

CASE STUDY

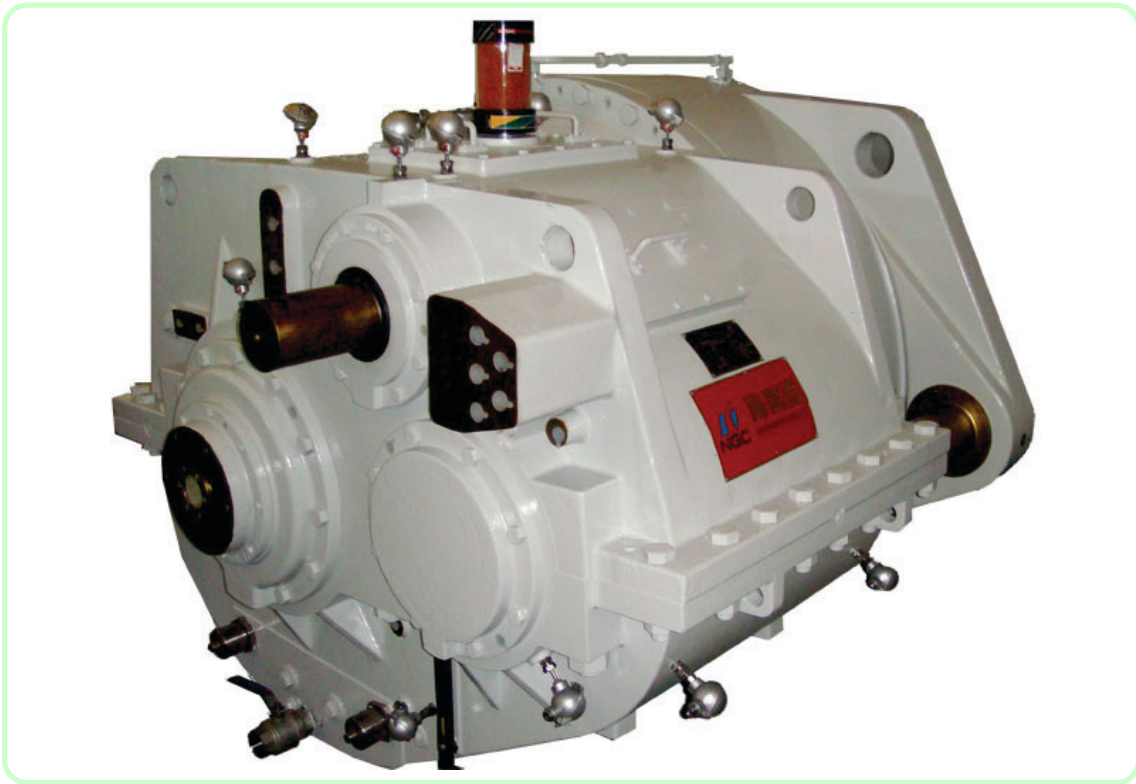
Nanjing High Speed Gear Manufacturing Co., Ltd.

China
Wind Energy
PULSE Platform

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NGC and Brüel & Kjær have worked together since 2006, and NGC has used Brüel & Kjær's PULSE Data Acquisition and Analysis platform for a range of applications ranging from R&D, quality control, production testing and validation to field measurements.

Photos courtesy of Nanjing High Speed Gear Manufacturing Co., Ltd.



The Company

Nanjing High Speed Gear Manufacturing Co., Ltd. (NGC) is a leading gearbox manufacturer for the wind energy market. In 2010, NGC produced 2400 gearboxes and aims at producing 3400 gearboxes in 2011. This will put NGC's scale of production in the global top three.



Nanjing High Speed Gear Manufacturing Co., Ltd.

Fig. 1
NGC mainly produces wind turbine gearboxes. The plant covers an area of 258 acres (172 000 m²) and annual production is approximately 4000 MW



The company has a 80% market share of the Chinese wind transmission equipment market and customers include GE Energy, Vestas, Repower, Nordex, Goldwind Science and Technology Co., Ltd., Dongfang Steam Turbine Works, Shanghai Electric Group Co., Ltd., and Sinovel.

A subsidiary of the holding company Nanjing High-Speed & Accurate Gear Group Co. Ltd., NGC was established on 8 July, 2003 and

began supplying the wind energy market in 2004. Since then, it has expanded its customer base and production scale to become one of the world leaders. NGC is located in Jiangning Science Park, Nanjing, and of its 2437 employees, 295 are engineering technicians.

Wind Energy Growth in China

In China, the growth in wind energy is set to continue at a breathtaking pace. Already in 2009, China accounted for one third of the annual wind capacity additions, with 13.8 GW worth of new wind farms installed. This took China's total capacity up to 25.9 GW, thereby overtaking Germany as the country with the most wind power capacity by a narrow margin.



China will remain one of the main drivers of global growth in the coming years, with annual additions expected to exceed 20 GW by 2014. This development is underpinned by a very aggressive government policy supporting the diversification of electricity supply and the growth of the domestic industry. The Chinese government has an unofficial target of 150 GW of wind capacity by 2020, and with the current growth rates, it looks likely that this ambitious target will be met well ahead of time. (Source GWEC 2009)

Ensuring Product Quality and Continuous Investment in Research, Design and Development

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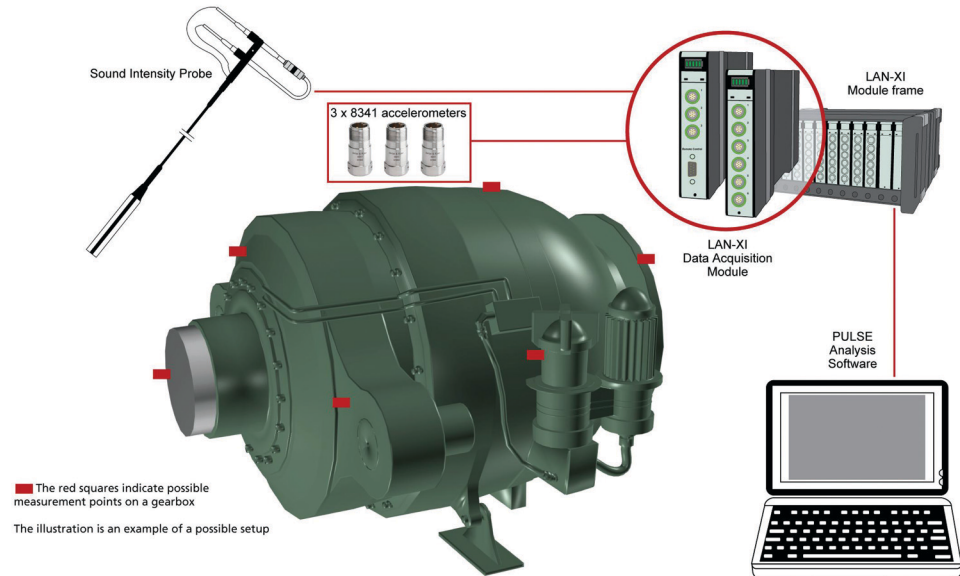
The company's gearboxes range in size – from 3 MW, 2 MW, 1.5 MW right down to 850 to 750 kW. With its latest 3 MW gearbox (see cover picture), NGC has signed agreements with several domestic companies to jointly develop and further improve its development capability and production. The gearboxes are designed and manufactured according to GL Rules, and all transmission components are machined according to ISO 6336 and DIN 3990 standards, ensuring gear accuracy and strength. The large ductile iron parts, such as planetary carriers, housings and torque arms, etc., are all analyzed by FEM to ensure their rigidity and stability. Materials, manufacturing processes, heat treatment and assembly procedures are also strictly controlled thus guaranteeing safe production.

All gearboxes undergo a series of tests and validations. These include nominal power test, 300% load test and stress test. Results show that the gearbox working efficiency is higher, the noise level and temperature rising is lower, and the tooth stress and load distribution are qualified. During testing, a large amount of data was gathered for use as the groundwork for the development of large power gearboxes.

A special lubrication cooling system has also been designed for all gearboxes. This system is internally circulated, and bearings and meshing positions between gears are lubricated impulsively by the oil pump. The lubricating efficiency is highly improved and as a result is more reliable and safe.

Brüel & Kjær plays an important part in ensuring the highest gearbox quality at NGC. Every test bench at NGC's two production facilities has a Brüel & Kjær data acquisition and analysis system and every single gearbox is run through a production quality control measurement program that meets strict customer requirements and ensures the highest customer satisfaction.

Fig. 2
*Diagram of a typical
Brüel & Kjær test bench
system*



Brüel & Kjær setups, similar to the one shown above, are used by NGC for research, design and development purposes. They were used during the development of the new 3 MW gearbox and will also be used for the even larger gearboxes that are currently under development.

NGC does not compromise with quality and totally trusts the products provided by Brüel & Kjær. Equally important are the local presence and the relationship built over the years between NGC and Brüel & Kjær.

In fact, Brüel & Kjær is used exclusively at NGC and key reasons for this include a strong field presence and assistance with test measurement setup, quick local support, reliable quality and the wide range of sound and vibration solutions.

NGC selected Brüel & Kjær back in 2006 for sound and vibration quality control testing after an in-depth evaluation of various suppliers. Today, it has Brüel & Kjær data acquisition and analysis systems installed at all test benches for both quality control in production and R&D.

NGC and Brüel & Kjær both look forward to future challenges, as the demands for larger gearboxes increase and new requirements for quality and reliability have to be met.