
Cutting tool data representation and exchange —

Part 202: Creation and exchange of 3D models — Irregular inserts

*Représentation et échange des données relatives aux outils
coupants —*

*Partie 202: Création et échange de modèles 3D — Plaquettes
irrégulières*





COPYRIGHT PROTECTED DOCUMENT

© ISO 2015, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword	iv
Introduction	vi
1 Scope	1
2 Normative references	1
3 Starting elements, coordinate systems, planes	1
3.1 General.....	1
3.2 Reference system.....	2
3.3 Coordinate system.....	2
3.3.1 General.....	2
3.3.2 Coordinate system for insert location.....	2
3.3.3 Coordinate system for insert mounting.....	3
3.4 Planes.....	4
4 Design of the model	4
5 Geometrical determination of the insert	4
5.1 Basic shapes of the cutting profile.....	4
5.2 Necessary properties.....	7
5.2.1 Necessary properties for the design of the cutting profile.....	7
5.2.2 Necessary properties for the design of the insert body.....	8
5.3 Design of the cutting profile.....	9
6 Inserts for grooving and parting	10
6.1 Necessary properties for the profile of grooving and parting inserts.....	10
6.2 Insert, one cutting edge for grooving, screw mounting.....	11
6.3 Insert, one cutting edge for grooving and parting, self-clamping.....	14
6.4 Insert, two cutting edges for grooving and parting, self-clamping.....	15
6.5 Insert, two cutting edges for parting, self-clamping.....	17
6.6 Insert, two cutting edges for profiling and partial threading.....	19
6.7 Insert, two cutting edges for profiling.....	21
6.8 Insert, multiple cutting edges for grooving and parting.....	23
7 Inserts for threading	25
7.1 Necessary properties for the profile of threading inserts.....	25
7.2 Lay-down threading insert, triangle shape, three cutting edges, one tooth.....	26
7.3 Lay-down threading insert, triangle shape, three cutting edges, three teeth.....	28
7.4 Threading insert with two cutting edges.....	31
7.5 Thread chaser.....	32
8 Fixing hole geometry of the inserts	34
8.1 General.....	34
8.2 Fixing hole styles.....	36
8.3 Fixing hole model.....	36
9 Attributes of surfaces — Visualization of the model features	37
10 Structure of the design elements (tree of model)	37
10.1 General.....	37
11 Data exchange model	38
Bibliography	39

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 29, *Small tools*.

ISO 13399 consists of the following parts, under the general title *Cutting tool data representation and exchange*:

- *Part 1: Overview, fundamental principles and general information model*
- *Part 2: Reference dictionary for the cutting items* [Technical Specification]
- *Part 3: Reference dictionary for tool items* [Technical Specification]
- *Part 4: Reference dictionary for adaptive items* [Technical Specification]
- *Part 5: Reference dictionary for assembly items* [Technical Specification]
- *Part 50: Reference dictionary for reference systems and common concepts* [Technical Specification]
- *Part 60: Reference dictionary for connection systems* [Technical Specification]
- *Part 80: Creation and exchange of 3D models — Overview and principles* [Technical Specification]
- *Part 100: Definitions, principles and methods for reference dictionaries* [Technical Specification]
- *Part 150: Usage guidelines* [Technical Specification]
- *Part 201: Creation and exchange of 3D models — Regular inserts* [Technical Specification]
- *Part 202: Creation and exchange of 3D models — Irregular inserts* [Technical Specification]
- *Part 203: Creation and exchange of 3D models — Replaceable inserts for drilling* [Technical Specification]
- *Part 301: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of thread-cutting taps, thread-forming taps and thread-cutting dies* [Technical Specification]

- *Part 302: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of solid drills and countersinking tools* [Technical Specification]

The following parts are under preparation:

- *Part 51: Designation system for customer solution cutting tools* [Technical Specification]
- *Part 70: Graphical data layout — Layer settings for tool designs* [Technical Specification]
- *Part 71: Graphical data layout — Creation of documents for the standardized data exchange — Graphical product information* [Technical Specification]
- *Part 72: Creation of documents for the standardized data exchange — Definition of properties for drawing header and their XML-data exchange* [Technical Specification]
- *Part 204: Creation and exchange of 3D models — Inserts for reaming* [Technical Specification]
- *Part 303: Creation and exchange of 3D models — Solid end mills* [Technical Specification]
- *Part 304: Creation and exchange of 3D models — Solid milling cutter with arbor hole* [Technical Specification]
- *Part 307: Creation and exchange of 3D models — End mills for indexable inserts* [Technical Specification]
- *Part 308: Creation and exchange of 3D models — Milling cutter with arbor hole for indexable inserts* [Technical Specification]
- *Part 309: Creation and exchange of 3D models — Tool holders for indexable inserts* [Technical Specification]
- *Part 311: Creation and exchange of 3D models — Solid reamers* [Technical Specification]
- *Part 312: Creation and exchange of 3D models — Reamers for indexable inserts* [Technical Specification]
- *Part 401: Creation and exchange of 3D models — Converting, extending and reducing adaptive items* [Technical Specification]
- *Part 405: Creation and exchange of 3D models — Collets* [Technical Specification]

Introduction

This part of ISO 13399 defines the concept, terms and definitions regarding the creation and exchange of simplified 3D models of irregular inserts that can be used with 3D models of cutting tools for NC-programming, simulation of manufacturing processes and the collision determination within machining processes. It is not intended to standardize the design of the indexable insert itself, nor the cutting tool.

An irregular insert is used in combination with a cutting tool in a machine to remove material from a workpiece by a shearing action at the cutting edges of the tool. Cutting tool data that can be described by ISO 13399 include, but are not limited to, everything between the workpiece and the machine tool. Information about inserts, solid tools, assembled tools, adaptors, components and their relationships can be represented by this part of ISO 13399. The increasing demand providing the end-user with 3D models for the purposes defined above is the basis for the development of this series of International Standards.

The objective of ISO 13399 is to provide the means to represent the information that describes cutting tools in a computer sensible form that is independent from any particular computer system. The representation will facilitate the processing and exchange of cutting tool data within and between different software systems and computer platforms and support the application of this data in manufacturing planning, cutting operations and the supply of tools. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and for archiving. The methods that are used for these representations are those developed by ISO/TC 184/SC4 for the representation of product data by using standardized information models and reference dictionaries.

Definitions and identifications of dictionary entries are defined by means of standard data that consist of instances of the EXPRESS entity data types defined in the common dictionary schema, resulting from a joint effort between ISO/TC 184/SC4/WG 2, *Standard for the neutral representation of standard parts* and IEC/TC 3, *Information structures, documentation and graphical symbols*, SC 3D, *Product properties and classes and their identification*, and in its extensions defined in ISO 13584-24 and ISO 13584-25.

Cutting tool data representation and exchange —

Part 202:

Creation and exchange of 3D models — Irregular inserts

1 Scope

This part of ISO 13399 specifies a concept for the design of cutting items, limited to any kind of irregular inserts, with the usage of the related properties and domains of values.

It specifies a common way of designing simplified models that contain the following:

- definitions and identification of the design features of irregular inserts, with a link to the properties used;
- definitions and identification of the internal structure of the 3D model that represents the features and the properties of irregular inserts.

The following are outside the scope of this part of ISO 13399:

- applications where these standard data may be stored or referenced;
- creation and exchange of simplified 3D models for cutting tools;
- creation and exchange of simplified 3D models for tool items;
- creation and exchange of simplified 3D models for other cutting items not described in this part of ISO 13399;
- creation and exchange of simplified 3D models for adaptive items;
- creation and exchange of simplified 3D models for assembly items and auxiliary items.

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.

ISO 1832, *Indexable inserts for cutting tools — Designation*

ISO 10303-242, *Industrial automation systems and integration — Product data representation and exchange — Part 242: Application protocol: Managed model-based 3D engineering*

ISO/TS 13399-80, *Cutting tool data representation and exchange — Part 80: Creation and exchange of 3D models — Overview and principles*

3 Starting elements, coordinate systems, planes

3.1 General

The creation of 3D models shall be done by means of nominal dimensions.