

Next generation bearing technology for gas-fired power station

Jessica Whelan and Richard Livermore-Hardy look at new large tilting pad radial bearings designed to further improve safety margins.

It is difficult to pick up an industry publication without seeing an article or viewpoint covering the trend away from coal toward natural gas as part of the global power generation mix.

Whether climate-change legislation happens this year, in 2011 or in 2020, project owners and financiers at the very least are 'cautious on coal.' This shift toward cleaner energy is creating increased focus on alternative fuel sources; nuclear energy and the many forms of renewable energy are the targets of technology development, investment and new business ventures.

However, in the short to mid-term, natural gas-driven power generation is the obvious substitute for coal as the economy recovers ... as GDP grows, so does the demand for energy.



This move toward natural gas as a primary source of energy has placed new demands on the makers of gas-fired combustion turbines. Larger, lower emission, and more reliable and efficient machines are required if turbines are to play a more vital role in the global power mix.

In anticipation of these market demands, Waukesha Bearings, a leader in hydrodynamic bearings and magnetic bearing systems, has developed the Next

Generation of large tilting pad radial bearing designs to further improve safety margins and provide superior performance to address the challenges associated with these machines.

The next generation technology was applied to Waukesha's patented Ball and Socket Tilting pad radial bearing with Directed Lubrication, which has been used successfully over the past 25 years in large frame gas turbines, steam turbines and turbo-generators. Throughout the development cycle, Waukesha engineers worked closely with leading original equipment manufacturers to translate turbine performance requirements into improved bearing designs using a combination of field experience, testing and advanced analysis techniques.

In order to directly address requirements for improved machine efficiency, Waukesha's latest design uses an efficient four-pad arrangement to minimise power loss and reduce the number of components.

As a result of the trend towards larger machines, higher bearing loads and surface speeds, the design also includes an optimised pad and hydrostatic jacking groove design to further reduce pad temperatures, leading to increased safety margins and machine reliability.

The latest technology compliments Waukesha's proven Ball and Socket pivot design, which, due to the proprietary design and materials, has excellent dynamic alignment capability typically required on 'hot' machines during the transition from cold to hot conditions plus high stiffness for assured bearing dynamic characteristics.

Waukesha engineers used proprietary predictive tools and testing to design and verify the performance of the Next Generation of large tilting pad radial bearing designs, which have now been in service for several years on numerous gas-fired combined cycle turbo-generator applications.

The knowledge gained during this process will allow Waukesha to further adapt their technology for the ever increasing requirements for improved performance and reliability in the gas-fired power generation market. ●

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