
Electric power generation industry

Weir Pumps

Industrial pumps

Bespoke bearing housings

Tapered roller bearings



Partnership leads to a fast delivery

Weir Pumps of Cathcart, Glasgow, part of Weir Clear Liquids Division, is a major manufacturer of high performance pumps and pumping solutions that are used throughout industry. In particular, the company supplies pumps for specialised applications in the nuclear, power generation, petrochemical and water supply sectors, with the majority of the company's products and systems being exported to customers throughout the world.

As part of the Weir Pumps growing global activities it was contracted to supply four vertical concrete volute circulating water pumps for the Qinshan phase III nuclear power station in China.

Located in Haiyan County, Zhejiang Province in the south eastern part of China, the Qinshan Phase III nuclear power plant comprises two 728 MW pressurised heavy-water reactors, which are the first of their kind to be installed in the country.

The pumps manufactured by Weir Pumps are used to supply cooling water to the reactor condensers, which take exhaust steam from the main turbines, and are based on the company's proven concrete volute design. This has a number of important advantages, including high capacity, ease of maintenance and optimum reliability with a long operating life, and is achieved by constructing the pump casing and suction draft

tube on-site in concrete, with the rotating parts being metallic and typically manufactured off-site.

Each of the Weir Pumps' units at the Qinshan nuclear power station has a 3.1 MW electric drive motor, speed-reducing gearbox, and intermediate bearing assembly and shaft system, with the vertical bearing housing assembly, between the drive motor and the pump, being manufactured and supplied by SKF.

SKF's lead-time for the project, from inception to delivery was a challenging twelve weeks. In this short time, the company successfully designed and supplied the bearings, housings, shafts and the interfaces, ready for the completed assemblies to be fitted on-site by the main contractor.



Considerable time was saved due to SKF's knowledge and experience of housing breaking loads, enabling the company to accurately and quickly develop the optimum housing geometry for this demanding application.

The distance between the motor and the pump is some 6.5 m (with 5 m between the motor and SKF housing) with the bearing assembly (750 mm, from flange to flange) being mounted mid-way. The space allowed for the bearing arrangement was approximately that of a standard SKF SD split plummer block housing, which was therefore used in a modified design to maximise the bearing separation. This also enabled the company to design the most cost effective solution without compromising the sealing and operational capability of the unit. The assembly is located immediately above an epicyclic reduction gearbox, the input speed being 1,000 r/min.

The SKF assembly also included a pair of SKF tapered roller bearings with a 180 mm bore, and integrated seal, nut and washer to allow high operating speeds of up to 990 rpm to be achieved. The housing consists of SG iron, which offers greater strength than conventional cast iron, and is coated with an epoxy polyamide paint resistant to 100% humidity and site temperatures of -4 to +40 °C. Combined, these features give a bearing life expectancy in excess of 176,000 operating hours. All the components were inspected and assembled at SKF's engineering workshop.

In addition, by incorporating an oil spray lubrication system, a garter seal could then be used to save space and, because the seal is in close proximity to the oil inlet, the seal lip in contact with the shaft face operates in favourable conditions, providing an extended operating life without the need to harden the shaft.

SKF's technical team worked closely with Weir Pump's designers to produce an effective and reliable solution. Paul Dysiewicz, SKF's Engineering Services Manager, explains that, *'The complete project demonstrates the emphasis that we place on our design and service centre capabilities, which are held in very high regard by long-term customers such as Weir Pumps. These facilities are continually being improved to deliver a service which we see as an essential asset in attracting and developing new partnerships in the future.'*



Tapered roller bearings

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