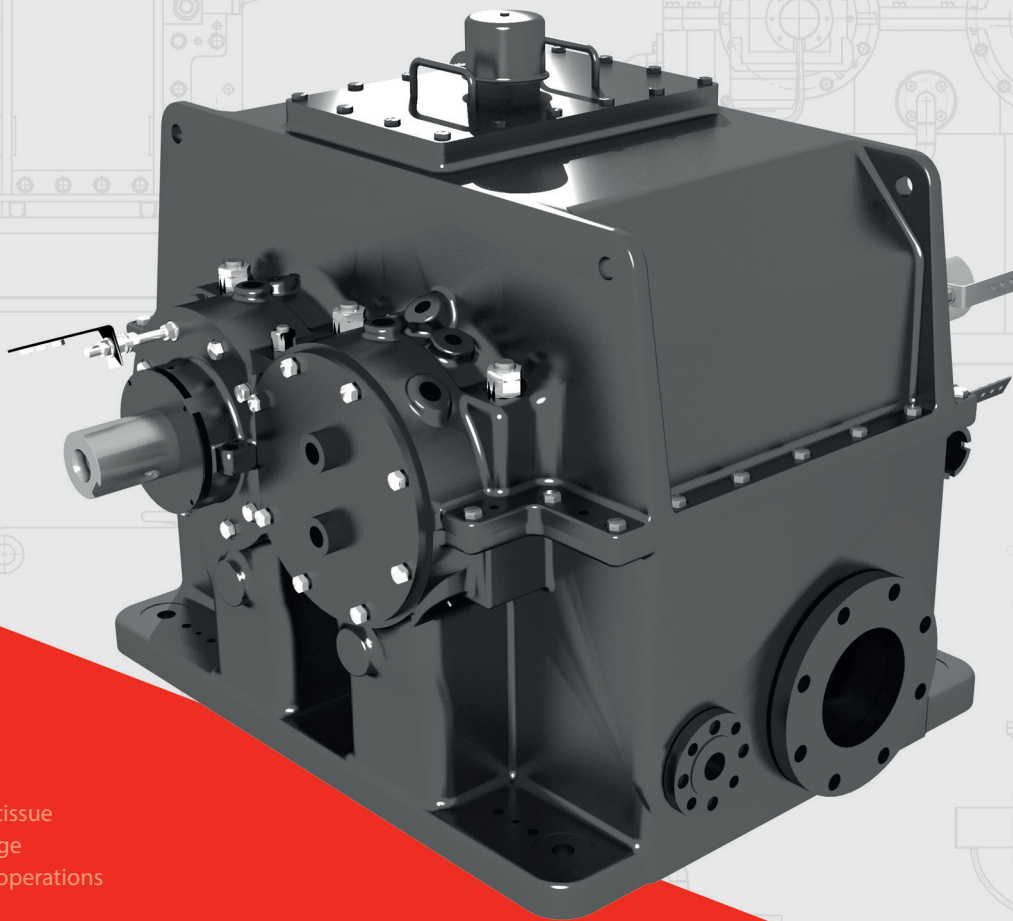




David Brown Santasalo



Cement
Chemicals
Defense
Fiber, paper & tissue
Food & beverage
Marine & port operations
Metals
Mining & minerals
Oil & gas
Panelboard
Power generation
Rail
Rubber
Sugar
Water & wastewater

HX Series

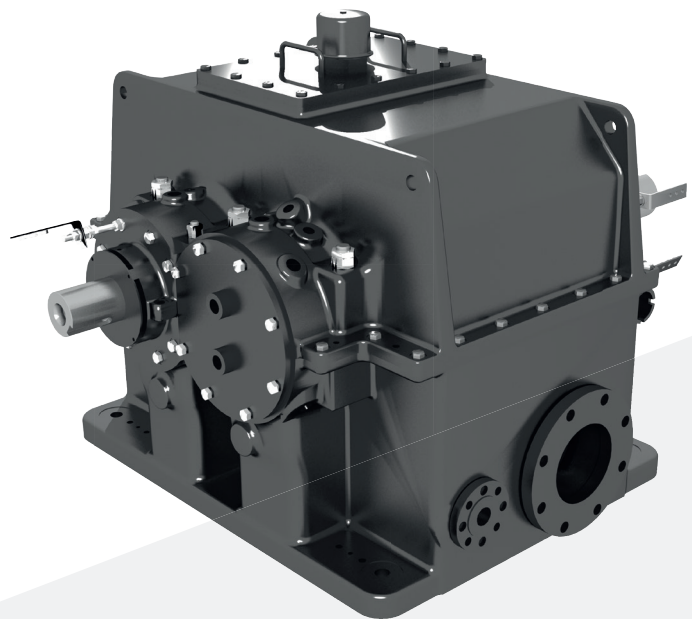
Proven high speed gearboxes
for critical applications

Delivering 100% process availability and significant business benefits to our customers worldwide.

Almost three centuries of combined gear engineering expertise supports the HX series - David Brown Santasalo's modular high speed gearbox for oil & gas and power generation applications.

Maximizing efficiencies

- A core platform that's adaptable to meet your operating requirements
- Delivers 100% process availability for at least five years
- HX gearboxes can be designed and manufactured to comply with API 613, API 677, AGMA 6011 and AGMA 421.06
- Optimized for low noise (<85dB) and low vibration (<2.9mm/second velocity and <4g acceleration)
- Available in rapid turnaround
- Ability to supply lubrication systems, instrumentation, turning gears and clutches
- 5X - five-year warranty on all HX gearboxes





HX thrives in extreme conditions. From 50°C highs in the Middle East to -42°C in Siberia, our gearboxes are renowned for their reliability.

**Reliable, proven
and cost effective gearboxes
for critical applications where
failure is not an option:**

OIL & GAS: Centrifugal pump drives and compressor drives for oil & gas applications.

- Sea water/produced water
- Injection pumps
- Flowline booster pumps
- Pipeline booster pumps
- LNG send out pumps for filling tankers
- Boiler feed pumps
- Decoking pumps
- Descaling pumps
- Gas injection
- Gas production
- Gas boosting/transmission
- Gas compression to LNG
- Gas recompression
- Boil off gas compressors for LNG

POWER: Generator packages

- Renewable energy
- Power transmission
- Power distribution
- Biomass

ALL TORQUE. ALL ACTION.

HX - high speed gearbox technology optimized to suit your specifications.

Compliant to all international standards



The HX series complies to:

- API 613
- API 677
- AGMA 6011
- AGMA 421.06
- ISO
- DIN

Gear design optimized for low noise and vibration



Single or double helical gears available as standard:

- Carburized gears as standard
- Through hardened gears available on request
- Nitrided gears available on request

Customized labyrinth seals



- On each shaft end for robust leakage prevention
- Protects from fatigue for longer parts life
- Stand alone or integrated system
- Customized for space restrictions and customer specification

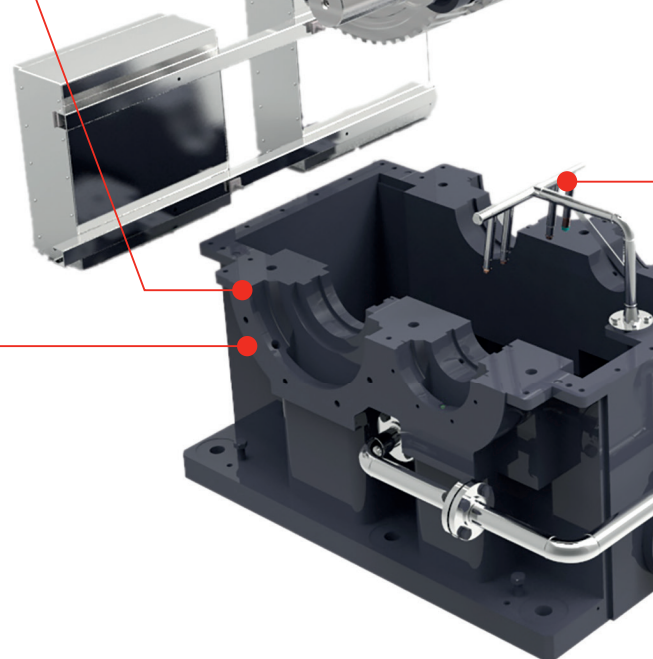
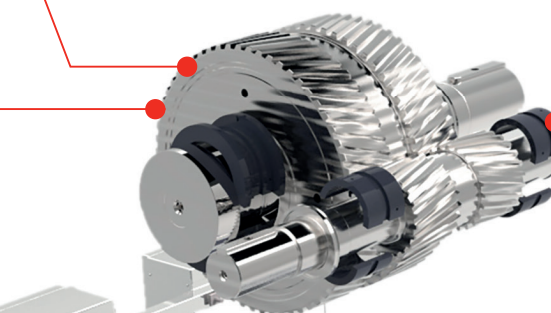
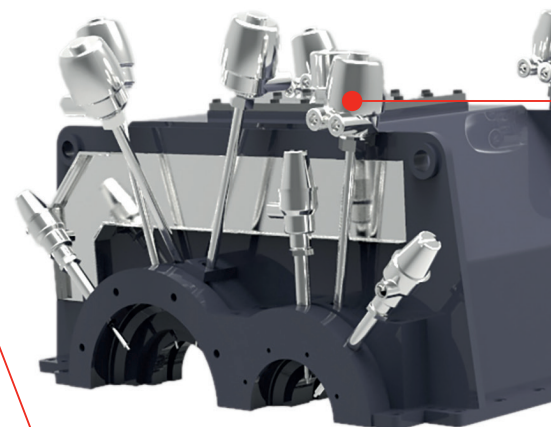
Case options to suit all environments



Folded, fabricated case:

- Eliminates leakage
- Reduces weight
- Optimized cost and lead time

Cast or gray iron is available on larger order quantities



Standard instrumentation packages

Three standard instrumentation packages are available to suit your requirements:

- **Bronze:** minimum instrumentation
- **Silver:** minimum API 613 instrumentation
- **Gold:** maximum API 613 instrumentation

Bearing choices available to suit all application demands

Bearing options to suit all HX configurations:

- Rolling element
- Plain white metal bearings
- Tilting pad bearings
- Taper land thrust bearings as standard
- Tilt pad thrust bearings for API 613 compliance available

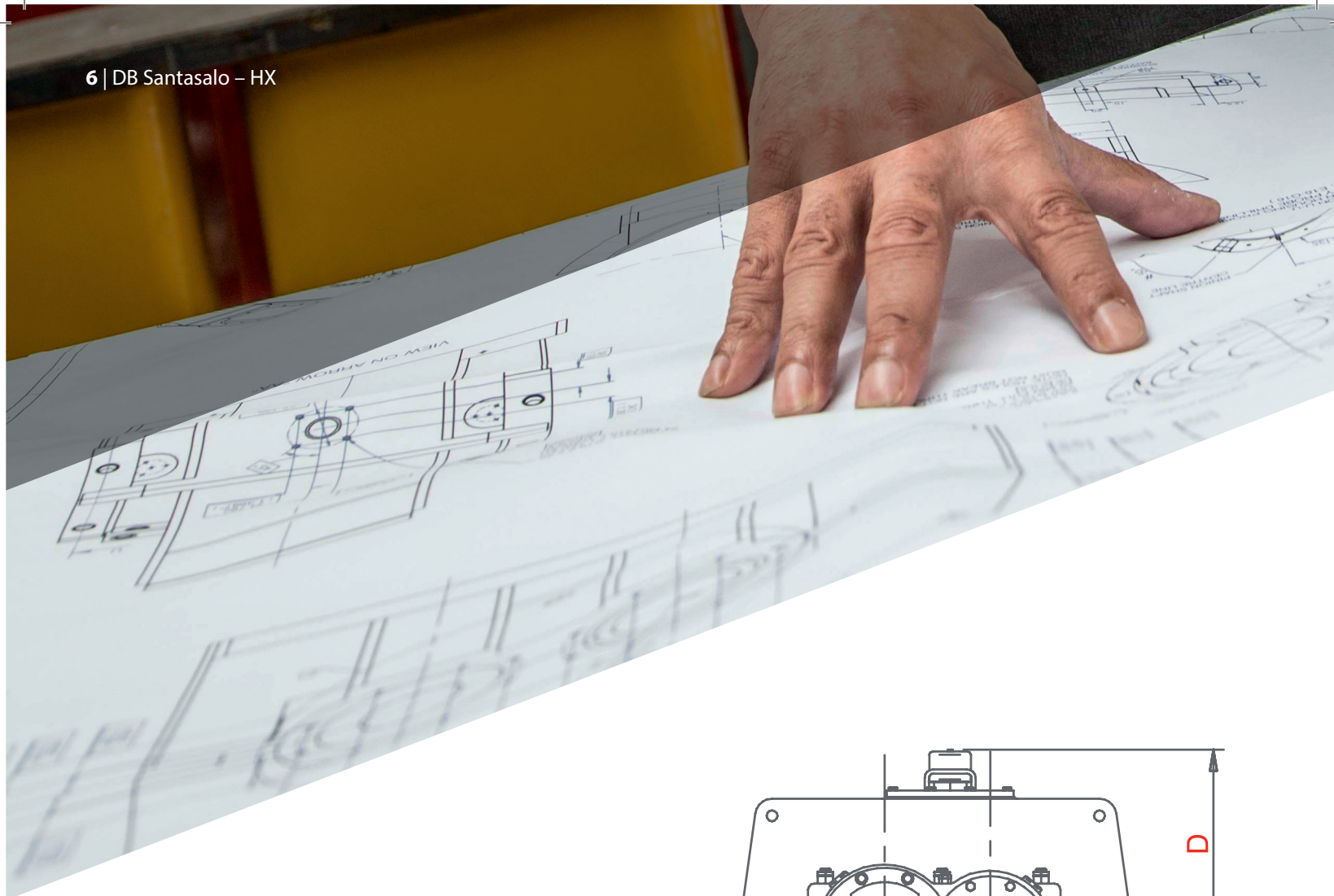
Optimized oil flow requirements

Lubrication requirement:

- Specific and efficient gear meshing
- Optimized lubrication system
- Cost of packaging reduced

Flexible case design for optimized packaging on first installation

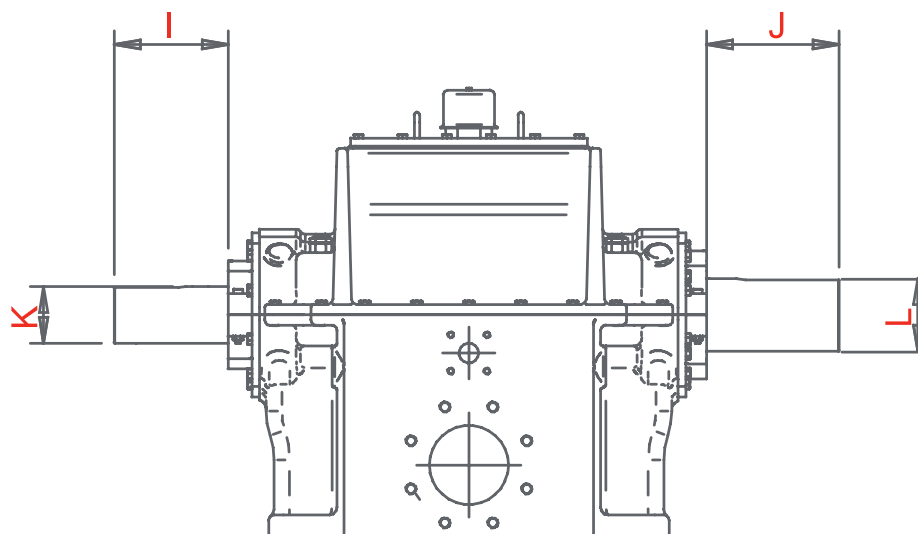
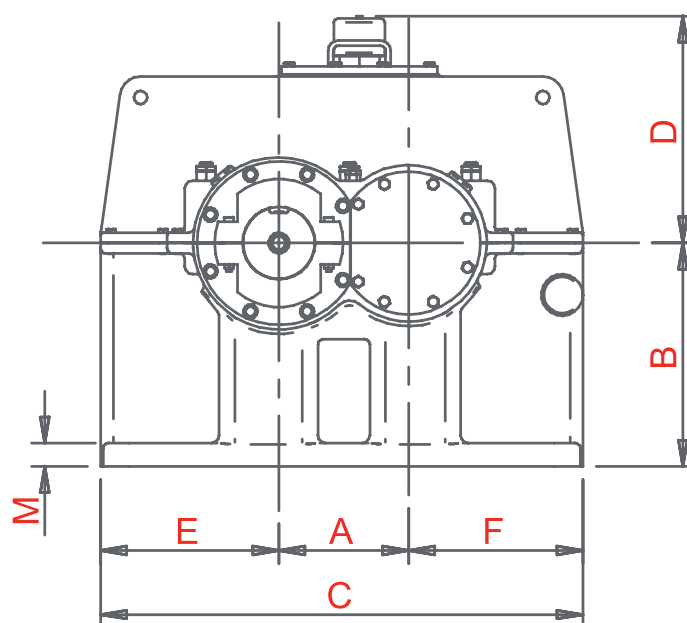
Simplified packaging and minimized pipe runs as a result of flexible oil inlet/outlet locations. ANSI or DIN oil flange as standard.



Model range

The HX series is based on 11 frame sizes, incorporating key center distances in both low and high ratio combinations.

The casing width is always optimized according to your application and required ratio.



Low ratio

- Ratios 1.2 to 4.1
- Optimized ratios beyond 4.1 are available on request

	A	B	C	D	E	F	I	J	ØK max	ØL max	M	
											Cast	Fabricated
HX200	200	400	810	430	290	320	165	205	100	125	40	65
HX250	250	430	950	485	340	360	205	260	125	160	45	65
HX280	280	460	1030	520	370	380	230	295	140	180	50	65
HX315	315	500	1135	560	410	410	260	325	160	200	55	65
HX355	355	540	1245	600	440	450	295	365	180	225	55	65
HX400	400	590	1370	650	490	480	325	405	200	250	65	65
HX450	450	640	1520	720	540	530	365	455	225	280	65	84
HX500	500	690	1650	770	590	560	405	510	250	315	70	84
HX560	560	750	1800	830	640	600	455	575	280	355	70	84
HX630	630	820	1990	900	700	660	510	645	315	400	75	92
HX710	710	900	2180	975	770	700	575	725	355	450	80	92

High ratio

- Ratios 4.1 to 8.5
- Optimized ratios beyond 8.5 are available on request

	A	B	C	D	E	F	I	J	ØK max	ØL max	M	
											Cast	Fabricated
HX200	200	400	770	430	310	260	165	205	100	125	40	60
HX250	250	430	870	485	360	260	205	260	125	160	45	60
HX280	280	460	930	520	380	270	230	295	140	180	50	65
HX315	315	500	1045	560	430	300	260	325	160	200	55	65
HX355	355	540	1125	600	470	300	295	365	180	225	55	65
HX400	400	590	1230	650	510	320	325	405	200	250	65	65
HX450	450	640	1370	720	570	350	365	455	225	280	65	65
HX500	500	690	1480	770	620	360	405	510	250	315	70	70
HX560	560	750	1620	830	670	390	455	575	280	355	70	70
HX630	630	820	1790	900	740	420	510	645	315	400	75	75
HX710	710	900	1970	975	820	440	575	725	355	450	80	80

HX800, HX900 and high speed gearboxes with larger center distances also available

Options to suit your requirements

The HX series encompasses a range of gear options to suit any high speed application. Flexible product configurations give you multiple options with infinite designs available from our expert applications engineering team.

Multi-stage gearing

- Speed increaser or reducer with multiple shafts
- Ratios >9.5
- API & AGMA compliant
- Double or single helical gear options



Planetary gearing (multiple gear types available):

- Spur
- Single helical
- Double helical
- Single or multiple stage (reducer or increaser)
- Pump and starter options available



Multi pinion/integral gear unit

- Up to 55,000rpm
- Compressor stages 1 to 8
- Single or double helical gearing
- API standard



Right-angle drives

- Designed for irrigation pump, fire safety pump and test bench applications
- Complies to API, AGMA and ISO6336 standards
- Speeds up to 2,000rpm on high speed shaft
- Ratio from 1:1 to 1000:1
- Power from 50kW – 8,000kW



Accessories

The HX series is designed to operate at maximum efficiency with minimum lubrication to reduce costs for packagers and end users. Our customers have access to a range of accessories and lubrication systems from auxiliary pumps through to external lubrication systems for optimum gear operation.

Auxiliary pump

Gear or screw type, the auxiliary pump is mounted on the low speed shaft with the oil flow generated by the rotation of the gearbox. The pump is supplied fitted to the gearbox, ready for the customer's installation.

Self-lubricated gear system

An autonomous lubrication system is available for HX series gearboxes, where the gear case is used as an oil reservoir. Generally comprising an auxiliary pump, filters and a heat exchanger as well as temperature and pressure instruments, the self-lubricating system can be supplied to API 614.

External lubrication system

Comprises an auxiliary pump, starting pump, filters, heat exchanger, temperature and pressure instruments. The HX gear case will be extended and used as the oil reservoir. The external lubrication system can be supplied to API 614.

Accessories	
Turning gear	For easy, trouble-free start up and shut down of the installation
Coupling	Flexible or rigid couplings available
Instrumentation	Temperature and vibration sensors monitor the gearbox for maximum process availability
Acoustic hood	Between -3 to -10 dBa, a blanket or rigid cover on the gear case will meet safety and environmental standards
Painting	Four standards of painting are available to cover all environments from offshore to extreme temperatures



Assurance critical test procedures

All HX series gearboxes achieve full API 613 or AGMA standards to ensure complete reliability in the field. Our dedicated test facilities work to certify the performance of all HX gearboxes for complete peace of mind. Throughout the testing process, bearing temperatures, oil flow and oil temperature are monitored, checked and recorded by a specialist engineer, with thorough examination and analysis performed after each test.

Test and checks include:

- At full speed with no load
- Bearing temperatures, oil flow and oil temperature
- Partial load testing (optional)
- Back to back option for full load test (optional)



Testing expertise

David Brown Santasalo has a dedicated team of specialist test engineers including experienced noise and vibration engineers, equipped with a comprehensive range of noise and vibration monitoring instrumentation.



Quality control

Quality systems and procedures applied during the design, manufacture and testing of the gear units are to ISO 9001 requirements. These systems are assured, approved and monitored by the major agencies in the region of manufacture, ensuring the most rigorous controls are maintained.



Inspection

Inspection points are integrated into the manufacturing cycle from material receipt, through the component manufacturing processes, to final assembly and testing. The latest gear measuring equipment is available to measure pitch, profile and leads.

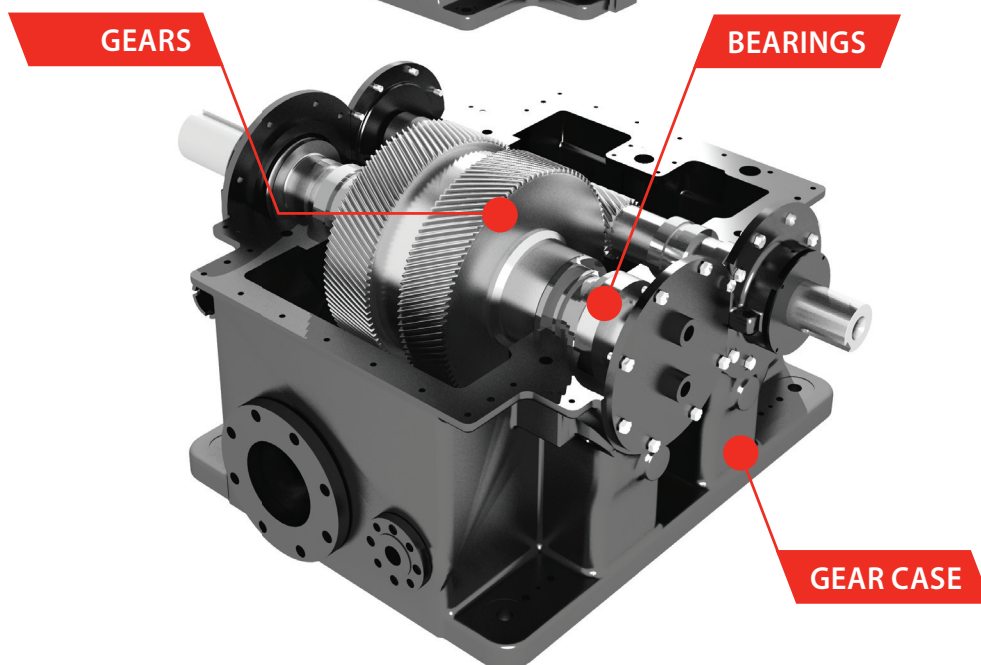
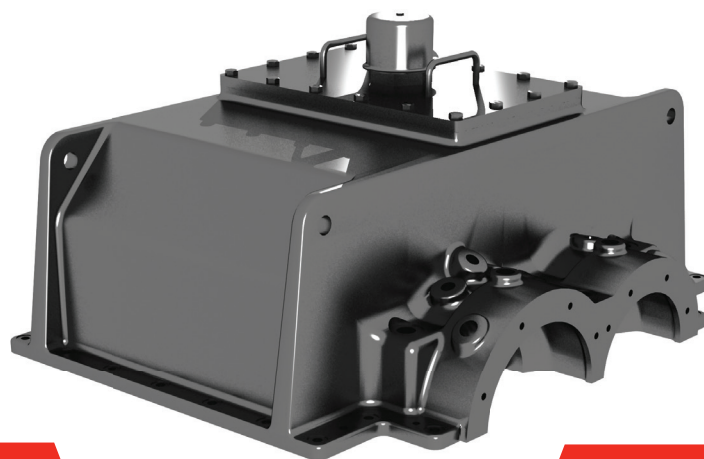




David Brown Santasalo's HX high speed gearing technology is engineered to API 613 standards using dedicated test facilities.

Engineered for complete assurance

Our 5X five year warranty is available on all new David Brown Santasalo HX gearboxes covering the gear case, gears and bearings.



HX delivers peace of mind with complete reliability and no additional service and repair costs for at least five years. A single robust maintenance regime works to lower total cost of ownership for maximum gearbox life and a healthier balance sheet.



Although HX series gearboxes are engineered for a 20 year design life, your gearbox requires regular service and maintenance to ensure 100% process availability. We have 23 gearbox service and repair centers across the globe, which are all fully equipped to deliver regular service and maintenance, field service and support whenever and wherever you need us.

In situ inspection

Using the latest in video endoscope technology, our service engineers inspect your high speed gearbox to ensure all components are running smoothly. Regular in-situ inspections can help identify issues before they cause failure so they are an ideal way to reduce expenditure on emergency repairs.

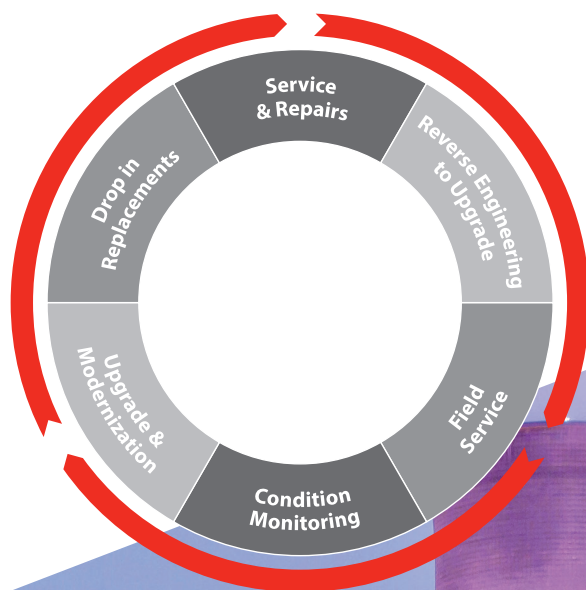
Gearbox repair

Depending on your gearbox model and application, our service engineers can conduct repairs in-situ to reduce downtime to its lowest level. If your gearbox cannot be repaired at site, our teams will strive to minimize the costs associated with removing your gearbox from its application.

Gearbox upgrade

If your current high speed gearbox is not performing as well as it should be or needs to meet enhanced operating requirements, David Brown Santasalo can deliver full upgrade programs. We can thoroughly inspect any make and model of high speed gearbox to provide full technical reports and upgrade recommendations.

Complete assurance with 3X is a free three year warranty available on any high speed gearbox **served, repaired or upgraded** by David Brown Santasalo. 3X delivers complete gearbox assurance for any gearbox brand, as well as access to round the clock support through our global service center network. For more information contact your local David Brown Santasalo representative today.



**FREE THREE YEAR
WARRANTY**





- **Manufacturing & service**
 - Canada
 - China
 - Finland
 - France
 - India
 - South Africa
 - UK

- **Service centers**
 - Australia
 - Canada
 - Chile
 - Dubai
 - Finland
 - Germany
 - Indonesia
 - Peru
 - Philippines
 - South Africa
 - Sweden
 - USA

- **Sales**
 - Brazil
 - China
 - France
 - USA



Global expertise delivered locally

David Brown Santasalo has high speed manufacturing and service capabilities across the globe. Whenever and wherever you need us, we are there to support your high speed gearbox requirements.

Our long-standing expertise gives customers the confidence to trust us with their business critical engineering challenges. With sourcing specialists able to reduce the cost of manufacture – and the ability to recommend the most cost efficient manufacturing & service location – we can deliver real value.

Key features

- Full in-house design, test and manufacturing capability
- All designs optimized for lifetime performance and ongoing maintainability
- State of the art in-house manufacturing provides strong engineering solutions
- Extensive and stringent testing process coupled with an unsurpassed knowledge of gear applications
- Rapid global service support

We know that speed of response, availability and agility are of utmost importance and our global footprint means we have people on the ground wherever and whenever you need us. Whenever you call, we're on hand to complete servicing or on-site maintenance or happy to provide training and manuals for your own maintenance staff. Around the world, our local repair and maintenance teams are committed to supporting you for the life of your vehicle.



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