CASE STUDY

Early detection of concealed damages: Failed piston rod

Application

- LDPE Plant in Brazil
- Booster/Primary compressor
- Manufacturer: Demag
- Gas: Ethylene
- No. stages: 5

A condition monitoring system using vibration, dynamic pressure, piston rod drop and several process instruments was installed, and within six months, the compressor was stopped due to high vibration.

Trended crosshead slide vibration for a period of approximately two hours prior to the shutdown. Vibration increase is limited to the piston rod load reversal positions, indicating a clearance at the piston rod connections.

RMS crosshead vibration in 3-D trend view for a period of one hour prior to the shutdown. The piston rod position analysis provided additional evidence of the root cause.

The peak-to-peak value per revolution increased up to 250 μm. The analysis of the recorded signals revealed typical indications for a loose piston rod connection.
The analysis of the recorded signals revealed typical indications for a loose piston rod connection. The maintenance team inspected the connection and the first impression was that the connection was still ok. Because operators were alarmed by the information they received from the PROGNOST®-NT monitoring system, they intensified the search for the root cause and opened the piston rod crosshead connection. This revealed that the piston rod was in fact broken within the thread region of the connection.

By analyzing the short term trend of rod-drop peak-peak displacement it was possible to figure out that the most probable cause of failure was a broken piston rod.