AVEVA PI WORLD

Building towards a sustainable state-of-the-art grain operation at TEMCO

Optional Subtitle

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AVEVA

About TEMCO

- 50/50 Joint Venture between CHS and Cargill
- Currently employ +50 people
- Operates 3 Export Terminals
  - Tacoma Washington
  - Portland Oregon
  - Kalama Washington
- Store and handle grains for export from the Pacific Northwest
- The main bulk products handled
  - Corn
  - Soybeans
  - Wheat
- Leveraging the strengths of TEMCO's parents
  - Grain origination
  - Rail and ocean freight logistics
 - Freight forwarding and other supporting functions

Inbound Freight

- Barge Receiving:
  - 250+ Barges per year (15% of total export volume)
  - Unloading capacity 20,000 BPH (500 MTPH)
- Rail Receiving:
  - 50,000+ Railcars per year (85% of total export volume)
  - Unloading capacity 120,000 BPH (3200 MTPH)
  - Rail yard accommodates 450 railcars
  - Can unload a single shuttle in 10-12 hrs
  - Capable of unloading 2 shuttle trains (220 railcars) simultaneously
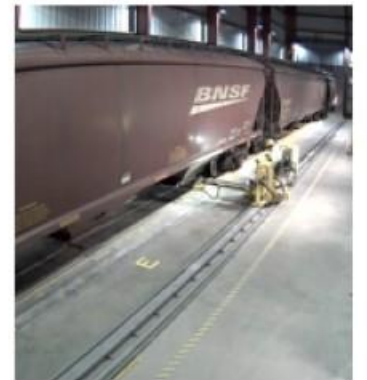
Vessel Loading

- 125+ Vessels per year

- Two ship loading spouts with a loading capacity of 120,000 BPH (3200 MTPH) each

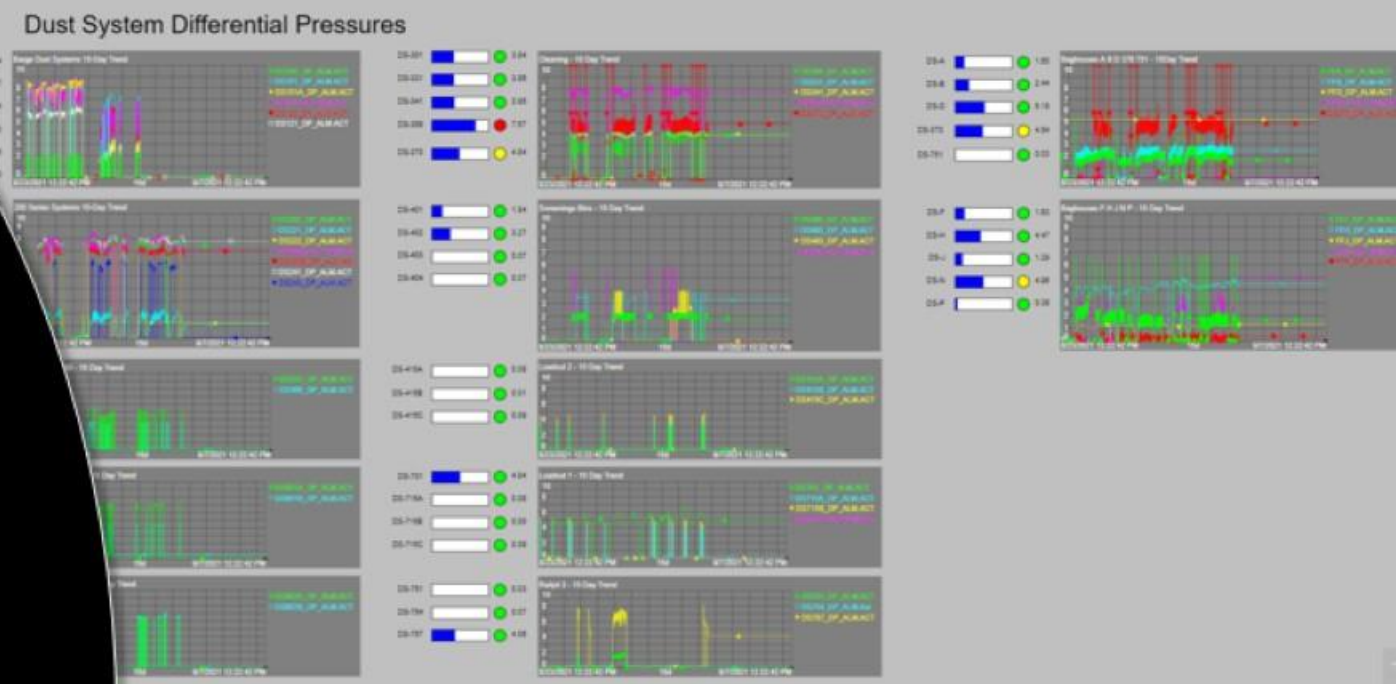- Capable of loading Panamax and Handymax vessels
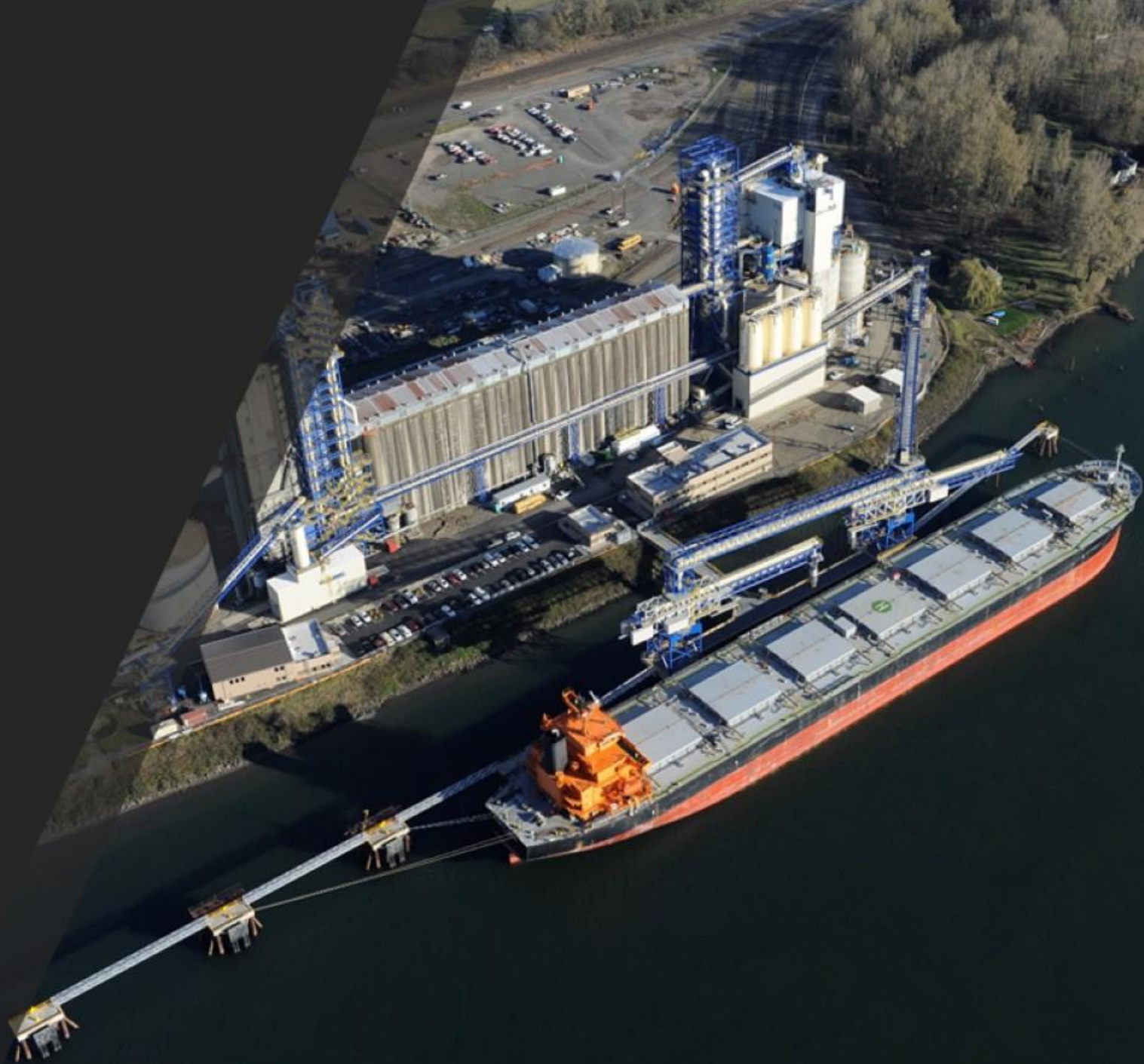
TEMCO – Investing in the future

- **Upgrade and Modernization Project completed in 2014**
  - Increased both rail and barge receiving capacities
  - Increased ship loading capacities
  - Upgraded cleaning equipment and increased capacity
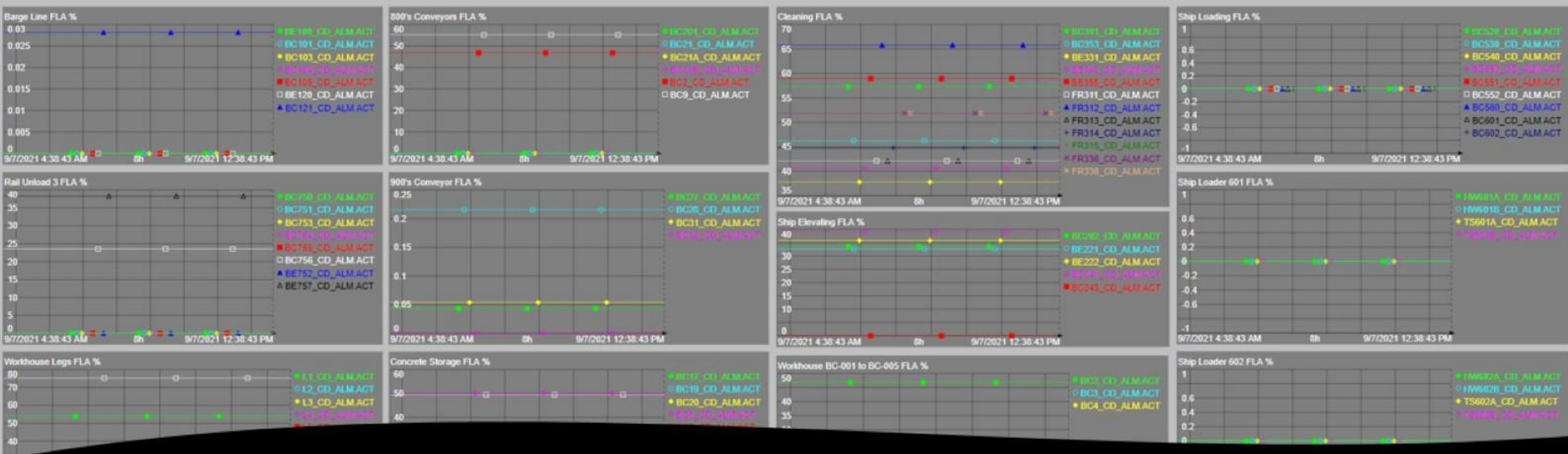 - Control room modernization
  - Install PI system

Why PI?

- With the investment into structures, new equipment, capacity and increased production, our management team wanted real time visibility into the health and status of our equipment at any given time. Some examples would be: Real time baghouse differential pressures. Motor operating FLA's. Belt tensions and the list goes on and on.

- PI was an obvious choice to monitor our investment

- Although PI does a fantastic job of reporting real time information, what we didn't realize at the time of the investment was what PI would give us in the ability to troubleshoot maintenance issues

Dust System Differential Pressures

Roller Belt Tensions

L H	Shipping Belts	
○○ BC-520	3668	
○○ BC-530	4129	
○○ BC-540	2963	
○○ BC-550	6628	
○○ BC-551	3908	
○○ BC-552	6016	
○○ BC-560	-6247	
○○ BC-601	3932	
○○ BC-602	3895	

L H	Weighback Belts	
○○ BC-571	1267	
○○ BC-572	1483	
○○ BC-575	923	
○○ BC-576	1197	
○○ BC-580	1455	
○○ BC-585	2015	

| L H	Rail Pit 3 Belts	
○○ BC-750	1393	
○○ BC-751	1887	
○○ BC-753	3689	
○○ BC-754	5503	
○○ BC-755	3185	
○○ BC-756	4840	

Troubleshooting Example:

- Maintenance gets a call from the control room that belt 552 has gone down under a load. Control room attempted a re-start but the motor would not come up to speed and went down again on a slow speed.

- Without the use of PI a problem like this comes with a lot of questions followed by an investigation and inspection. Was the belt tension to loose? Is the motor weak? Do we have a bad bearing? Did the control room over load the belt? Etc.

- In minutes using PI we were able to see that the load that over loaded 552, went across the previous 5 belts as well. We knew this by historically seeing the FLA for each motor. We were then able to see that the gate briefly opened to 100% and then went back to its set point. We then confirmed this with the operator and found that when intending to enter a set point of 10%, 100% was accidentally entered and then corrected. What was first thought to be a maintenance issue was actually a simple operator error.

Conclusion:

- We use PI more times than I can count in a day. Whether it be to monitor equipment, track operating hours, troubleshoot programming and maintenance issues, build custom user screens for process improvement, you name it. It is an invaluable part of our day to day

- We have plans to integrate PI with our CMMS program in short order. This will allow for PI to report high dust system DP's (as an example) and auto generate a work order through our CMMS to inspect for cause. Same is true for bearing temps, belt tension or numerous other simple issues we run into day to day that have to be manually entered.
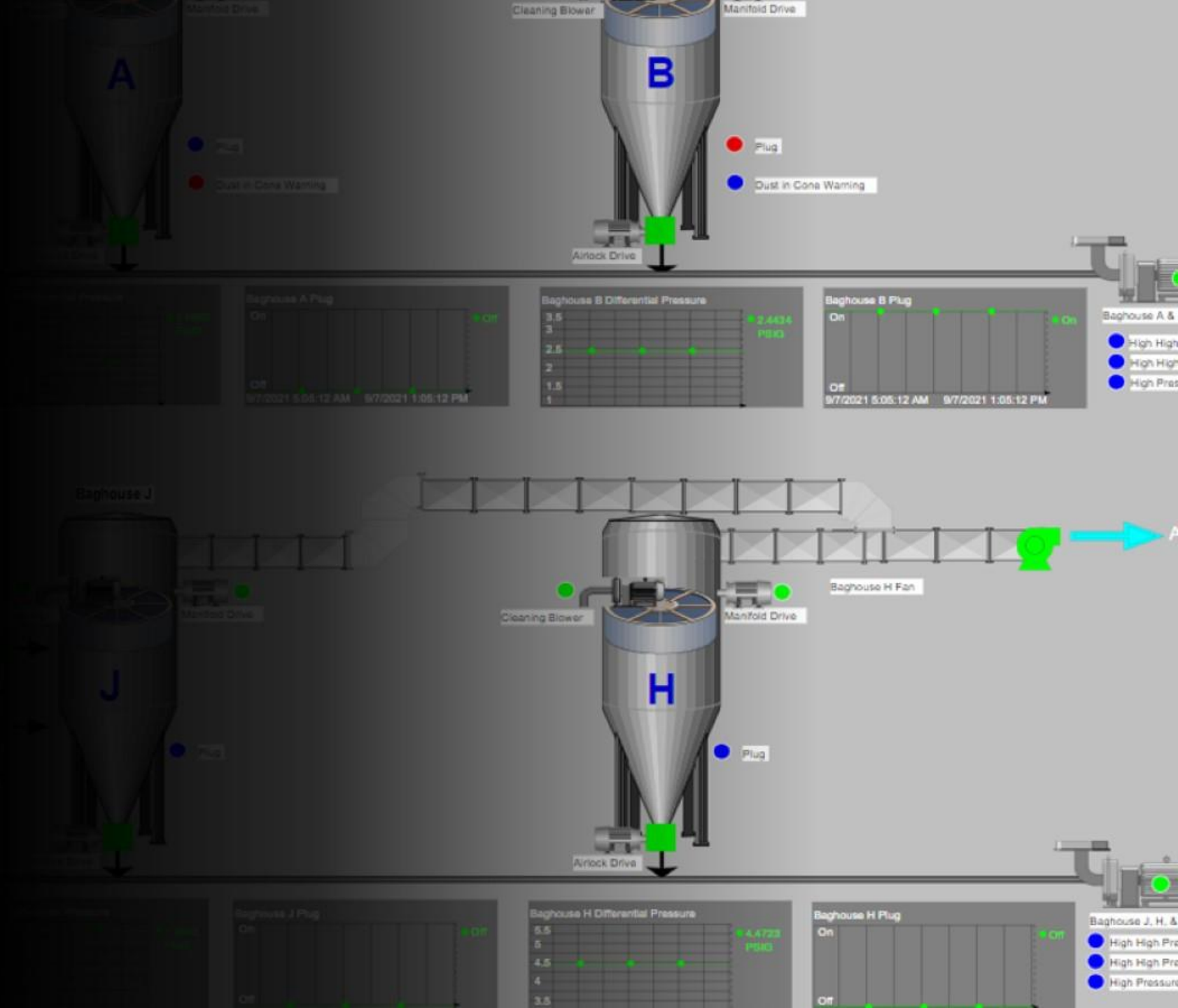
World-class upstream operations

Challenge

- With the investment into structures, new equipment, capacity and increased production, our management team wanted real time visibility into the health and status of our equipment at any given time.

- Achieve higher availability and lower maintenance costs

Solution

- Deployed the AVEVA PI System technology including PI AF and PI Vision as an advanced foundation for Process Monitoring, Condition Based Maintenance & Diagnostics

Benefits

- Increased production and operational efficiency, reduced costs, exception-based surveillance, significantly accelerated 'Time to Resolution' for maintenance teams.

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Maintenance and Reliability Leader

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Kris Stone - TEMCO

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TEMCO - Kalama

Kalama, WA