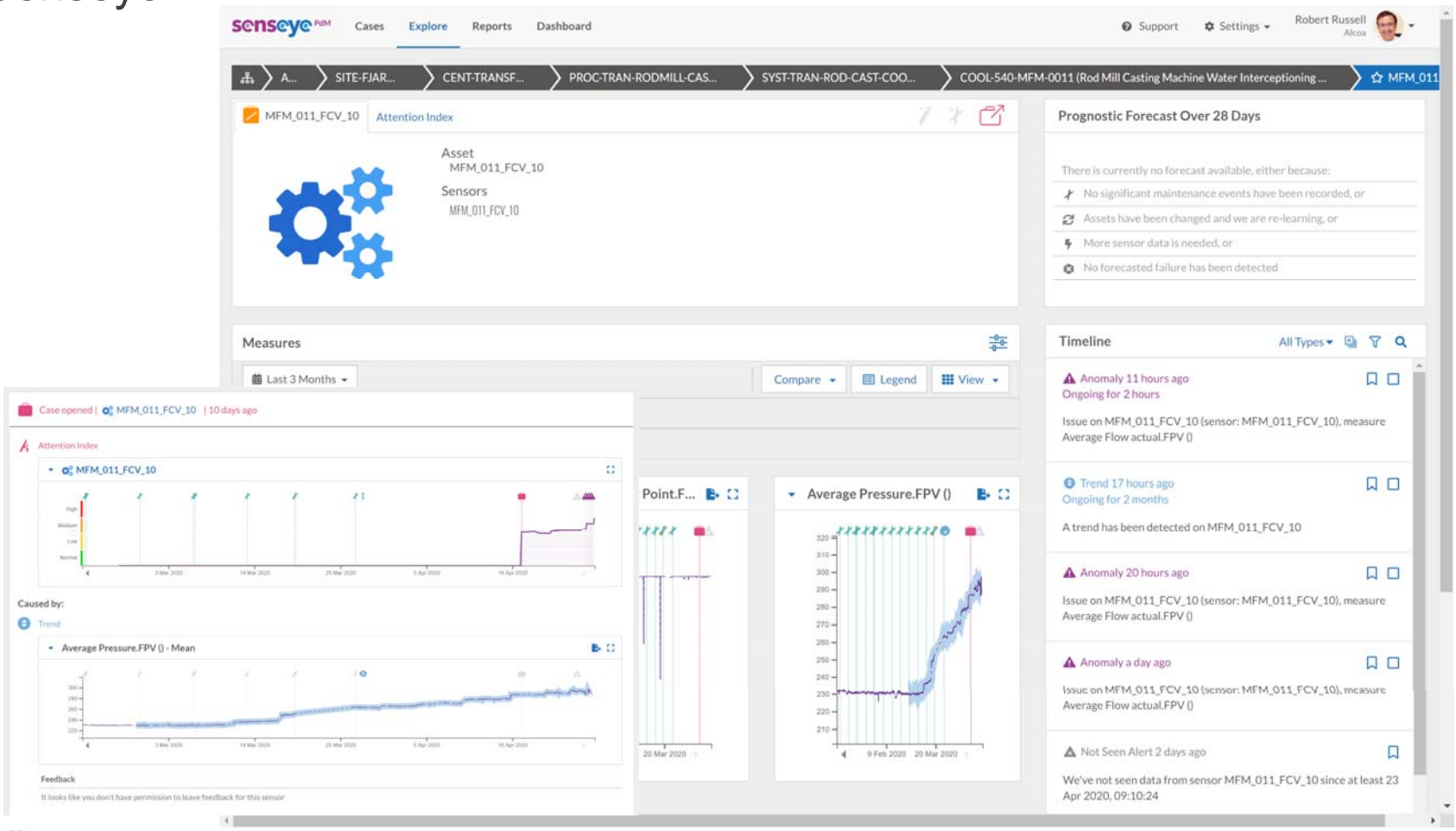


# In Senseye

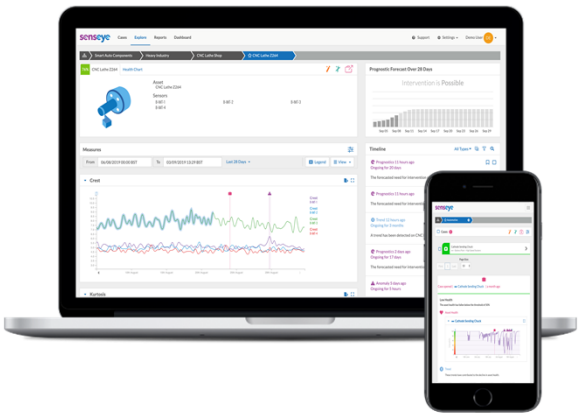


# In Senseye



# HDC saw motor case study

*Issue: Belt guard came loose and was in contact with the sawing drive, damaging belt*
*Action: Replaced belts and fastened the belt cover*



senseye PdM


| | |
|---|---|
| **Asset Name** | MTR-540-MZX-0007-M1 (Saw Carriage 2 motor) |
| **Location** | SYS-TRAN-HDC-SAWING |
| **Failure mode** | Loose Component |
| **Shown on existing systems** | No |
| **Unplanned downtime avoided** | 12 hours |

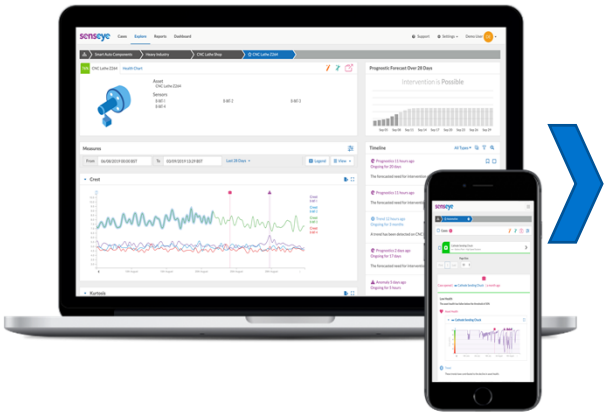
T0 - Case raised on saw motor due to increase in idling motor current

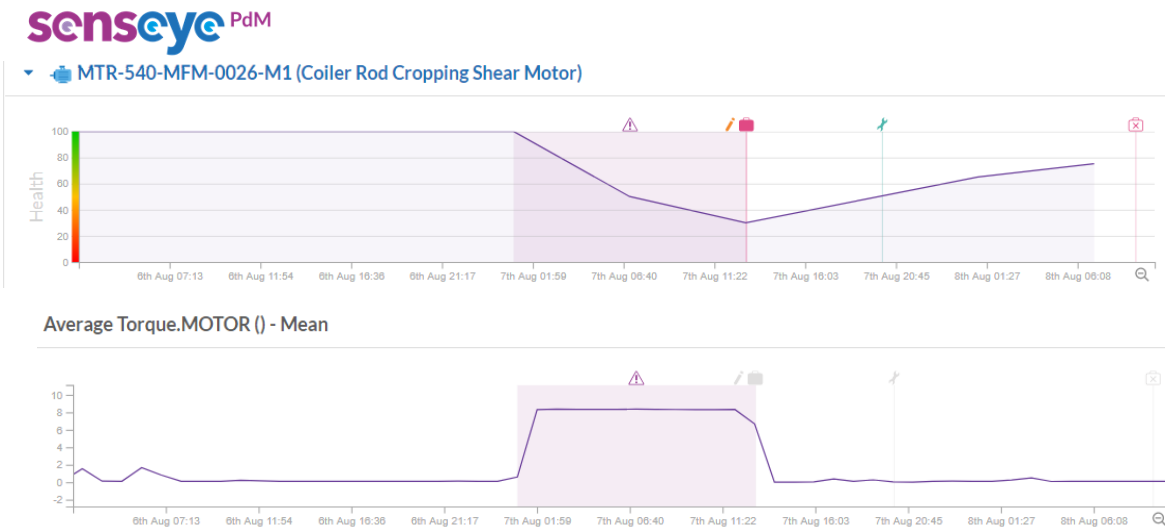
T0+2d – Case reviewed and issue being investigated

T0 + 1w – Issue resolved during maintenance shutdown

# Coiler Rod Cropping Shear Motor

*Issue: Lower pinch roller sensor came loose – leading to a sharp increase in shear motor torque*
*Action: Re-fastened sensor which returned the measured motor torque to normal levels*






| | |
|---|---|
| **Asset Name** | MTR-540-MFM-0026-M1 (Coiler Rod Cropping Shear Motor) |
| **Location** | SYS-TRAN-ROD-COILER |
| **Failure mode** | Loose Sensor |
| **Shown on existing systems** | No |
| **Unplanned downtime avoided** | 3 hours |

T0 – Case raised on rod cropping shear motor due to sensor failure

T0 – Insight, case reviewed, issue being investigated

T0 – Sensor re-fastened and motor torque issue resolved

# Predictive Maintenance Results


Learnings for other Alcoa plants for global roll out:

- Types of measurements which are most effective
- Data preparation and aggregation for best performance
- Usage of OSI PI System templates for identical identical equipment

# Next steps - Alcoa

- Expanding to 1k+ assets in Fjarðaál
- Alcoa is currently looking for opportunities in other sectors of the business to making use of this initial work
- Diverse assets & sites across the company
- PI System and Asset Framework used to template the data transformations for rapid rollout at global scale

# Next steps - Senseye

- Research & design work on larger machines & assets that are coupled
- Deeper integration with PI System and Asset Framework for quicker onboarding
- Ongoing proprietary algorithm updates

# Alcoa – Summary Slide

Alcoa

## CHALLENGES

- Equipment data available in PI System but not utilized for condition monitoring purposes in any scale
- Complexity of operations affecting data

## SOLUTION

- Build precise Asset framework element model and utilize Event frames to aggregate relevant data for condition monitoring
- Implement Senseye PdM to deliver predictive analytics on top of PI System to analyze and monitor the data and provide guidance towards equipment to focus on

## BENEFITS

- Increase operations knowledge of their equipment process and equipment data
- Reduced equipment downtime
- Lowered maintenance cost
- ROI in 6 months

"We are pleased to have partnered with Senseye on this corporate initiative to enable Predictive Maintenance and improve operational efficiencies. The results and ROI were executed in a prompt manner and our users are thrilled with the ease of use of the Senseye PdM product."

# Questions?

Please wait for
the **microphone**

State your
**name & company**

# Save the Date...


AMSTERDAM
October 26-29, 2020

OSIsoft. PI World