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Condition monitoring and diagnostics of machines — Vibration condition monitoring —

Part 2: Processing, analysis and presentation of vibration data

*Surveillance des conditions et diagnostic des machines — Surveillance
relative aux conditions des vibrations —*

Partie 2: Traitement, analyse et présentation des données vibratoires



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Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 13373-2 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 2, *Measurement and evaluation of mechanical vibration and shock as applied to machines, vehicles and structures*.

ISO 13373 consists of the following parts, under the general title *Condition monitoring and diagnostics of machines — Vibration condition monitoring*:

- *Part 1: General procedures*
- *Part 2: Processing, analysis and presentation of vibration data*

Further parts are under preparation:

- *Part 3: Basic techniques for diagnostics*

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Introduction

The purpose of this part of ISO 13373, which covers the area of vibration condition monitoring of machines, is to provide recommended methods and procedures for processing signals and analysing data obtained from vibration transducers attached to a machine at selected locations for the purpose of monitoring the dynamic behaviour of a machine.

Broadband vibration measurements provide an overview of the severity of machine vibration that can be observed and trended to alert machine users when an abnormal condition exists with a machine. Processing and analysing these vibration signals further in accordance with the procedures specified in this part of ISO 13373 gives the user an insight into ways of diagnosing the possible cause or causes of the machinery problems, which allows for more focused continued condition monitoring.

The advantages of such a monitoring programme are that machinery operators will not only be made aware that a machine may fail at a certain time, and that maintenance should be planned prior to the failure, but it will provide valuable information regarding what maintenance should be planned and performed. The vibrations are manifestations or symptoms of problems such as misalignment, unbalance, accelerated wear, flow and lubrication problems.

ISO 13373-1 contains guidelines for vibration condition monitoring of machines. This part of ISO 13373, however, contains guidelines for the processing, presentation and analysis of the vibration data thus obtained, and that can be used for diagnostics to determine the nature or root causes of problems.

The signal processing, analysis and diagnostic procedures applied to vibration condition monitoring may vary depending on the processes to be monitored, degree of accuracy desired, resources available, etc. A well-conceived and implemented condition monitoring programme will include consideration of many factors, such as process priority, criticality and complexity of the system, cost-effectiveness, probability of various failure mechanisms and identification of incipient failure indicators.

An appropriate process analysis needs to dictate the types of data desired to monitor the machinery condition suitably.

The vibration analyst needs to accumulate as much pertinent information as possible about the machine to be monitored. For example, knowing the vibration resonant frequencies and the excitation frequencies from design and analytical information will provide an insight regarding the vibration frequencies anticipated and, consequently, the frequency range that is to be monitored. Also, knowing the machine's initial condition, the machine's operational history, and its operating conditions provides additional information for the analyst.

Other advantages to this pre-test planning process are that it provides guidance as to what types of sensors are needed, where they should optimally be located, what kind of signal conditioning equipment is required, what type of analysis would be most appropriate, and what are the relevant criteria.

Further standards on the subject of machinery condition monitoring and diagnostics are in preparation. These are intended to provide guidance on the overall monitoring of the "health" of machines, including factors such as vibration, oil purity, thermography and performance. Basic techniques for diagnostics will be described in an additional part of ISO 13373, which is under preparation at present.