

# The attraction of magnetic bearings for end users

Michael K Swann looks at a solution that turns most aspects of magnetic bearing commissioning and machine troubleshooting over to the OEM and end-user.

**T**he traditional method of installing and commissioning magnetic bearings relies heavily on trained engineers on-site, both at the factory of the original equipment manufacturer (OEM) and at the end-user field location. To this point, the same has held true during routine maintenance of the magnetic bearing systems. This conventional approach adds to the operating expense of using magnetic bearings and encumbers end-users with the logistical headaches of getting the supplier on-site to support maintenance requirements over the life of the turbomachinery.

Waukesha Magnetic Bearings (Waukesha) is challenging the status-quo; offering a solution that turns most aspects of magnetic bearing commissioning and machine troubleshooting over to the OEM and end-user, with specialist support coming primarily via remote condition monitoring and comprehensive training programmes. Reduced need for on-site maintenance of the system ultimately increases machine reliability and availability – a significant benefit to end-users and major contributor to the decreased total cost of ownership of magnetic bearing systems.

This fundamental shift to the application of magnetic bearing technology is enabled by Waukesha's full range of digital controllers featuring remote connectivity capability. The approach leverages both the inherent intelligence of magnetic bearing systems and the remote connectivity capability of third generation controls technology.

The magnetic bearing system intelligence allows for machine commissioning and diagnosing of machine problems using a wealth of output information provided by the system (including information related to rotor forces as well as information regarding the stability of the rotor-bearing system) that is unavailable with mechanical bearings.

Remote connectivity enables the performance

of these operations on-demand from a remote location with no site visits required for 'second-in-class' and subsequent machines.

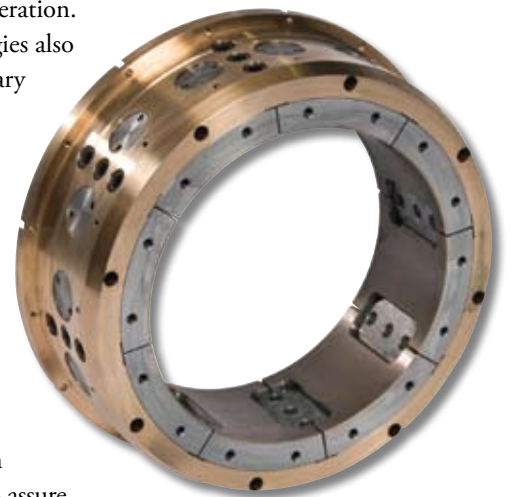
The third generation controllers available from Waukesha allow for remote connection via TCP/IP to facilitate the measurement of vibration, bearing load and rotor stability. The benefits of these capabilities can be seen in the initial commissioning, subsequent troubleshooting and retuning of the machine after many years of operation.

Third generation technologies also provide the ability to use auxiliary bearings to accommodate transient overloads of the magnetic bearings. This emulates the high load capacity of oil lubricated bearings while assuring rotor stability that can be observed and measured.

Moreover, the remote connectivity feature allows automatic clearance checking on demand (while non-rotating) to assure that the auxiliary bearing wear is below the threshold for replacement. As wear is the only failure mode in this bushing-type auxiliary bearing, automatic clearance checking effectively allows for the remote observation of the machine service condition.

Typical applications for active magnetic bearings include motor-driven gas compression, turbo-expanders and other large high-speed turbomachinery

Waukesha offers three air-cooled digital controllers – Zephyr, Chinook, and Elephanta. Each is optimised for performance in specific applications, including subsea, and designed to accommodate a variety of input power systems. Waukesha's controller range can accommodate turbomachinery applications from as low as 1 MW to 50 MW and more. ●



**Fig. 1. Waukesha's RDS auxiliary bearing designs offer unparalleled machine protection with technology that prevents damage to machine components in the unlikely event of system malfunction. This design also allows remote observability of the service condition without machine disassembly.**

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