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White Paper provides advice and guidance on the Condition Monitoring of Rolling Bearings

A technical white paper that provides engineers with advice and guidance on the condition monitoring of rolling bearings is now available.

The paper, entitled ‘The Role of Vibration Monitoring in Predictive Maintenance’ is written by Dr Steve Lacey, Engineering Manager at Schaeffler (UK) Ltd.

As companies downsize and look to reduce costs, maintenance can often become a casualty. However, as equipment and machinery becomes more complex and automated, the need to have a properly structured and funded maintenance strategy is more important than ever.

Undertaking thorough risk assessments across the business can help companies identify how critical existing machines are to their overall operation, which helps to determine the potential return on investment of a properly funded maintenance strategy.

As Dr Steve Lacey advises: “Rolling bearings are a critical component used extensively in rotating equipment and machinery. When they fail unexpectedly, this can result in a catastrophic failure with high associated repair and replacement costs. Vibration-based condition monitoring can be used to detect and diagnose machine faults and form the basis of a Predictive Maintenance Strategy.”

As well as providing the reader with information on the basic approaches to the various types of maintenance strategy (reactive, preventive and predictive), the paper also provides useful guidance on how to set up and identify the criticality of assets in your business, including potential return on investment from implementing a predictive maintenance regime.

The paper then discusses the technical benefits of using condition monitoring systems and techniques to support the predictive maintenance strategy. This includes vibration monitoring, which can be used to detect early signs of failure of rolling bearings.

Detailed analysis of the various rolling bearing vibration monitoring techniques are discussed and appraised. Sections are included on frequency spectrum, envelope spectrum, Cepstrum analysis, bearing characteristic frequencies, typical bearing defects, variable compliance and bearing speed ratio.

The final chapter of the paper considers various real-life scenarios of rolling bearing vibration monitoring, including detailed studies of a 250kW electric motor; an impact crusher drive shaft; a 2MW generator on a test bed; a vertical impact crusher; and the gearbox of a wind turbine.

Dr Lacey comments: “Rolling bearings generate characteristic vibration frequencies that can combine to give complex vibration spectra, which at times may be difficult to interpret other than to an experienced vibration analyst.”

“However, with rolling bearings, characteristic vibration signatures are often generated in the form of

modulation of the fundamental bearing frequencies. This can be used to our advantage and vibration condition monitoring software is designed to identify these features and provide an early warning to an impending problem. This usually takes the form of signal demodulation and the envelope spectrum, which indicates early deterioration of the rolling contact surfaces."
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