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Condition monitoring and diagnostics of machines — Approaches for performance diagnosis

Surveillance et diagnostic d'état des machines — Démarches pour le diagnostic de performance

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 5, *Condition monitoring and diagnostics of machines*.

Introduction

Challenged with high energy costs, emission reduction demands, and increasing flexibility demands, ensuring and verifying maximum efficiency of machines and systems has become a constant struggle for owners and operators.

Machines, groups of machines or industrial installations (equipment) fulfil their tasks by employing energy conversion or energy transportation processes. The efficiency of these energy conversion and energy transportation processes is the performance of the equipment or related processes. Good performance means high efficiency and low losses. If the energy conversion process includes a thermodynamic process, especially a thermodynamic cycle process, performance monitoring can become very complex.

Performance monitoring and diagnostics systems are increasingly implemented for this purpose. These are modern information systems that monitor the processes of machines, groups of machines, or complete industrial installation in order to detect and localize opportunities to improve their efficiency respective performance.

The benefits of performance monitoring and diagnostics lie in the provision of information (e.g. measured descriptors and expected descriptors) regarding the current performance status of the equipment. This information is the basis to avoid non-optimal operating states, degradation processes, and to ensure early detection and quantification of deterioration processes (e.g. erosion, corrosion).

Performance monitoring is often used in addition to condition monitoring.

Targets of performance monitoring and diagnostics are

— enhanced quality of energy conversion by achieving optimized operation,

— emission reduction,

— quantifying deterioration,

— recognizing faulty instrumentation,

— detecting defective equipment,

— enhanced availability of machines,

— increasing efficiency, thereby reducing energy costs and costs for emissions, and

— improvement in internal reporting and communication by increased transparency and calculation of well-defined descriptors.

Results of performance monitoring and diagnostics are addressed to

— operators to change the operating regime in case of identified not optimal operation, and

— maintenance staff to repair or modify the machine or equipment in order to eliminate identified faults/deterioration.

Condition monitoring and diagnostics of machines — Approaches for performance diagnosis

1 Scope

This International Standard provides an introduction on how to apply performance monitoring and diagnostics for machines, groups of machines, up to complete industrial installation (equipment) typically covering the whole lifetime of the machines.

This International Standard is intended to

— introduce the terminology specifically related to performance monitoring and diagnostics of machines,

— describe the types of performance monitoring and diagnostics procedures and their merits,

— provide guidance on installation of performance monitoring and diagnostics systems,

— outline methods and requirements for carrying out performance monitoring and diagnostics of machines, and

— provide information on data interpretation, and assessment criteria and reporting requirements.

This International Standard includes testing procedures for determining the accuracy of performance monitoring and diagnostics systems and procedures (including providing inputs for benchmarking the performance of equipment).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 13372, *Condition monitoring and diagnostics of machines — Vocabulary*

ISO 13379-1, *Condition monitoring and diagnostics of machines — Data interpretation and diagnostics techniques — Part 1: General guidelines*

ISO 17359, *Condition monitoring and diagnostics of machines — General guidelines*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13372, ISO 13379-1, ISO 17359, and the following apply.

3.1
performance
behaviour, characteristics and efficiency of a technological process, running in a machine derived by measurement and calculation of one or more parameters, for example, power, flow, efficiency or speed, which singly or together provide the necessary information

[SOURCE: ISO 13372:2012, 2.3]

Note 1 to entry: Performance is used to qualify energy conversion processes with mostly thermodynamic process parts included.