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DIGITAL TRANSFORMATION THROUGHOUT THE PRODUCT LIFECYCLE

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INTRODUCTIONS

Howden
has over
6,000 experts in
35 countries

40+ *Service centres*

33 *Manufacturing sites*

With assets installed
in 169 countries



 Denotes countries where we have a physical presence

CUSTOMER ATTACHMENT



Our aftermarket growth strategy is built upon customer attachment as a way to establish strong customer relationships throughout the equipment life-cycle and provide operational insights.



Reliability



Availability



Performance

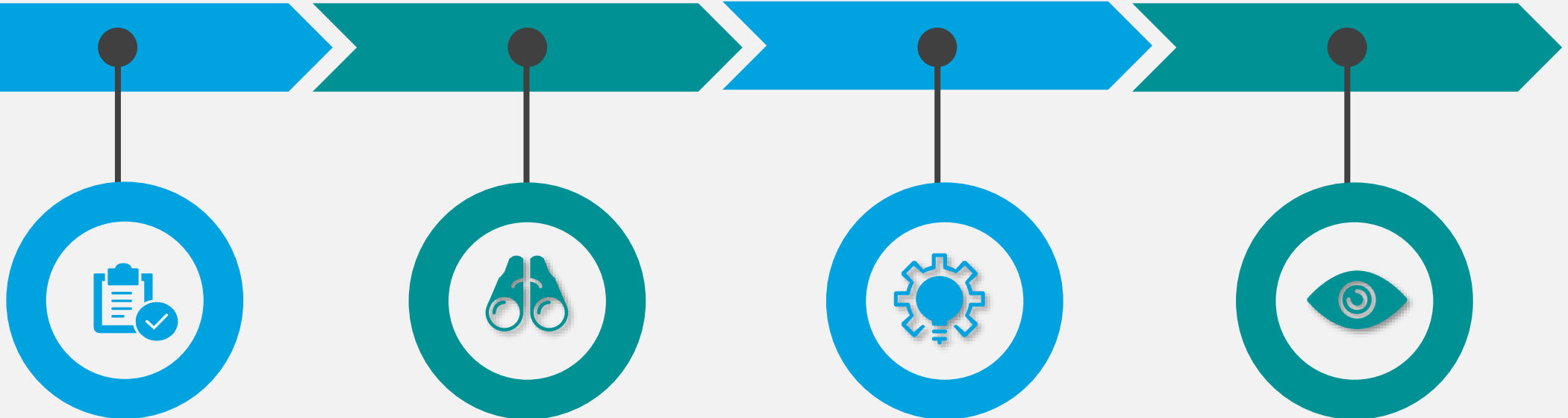
Customer intimacy throughout the product lifecycle

Design and
Manufacture

Commissioning &
Warranty

Aftermarket
Services

Renewal &
Expansion



Manufacturing Localisation

Remote collaboration &
Design

Digital Warranty with every New Build product

Asset connected at no extra cost
during commissioning phase

Service Agreements

Optimisation of asset
maintenance needs through
customer tailored agreements

Customer Success

Best-in-class service execution
capabilities coupled with local
presence & product know-how



DESIGN & MANUFACTURE

DESIGN & MANUFACTURE



DESIGN & MANUFACTURE

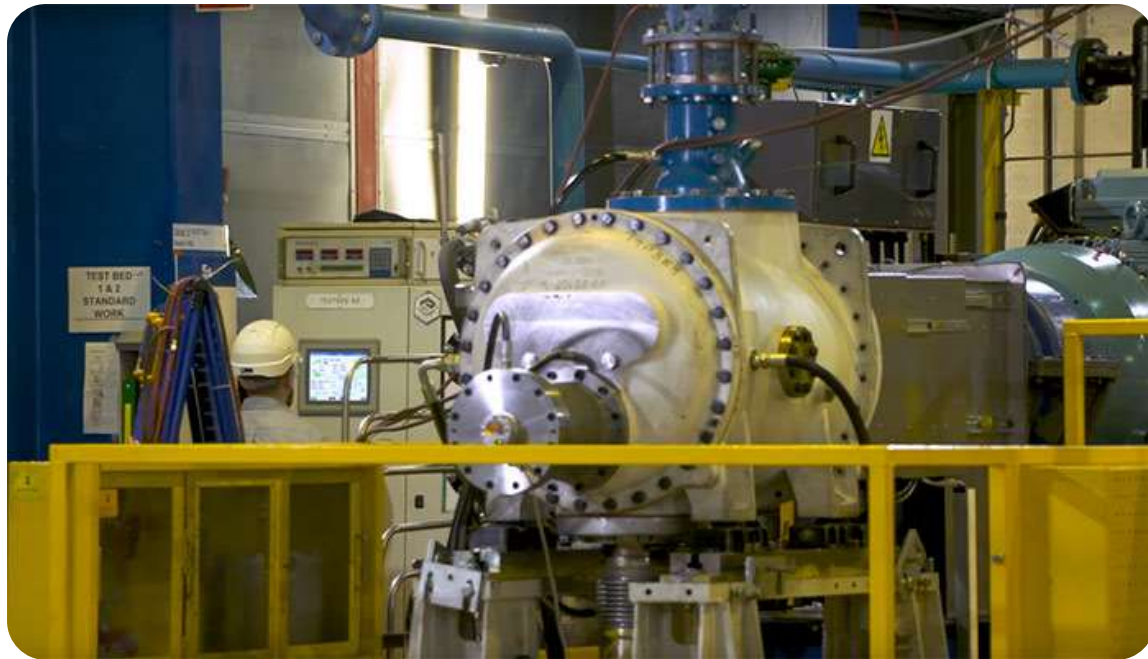
The screenshot shows the vuforia editor interface. On the left, there is a sidebar with navigation options like 'Home', 'My Editor', 'Created by me', 'Shared with me', 'Public', and 'Deleted assets'. The main area displays a grid of assets under the heading 'MY EDITOR > HTC > Edith_HTC'. The assets are organized by name, type, date modified, and created by. The right pane shows a detailed view of an assembly step titled 'HTC_Diaphragm Compressor_Assembly_Crankshaft Main'. It includes a 'Recent Solid E Step' section with a toggle and navigation icons. Below this, there are instructions: 'Attach the rings on both sides of the crankshaft' with two small images. A section titled 'Attach plugs' includes a list of steps: 'Place plug on torque wrench', 'Put the wrench 180° around on the plug', 'Attach to the crankshaft', and 'Tighten using the torque wrench'. This section also has two small images. At the bottom, it says 'Part 3 - Attach bearings'.

The screenshot shows a video player interface. The video displays a close-up of a mechanical assembly, likely a crankshaft, with a hand pointing to a specific part. Below the video, there is a progress bar and a timestamp '17 OF 53'. The video content includes the following text: 'Attach first bearing to the crankshaft' and 'I Wear the special gloves while handling the hot bearings!'. There is a small thumbnail image of the assembly process below the text.

- 21. Tighten the special nut...
- 22. Attach second bearing to the crankshaft
- 23. Fully push the second bearing in.
- 24. Tighten the special nut...

DESIGN & MANUFACTURE

- Digital Transformation of Howden Test Studio
- Remote testing
- Optimising equipment performance





COMMISSIONING & WARRANTY

COMMISSIONING & WARRANTY

- Health score predictions on critical assets and sub-components

2x Recip compressors (connected 2019) 1x SG Blower (connected 2020)

Howden Uptime identified a deviation in blower performance which showed the blow-off valve (BOV) was modulating excessively.

Follow up investigation in April 2022 determined the flow meter had drifted out of calibration.

Following corrective maintenance, the BOV is only spending 2% of its time marginally open compared to 70% open pre-maintenance.

This refinery now delivers the same process flow with up to 10% less energy consumption. Customer Savings approx. \$17K/year .



DIGITAL WARRANTY

Advantage

Digital competitors lack new build advantage and customer relationship.



Standards

Industry trends show digital solution/smart products as standard.



Differentiation

Currently leading product differentiation through Howden Uptime in standard warranties.



Key value points



Reduced time to respond to anomalies and failures



Remote monitoring and assistance



Data-driven maintenance planning



Improved accuracy of remaining useful life forecasts



Improves resolution times, communication and transparency



Reduced warranty costs



Enablement of product development



Improved value selling of service agreements and spare parts



Increased support effectiveness



AFTERMARKET SERVICES

AFTERMARKET SERVICE SOLUTIONS

Service Solutions



Service Support

Remote Analytics Centre

- Fleet management and monitoring
- Data analytics
- Technical support on asset operation, maintenance strategies and performance upgrades
- Dedicated Customer Success Manager



Howden Uptime

Asset connectivity for remote health monitoring

- Access to 24/7 online portal
- Asset health score & reporting
- Remote technical support via Howden Virtual Expert
- Dedicated Customer Success Manager

Tailor-made solution based on customer service requirements

Bundle up as many additional features to derive the right service solution

Discounted spare parts

Maintenance planning and unscheduled maintenance support

Equipment health monitoring

Stock management

Training

Asset performance optimisation

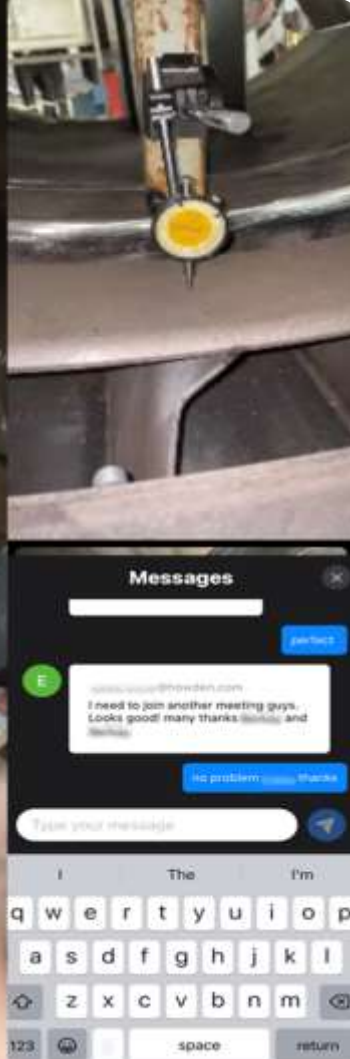


Bespoke analytics

Howden Data Driven Advantage



REMOTE ASSISTANCE

Remote expertise is only a tap away



Howden
Virtual Expert

Messages


perfect

www.howden.com
I need to join another meeting guys. Looks good! many thanks [Name] and [Name]

No problem [Name], thanks

Type your message


q w e r t y u i o p
a s d f g h j k l
z x c v b n m
123 space return



CLOSE

5 of 20

Remove the male housing, using an M12 Hex Socket

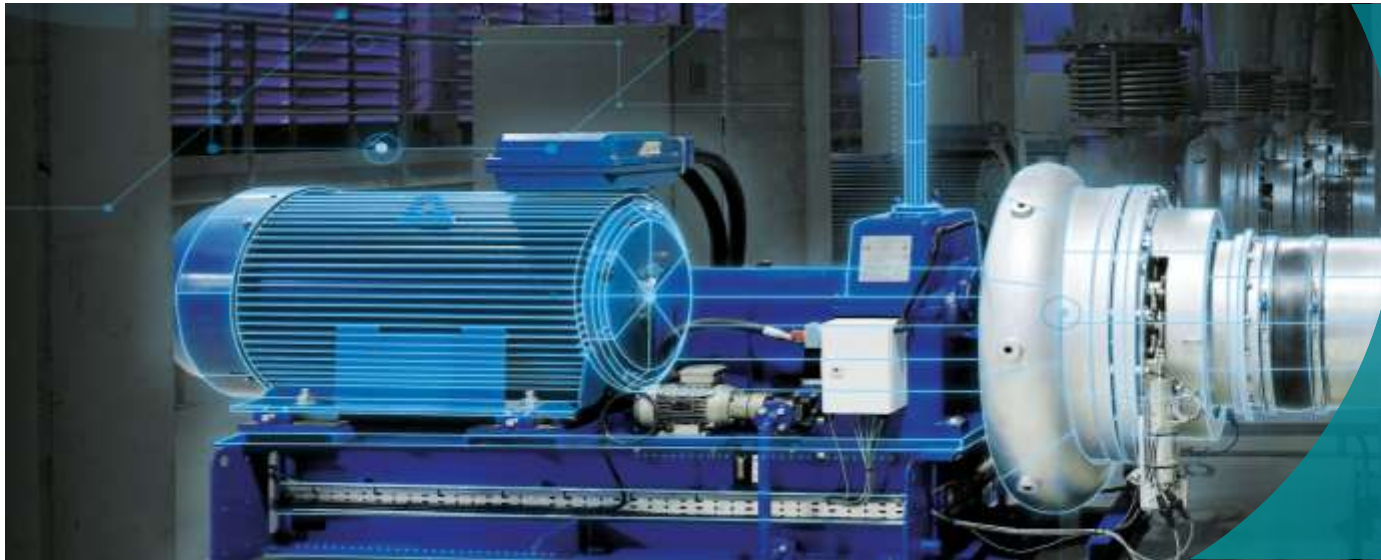


258 SEAL REPAIR



OUTCOMES

DELIVERING CUSTOMER VALUE



Vestfjordens Avløpsselskap West Fjords Wastewater Company

Largest inter-municipal company in Norway

- Oslo 70,5 %, Bærum 21,5 %, Asker 8,0 %
- Population ~ 615 000
- 95 – 105 mill m³/Y wastewater (~ 3 500 l/s)

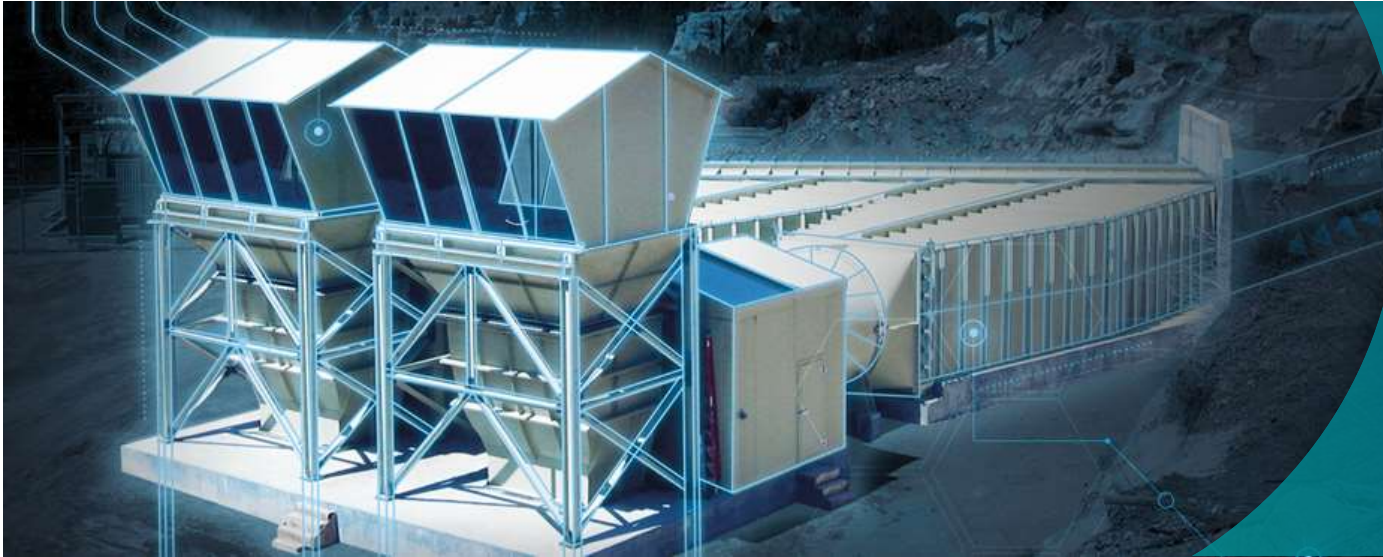
Customer Relationship History

- 1995 purchased 5 compressors from HV Turbo (3 KA5 and 2 KA10)
- Understanding how the equipment operates allowed adjustments to optimize the performance and improve the operational efficiency of the entire Howden fleet.

Uptime enabled 9% efficiency savings

- PLC upgrade that includes dynamic control based on Howden Uptime digital twin calculations
- Impeller resizing retrofit to align blower performance to optimum efficiency
- Purchase of one additional unit
- Howden Uptime digital twin models at the core of future plant controls

DELIVERING CUSTOMER VALUE



Ningtiaota Mine, China

It is essential to have a constant flow of air in the mine to ensure underground safety. If one fan fails, the stand-by needs to start up within 10 minutes to ensure clean air is flowing through the mine. This means the reliability of these fans are vital.

The Solution

- Howden Uptime provides insight into the overall health of the fans and prompts operational adjustments to maximise performance
- This allows the maintenance team, at a glance, to see the overall performance of the fans without having to be on-site

Installing Howden Uptime resulted in energy savings of \$10,000

- After having Howden Uptime installed, a monthly report identified a flow gap of 650m³/min between the two fans
- Howden experts flagged this issue to Ningtiaota and recommended they adjust the blade angle down by 3%
- As a result of this operational change, the maintenance team were able to reduce the motor power by 15-20kW while still meeting the demand of ventilation



QUESTIONS?

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THANK YOU

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