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Condition monitoring and diagnostics of machines — Data interpretation and diagnostics techniques —

Part 2: Data-driven applications

Surveillance et diagnostic d'état des machines — Interprétation des données et techniques de diagnostic —

Partie 2: Systèmes guidés par les données

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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).

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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 machine systems*.

ISO 13379 consists of the following parts, under the general title *Condition monitoring and diagnostics of machines — Data interpretation and diagnostics techniques*:

— *Part 1: General guidelines*

— *Part 2: Data-driven applications*

— *Part 3: Knowledge-based applications*

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Introduction

This part of ISO 13379 contains general procedures that can be used to determine the condition of a machine relative to a set of baseline parameters. Changes from the baseline values and comparison to alarm criteria are used to indicate anomalous behaviour and to generate alarms: this is usually designated as condition monitoring. Additionally, procedures that identify the cause(s) of the anomalous behaviour are given in order to assist in the determination of the proper corrective action: this is usually designated as diagnostics.

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Condition monitoring and diagnostics of machines — Data interpretation and diagnostics techniques —

Part 2: Data-driven applications

1 Scope

This part of ISO 13379 gives procedures to implement data-driven monitoring and diagnostic methods to facilitate the work of analysis carried out by specialist staff typically located in a monitoring centre.

Although some of the steps are embedded in existing tools, it is essential to be aware of the following steps for optimum use:

— selection of the asset, the critical failures and the available process parameters;

— data cleaning and resampling;

— model development;

— model initialization and tuning;

— model performance evaluation;

— diagnostics process.

The implementation of these steps does not require a thorough knowledge of the statistical methods. It does require the competence first to build the training models and then to carry out monitoring and diagnostics processes.

The training in data-driven monitoring is carried out on equipment that is exhibiting normal behaviour. In that case, the principle of fault detection is to compare observed data to estimated data. A difference (called residuals) between an observed and expected values of the parameters reveals the presence of an anomaly, which can be related either to equipment or instrument.

The training in data-driven diagnosis is carried out both on equipment that is exhibiting normal behaviour and failures. The principle of the method is not to detect the deviation of a parameter but to identify a fault by comparison of the observed situation to the faults learnt during the training phase. The technique usually applied is pattern recognition followed by pattern classification.

Data can be available from the data historian of the distributed control system (DCS) or from specialized monitoring systems.

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*

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