
**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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ISO copyright office
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 13381-1 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 5, *Condition monitoring and diagnostics of machines*.

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

— *Part 1: General guidelines*

Future parts are under preparation and are intended to outline modelling methods and techniques applicable to prognostics.

Introduction

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

- detection of problems (deviations from normal conditions);
- diagnosis of the faults and their causes;
- prognosis of future fault progression;
- recommendation of actions;
- post-mortems.

As far as the prognosis of machine health is concerned (which demands prophecies of future machine integrity and deterioration), there can be no exactitude in the process requiring statistical or testimonial approaches to be adopted. Standardization in prognosis of machine health therefore embodies guidelines, approaches and concepts rather than procedures or standard methodologies.

Prognosis of future fault progressions requires foreknowledge of the probable failure modes, future duties to which the machine will/might be subjected, and a thorough understanding of the relationships between failure modes and operating conditions. This can demand the collection of previous duty and cumulative duty parameters, along with condition and performance parameters, prior to extrapolations, projections and forecasts.

Also, there are a growing number of models for damage initiation and damage progression. Prognosis processes need to accommodate these and future analytical damage models.

As computing power increases and multiple parameter analysis becomes a reality, the ability to predict the initiation of a failure mode is not inconceivable if the initiation criteria, expressed as a set of parameter values for a given mode, are known as well as their future behaviour for a given set of conditions.

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Condition monitoring and diagnostics of machines — Prognostics —

Part 1: General guidelines

1 Scope

This International Standard provides guidance for the development of prognosis processes. It is intended

- to allow the users and manufacturers of condition monitoring and diagnostics systems to share common concepts in the fields of machinery fault prognosis,
- to enable users to determine the necessary data, characteristics and behaviour necessary for accurate prognosis,
- to outline an appropriate approach to prognosis development, and
- to introduce prognoses concepts in order to facilitate the development of future systems and training.

2 Normative references

The following referenced documents are indispensable for the application of this document. 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 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 the following apply.

3.1

prognosis

estimation of time to failure and risk for one or more existing and future failure modes

3.2

confidence level

figure of merit that indicates the degree of certainty that the diagnosis/prognosis is correct

NOTE 1 It is expressed as a percentage.