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Condition monitoring and diagnostics of machines — Prognostics —

Part 1: General guidelines

Surveillance et diagnostic des machines — Pronostic —

Partie 1: Lignes directrices générales

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Foreword

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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).

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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 machine systems*.

This second edition cancels and replaces the first edition (ISO 13381-1:2004), which has been technically revised.

ISO 13381 consists of the following parts, under the general title *Condition monitoring and diagnostics of machines — Prognostics*:

— *Part 1: General guidelines*

The following parts are planned:

— *Part 2: Performance based approaches*

— *Part 3: Cyclic-driven life usage techniques*

— *Part 4: Useful-life-remaining prediction models*

Introduction

The complete process of machine condition monitoring consists of five distinct phases:

— detection of problems (deviations from normal conditions);

— diagnosis of the faults and their causes;

— prognosis of future fault progression;

— recommendation of actions;

— post-mortems.

Machine health prognosis demands prediction of future machine integrity and deterioration so there can be no exactitude in the process. Instead, prognosis requires statistical or testimonial approaches to be adopted. Standardization in machine health prognosis therefore embodies guidelines, approaches, and concepts rather than strict procedures or standard methodologies.

Prognosis of future fault progressions requires foreknowledge of the probable failure modes, future duties to which the machine will or might be subjected, and a thorough understanding of the relationships between failure modes and operating conditions. This may require an understanding of the physics underlying the fault modes and demand the collection of previous duty and cumulative duty parameters, previous maintenance history, inspection results, run-to-failure data, trajectories and associated operational data, along with condition and performance parameters prior to extrapolations, projections and forecasts.

Prognosis processes need to be able to accommodate analytical damage models.

As computing power increases, and data storage decreases in cost, multiple-parameter analysis becomes more complex and modelling becomes more sophisticated. Thus, the ability to predict the progression of damage accumulation is achievable if the initiation criterion is known (expressed as a set of parameter values for a given mode) in addition to future behaviour for a given set of conditions.

Condition monitoring and diagnostics of machines — Prognostics —

Part 1: General guidelines

1 Scope

This part of ISO 13381 provides guidance for the development and application of prognosis processes. It is intended to

— allow developers, providers, users and manufacturers to share common concepts of prognostics,

— enable users to determine the data, characteristics, processes and behaviours necessary for accurate prognosis,

— outline appropriate approaches and processes to prognostics development, and

— introduce prognostics concepts in order to facilitate future systems and training.

Other parts will include the introduction of concepts of the following forms of prognostic approaches: performance changes (trending) approaches (ISO 13381-2), cyclic-driven life usage techniques (ISO 13381-3), and useful-life-remaining models (ISO 13381-4).

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 2041, *Mechanical vibration, shock and condition monitoring — Vocabulary*

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 and ISO 2041 and the following apply.

3.1
prognosis
estimation of time to failure and risk for one or more incipient failure modes

[SOURCE: ISO 13372:2012, 10.2]