BS ISO 14955-1:2014

BSI Standards Publication

Machine tools — Environmental evaluation of machine tools

Part 1: Design methodology for energy-efficient machine tools

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of ISO 14955-1:2014.

The UK participation in its preparation was entrusted to Technical Committee MTE/1, Machine tools.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2014

ISBN 978 0 580 76705 0
ICS 25.080.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2014.

Amendments/corrigenda issued since publication

Date	Text affected

BS ISO 14955-1:2014

INTERNATIONAL STANDARD

ISO 14955-1

First edition
2014-05-15

Machine tools — Environmental evaluation of machine tools —

Part 1: Design methodology for energy-efficient machine tools

Machines-outils — Évaluation environnementale des machines-outils —

Partie 1: Méthode de conception de machines-outils économes en énergie

Reference number
ISO 14955-1:2014(E)

COPYRIGHT PROTECTED DOCUMENT

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

Published in Switzerland

Contents

Page

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 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 39, *Machine tools*.

ISO 14955 consists of the following parts, under the general title *Machine tools — Environmental evaluation of machine tools*:

— *Part 1: Design methodology for energy-efficient machine tools*

The following parts are planned:

— *Part 3: Principles for testing metal-cutting machine tools with respect to energy efficiency*

— *Part 4: Principles for testing metal-forming machine tools with respect to energy efficiency*

Introduction

As environmental impact is a common challenge for all products and as natural resources become scarce, environmental performance criteria for machine tools have to be defined and the use of these criteria has to be specified.

Machine tools are complex products for industrial use to manufacture parts ready for use or semi-finished products. The performance of a machine tool as key data for investment is multi-dimensional regarding its economic value, its technical specification, and its operating requirements which are influenced by the specific application. Therefore, the same machine tool can show quite different energy supplied to the machine depending on the part which is being manufactured and the conditions under which the machine is operated. Therefore, the environmental evaluation of a machine tool cannot be considered in isolation from these considerations.

This part of ISO 14955 tries to overcome this deficiency by breaking down the machine tool to machine components which come closer to a functional unit for environmental evaluation. The machine components are objects of specific improvements keeping the application of the system in mind. These improvements are subject for quantification together with the overall system design to achieve a product with an improved environmental performance. The provisions and procedures specified in this part of ISO 14955 are also intended to allow the calculation of environmental improvements on a multi-national level and across different manufacturers/suppliers and users.

Based on a list of positive environmental features, which can be built into a machine tool, the performance of this product is intended to be evaluated in order to quantify the environmental improvements achieved over a defined period.

ISO 14955 takes care of relevant environmental impacts during the use stage. Aside from the design and engineering of machine tools, the utilization of these products is also addressed.

Machine tools as manufacturing devices might have a significant influence on the environmental performance of the products being manufactured together with their final use stage. This aspect has to be treated very sensitively and might produce quite different results when an assessment is made with a broader definition of the system boundaries.

INTERNATIONAL STANDARD ISO 14955-1:2014(E)

Machine tools — Environmental evaluation of machine tools —

Part 1: Design methodology for energy-efficient machine tools

1 Scope

This part of ISO 14955 constitutes the application of eco-design standards to machine tools, mainly for metal working numerically controlled (NC) machine tools.

This part of ISO 14955 addresses the energy efficiency of machine tools during the use stage, i.e. the working life of the machine tool. Environmental relevant stages other than the use stage and relative impacts other than energy supplied to machine tools are not within the scope of this part of ISO 14955 and need a special treatment (e.g. according to ISO/TR 14062).

Elements of eco-design procedure according to ISO/TR 14062 are applied to machine tools. Reporting of results to users and suppliers and monitoring of results are defined.

Evaluation of energy efficiency implies quantification of the resources used, i.e. energy supplied, and of the result achieved. This part of ISO 14955 provides guidance for a reproducible quantification of the energy supplied. It does not suggest a methodology for quantifying the result achieved due to the lack of universal criteria. The result achieved in industrial application being machined workpieces, their properties (e.g. material, shape, accuracy, surface quality), the constraints of production (e.g. minimum lot size, flexibility), and other appropriate parameters for the quantification of the result achieved are intended to be determined specifically for each application or for a set of applications.

This part of ISO 14955 defines methods for setting up a process for integrating energy-efficiency aspects into machine tool design. It does not support the comparison of machine tools. Also, this part of ISO 14955 does not deal with the effect of different user behaviours or different manufacturing strategies during the use phase.

Lists of environmentally relevant improvements and machine components, control of machine components, and combinations of machine components are given in two informative annexes, one for metal-cutting machine tools (Annex A) and one for metal-forming machine tools (Annex B). Annex C provides an example of application of the methodology. Other machine tools, e.g. laser-cutting machine tools, material additive machine tools, and woodworking machine tools are currently not covered by informative annexes.

NOTE Certain machining processes and specific machine tools can allow significant changes in the environmental impact of machined workpieces, e.g. material reduction for aluminium cans by application of special press technology, higher performance of compressors by machining on precision form grinders.[3][5] The environmental impact of such processes or machine tools might be less important compared to the environmental impact of the machined workpieces and their application. These changes in the environmental impact of machined workpieces are not subject of this part of ISO 14955 but might be important if different machining processes or different machine tools have to be compared related to environmental impact of products. For instance, the accuracy of a machined workpiece might be a significant parameter for the environmental impact of the workpiece in its use stage, and any attempt to compare machine tools is intended to take this into account necessarily.

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.