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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

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.

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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*.

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*

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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.