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Condition monitoring and diagnostics of machine systems — Prognostics —

Part 1: General guidelines and requirements

Surveillance et diagnostic des systèmes machines — Pronostic —

Partie 1: Lignes directrices générales et exigences

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Foreword

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This document was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*, Subcommittee SC 5, *Condition monitoring and diagnostics of machine systems*.

This third edition cancels and replaces the second edition (ISO 13381-1:2015), which has been technically revised.

The main changes are as follows:

— update of definitions (for clarification purposes);

— revised data requirements;

— revised modelling types;

— revised failure modelling techniques (see Annex C);

— update of Bibliography.

A list of all parts in the ISO 13381 series can be found on the ISO website.

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Introduction

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

a) detection of problems (deviations from normal conditions);

b) diagnosis of the faults and their causes;

c) prognosis of future fault progression;

d) recommendation of actions;

e) 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.