

**Cement**

Chemicals

Defence

Fibre, paper & tissue

Food & beverage

**Marine & port operations**

**Metals**

**Mining & minerals**

Oil & gas

Panelboard

**Power generation**

Rail

**Rubber**

Sugar

Water & wastewater

**FD-Drive**

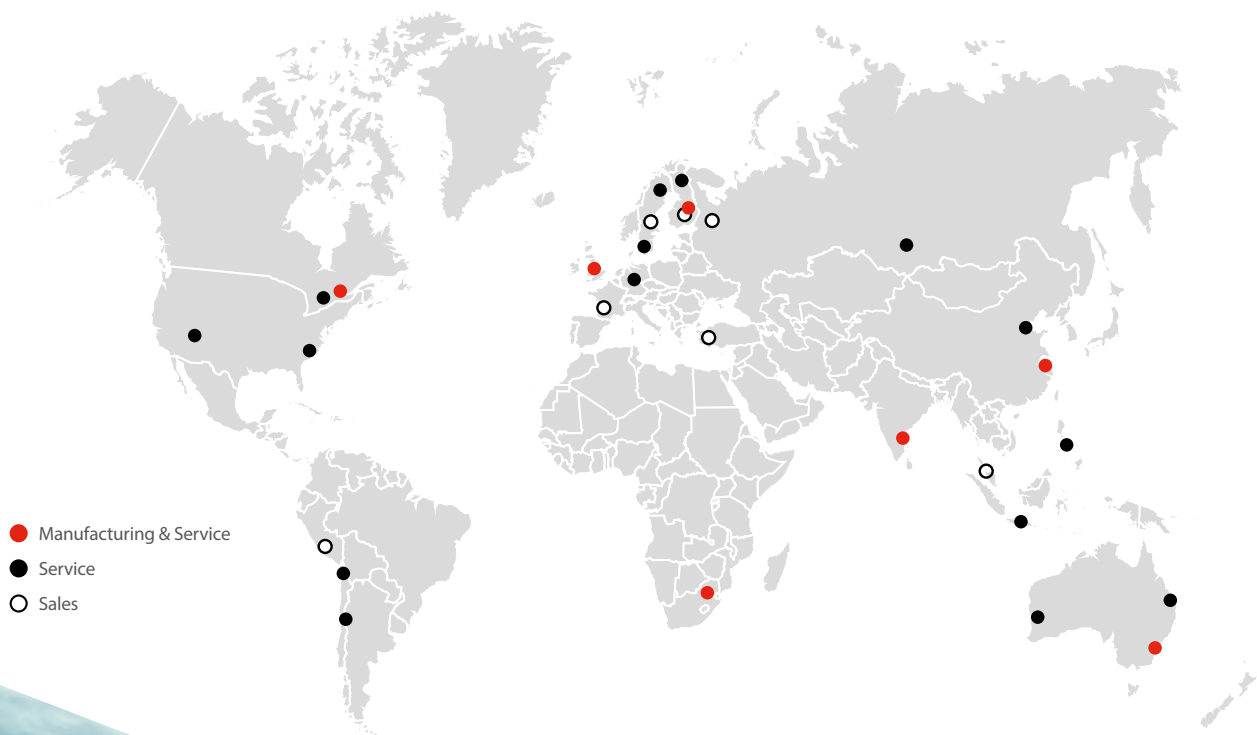
Next generation of gear technology

# Innovative mechanical power transmissions solutions for industry-critical applications

David Brown Santasalo has almost three centuries of combined gearbox design and manufacturing expertise, delivering an unparalleled insight into the environments in which process critical gearboxes operate.

With more than 1,100 employees, seven major manufacturing plants and 23 service centres across six continents, the business is ideally equipped to service its growing customer base in commodities, marine, defence, power, industrial and consumer end markets.

Always at the cutting edge of new technologies, our expert engineers are constantly innovating to deliver optimal results and life extension to gear units worldwide.



# The smartest gear and motor combination in the industry

## Innovation driven by motivation

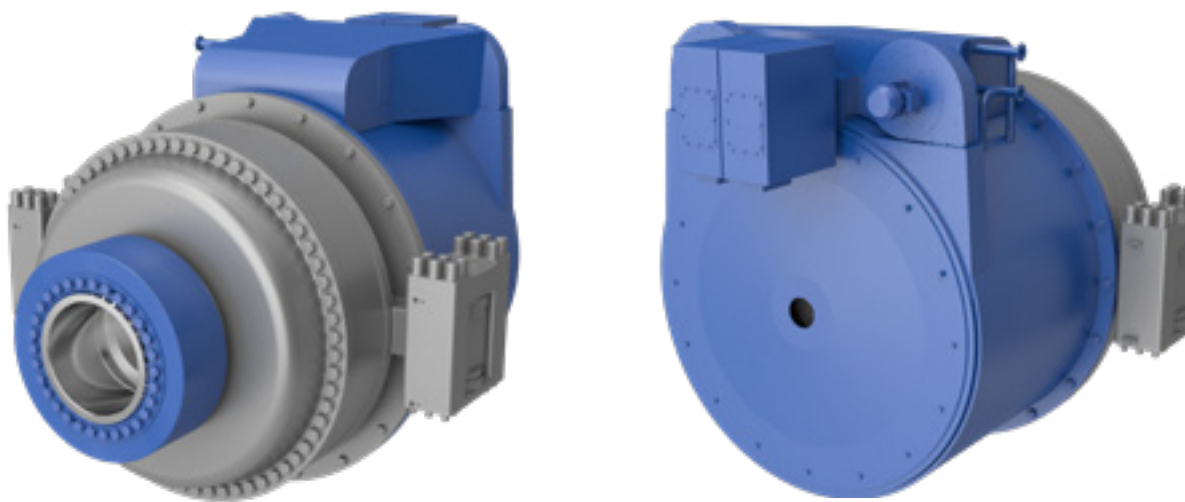
The FD-Drive is a fully integrated planetary reducer and permanent magnet motor construction with no separate motor bearings. This enables market leading torque density and compact size when compared to traditional technologies.

With patented Flexspider technology and stiff planet carrier, the FD-Drive also ensures optimal load sharing inside its planetary stage for optimised efficiency.

- Replaces motor or motor and gearbox in the drivetrain
- Planetary reducer fully integrated with a permanent magnet motor with common bearing arrangement
- Available with 1-or 2-stage planetary design
- Currently the product range goes from 2MW to 9MW and up to 9000kNm nominal torque
- Compact size, excellent torque density
- Highly scalable according to customer needs

Combines benefits of state of the art planetary gear design and Permanent Magnet Motor – both proven technologies, providing:

- Efficient air cooling inside the motor
- Form wound windings
- Low cogging torque
- No need for external excitation
- No slip-rings or rotor windings
- No separate motor bearings



# The best serviceability in the market

FD-Drive requires minimal maintenance. Right from the beginning, FD-Drive has been designed with easy serviceability in mind. The gear and motor components can be split and all components are changeable on site. The small size, simplified structure and foundations and great serviceability reduce the total life cycle costs.

## Rigorous testing procedures

- First two pieces of 3MW (3000kNm LSS torque) FD-Drives with 2-stage planetary, fully integrated to a PMM motor were manufactured, tested and officially verified to the wind industry in early 2012
- The units were test run for three months back-to-back, with full load including cold starts in the weather chamber (-35 C) before they were taken apart for inspection
- Overall efficiency was defined at 96.6% for the 2-stage planetary +PMM
- Actual test procedure for the 3MW pilot project illustrated below:

### Component Testing

#### Gear Load Test

#### Test in a Tilted Position

#### FD Idling and Converter Set up

#### FD Back-to-Back Load Test

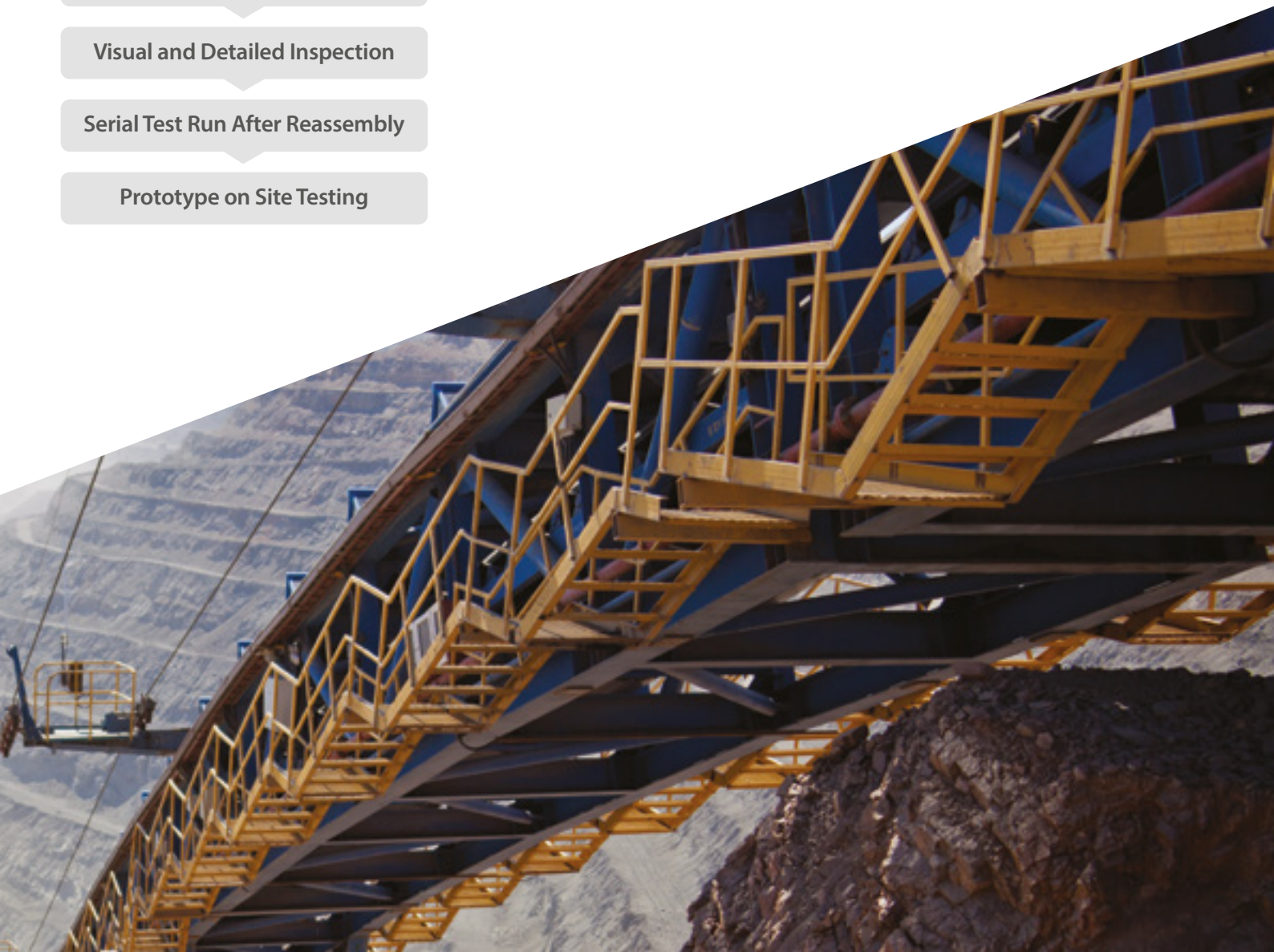
#### Visual and Detailed Inspection

#### Serial Test Run After Reassembly

#### Prototype on Site Testing

### FD-Drive Back-to-Back Test

- Overall electromechanical verification
- Heat run in all operation points
- Dynamic behavior
- Shaft current measurements
- Overall efficiency definition
- Overall sound power measurement

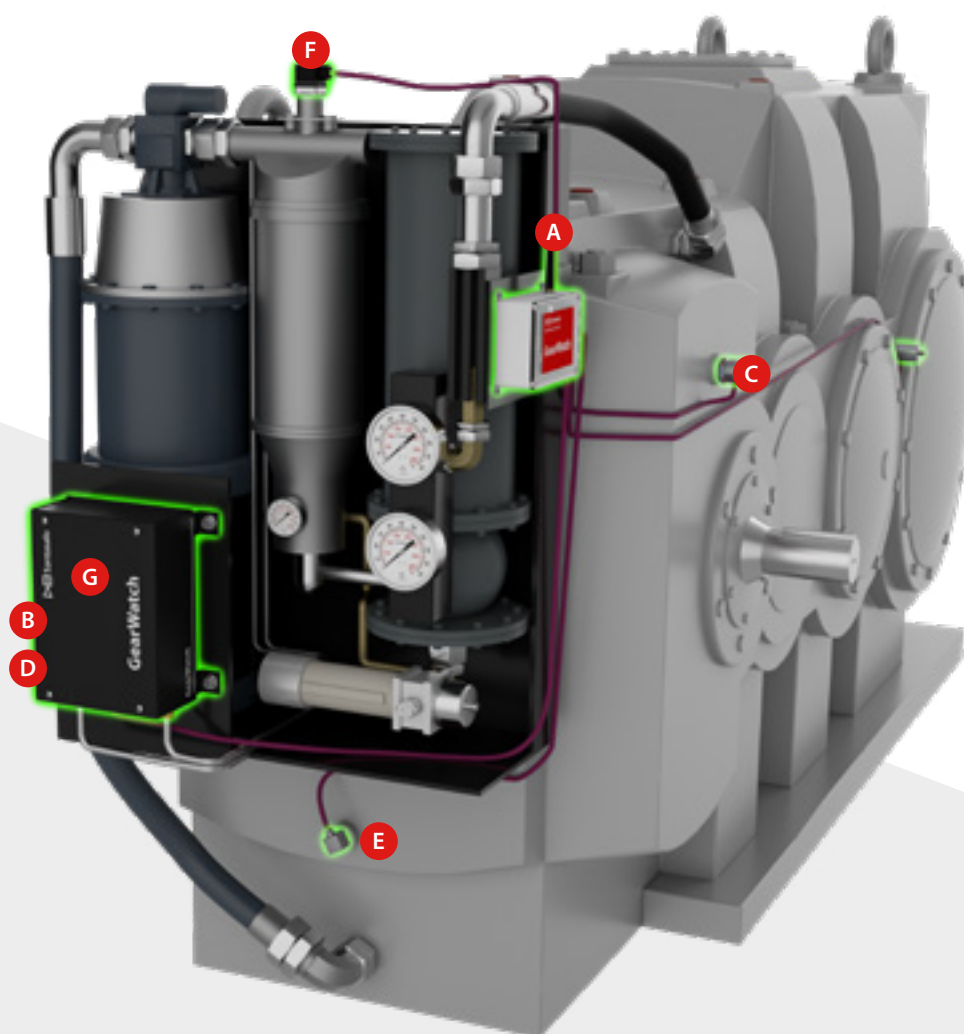


# GearWatch condition monitoring system

Our GearWatch condition monitoring system is a smart, compact and value-adding tool for predictive remote process equipment monitoring. GearWatch measures, records and analyses data, reporting changes in measured parameters in real time, 24/7 via the internet.

Oil particle content monitoring enables early detection of potential gear unit failures months, or even a year in advance. This allows you to plan maintenance activities around your operational requirements.

Available in three packages; DBS GearWatch Standard, oil particle counting which continuously monitors the condition of the gear unit. DBS GearWatch Oil Monitoring, online oil quality measurements are combined with oil particle counting. DBS GearWatch Pro, a tailored monitoring system for gear units & drive trains within selected parameters. It provides comprehensive condition monitoring by combining oil particle & quality measurements with vibration analysis.



**A**  
Smart  
Terminal



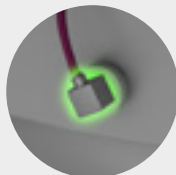
**B**  
Oil Particle  
Counter



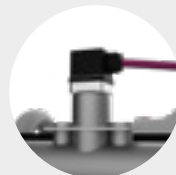
**C**  
Vibration  
Sensors



**D**  
Oil Analysing  
Unit



**E**  
Oil temperature  
Sensor



**F**  
Oil Pressure  
Sensor



**G**  
Oil Quality  
Sensor



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GearWatch Condition  
Monitoring:



[www.dbsantasalo.com](http://www.dbsantasalo.com)

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