ASARCO CASNE

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Digital transformation at Ray Mine using AVEVA™ PI System™ and AVEVA™ Predictive Analytics

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AVEVA

CASNE

- Operating globally from Bellevue, WA USA. Established in 1979.
- Full-service engineering, systems integration, and technology services.
- AVEVA™ endorsed systems integrator (AVEVA™ PI System™ installations) since 2006.
- Partnership with ASARCO since 2022.

- OIL AND GAS
- WATER/WASTEWATER
- MANUFACTURING
- POWER GENERATION
- T&D

- DATA CENTERS
- CRITICAL FACILITIES
- TRANSPORTATION
- MINING

AVEVA
ENDORSED
OPERATIONS
System
Integrator

CASNE
CLOUDSTREAM

AVEVA

ASARCO

ASARCO

ASARCO (American Smelting and Refining Company), the U.S. based subsidiary of Grupo Mexico, is an integrated copper mining, smelting and refining company.

The company operates three mines, associated mills and smelter in Arizona, which includes plants that produce copper cathode & rod.

RAY MINE

The Ray Operations consists of an open pit mine with a concentrator and a solvent extraction-electrowinning operation, and associated maintenance, warehouse and administrative facilities.

OVER 100 YEARS OF PRODUCING COPPER IN ARIZONA

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Problem statement

ASARCO partnered with AVEVA and CASNE in early 2022 to kickstart their digital transformation journey.

ASARCO's mines had many different data sources with no central historian to monitor their critical assets. They also had no easy way to do calculations and reporting across different areas of their operation.

The goal was a full digital transformation: to integrate data and monitor assets in real-time, increase profits, improve safety, and optimize operations.

Another goal was to enable early detection of maintenance issues and process deviations to prevent critical asset failures and unplanned downtime.

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CHALLENGE

Decentralized data and reporting, limited real-time visibility into asset and operations performance

No visibility into mechanical and electrical data on mobile assets

No proactive warning of impending asset failure

Deep tribal knowledge that was underutilized

SOLUTION

Integrate all data to centralized PI historian (including mobile asset data via Monico mcore)

Develop Predictive Analytics models to proactively alert of impending asset failure

Translate tribal knowledge into analytics and reports around critical use cases for performance and safety

BENEFITS

Real-time insights to critical assets to enable fact-based decision making

Prevent costly asset failures and unplanned downtime by early alert of deviation

Enable optimization of operations and proactive response across all critical areas

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Critical use cases

ASARCO identified critical use cases to develop reports, analytics, and predictive models around:

Slope Stability

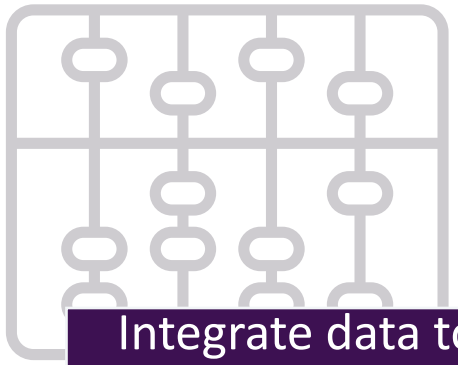
Fleet Management

Concentrator

Road to AI

In order to enable analytics, reports, and predictive models, ASARCO had to prepare:

Identify critical data points and sensors



Integrate data to centralized historian

Backfill and Cleanse Historical Data

Organize and Add Context to Data

Develop Analytics, Reports, and Models

Review and Tune Models

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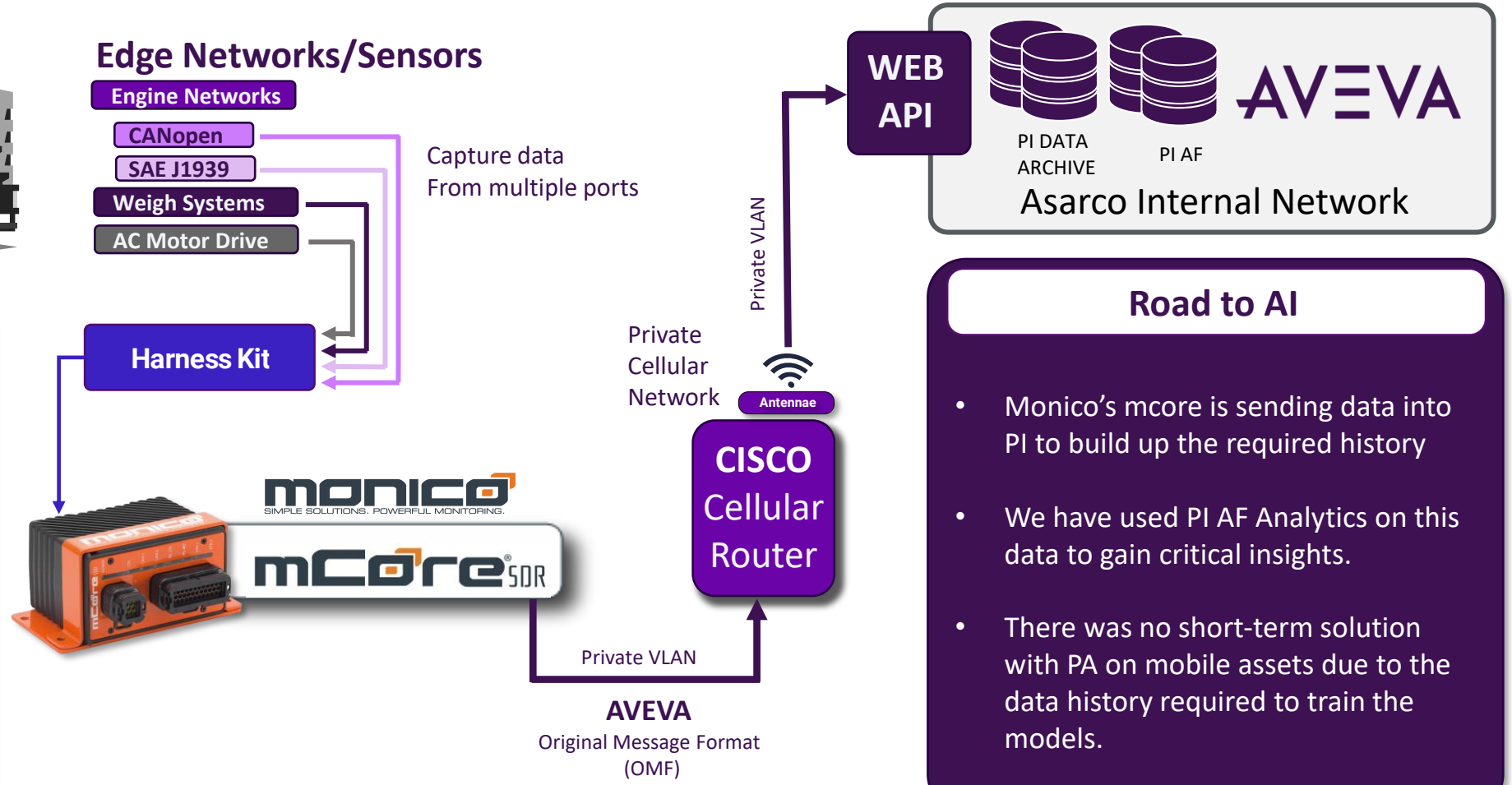
Data integrations to the AVEVA™ PI System™

- The AVEVA PI System allowed us to integrate several disparate systems to gain greater insights into correlated events and enhance the value of the data

Mobile assets: AI challenges

Challenges for AI

- Mobile assets do not have localized historians with years of data for us to train predictive models on
- We have to plan ahead to build up good data history to train predictive models



Road to AI

- Monico's mcore is sending data into PI to build up the required history
- We have used PI AF Analytics on this data to gain critical insights.
- There was no short-term solution with PA on mobile assets due to the data history required to train the models.

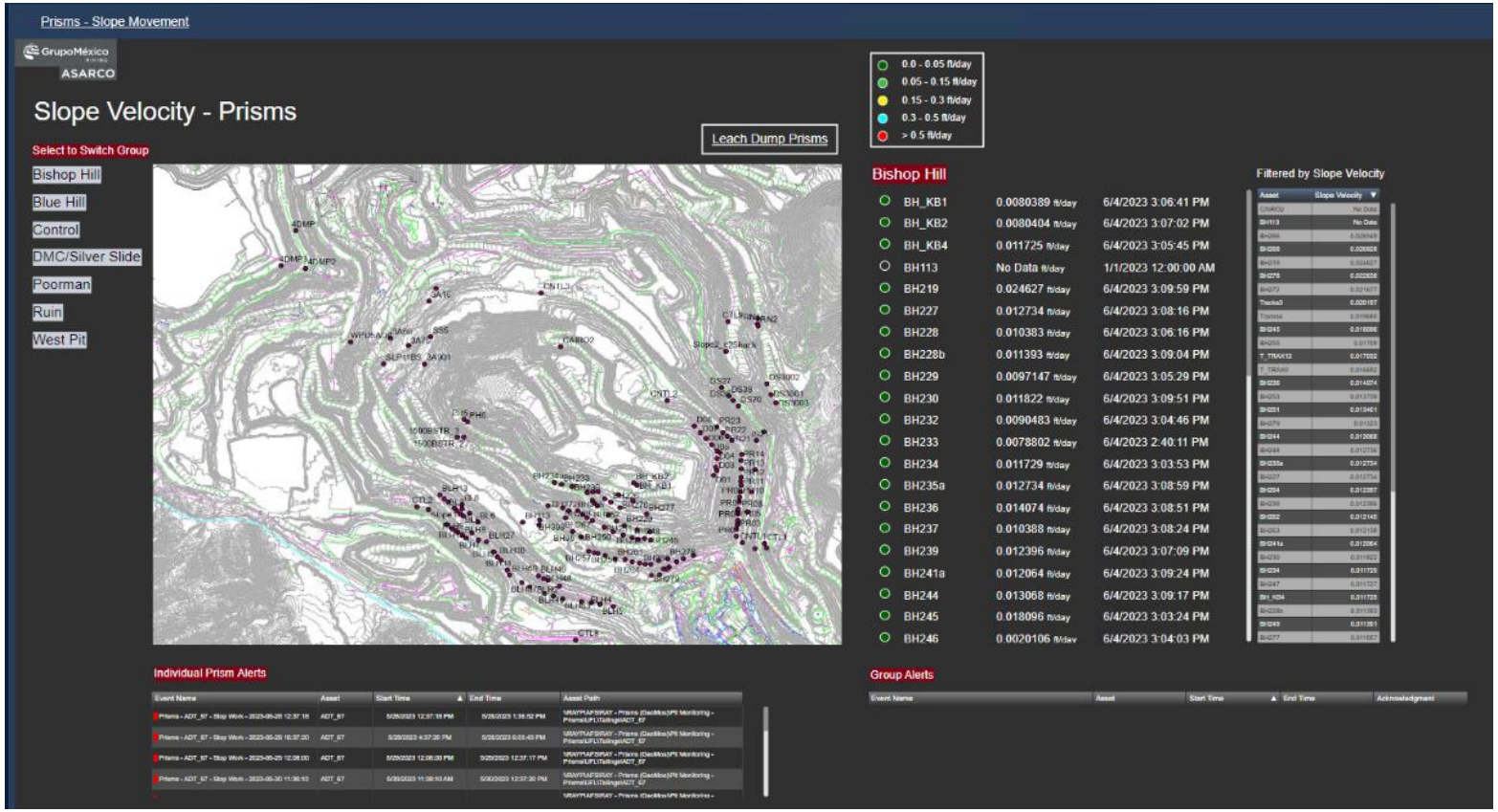
AVEVA™ PI System™: slope stability

GOAL:

- Monitor slope conditions (slope movement, dewatering well health, weather conditions)
- Detect indicators of potentially unsafe slope conditions, and alert operations teams

SOLUTION:

- PI UFL Connector auto-integrates data for all prisms (slope distance measurements)
- Using AF, analyze for slope movement, high windspeed and precipitation events, and dewatering well health
- PI Vision multi-states and PI Notification emails to alert on events



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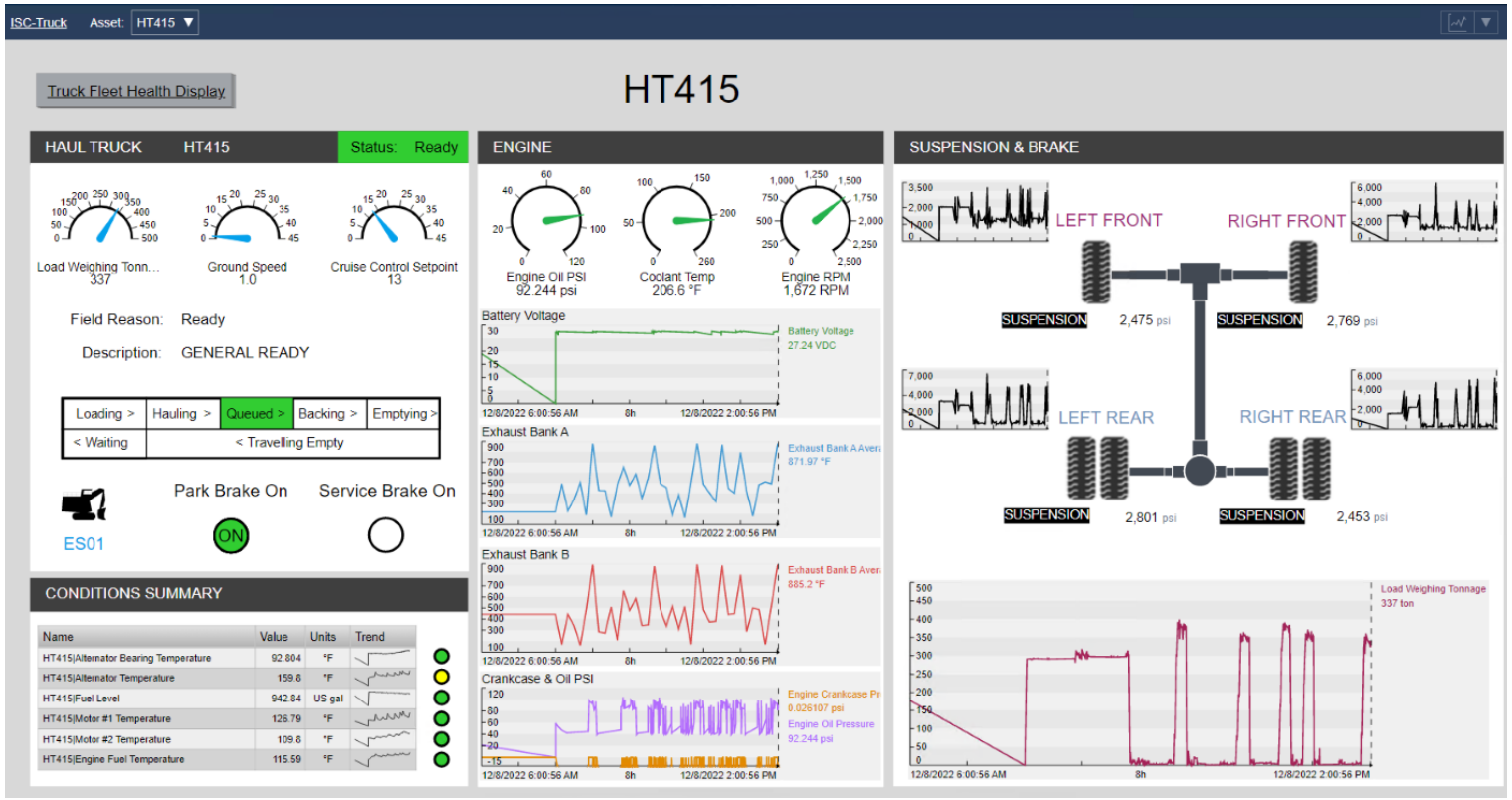
AVEVA™ PI System™: Fleet Management (Asset Health)

GOAL:

- Monitor health and performance of mobile assets
- Proactively alert on maintenance needs

SOLUTION:

- Integrate mobile asset data to PI from Monico and Dispatch 6
- Create AF Analytics and Notifications to monitor equipment health and alert on maintenance needs



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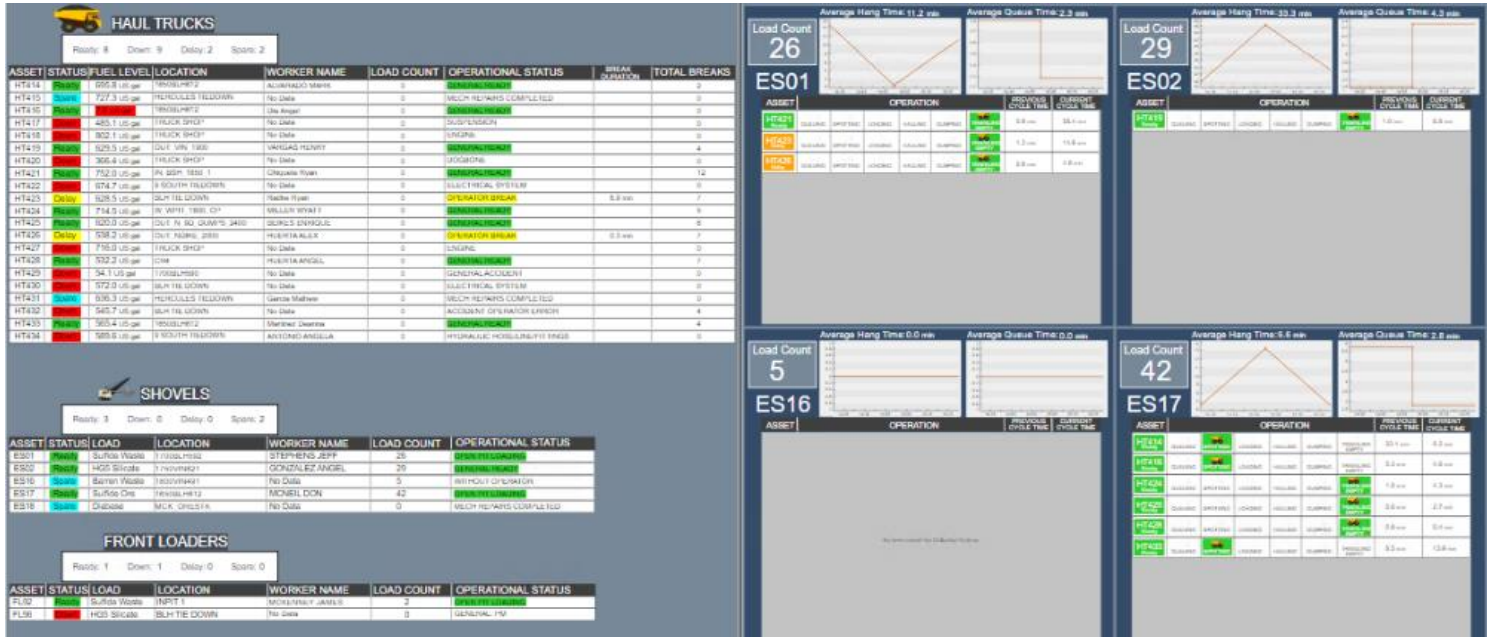
AVEVA™ PI System™: Fleet Management (Dispatch)

GOAL:

- Monitor status and location of mobile assets
- Coordinate and optimize production and performance

SOLUTION:

- Integrate mobile asset data to PI from Monico and Dispatch 6
- Create AF Analytics and Notifications to monitor crew and operator performance and highlight training issues
- Fleet-wide visualization of all assets to allow dispatchers to make real-time fact-based decisions



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PA: SAG Mill (Trunnion)

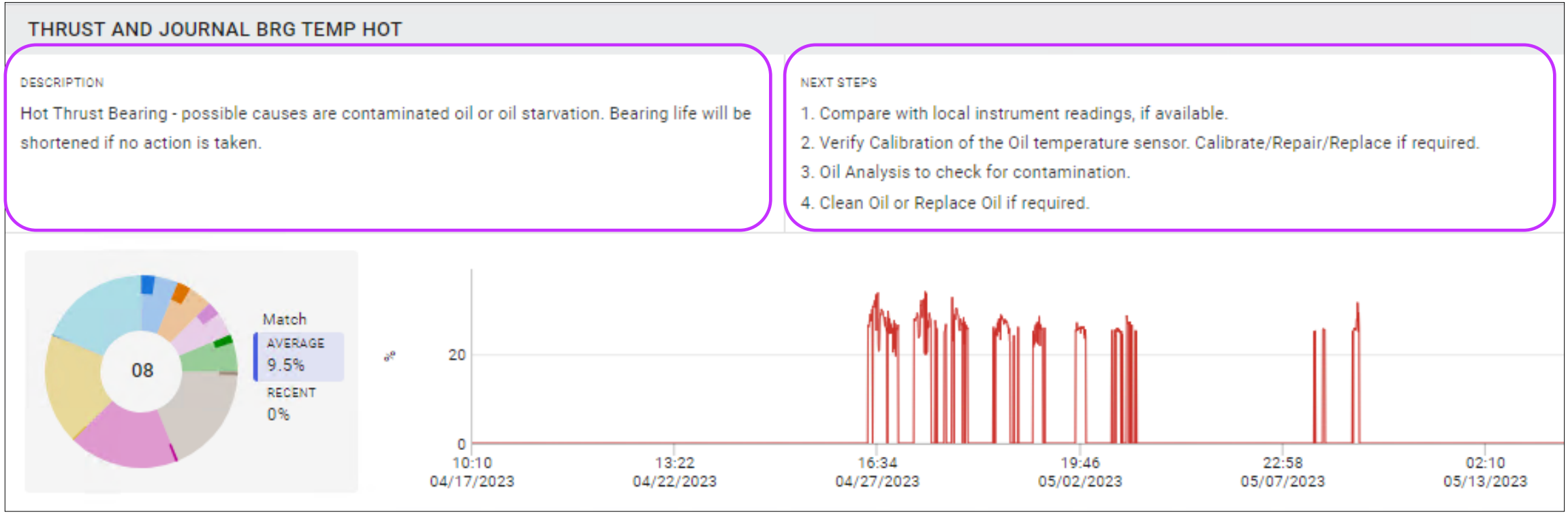
GOAL:

- Monitor health and performance of crushing circuit assets
- Proactively alert on maintenance needs

SAG Mill Trunnion - Thrust Bearing Temperature Issue:

- Thrust bearing temperature deviated from prediction by 7-8°F when brought back online after brief shut down
- It is expected that the North and South Bearing Temps are almost equal, but before shut down there was 5-6°F difference between them.
- All trunnion bearing temperatures were reading under 115°F, however, last year at that same time the temperatures were running around 103°F.

PA: SAG Mill (Trunnion)



Fault Diagnostic Match & Prescriptive Actions:

- Fault is matched to diagnostics and an alert is generated
- Alert describes the fault and outlines next steps for action
  - Recommend to check cooling system and heat exchangers on lube system.
  - If the cooling system checks out, make sure we had spare bronze liner on site.

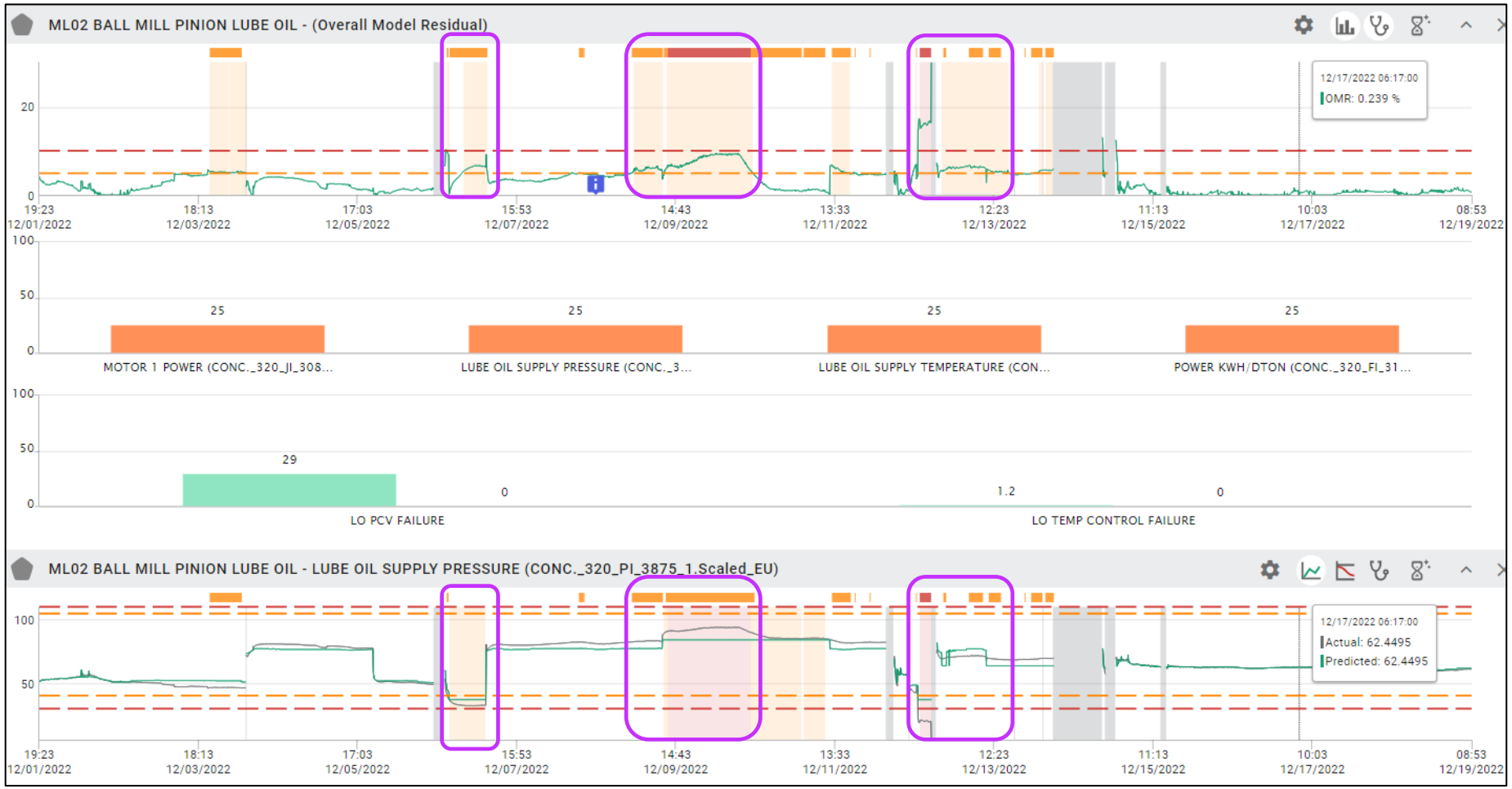
Resolution:

- Case created to track changes in trends
- Customer created work orders and acted in the field
- During down day, equipment was corrected (adjusted flows on lube oil system and cleaned exchangers / strainers) and temps dropped
- Avoided cost: severe impact and cost, avoid approx. 4 days of mill downtime and potential trunnion liner replacement

PA: Ball Mill (Pinion)

Ball Mill Pinion - Lube Oil Supply Pressure Issue:

- Lube oil supply pressure fell below warning limit of 40 PSI after coming back online on 12/6
- The pressure remained in warning for over 12hr and returned to within normal ranges on 12/7 at around 80 PSI.
- Periodic instances of not matching predictive values in the following days



PA: Ball Mill (Pinion)

Fault Diagnostic Match & Prescriptive Actions:

- Field investigation required to diagnose
- Review check valve for issues or possible clogging

Resolution:

- Pump, check valve, and clogging issues were discovered
- Changed out pumps for pinion lube oil supply system and made adjustments to check valves matching OEM recommended settings
- Avoided cost: high impact and cost, prevent loss of mill (1/2 production) for 2 days to change out a pinion

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MINING | ARIZONA

ASARCO's Ray Mine has avoided costly asset failures and downtime

Challenge

- Decentralized data and reporting, limited visibility into asset and operations performance. No visibility into mechanical and electrical data on mobile assets
- No proactive warning of impending asset failure
- Deep tribal knowledge that was underutilized

Solution

Integrate all data to AVEVA PI System. Build PI AF Analytics to encode tribal knowledge. Develop Predictive Analytics models to proactively alert of impending asset failure.

Results

- **Proactive detection to prevent more costly asset failures**
- **Prevent unplanned downtime and lost/reduced productivity**
- **Leverage root-cause analysis to prevent recurrence of issues**
- **Improved training and efficiency of operations teams**
- **Optimization of operations in real-time, increased profits and consistency**

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What's Next?

Replicate and build upon previous development to monitor additional sites

PI + PA integration at Additional Mines

Integrate data from additional mobile assets and monitor reliability and performance

Additional Mobile Asset Integration

Develop predictive models on mobile assets for proactive alert of impending failure

Predictive Models on Mobile Assets

Power BI Reporting

Lube Oil Analytics

Analyze additional KPIs and production metrics

Monitor critical assets and alert proactively for maintenance needs

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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!

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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. The company is headquartered in Cambridge, UK.

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