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Automation systems and integration — Evaluating energy efficiency and other factors of manufacturing systems that influence the environment —

Part 2: Environmental performance evaluation process

Systèmes d'automatisation et intégration — Évaluation de l'efficacité énergétique et autres facteurs de fabrication des systèmes qui influencent l'environnement —

Partie 2: Processus d'évaluation de la performance environnementale

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 184, *Automation systems and integration*, Subcommittee SC 5, *Interoperability, integration and architectures of enterprise systems and automation applications*.

A list of all parts in the ISO 20140 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

ISO 20140 specifies a method for evaluating the energy efficiency and other factors of a manufacturing system that influence the environment, e.g. energy consumption, waste and release.

ISO 20140 is applicable to manufacturing systems for discrete, batch, and continuous manufacturing.

ISO 20140 focuses on manufacturing systems that have a hierarchical structure.

ISO 20140 can be used for:

— benchmarking of environmental performance against a generic reference manufacturing system or comparing between different manufacturing systems;

— alternative studies for improving environmental performance;

— setting targets of environmental performance improvement;

— visualizing the environmental performance of a manufacturing system under operation.

Expected users of ISO 20140 are:

a) managers who are responsible for environmental conditions of a manufacturing system;

b) engineers who design manufacturing processes for products;

c) engineers who design a manufacturing system;

d) engineers and foremen who are responsible for manufacturing products.

This document specifies a process for environmental performance evaluation of activities executed by a manufacturing system based on the general principles described in ISO 20140-1. The process uses environmental performance evaluation data based on ISO 20140-5.

This document does not specify any evaluation process specific to particular implementations of manufacturing systems.

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Automation systems and integration — Evaluating energy efficiency and other factors of manufacturing systems that influence the environment —

Part 2:
Environmental performance evaluation process

1 Scope

This document specifies a process for environmental performance evaluation of activities executed by a manufacturing system based on the general principles described in ISO 20140-1. The process uses environmental performance evaluation data based on ISO 20140-5.

This document does not specify any evaluation process specific to particular implementations of manufacturing systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 20140-1, *Automation systems and integration — Evaluating energy efficiency and other factors of manufacturing systems that influence the environment — Part 1: Overview and general principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20140-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
aggregated EPE data
numerical representation of *environmental influence* (3.3) caused by a manufacturing process in a given type of environmental influence and in a given mode

3.2
energy efficiency
ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy

[SOURCE: ISO 50001:2011, 3.8, modified — Example and Note to entry have been deleted.]

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3.3
environmental influence
result of manufacturing process that can cause environmental impacts and that is considered throughout the life cycle of the manufacturing system associated with the process

Note 1 to entry: Environmental influence, such as energy consumed and CO_2 emitted, can cause environmental impacts, such as global warming and sea level rise.

EXAMPLE Amount of electric energy consumed; amount of CO_2 emitted; amount of hazardous substance discharged.

3.4
environmental KPI
key performance indicator (3.7) that represents *environmental performance* (3.5)

3.5
environmental performance
measurable results related to environmental aspects

[SOURCE: ISO 14045:2012, 3.5]

3.6
environmental performance evaluation data
EPE data
data that is used to evaluate the *environmental performance* (3.5)

[SOURCE: ISO 20140-5:2017, 3.6, modified.]

3.7
key performance indicator
KPI
quantifiable level of achieving a critical objective

Note 1 to entry: The KPIs are derived directly from, or through an aggregation function of, physical measurements, data and/or other KPIs.

[SOURCE: ISO 22400-1:2014, 2.1.5]

3.8
system value
worth or desirability ascribed to a manufacturing process

4 Framework of environmental performance evaluation process

The environmental performance evaluation process shall comprise the sub-processes of developing a specification of environmental performance evaluation, specifying the environmental KPIs, calculating the environmental KPIs, and reporting the evaluation results as illustrated in Figure 1. This document specifies the requirements for these sub-processes.

a) Developing specification of environmental performance evaluation

   A specification of environmental performance evaluation is developed in this process. This specification includes requirements for aggregated EPE data.

b) Specifying environmental KPIs

   Environmental KPIs are specified by a formula with the necessary conditions, according to the specification of environmental performance evaluation specified by the process described in a) above.

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