



CASE STUDY **FAN FAULT DETECTION** **IN STEEL PLANT**

April 17, 2025

BACKGROUND



CUSTOMER

A leading global steel manufacturer with an annual capacity exceeding 10 million tons and generating over \$15 billion in revenue. The company produces a wide range of steel products, including hot rolled coils, plates and sheets, billets, as well as cold rolled annealed coils and sheets.



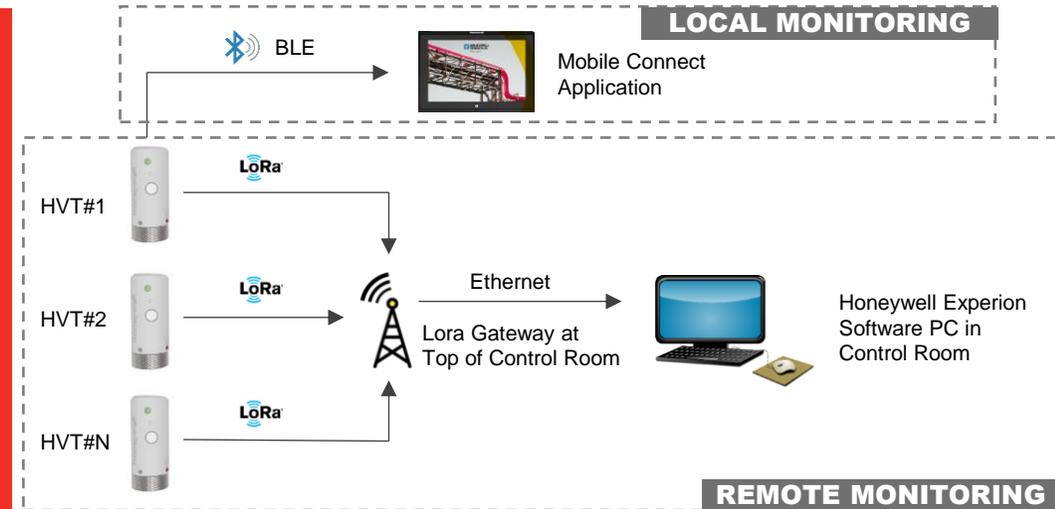
CHALLENGES

- The customer had previously implemented equipment monitoring systems for certain gearboxes and motors.
- Seeking alternatives that offer multi-parameter measurements in a single device.
- Customer required enhanced features related to vibration data.
- There was also a need for email alerts to notify the central monitoring team of machines exhibiting abnormal vibration levels, enabling prompt action.

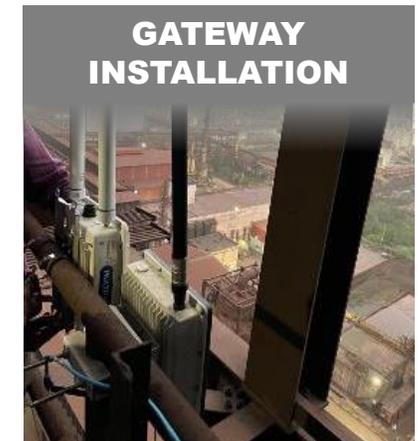


SOLUTION

- Honeywell proposed the implementation of its on-premise LoRaWAN-based Honeywell Versatilis Equipment Health Monitoring solution to monitor conveyors, fans, motors etc.
- This solution empowered the Electrical & Automation team to receive remote alerts regarding asset conditions directly through email notifications.
- A total of 47 sensors were installed across 17 machines in the Direct Reduced Iron (DRI) section of the steel plant, with power ratings ranging from 30 kW to 500 kW at 1470 RPM.



SOLUTION ARCHITECTURE IMPLEMENTED



DRI – DIRECT REDUCED IRON

MACHINE AND TRANSMITTER DETAILS

Asset Type:

Fan

Rating:

500 kW, **1487** rpm

Asset Name:

Bottom Seal Gas (BSG) Dedusting system

Function:

BSG is used to remove dust particles from Product Discharge Chamber (HDRI feeding system) and vent out to atmosphere. If it fails, bubbler will jam, and furnace seal may break. HDRI Feed will be stopped to Steel Melting shop.

Measurement Parameters:

Measurement parameters encompass a variety of metrics, including 3-axis acceleration and velocity, surface temperature, noise levels, ambient temperature, ambient pressure, and humidity. This data provides thorough insights into the performance of the deoxidizing fan. Root Mean Square (RMS) data is transmitted every hour, while 36 Fast Fourier Transform (FFT) peaks are reported every 8 hours, along with measurements of 10 energy bands.

Transmitter Location:

Motor Drive End; Motor Non-Drive End ; Fan Coupling End



HDRI – HOT DIRECT REDUCED IRON



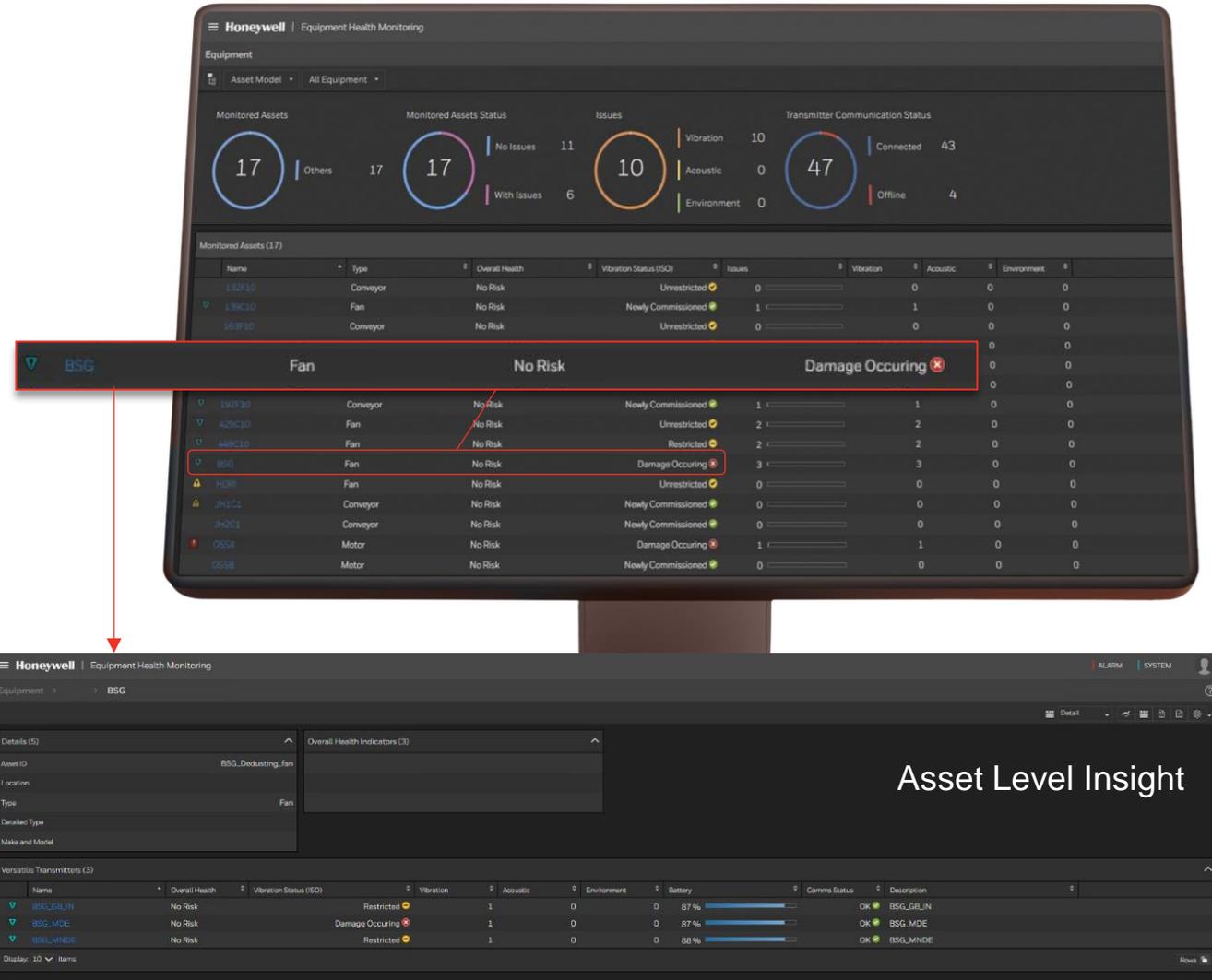
Honeywell Versatilis Transmitter installed on BSG motor & Fan Coupling End (Red circled)

REMOTE MONITORING PLATFORM EXPERION EHM



MEASUREMENT PARAMETERS

- Customer accessed Experion EHM (on-premise) dashboard which provides site level asset health status.
- ISO 10816-3 standard was used to monitor all 17 machines.
- One of the deoxidizing fans got the ISO Vibration Status to “Damage Occurring” Mode as highlighted in the figure.
- Customer was alerted about the rise in trend in all 3 sensor location.

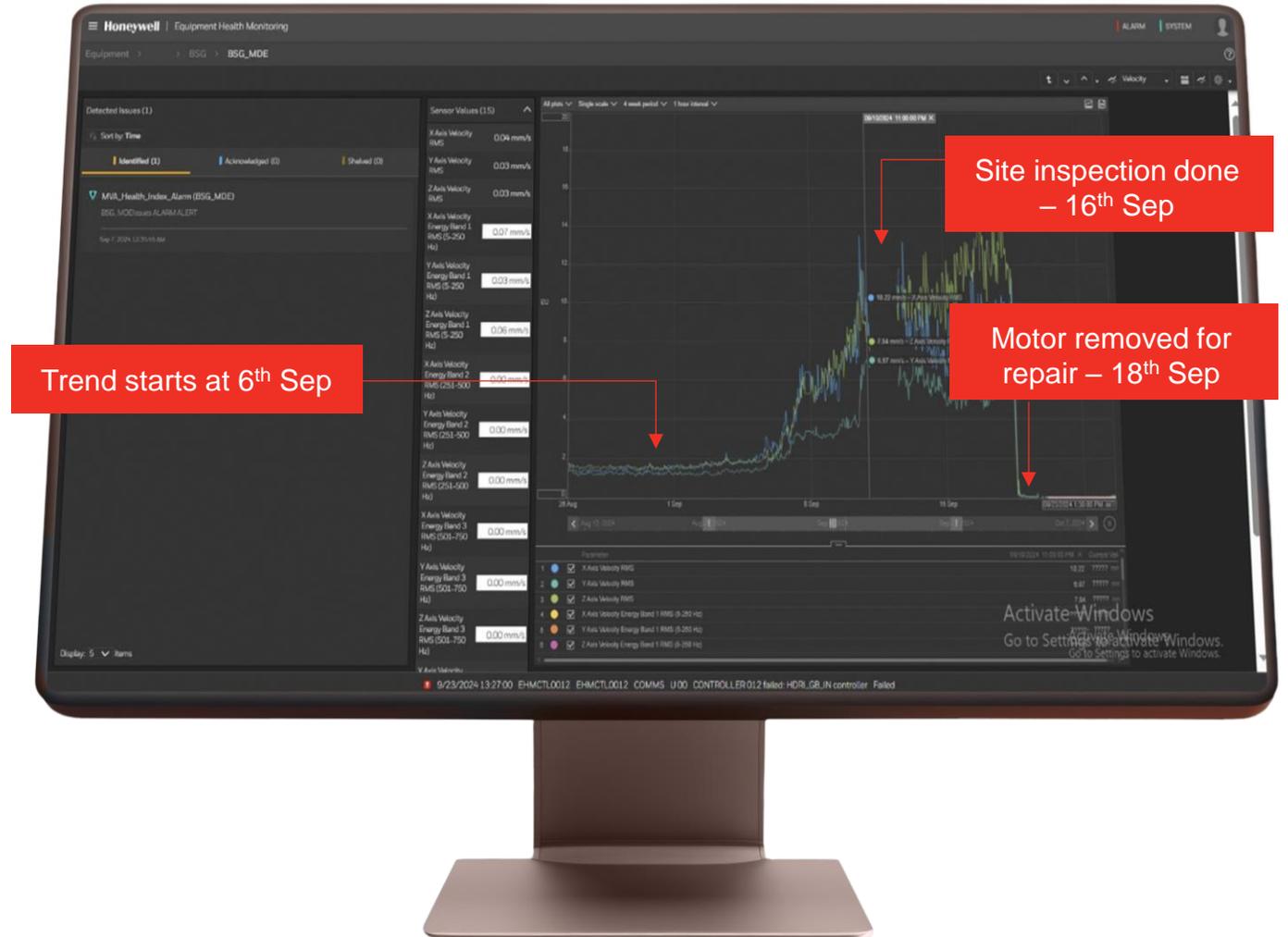


FAN VIBRATION ANALYSIS: MOTOR DRIVE END



OBSERVATIONS & FINDINGS

- Motor Drive End transmitter showed higher vibration level as compared to ISO 10816-3.
- Velocity level increased from 2 mm/s to 16 mm/s within 10 days of alert.
- The alert helped customer plan the maintenance work on motor by early warning and significant cost saving by avoiding secondary damage.
- After replacement, the velocity readings are below 1 mm/s.

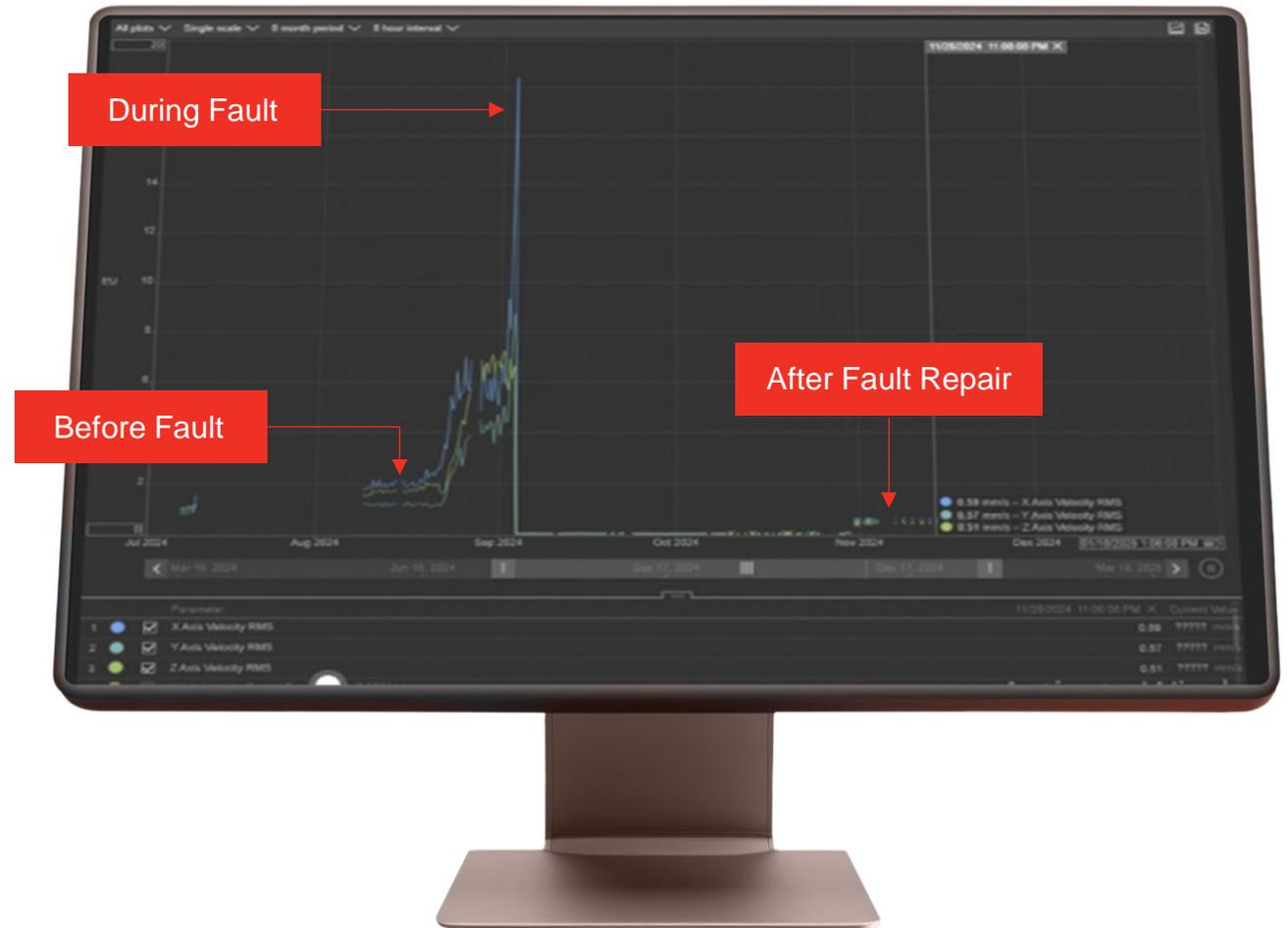


FAN VIBRATION ANALYSIS: MOTOR NON DRIVE END



OBSERVATIONS & FINDINGS

- Motor Non-Drive End transmitter showed higher vibration level as compared to ISO 10816-3.
- Velocity level increased from 2 mm/s (Before Fault) to 18 mm/s (During Fault) within 10 days of alert.
- After motor replacement, the velocity readings are below 1 mm/s.



FAN VIBRATION ANALYSIS: FAN COUPLING INPUT



OBSERVATIONS & FINDINGS

- Fan coupling end transmitter showed higher vibration level as compared to ISO 10816-3.
- Velocity level increased from 3 mm/s (Before Fault) to 12.2 mm/s (During Inspection) within 10 days of alert.
- After motor replacement, the velocity readings are around 3 mm/s.



TROUBLESHOOTING CUSTOMER MONITORING TEAM



OBSERVATION

- Found 29.1X order in the vibration spectrum in the horizontal direction at both Motor drive end & non drive end
- Found 12.4X order in vertical direction at Motor end
- G's value at Motor Drive end & non drive end is very high



RECOMMENDATIONS

- Check the condition of the bearings of the Motor Drive End & Non-Drive End



DAMAGED BEARING OF MOTOR FROM INSPECTION

CUSTOMER FEEDBACK ON SOLUTION



MULTIPLE SENSING

- Sensing of multiple parameters in addition to vibration could help detect process and ambient condition issues



LESS TOTAL COST OF OWNERSHIP COSTS

- Third party Gateways
- No data transfer cost



LONGER DISTANCE COVERAGE

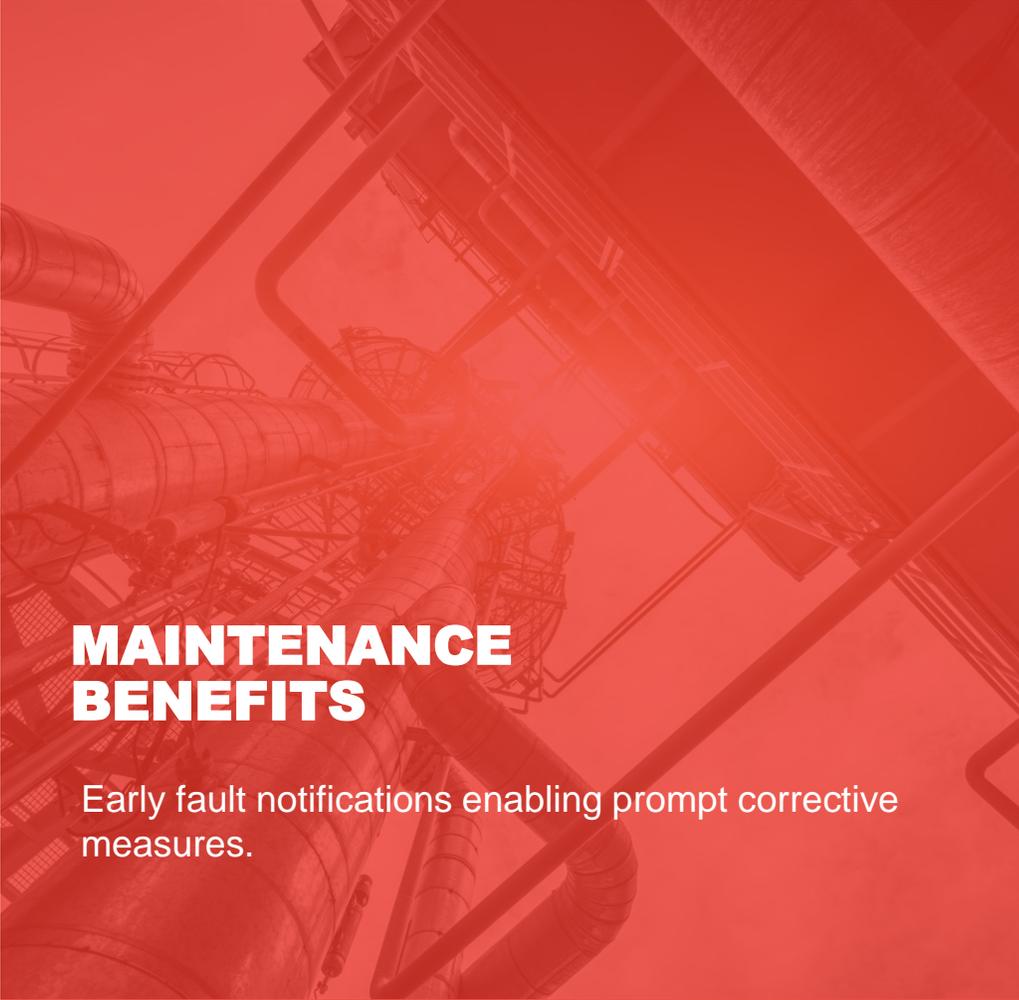
- In structural environments, sensor covers extensive distances using LoRaWAN technology.



SIMPLE SOLUTION

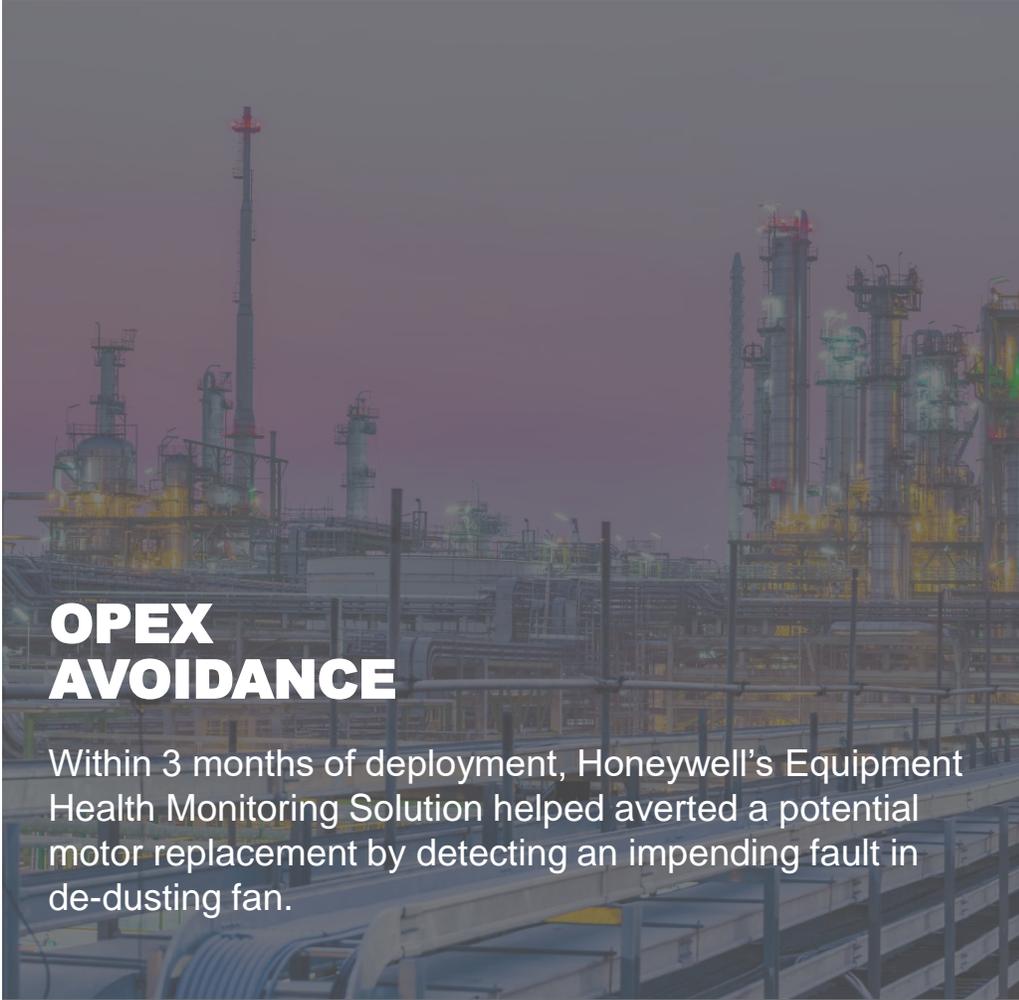
- Basic alerts for abnormal conditions proved to be highly effective.

KEY BENEFITS DELIVERED



MAINTENANCE BENEFITS

Early fault notifications enabling prompt corrective measures.



OPEX AVOIDANCE

Within 3 months of deployment, Honeywell's Equipment Health Monitoring Solution helped avert a potential motor replacement by detecting an impending fault in de-dusting fan.

HONEYWELL **VERSATILIS®** **TRANSMITTER**

Honeywell Versatilis® Transmitters unlock the possibilities for condition-based monitoring of rotating equipment, including pumps, motors, compressors, fans, blowers and gearboxes. Low power consumption and easy installation helps manufacturers, and easy installation helps manufacturers to deploy it at a scale while keeping OPEX low.

ARE YOU LOOKING TO EMBRACE THE PREDICTIVE MAINTENANCE?

