TECHNICAL SPECIFICATION

ISO/TS 13399-301

First edition
2013-10-15

Cutting tool data representation and exchange —

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

Représentation et échange des données relatives aux outils coupants —

Partie 301: Description des modèles 3D basés sur les propriétés de l'ISO/TS 13399-3: Modélisation des tarauds, tarauds à refouler et filières de filetage

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581e-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

Reference number
ISO/TS 13399-301:2013(E)

© ISO 2013

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581c-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

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
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

 © ISO 2013 – All rights reserved

Contents

Page

Foreword ..... **v**

Introduction ..... **vii**

1 Scope **1**

2 Normative references **1**

3 Starting elements, coordinate system, planes **1**
- 3.1 General 1
- 3.2 Reference system 2
- 3.3 Coordinate system at the cutting part 2
- 3.4 MCS coordinate system 3
- 3.5 Planes 3

4 Design of the model **4**
- 4.1 General 4
- 4.2 Necessary parameters for the connection interface feature 5

5 Thread-cutting tap with offset shank **5**
- 5.1 General 5
- 5.2 Necessary properties 6
- 5.3 Geometry of the non-cutting part including the shank 6
- 5.4 Geometry of the cutting part 7
- 5.5 Thread-cutting tap with offset shank — Complete 8

6 Thread-cutting tap with reinforced shank **9**
- 6.1 General 9
- 6.2 Necessary properties 9
- 6.3 Geometry of the non-cutting part including the shank 10
- 6.4 Geometry of the cutting part 10
- 6.5 Thread-cutting tap with reinforced shank complete 10

7 Thread-forming tap with offset shank **11**
- 7.1 General 11
- 7.2 Necessary properties 11
- 7.3 Geometry of the non-cutting part including the shank 11
- 7.4 Geometry of the cutting part 12
- 7.5 Thread-forming tap with offset shank — Complete 12

8 Thread-forming tap with reinforced shank **12**
- 8.1 General 12
- 8.2 Necessary properties 13
- 8.3 Geometry of the non-cutting part including the shank 13
- 8.4 Geometry of the cutting part 13
- 8.5 Thread-forming tap with reinforced shank — Complete 13

9 Thread-cutting die round shape **13**
- 9.1 General 13
- 9.2 Necessary properties 14
- 9.3 Geometry of the non-cutting part 14
- 9.4 Geometry of the cutting part 15
- 9.5 Thread-cutting die, round shape — Complete 16

10 Thread-cutting die, hexagonal shape **17**
- 10.1 General 17
- 10.2 Necessary properties 17
- 10.3 Geometry of the non-cutting part 18
- 10.4 Geometry of the cutting part 18
- 10.5 Thread-cutting tap, hexagonal shape — Complete 18

11 Design of details **19**

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581e-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

© ISO 2013 – All rights reserved

11.1 Basis for modelling 19
11.2 Contact/clamping surfaces — Orientation 19
11.3 Chamfers, rounding, others 20
11.4 External centring at the face 20
12 Attributes of surfaces — Visualization of model features 21
13 Structure of design elements (tree of model) 21
14 Data exchange model 23
Annex A (informative) **Information about nominal dimensions 24**
Bibliography 25

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581c-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

 © ISO 2013 – All rights reserved

Foreword

IISO (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. 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. 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/TS 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 100: Definitions, principles and methods for reference dictionaries* [Technical Specification]

— *Part 150: Usage guidelines* [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 80: Concept for the design of 3D models based on properties according to ISO/TS 13399: Overview and principles* [Technical Specification]

© ISO 2013 – All rights reserved

— *Part 201: Concept for the design of 3D models based on properties according to ISO/TS 13399-2: Modelling of regular inserts* [Technical Specification]

— *Part 202: Concept for the design of 3D models based on properties according to ISO/TS 13399-2: Modelling of irregular inserts* [Technical Specification]

— *Part 203: Concept for the design of 3D models based on properties according to ISO/TS 13399-2: Modelling of exchangeable inserts for drilling* [Technical Specification]

— *Part 204: Concept for the design of 3D models based on properties according to ISO/TS 13399-2: Modelling of inserts for reaming* [Technical Specification]

— *Part 303: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of end mills with solid cutting edges* [Technical Specification]

— *Part 304: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of milling cutters with arbor hole and solid cutting edges* [Technical Specification]

— *Part 307: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of end mills for indexable inserts* [Technical Specification]

— *Part 308: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of milling cutters with arbor hole for indexable inserts* [Technical Specification]

— *Part 309: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of tool holders for indexable inserts* [Technical Specification]

— *Part 311: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of solid reamers* [Technical Specification]

— *Part 312: Concept for the design of 3D models based on properties according to ISO/TS 13399-3: Modelling of reamers for indexable inserts* [Technical Specification]

— *Part 401: Concept for the design of 3D models based on properties according to ISO/TS 13399-4: Modelling of converting, extending and reducing adaptive items* [Technical Specification]

— *Part 405: Concept for the design of 3D models based on properties according to ISO/TS 13399-4: Modelling of collets* [Technical Specification]

iTeh Standards
(https://standards.iteh.ai)
Document Preview
https://standards.iteh.ai/catalog/standards/iso/189d591c-394c-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

 © ISO 2013 – All rights reserved

Introduction

This part of ISO 13399 defines the concept, terms and definitions for designing simplified 3D models of taps and dies, which can be used for NC programming, simulation of the manufacturing processes and the avoidance of collision within machining processes. It is not intended to standardize the design of the cutting tool itself.

A cutting tool is used in a machine tool 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 (all parts) 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 ISO 13399 (all parts). The increasing demand by the end user for 3D models for the purposes defined above is the basis for the development of this series of International Standards.

The objective of ISO 13399 (all parts) is to provide the means to represent information describing cutting tools in computer-sensible form, independent of 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 these 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/SC 4 for the representation of product data by using standardized information models and reference dictionaries.

Dictionary entries are defined and identified 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/SC 4 and IEC SC3D, and its extensions defined in ISO 13584-24 and ISO 13584-25.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581c-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

© ISO 2013 – All rights reserved

iTeh Standards
(https://standards.iteh.ai)
Document Preview

ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581c-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

Cutting tool data representation and exchange —

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

1 Scope

This part of ISO 13399 specifies a concept for the design of tool items, limited to any kind of taps and dies, together with the usage of the related properties and domains of values.

This part of ISO 13399 specifies a common way of designing simplified models that contain:

— definitions and identifications of the design features of thread-cutting taps, thread-forming taps and thread-cutting dies with solid cutting edges, with a link to the properties used;

— definitions and identifications of the internal structure of the 3D model that represents the features and properties of thread-cutting taps, thread-forming taps and thread-cutting dies with solid cutting edges.

iTeh Standards
(https://standards.iteh.ai)
Document Preview

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

— applications where these standard data may be stored or referenced;

— concept of 3D models for cutting tools;

— concept of 3D models for cutting items;

ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/189d581c-394e-4517-bf84-3e269dd291a7/iso-ts-13399-301-2013

— concept of 3D models for other tool items not described in the scope of this part of ISO 13399;

— concept of 3D models for adaptive items;

— concept of 3D models for assembly and auxiliary items.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable to 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/TS 13399-3, *Cutting tool data representation and exchange — Part 3: Reference dictionary for tool items*

ISO/TS 13399-60, *Cutting tool data representation and exchange — Part 60: Reference dictionary for connection systems*

3 Starting elements, coordinate system, planes

3.1 General

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

© ISO 2013 – All rights reserved

WARNING — There is no guarantee that the 3D model, created according to the methods described in this part of ISO 13399, is a true representation of the physical tool supplied by the tool manufacturer. If the model is used for simulation purposes (e.g. CAM simulation), it shall be taken into consideration that real product dimensions may differ from nominal dimensions.

NOTE Some of the definitions have been taken from ISO/TS 13399-50.

3.2 Reference system

The reference system consists of the following standard elements:

— standard coordinate system;

— right-handed rectangular Cartesian system in three-dimensional space, called the "primary coordinate system" (PCS);

— three orthogonal planes;

— planes in the coordinate system that contain the axes of the system, named "XY-plane" (XYP), "XZ-plane" (XZP) and "YZ-plane" (YZP);

— three orthogonal axes;

— axes designated as intersections of the three orthogonal planes lines, named "X-axis" (XA), "Y-axis" (YA) and "Z-axis" (ZA), respectively.

iTeh Standards
(https://standards.iteh.ai)
Document Preview
ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/iso/18...4581c...17-bf84-...269dd291a7/iso-ts-13399-301-2013

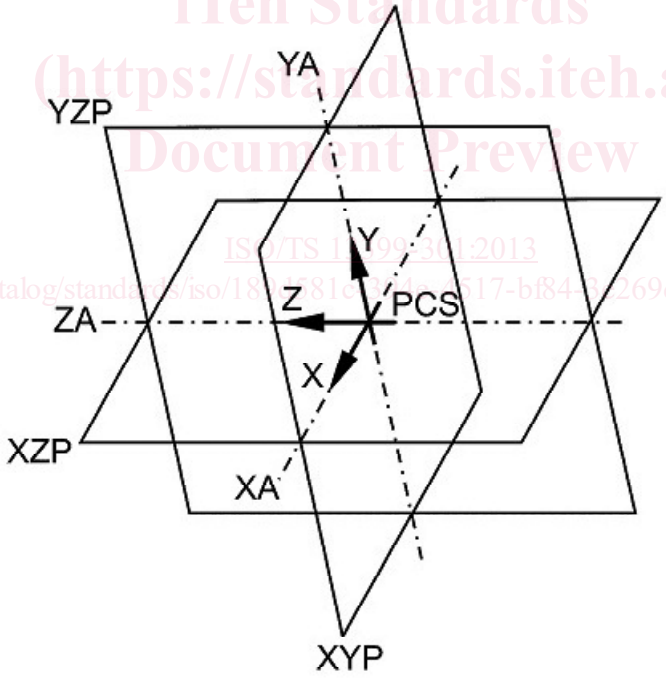

Figure 1 — Reference system

3.3 Coordinate system at the cutting part

The coordinate system at the cutting part, e.g. the planar face, named "coordinate system in process" (CIP), with a defined distance to the PCS shall be defined as indicated in Figure 1 and oriented as indicated in Figure 2 as follows:

— Z-axis of CIP points to the PCS;

— Z-axis of CIP is collinear to the Z-axis of PCS;

 © ISO 2013 – All rights reserved

— y-axis of CIP is parallel to the y-axis of PCS.

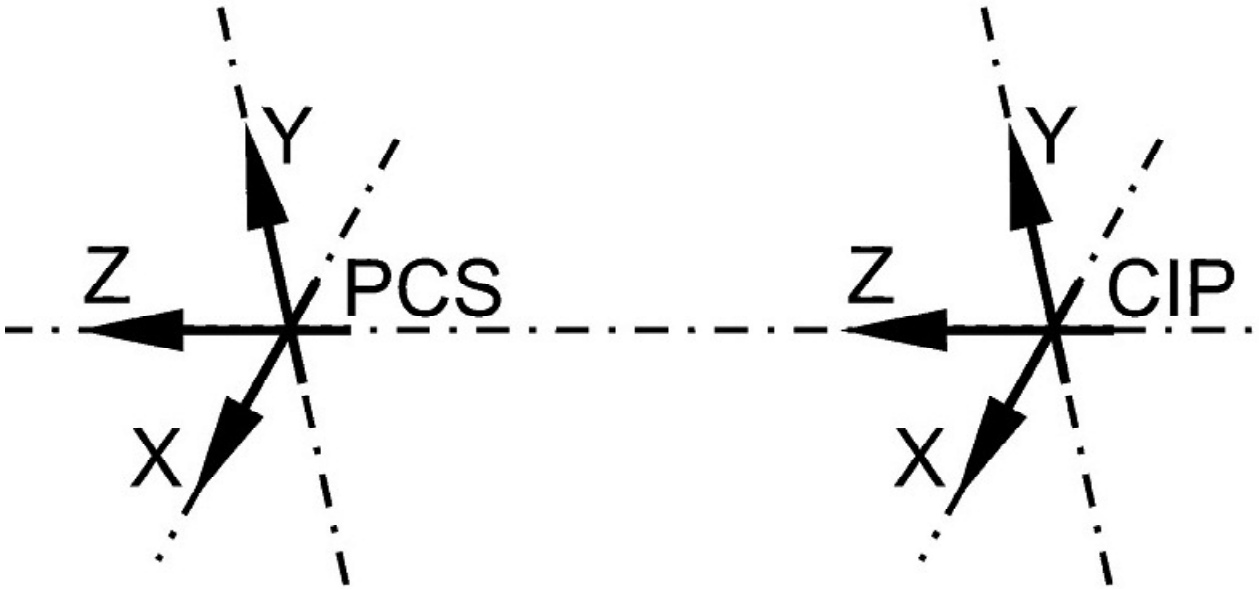

Figure 2 — Orientation of CIP

iTeh Standards
(https://standards.iteh.ai)
Document Preview

If the 3D modelling software gives the possibility to include interfaces for components, e.g. to mount a thread-cutting tap on to a complete cutting tool, it is advisable to use the coordinate system CIP.

If necessary, another designation shall be given to the interface of the component (dependent on the software). That name is "CSIF" (for "coordinate system interface") and it includes the coordinate system CIP.

3.4 MCS coordinate system

ISO/TS 13399-301:2013
https://standards.iteh.ai/catalog/standards/sist/...

A "mounting coordinate system" (MCS) shall be inserted within the 3D model to allow mounting with other components, which is congruent to the PCS. Figure 3 shows the orientation of MCS and PCS.

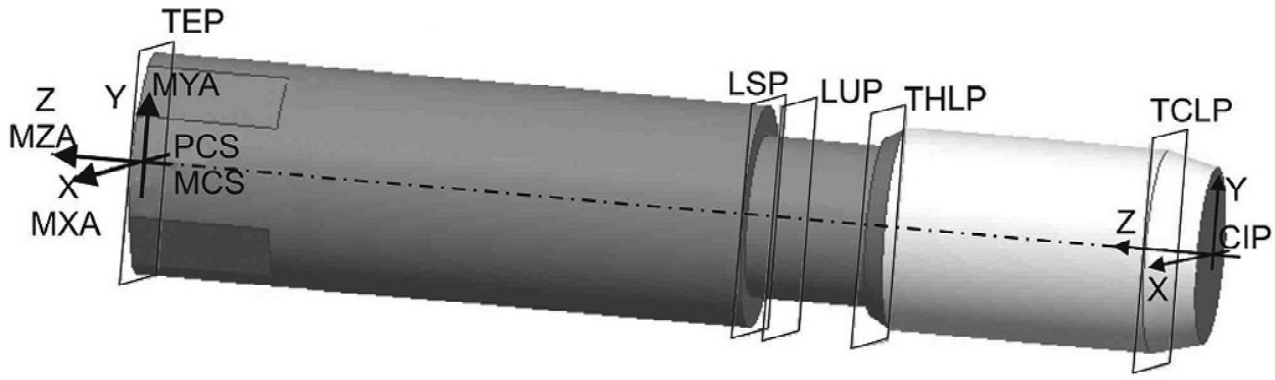

Figure 3 — Orientation of MCS and PCS, reference system (example)

3.5 Planes

Modelling shall be based on planes according to Figure 3, to be used as reference, if applicable. It is therefore possible to vary the model or to suppress single features of independent designs by changing the value of one or more parameter(s) of the model design. Furthermore, identification of different areas shall be simplified by using the plane concept, even if they come into contact with each other with the same size (e.g. chip flute, shank).

© ISO 2013 – All rights reserved