PD ISO/TS 13399-301:2013

BSI Standards Publication

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

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National foreword

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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

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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.

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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]

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— *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]

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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.

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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.

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;

— 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.

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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.

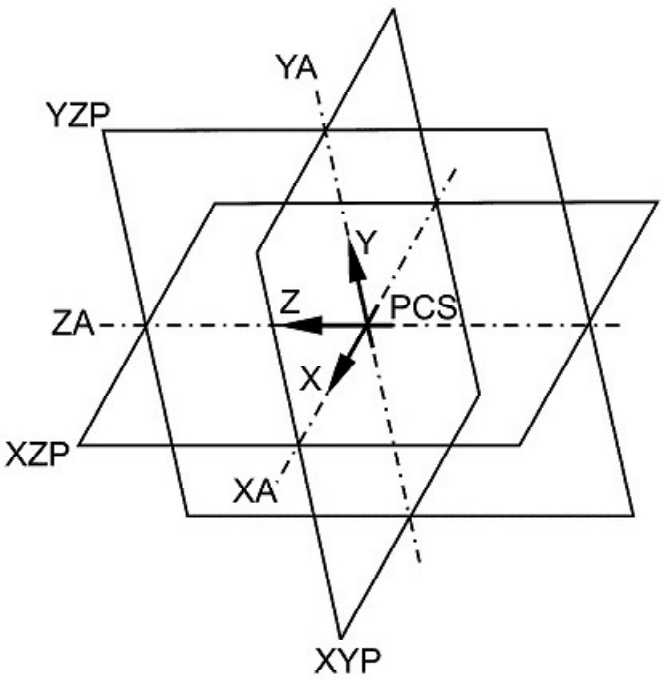

Figure 1 — Reference system

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;

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