



BSI Standards Publication

Cutting tool data representation and exchange

Part 3: Reference dictionary for tool items

National foreword

This Published Document is the UK implementation of [ISO/TS 13399-3:2021](#). It supersedes [PD ISO/TS 13399-3:2014](#), which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MTE/15, Hand tools.

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

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© The British Standards Institution 2022
Published by BSI Standards Limited 2022

ISBN 978 0 539 15266 1

ICS 25.100.01; 35.240.50

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This Published Document was published under the authority of the Standards Policy and Strategy Committee on 31 March 2022.

Amendments/corrigenda issued since publication

Date	Text affected
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TECHNICAL SPECIFICATION

ISO/TS 13399-3

Third edition
2021-11-22

Cutting tool data representation and exchange —

Part 3: Reference dictionary for tool items



Reference number
ISO/TS 13399-3:2021(E)

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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 29, *Small tools*.

This third edition cancels and replaces the second edition ([ISO/TS 13399-3:2014](http://www.iso.org/iso/foreword.html)), which has been technically revised.

The main change is as follows:

- update of the classes and properties in line with the modifications in the cutting tool dictionary.

A list of all parts in the [ISO 13399](http://www.iso.org/iso/foreword.html) 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.

Introduction

This document defines the terms, properties, and definitions for portions of a cutting tool that support one or more cutting items with defined cutting edges. Tool items include, but are not limited to, turning tools, milling tools, drilling tools, threading tools, etc. The purpose of this document is to provide a reference dictionary to support the use of the general information model defined in [ISO 13399-1](#).

A cutting tool with defined cutting edges is used on 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 the [ISO 13399](#) series include, but are not limited to, everything between the workpiece and the machine tool. Information about inserts (e.g. regular and irregular shaped replaceable cutting items), solid tools (e.g. solid drill and endmill), assembled tools (e.g. boring bars, indexable drills, and indexable milling cutters), adaptors (e.g. milling arbor and drilling chuck), components (e.g. shims, screws, and clamps), and their relationships can be represented by the [ISO 13399](#) series. The principles of the [ISO 13399](#) series are given in [Annex A](#); and possible assemblies of the components of a cutting tool are illustrated in [Figure A.1](#).

The objective of the [ISO 13399](#) series 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 facilitates the processing and exchange of cutting tool data within and between different software systems and computer platforms and supports 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 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.

An information model is a formal specification of types, ideas, facts, and processes which together describes a portion of interests of the real world and which provides an explicit set of interpretation rules. Information is knowledge of ideas, facts, and/or processes. Data are symbols or functions that represent information for processing purposes. Data are interpreted to extract information by using rules for how that should be done and a dictionary to define the terms that identify the data items. Everyone in a communication process is expected to use the same information model, the same set of explicit rules, and the same dictionary in order to avoid misunderstanding. If an information model and its dictionary are written in a computer-sensible language, then there is the additional benefit that they can be computer processable.

An engineering information model is therefore a specification for data that establishes the meaning of that data in a particular engineering context. A model has to be developed by formal methods to ensure that it meets the needs of the situation that it represents. An engineering information model defines the information objects that represent the concepts in an engineering application, the attributes of the objects, their relationships, and the constraints that add further meaning. An information model is an abstract concept that can be used repeatedly for any example of the real-world situation that it represents. An instance of the model is created when it is populated with the data items and their values that are applicable to a particular example of that situation.

This document uses the following International Standards developed by ISO/TC 184/SC 4 :

- the EXPRESS language defined in [ISO 10303-11](#) for defining the information model in [ISO 13399-1](#);
- the file format for data exchange derived from the model and defined in [ISO 10303-21](#);
- the data dictionary defined in the [ISO 13584](#) series.

Each class, property, or domain of values of this application domain constitutes an entry of the reference dictionary defined in this document. It is associated with a computer-sensible and human-readable definition, and with a computer-sensible identification. Identification of a dictionary entry allows unambiguous reference to it from any application that implements the information model defined in [ISO 13399-1](#).

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

Cutting tool data representation and exchange —

Part 3: Reference dictionary for tool items

1 Scope

This document specifies a reference dictionary for tool items, together with their descriptive properties and domains of values.

This document specifies a reference dictionary containing:

- definitions and identifications of the classes of tool items and their features, with an associated classification scheme;
- definitions and identifications of the data element types that represents the properties of tool items and their features;
- definitions and identifications of domains of values for describing the above-mentioned data element types.

The following are within the scope of this document:

- standard data that represent the various classes of tool items and tool item features;
- standard data that represent the various properties of tool items and tool item features;
- standard data that represent domains of values used for properties of tool items and tool item features;
- definition of cutting operations;
- definitions of reference systems for tool items and their properties;
- one implementation method by which the standard data defined in this document can be exchanged.

NOTE 1 The implementation method by which the standard data defined in this document can be exchanged is specified in [ISO 10303-21](#).

The following are outside the scope of this document:

- specialized or expert knowledge in the design and use of cutting tools;
- rules to determine what information should be communicated;
- applications where these standard data can be stored or referenced;
- implementation methods other than the one defined in this document by which the standard data can be exchanged and referenced;
- information model for cutting tools;
- definitions of classes and properties for cutting items;
- definitions of classes and properties for adaptive items;
- definitions of classes and properties for assembly items;

- definitions of classes and properties for connection systems;
- definitions of classes and properties for reference systems.

NOTE 2 The information model for cutting tools is defined in [ISO 13399-1](#).

NOTE 3 The definitions of classes and properties for cutting items, adaptive items, and assembly items are provided in [ISO/TS 13399-2](#), [ISO/TS 13399-4](#), and [ISO/TS 13399-5](#), respectively.

NOTE 4 The definitions of classes and properties for connection systems and reference systems are provided in [ISO/TS 13399-50](#).

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/TS 13399-50](#), *Cutting tool data representation and exchange — Part 50: Reference dictionary for reference systems and common concepts*

[ISO/TS 13399-100](#), *Cutting tool data representation and exchange — Part 100: Definitions, principles and methods for reference dictionaries*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in [ISO/TS 13399-50](#), [ISO/TS 13399-100](#) and the following apply.

ISO and IEC maintain terminology 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 applicable property

property ([3.17](#)) that is defined for some family of items and that applies to any member of this family

[SOURCE: ISO 13584-24:2003, 3.3, modified — "family of parts" has been replaced by "family of items"; "shall apply" has been replaced by "applies"; "any part" has been replaced by "any member"; the EXAMPLE has been removed.]

3.2 basic semantic unit

entity ([3.10](#)) that provides an absolute and universally unique identification of a certain object of the application domain that is represented as a *dictionary* ([3.9](#)) element

[SOURCE: ISO 13584-42:2010, 3.4, modified — The 3 EXAMPLEs and note 1 to entry have been removed.]

3.3 chip

material removed from a *workpiece* ([3.20](#)) by a cutting process

3.4 cutting tool

device or assembly of items for removing material from a *workpiece* ([3.20](#)) through a shearing action at the defined cutting edge or edges of the device

Note 1 to entry: A cutting tool can be the assembly of one or more adaptive items, a tool item, and several cutting items on a tool item. See [Figure A.1](#).

[SOURCE: ISO 13399-1:2006, 3.1.]

3.5

data

representation of *information* ([3.13](#)) in a formal manner suitable for communication, interpretation, or processing by human beings or computers

[SOURCE: ISO 10303-1:2021, 3.1.29]

3.6

data element type

unit of *data* ([3.5](#)) for which the identification, description, and value representation have been specified

[SOURCE: ISO 13584-42:2010, 3.13, modified — Note 1 to entry has been removed.]

3.7

data exchange

storing, accessing, transferring, and archiving of *data* ([3.5](#))

[SOURCE: ISO 10303-1:2021, 3.1.31]

3.8

data type

domain of values

[SOURCE: ISO 10303-11:2004, 3.3.5]

3.9

dictionary

table consisting of a series of entries with one meaning corresponding to each entry in the dictionary and one dictionary entry identifying a single meaning

Note 1 to entry: In the ISO 13399 series, a dictionary is a formal and computer-sensible representation of an *ontology* ([3.16](#)).

[SOURCE: ISO 13584-511:2006, 3.1.9, modified — The original notes 1 to 3 to entry have been replaced by a new note 1 to entry.]

3.10

entity

class of *information* ([3.13](#)) defined by its attributes which establishes a domain of values defined by common attributes and constraints

3.11

entity data type

representation of an *entity* ([3.10](#))

3.12

implementation method

means for computers to exchange *data* ([3.5](#))

3.13

information

facts, concepts, or instructions

[SOURCE: ISO 10303-1:2021, 3.1.41]

3.14

information model

formal model of a bounded set of facts, concepts, or instructions to meet a specific requirement

3.15

machine side

identification of a direction pointing towards the machine

3.16

ontology

explicit and consensual specification of concepts of an application domain independent of any use of these concepts

Note 1 to entry: In the [ISO 13399](#) series, a *dictionary* ([3.9](#)) is the formal and computer-sensible representation of ontology.

[SOURCE: ISO 13584-511:2006, 3.1.20, modified — In note 1 to entry, the reference to "ISO 13584" has been replaced by "the ISO 13399 series".]

3.17

property

defined parameter suitable for the description and differentiation of products

[SOURCE: ISO 13584-42:2010, 3.37, modified — Notes 1 to 5 to entry have been removed.]

3.18

transient surface

part of the surface which is formed on the *workpiece* ([3.20](#)) by the cutting edge and removed during the following cutting stroke, during the following revolution of the tool or workpiece, or by the following cutting edge

[SOURCE: ISO 3002-1:1982, 3.1.3]

3.19

visible property

property ([3.17](#)) that has a definition meaningful in the scope of a given characterization class, but that does not necessarily apply to the various products belonging to this class

[SOURCE: ISO 13584-42:2010, 3.46]

3.20

workpiece

object on which a cutting action is performed

[SOURCE: ISO/TS 13399-2:2021, 3.21]

3.21

workpiece side

identification of a direction pointing towards the *workpiece* ([3.20](#))

4 Abbreviated terms

BSU basic semantic unit

DET data element type

5 Representation of the ontology concepts as dictionary entries

5.1 General

A concept in the ontology is identified by a name in lower-case characters. The name of a class that represents the concept in the dictionary is identified by lowercase characters with multiple words joined by an underscore character.

EXAMPLE “tool item type” is the name of a concept in the ontology. "tool_item_type" is the identifier of the class in the dictionary that represents the concept.

Data for tool items are grouped into two main classes: tool_item_feature and tool_item_type. The items in the classification of tool_item_type are identified by a label that is derived from the main application of a tool. However, it should be recognized that a tool can be used for more than one type of cutting operation. A tool_item_feature is an aspect of a tool_item_type that can not exist in isolation from the tool_item_type. A classification of cutting operations is also provided for completeness and to aid definitions.

Some of the definitions of properties that are applicable to tool items are defined in terms of a primary coordinate system. The coordinate system is the same for adaptive items, cutting items, and tool items and is defined in [ISO/TS 13399-50](#). The applications of this coordinate system to tool items are described in this document. All functional dimensions of a tool item that uses replaceable cutting items are defined on the assembly of the tool item and the master insert. The convention followed is “the tool in hand”.

Each entry in the dictionary, either a class or a property, is identified with a numerical code (BSU) that is generated at random when the dictionary is compiled. A BSU can be made unique by the addition of a code that is a reference to the supplier of the dictionary. Each classified item in [5.2](#), [5.3](#), and [5.4](#) is associated with its definition from the dictionary.

The [ISO 13399](#) series shall follow the principles in [Annex A](#). The structure of the classification is provided in [Annex B](#). The definitions of the cutting item classes are provided in [Annex C](#). The properties applicable to tool item classes are defined in [Annex D](#).

5.2 Reference systems for tool items

5.2.1 General

The primary coordinate system used for tool items in this document is the same coordinate system as is defined in [ISO/TS 13399-50](#). The additional reference entities relevant for tool items are as follows:

- coordinate_system_in_process;
- coordinate_system_workpiece_side;
- cutting_reference_point;
- dependency;
- feed_direction_primary;
- master_insert;
- mirror_plane;
- mounting_coordinate_system;
- primary_coordinate_system;
- prismatic_tool_item_position;

- round_tool_item_position;
- tool_cutting_edge_plane;
- tool_feed_plane;
- tool_rake_plane;
- xy-plane;
- xyw-plane;
- xz-plane;
- xzw-plane;
- yz-plane;
- yzw-plane.

5.2.2 cutting_reference_point

Theoretical sharp point of the cutting tool from which the major functional dimensions are taken.

NOTE 1 For the calculation of this point the following cases apply:

Case 1: For a tool cutting edge angle less than or equal to 90° , the point is the intersection of the tool_cutting_edge_plane, the tool_feed_plane, and the tool_rake_plane.

Case 2: For a tool cutting edge angle greater than 90° , the point is the intersection of the tool_feed_plane, a plane perpendicular to the tool_feed_plane and tangential to the cutting corner, and the tool_rake_plane.

Case 3: For ISO tool styles D and V with only axial rake, the point is the intersection of a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool_rake_plane.

Case 4a: For round inserts with one feed direction parallel to the tool axis, the point is the intersection of a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool_rake_plane.

Case 4b: For round inserts with two feed directions, one parallel to the tool axis and one perpendicular to the tool axis with two cutting_reference_point, each point is the intersection of a plane perpendicular to its feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool_rake_plane.

NOTE 2 In Case 3, the theoretical sharp corner of the insert and the cutting_reference_point are on the plane that is perpendicular to the tool_feed_plane.

5.2.3 feed_direction_primary

Direction of movement of a cutting tool to achieve the main cutting function of the tool.

5.2.4 master_insert

Nominal, replaceable cutting item that is used for defining the dimensions of a cutting tool.

NOTE 1 A master insert can substitute for either a regular or an irregular insert and uses the position of the item that it replaces.

NOTE 2 Definitions making use of a master insert also apply to solid or brazed tools.

5.2.5 **prismatic_tool_item_position**

Identifies the location of a prismatic tool item where:

- the base of the tool item shall be coplanar with the XZ-plane;
- the normal for the base of the item shall be in the -Y direction;
- the rear backing surface shall be coplanar with the YZ-plane;
- the normal for the rear backing surface shall be in the -X direction;
- the end of the item shall be coplanar with the XY-plane;
- the normal for the end of the item shall be in the -Z direction; and
- the rake face of the primary cutting item shall be completely visible in the XZ quadrant.

NOTE 1 This definition applies to right-handed tool items. Left-handed tool items are as defined for right-handed items but mirrored through the YZ-plane.

NOTE 2 For cartridges, the top of the axial adjustment screw shall be coincident with the XY-plane.

5.2.6 **round_tool_item_position**

Identifies the location of a round tool item where:

- the axis of the tool item shall be colinear with the Z-axis;
- the vector of the shank that points in the Z direction shall also point towards the workpiece side;
- the drive slots or clamping flats, if present, shall be parallel with the XZ-plane;
- the contact surface of the coupling, the gauge plane, or the end of the cylindrical shank shall be coplanar with the XY-plane; and
- the rake face of the primary cutting item shall be visible in the XZ quadrant.

NOTE This definition applies to right-handed tool items. Left-handed tool items are as defined for right-handed tool items but mirrored through the YZ-plane.

If a bore is present, the vector of the bore of the item that points in the Z direction shall also point towards the workpiece side.

5.2.7 **tool_cutting_edge_plane**

Plane perpendicular to the xy-plane through the major cutting edge of a master insert or of a solid tool.

5.2.8 **tool_feed_plane**

Plane perpendicular to the xy-plane that is parallel to the primary feed direction of the tool item and that is tangential to the cutting corner of the master insert or of a solid tool.

5.2.9 **tool_rake_plane**

Plane that contains the cutting edges of a master insert or of a solid tool.

5.3 Tool item feature

5.3.1 tool_item_feature

Generic family of characteristics of a tool item that cannot exist independently of the tool item. tool_item_feature has the following subclasses:

- chip_management;
- drill_point;
- guide_pilot_feature;
- pilot_drill_feature;
- tool_hub.

5.3.2 chip_management

Generic class of features of the tool body or assembly to control the direction of motion of the chip channel exit.

End of the chip channel on the machine side.

5.3.3 drill_point

Part of a drill that first makes contact with the workpiece.

5.3.4 guide_pilot_feature

Portion of a cylindrical tool in front of the cutting portion that acts to limit the sideways movement of the tool in operation.

5.3.5 pilot_drill_feature

Part of a larger drill for guiding the main cutting operation.

5.3.6 tool_hub

Central part of a disk-shaped tool item with increased thickness.

5.4 Tool item type

5.4.1 tool_item_type

Generic family of items that support or hold one or more cutting items in a cutting operation. tool_item_type has the following subclasses:

- broach;
- burr_tool;
- cartridge;
- drill;
- mill;
- ream;

- rotating_borer;
- threading_die;
- threading_tap;
- turn.

5.4.2 broach

5.4.2.1 General

Family of items designed for use mainly in broaching operations. Broach has the following subclasses:

- cylindrical_broach;
- disk_broach;
- prismatic_broach;
- tapered_broach.

5.4.2.2 cylindrical_broach

Tool item used for changing the dimensions of an existing profile that has a constant circular cross section and cutting edges around the whole circumference.

5.4.2.3 disk_broach

Disk-shaped tool item used for changing the dimensions of an existing profile and that has the cutting edges on the periphery of the disk.

5.4.2.4 prismatic_broach

Tool item with a constant rectangular cross section used for changing the dimensions of an existing profile and that has cutting items on one side of the cross section.

5.4.2.5 tapered_broach

Tool item for changing the dimensions of an existing profile and that has continuously varying cross section with cutting edges surrounding the cross section.

NOTE The cross section can be rectangular, circular, or elliptical.

5.4.3 burr_tool

Small rotating tool for removing areas of roughness from a machined edge.

5.4.4 cartridge

Tool item that carries a solid cutting edge or locks a replaceable insert and is designed to be mounted onto either an adaptive item or a tool item.

5.4.5 drill

5.4.5.1 General

Family of items designed for use mainly in drilling operations. drill has the following subclasses:

- centre_drill;
- chamfer_drill;
- conical_drill;
- core_drill;
- counterbore_drill;
- countersink_drill;
- deep_hole_drill;
- pilot_drill;
- step_drill;
- trepanning_drill;
- twist_drill.

5.4.5.2 centre_drill

Tool item for creating a hole for the location of a subsequent operation.

NOTE This drill is usually a solid drill.

5.4.5.3 chamfer_drill

Tool item for creating a chamfer in or on a hole.

5.4.5.4 conical_drill

Tool item for forming a cone-shaped hole.

NOTE This drill is usually a solid drill.

5.4.5.5 core_drill

Tool item without a central cutting point or means of starting a hole.

NOTE The tool is used to enlarge an existing hole, for example, in a casting and has the characteristics of a reamer.

5.4.5.6 counterbore_drill

Tool item for creating a counterbore section of a hole.

5.4.5.7 countersink_drill

Tool item for creating a countersink section of a hole.

5.4.5.8 deep_hole_drill

Tool item for creating a hole usually deeper than 10 times the diameter of the tool item.

5.4.5.9 pilot_drill

Tool item that is added to a larger drill for guiding the main cutting operation.

5.4.5.10 step_drill

Tool item for creating a stepped hole.

5.4.5.11 trepanning_drill

Tool item used to cut a deep face groove leaving a plug of material equal to the inner diameter.

NOTE The tool can be small to leave a boss on a component or large to create a large hole but not produce all the material to swarf.

5.4.5.12 twist_drill

Solid drill with helical chip flutes.

5.4.6 mill

5.4.6.1 General

Family of rotating tool items intended mainly for use in milling operations. mill has the following subclasses:

- double_half_side_mill;
- end_mill;
- face_mill;
- half_side_mill;
- ring_mill;
- slab_mill;
- slotting_cutter;
- threading_grooving_mill.

5.4.6.2 double_half_side_mill

Milling cutter that cuts on both sides and part of the periphery and is used for enlarging an existing slot.

NOTE The Z-axis is perpendicular to the slot being enlarged; the cutting width is less than half the cutting diameter ($CW < CD/2$) and the mounting is normally a bore mount.

5.4.6.3 end_mill

Milling cutter with an integral shank.

NOTE The Z-axis is either perpendicular or parallel to the surface being machined and the tool has a cutting diameter of less than 150 mm ($CD < 150$ mm).

5.4.6.4 face_mill

Milling cutter that produces a flat surface on the workpiece although the cutting edges on the periphery remove most of the workpiece material.

NOTE The Z-axis is perpendicular to the surface being machined; there is one row of inserts; the mounting is usually a bore with transverse keyways and the depth of cut is less than the cutting diameter ($DOC < CD$).

5.4.6.5 half_side_mill

Milling cutter that cuts on the periphery and one side.

NOTE The Z-axis is perpendicular to the main workpiece surface being produced; the depth of cut is less than half the cutting diameter ($DOC < CD/2$) and the mounting is normally a bore mount.

5.4.6.6 ring_mill

Milling cutter that cuts on the internal annular surface and both sides.

NOTE The Z-axis is perpendicular to the slot being produced and the cutting width is less than half the cutting diameter ($CW < CD/2$).

5.4.6.7 slab_mill

Milling cutter with cutting edges on the periphery for machining large surfaces.

NOTE The tool axis is parallel to the workpiece surface; the mounting surface is a bore and the useable length is greater than cutting diameter ($LU > CD$).

5.4.6.8 slotting_cutter

Milling cutter that cuts on the periphery and both sides.

NOTE The Z-axis is perpendicular to the slot being produced; the cutting width is less than half the cutting diameter ($CW < CD/2$) and the mounting is normally a bore mount.

5.4.6.9 threading_grooving_mill

Milling cutter that cuts on its periphery to produce a groove or a thread.

NOTE The Z-axis is parallel to the groove width or to the axis of thread being cut and the mill can either be designed with an integral shank or with a bore mount.

5.4.7 ream

5.4.7.1 General

Family of items designed for use mainly in reaming operations. ream has the following subclasses:

- cylindrical_reamer;
- profile_reamer;
- stepped_reamer;
- tapered_reamer.

5.4.7.2 cylindrical_reamer

Tool item used for reaming a cylindrical surface.

5.4.7.3 profile_reamer

Tool item for reaming a non-regular surface.

5.4.7.4 stepped_reamer

Tool item for reaming a hole with more than one diameter.

5.4.7.5 tapered_reamer

Tool item for reaming a conical hole.

5.4.8 rotating_borer

Assembly of cutting item or items, tool item or items, and adaptive item or items to enlarge an existing hole.

5.4.9 threading_die

5.4.9.1 General

Family of items used for external threading operations. `threading_die` has the following subclasses:

- `cylindrical_die`;
- `hexagonal_die`.

5.4.9.2 cylindrical_die

Threading die whose outside shape is cylindrical.

5.4.9.3 hexagonal_die

Threading die whose outside shape is hexagonal.

5.4.10 threading_tap

5.4.10.1 General

Family of items designed to form an internal thread in an existing hole in a workpiece. `threading_tap` has the following subclasses:

- `conical_tap`;
- `cylindrical_tap`.

5.4.10.2 conical_tap

Tool item that creates tapered internal threads.

5.4.10.3 cylindrical_tap

Tool item that creates internal cylindrical threads.

5.4.11 turn

5.4.11.1 General

Family of items designed for use mainly in turning and boring operations. turn has the following subclasses:

- boring_bar;
- prismatic_tool_holder;
- system_tool.

5.4.11.2 boring_bar

Tool item with cylindrical cross section shank mainly used for internal turning operations.

5.4.11.3 prismatic_tool_holder

Tool item with prismatic cross section shank mainly used for external turning operations.

NOTE The class includes, but is not limited to, square and rectangular shanks.

5.4.11.4 system_tool

Tool item with manufacturer-specific connection used for external and/or internal turning operations.

5.5 General feature types

- adjustment:
 - adjustment axial;
 - adjustment radial.
- bolt hole circle;
- coolant supply;
- cutting data association;
- flange;
- keyway;
- locking mechanism;
- runout axial;
- runout radial;
- tool thread external:
 - thread inch external;
 - thread metric external;
 - thread trapezoidal external.
- tool thread internal:
 - thread inch internal;

- thread metric internal;
- thread trapezoidal internal.

5.6 Cutting item feature

Cutting item feature classes and related properties can be used for tool items. They are defined in [ISO/TS 13399-2](#).

5.7 Connection item feature

Connection item feature classes and related properties can be used for tool items. They are defined in [ISO/TS 13399-4](#).

6 Properties for tool item features and tool item types

The properties that are applicable to items defined in [Clause 5](#) are defined in [Annex D](#), where the association of a property with a class is also specified. In the compilation of the dictionary, all properties are visible properties at the root class of the dictionary and are made applicable properties at the class level where they apply. The names of properties that can be applicable to tool item features and tool item types, with their identification codes (BSU), are shown in [Table 1](#). The order of the names in the table should be read in rows from left to right.

NOTE 1 Cutting item feature classes and related properties can be used for tool items. They are defined in [ISO/TS 13399-2](#).

NOTE 2 The value domains for properties are specified in [ISO/TS 13399-100](#).

NOTE 3 The BSU can be made unique by the addition of the code for the supplier of the dictionary as a prefix to the identification code.

EXAMPLE The unique BSU for a dimension on lf would be: 0112/1///13399__2-71D0793ECE F9A for version two of the dictionary.

Table 1 — Names of properties for tool items

Property name	Symbol	Identification code (BSU)
adjustability	ADJBY	71EBBA9E78025
adjustable unit assembly length	ADJUL	7272127597464
attachment length holder	LATTH	72721272EB288
axial groove outside diameter maximum	DAXX	71D07543FD182
axial groove outside diameter minimum	DAXN	71CF299354332
axial groove support direction	AXGSUP	726E2FC1D9392
balance quality code	BLQ	71DF151EA5CF1
balance weight outside diameter	BLWOD	727212760A318
balancing method code	BLMC	71EAC0CAB861F
blade reinforcement radius	BLRAD	71CF2992DBC44
body angle workpiece side	BAWS	72C4A71D1B94B
body clearance depth	BCDP	71EAC81F88336
body clearance depth axial	BCDPAX	726E2FCE55394
body clearance diameter	BCD	726E3725BB986
body diameter	BD	71ED6A9AF7D1D
body diameter maximum	BDX	71D08462F8185

Property name	Symbol	Identification code (BSU)
body diameter reduced	BDRED	726E2FAEEDE7
body half taper angle	BHTA	71EAC472BD116
body height	HTB	71EBB332C60EB
body length	LB	71ED6AA478A3D
body length maximum	LBX	71DCD3B16750B
body material code	BMC	71DF1523224D8
body section count	BSC	72C5C9C07963B
body width	WB	71EBB33230236
brand	BRAND	728ECFD658014
bridge height	BH	7272127ACA99C
cartridge outside diameter	CAOD	7272127B20A66
cartridge size code	CASC	71DF1523EE184
center point of the profile radius X-direction	CPRADX	72AC4750EEEF5
center point of the profile radius Z-direction	CPRADZ	72AC4750D3EE8
central flat	CF	72719B181D75D
centre drill style code	CTRSYC	7280553ACDD96
chip flute radius	RCF	7272127E28662
clamping length machine side	LSCMS	71EBAF896BE9A
clamping length maximum machine side	LSCXMS	71ED6E54B15C4
clamping length minimum machine side	LSCNMS	71EBB339ED2BD
clamping length minimum workpiece side	LSCNWS	72E33DEACC133
clamping length workpiece side	LSCWS	72996F3DC8E8A
clamping type code	MTP	71CF298EEB4F5
clamping width	WSC	71EBAF85006BD
clearance angle axial	ALP	71EAC83CD450B
clearance angle normal	ALN	71ED6E5CD0DAE
clearance angle orthogonal	ALO	71D08418C3B4D
clearance angle radial	ALF	71EAC83B73825
coating property	CTP	71DD703B84298
cogging style code	COGSC	72806055E5B54
collision diameter	CDIA	727212879692C
connection depth	CBDP	71EAC48CAD407
connection bore diameter (deprecated)	DCB	71E01D92C41E8
connection code form output side	CCFOP	727212846FDA5
connection code form type machine side	CCFMS	726E3E84DD902
connection code form type workpiece side	CCFWS	726E3E8558953
connection code machine side	CCMS	71D102AE3B252
connection code type machine side	CCTMS	726E3E82E53A6
connection code type output side	CCTOS	727212869DDE2
connection code type workpiece side	CCTWS	726E3E83D7357
connection code workpiece side	CCWS	71D102AE8A5A9
connection count workpiece side	CCONWS	71EDD2C17746F
connection diameter machine side	DCONMS	71EBDBF5060E6
connection diameter maximum workpiece side	DCONXWS	72807E35DE582

Property name	Symbol	Identification code (BSU)
connection diameter minimum workpiece side	DCONNWS	72807E3576AAE
connection diameter workpiece side	DCONWS	7272379A5F325
connection protruding length	LPCON	726E3E863255C
connection retention knob thread size	CRKS	71CF298A76B66
connection size code (deprecated)	CZC	71FC193318002
connection size code machine side	CZCMS	727C2BCCC5596
connection size code maximum workpiece side	CZCXWS	72807E36B6C92
connection size code minimum workpiece side	CZCNWS	72807E366B041
connection size code workpiece side	CZCWS	727C2BCBC1684
connection thread nominal size machine side	THSZMS	727BE508AAB46
connection thread nominal size workpiece side	THSZWS	727BE5090F9AA
connection unit base precision machine side	CUBPMS	7280553C9A894
connection unit base precision maximum workpiece side	CUBPXWS	729A91AC5433F
connection unit base precision minimum workpiece side	CUBPNWS	729A91ABE3690
connection unit base precision workpiece side	CUBPWS	7280605902AD1
connection unit basis	CUB	71ED6E16D5978
contact surface diameter machine side	DCSFMS	71D087D97FCE3
coolant supply property	CSP	71EBB342CC751
counterbore depth connection bore	LCCB	726E2FCE0826C
counterbore diameter connection bore	DCCB	726E2FCF353DE
countersink angle	SIGCSK	726E2FCD1A3C4
cutting data association code	CDAC	72719B2427AED
cutting data association property	CDAP	72719B23A5008
cutting depth maximum	CDX	71CEAEBD5A66A
cutting diameter	DC	71D084653E57F
cutting diameter internal	DCIN	71D0846545C4E
cutting diameter internal maximum	DCINX	71D0846570977
cutting diameter internal minimum	DCINN	71D084655A2F7
cutting diameter maximum	DCX	71D084656CE32
cutting diameter minimum	DCN	71D0846556288
cutting diameter size code	DCSC	71DF1527D828C
cutting edge centre count	ZNC	71DCD0033973E
cutting edge length	L	71DD6C95DA49B
cutting edge sequence	CESEQ	726E3AABCE55D
cutting end count	NCE	71DCD00CBBC2A
cutting item count	CICT	71DF8C52B8926
cutting length at minimum bore diameter	CLMBS	71CF299287FD3
cutting part design style code	CDPSC	72719B101A1FD
cutting pitch density	CPDN	71DF15283219C
cutting pitch differential	CPDF	71DF152D8CF7D
cutting point translation X-direction	CTX	71FD1E2EDD973
cutting point translation Y-direction	CTY	71FD1E2F66B38
cutting width maximum	CWX	71D07569F8BC3
cutting width minimum	CWN	71D0756A28B42

Property name	Symbol	Identification code (BSU)
damping property	DPC	71CED03D70452
datachip provision	DCP	71CF29869CA0F
depth of cut maximum	APMX	71D07576C0558
design configuration style code	DCC	71CF2993DC583
designation	DES	728ECFD4A0629
diameter hole tolerance class	DHTOLC	72C4A72599564
diameter hole tolerance lower	DHTOLL	72C4A7255D6CA
diameter hole tolerance upper	DHTOLU	72C4A7257B716
die chip hole count	DCHC	726E2FC5A2BA5
die chip hole diameter	DDCH	726E2FC4858CC
die chip hole diameter circle	DDCHC	726E2FC51A8C7
dimension a on lf	LFA	71D0793ECE9A
dimension a on wf	WFA	71CF299431CAC
distance reference point PK	LDC	726E3AAAF99A3
drill back taper	DBT	71EAC81AD9AE1
drilling part length	LDP	727CE21EEC94F
drive angle	DRVA	71D08096F930C
drive count	DRVCT	71E0306423B2A
drive length	DRVL	72724DE6DABFF
drive size	DRVSC	71E03063ABD6E
drop head design	DHD	71EAC49F75413
end chamfer	EC	72724DE823AF8
end chamfer angle	ECA	72724DE89D232
end chamfer distance	ECD	72724DE99F0D4
face effective cutting edge count	ZEFF	71DCD00239812
face mounted insert count	ZNF	71DCD0029BBE7
flat width (deprecated)	FW	726E372B58657
flute count	NOF	71DCCFE8B883E
fluted land width	FLW	71EAC8210DF36
form type	FMT	71EBBE32903BD
functional diameter	DFC	7272379AD9C85
functional length	LF	71DCD39338974
functional length minimum	LFN	71EBC1EB8456A
functional length secondary	LFS	71D078F5BEDBE
functional width	WF	71CF29984CDA7
functional width 2	WF2	71D193F495583
functional width secondary	WFS	71CF299874B1E
grade application main	GRDAPPM	729A91AB4451E
grade application range max	GRDAPRX	729A91AAEB181
grade application range min	GRDAPRN	729A91A635147
grade identification	GRDID	729A919BF211A
grade main application group identification letter	GRDMAPID	729A919C3D239
grade manufacturers designation	GRDMFG	726E3EA930D39
grade standard designation main application	GRDPRI0	726E3EA8A9ED6

Property name	Symbol	Identification code (BSU)
groove depth minimum bore diameter	GDMB	71CF298FB10E4
guide element property	GEP	71EE070696F08
guide pilot property	GPP	7280553614076
hand	HAND	71CF29872F0AB
head back offset length	HBKL	71D075730A82B
head back offset width	HBKW	71D075731F172
head bottom offset height	HBH	71CF298F073D3
head bottom offset length	HBL	71CF298F4E487
head diameter	HDD	71E03062EC034
head end angle	HEA	72724DEFB9646
head length	LH	71D07574A61E8
hole type	HTY	72719B167AE15
hub height	HHUB	726E37249379B
hub property	HBP	71DF5C078FF46
inclination angle	LAMS	71D075754F8A3
insert adjustable count	ZADJ	71DF1538E7378
insert included angle	EPSR	71CE7A96BC122
insert index count	NOI	71CE7AA1998FF
insert length	INSL	71CE7A9DFA23A
insert seat size code	SSC	71CEAEBF2A69F
insert shape code	SC	71CE7A9F0C79F
insert thickness	S	71CE7A9F5308C
insert width	W1	71CE7A9FB11C3
interference cutting diameter	DCINTF	726E2FCC0EC78
item style code	ISYC	726E424FE9EC2
keyway property	KYP	71DF5C0761888
main work angle of tool	MWAT	72C4A71C21F24
master insert identification	MIID	71CF298FDE0EF
maximum overhang	OHX	72C4A723AD619
minimum bore diameter	DMIN	71D07543367C5
mounting coordinate system distance	MCSD	72719B2173235
mounting hole angle	MHA	71EAC0F064E2D
mounting hole distance	MHD	71EAC0E9FA4CD
mounting hole distance 2	MHD2	71EAC0EF68BB7
mounting hole height	MHH	71EAC0EFA1BF3
neck diameter	DN	71EAC48EC5DE0
neck length	LN	71EBC1E026769
offset chip flute inner pocket	OFFCFIN	727BE4E8EB1D5
offset chip flute outer pocket	OFFCFEX	727BE4E83C904
overall height	OAH	71D078EB73E87
overall length	OAL	71D078EB7C086
overall length minimum (deprecated substituted by residual grinding length)	OALN	71EBC1E8857BE
overall width	OAW	71CF299257986

Property name	Symbol	Identification code (BSU)
overhang minimum	OHN	72719B21DF5DB
overlapping capability	LCB	71DF1526AC952
peripheral effective cutting edge count	ZEFP	71DCCFF75E485
peripheral mounted insert count	ZNP	71DCD00054F65
plug angle	PLGANG	726F30BC507E3
plug length	PLGL	726E372E4FBE9
plunge depth maximum	AZ	71D08099F1DDC
premachined hole diameter	PHD	71DCCC5A4FD18
premachined hole type	PHT	72719B2280DBA
presetting cutting diameter greater	DCPSX	72723798609B4
presetting cutting diameter internal, greater	DCIP SX	7272379692AF6
presetting cutting diameter internal, smaller	DCIP SN	7272379632320
presetting cutting diameter smaller	DCPSN	72723798D9173
profile angle	PRFA	727BE4EA0BC27
profile included angle	PNA	71CEAEBF0C234
profile radius	PRFRAD	71E019EBAE1B1
profile specification	PRSPC	71DF8C5D91804
protruding length	LPR	71DCD394BB20E
qualified tool code	QTC	71D078ED2C21E
radial width of cut	AE	7280605D97D83
radius countersunk	RCSK	726E2FCCB7224
rake angle axial	GAMP	71CF29990C41F
rake angle normal	GAMN	71CF2998EBD46
rake angle orthogonal	GAMO	71D0808F8F719
rake angle radial	GAMF	71CF2998A1609
ramping angle maximum	RMPX	71DF1538632D9
reduced body diameter length	LDRED	727BE4DF14C62
rotational speed maximum	RPMX	71DF153A691F2
row count	NOR	726F30C2C3EEA
row identifier (deprecated)	RID	71CED04867743
seal	SALP	72719B2B51519
shank cross section shape code	SX	71CF2988A5874
shank diameter (deprecated)	DMM	71CF29862B277
shank height	H	71CF29883E014
shank length	LS	71CF298870946
shank width	B	71CF298751FCF
shim inclination angle	SHIAN	71FAE074D2EBD
side	SIDE	71EBDBF130AE6
standard letter	STDLET	72807E1CC4B50
standard number	STDNO	72719B17B907F
step count	NOS	71DCCC3BD1B96
step diameter length	SDL	71DCCC3DFA23A
step distance	SD	71DCCC47221E0
step included angle	STA	71DF151D6E547

Property name	Symbol	Identification code (BSU)
stock removal maximum	SRX	71EBC1EC0BB22
stock removal minimum	SRN	71EBC1EBC839F
stock removal recommended	SRR	71EBC1EC3E8B6
support height	HSUP	72724DF094129
tangentially mounted insert	TMINS	71EAC496E7425
tap center tip angle	ANGTCT	726E2FCA7ECF0
tap center tip diameter	DTCT	726E2FC624810
tap chamfer length	TCL	726E3EB2AB5CB
tap chamfer point diameter	TCPD	71EBC1EA293DC
tap chamfer style	TCS	71E02C679DC6D
tap set code	TAPSC	726E3EB308CDD
tap type identifier	TTPID	71DF153B4ABCD
taper angle	TA	71EAC4A2B6544
taper diameter largest	DTAX	726E3AA6C4A1C
taper diameter smallest	DTAN	726E3AA639325
taper form barrel angle	TFBA	72E24F5BF9F16
taper gradient	TG	71CEAEC02FEBD
tapered	TPD	71EC659C9B3CE
thread cutting part length	THL	72550E426D771
thread diameter	TD	71E02C5C2EED3
thread diameter inch fraction	TDFR	726E3EACB6BE4
thread diameter inch measure	TDIN	726E3EA9B08AD
thread diameter minimum	TDN	726E2FC37D98A
thread diameter size	TDZ	71EBBAA3BCA70
thread tolerance class	TCTR	71DF153FA5F85
tolerance class connection diameter machine side	TCDCONMS	72719B2BD8041
tolerance class connection diameter maximum workpiece side	TCDCONXWS	729A91ADE068B
tolerance class connection diameter minimum workpiece side	TCDCONNWS	729A91AD69059
tolerance class connection diameter workpiece side	TCDCONWS	727ED91B5AA66
tolerance class machined hole diameter	TCDH	72719B197DA99
tool assembly height	HTA	728B074BFC2AD
tool assembly length	LTA	728B074A39EBC
tool assembly width	WTA	728B074B7B0B5
tool changer interference diameter maximum	DIX	71CF298A3A99A
tool changer interference length minimum	LIN	71CF2989AF0E0
tool cutting edge angle	KAPR	71D078F683C9B
tool cutting edge angle type code	CEATC	71D078F6E9893
tool holder shape code	THSC	71D078FD4E7BE
tool lead angle	PSIR	71D078F77616B
tool style code	TSYC	71D078FBF6C68
unit system	UST	71EBBA9ED6C0A
usable length	LU	71EBB33490FDA
usable length diameter ratio	ULDR	71DCCC62CD9EE
usable length maximum	LUX	71CF2992BDBCC

Property name	Symbol	Identification code (BSU)
web taper	WBTP	71EAC823D95A7
web thickness	WBTHK	71EAC82313165
work piece parting diameter maximum	CUTDIA	71D0757C787B8

Annex A **(normative)**

Principles of the ISO 13399 series

A.1 General

The ISO 13399 series is intended for use by, among others, tool producers and vendors, manufacturers, and developers of manufacturing software. The ISO 13399 series provides a common structure for exchanging data about cutting tools with defined cutting edges. The ISO 13399 series is intended to provide for, or improve, several manufacturing activities, including:

- the integration and sharing of data for cutting tools and assemblies between different stages of the manufacturing cycle and between different software applications;
- the direct import of data from cutting tool suppliers into a customer's database;
- the management of cutting tool information from multiple sources and for multiple applications.

Different companies use different business models to determine their need for the communication of information about their products. For example, one cutting tool manufacturer can regrind its customers' tools while another can allow its customers to do the regrinding and provide the information to enable them to do so. Therefore, the two cutting tool manufacturers can have a different set of cutting tool properties to communicate using the information model and dictionaries provided in the ISO 13399 series.

The ISO 13399 series defines only the information that can be communicated, but does not specify what information shall be communicated.

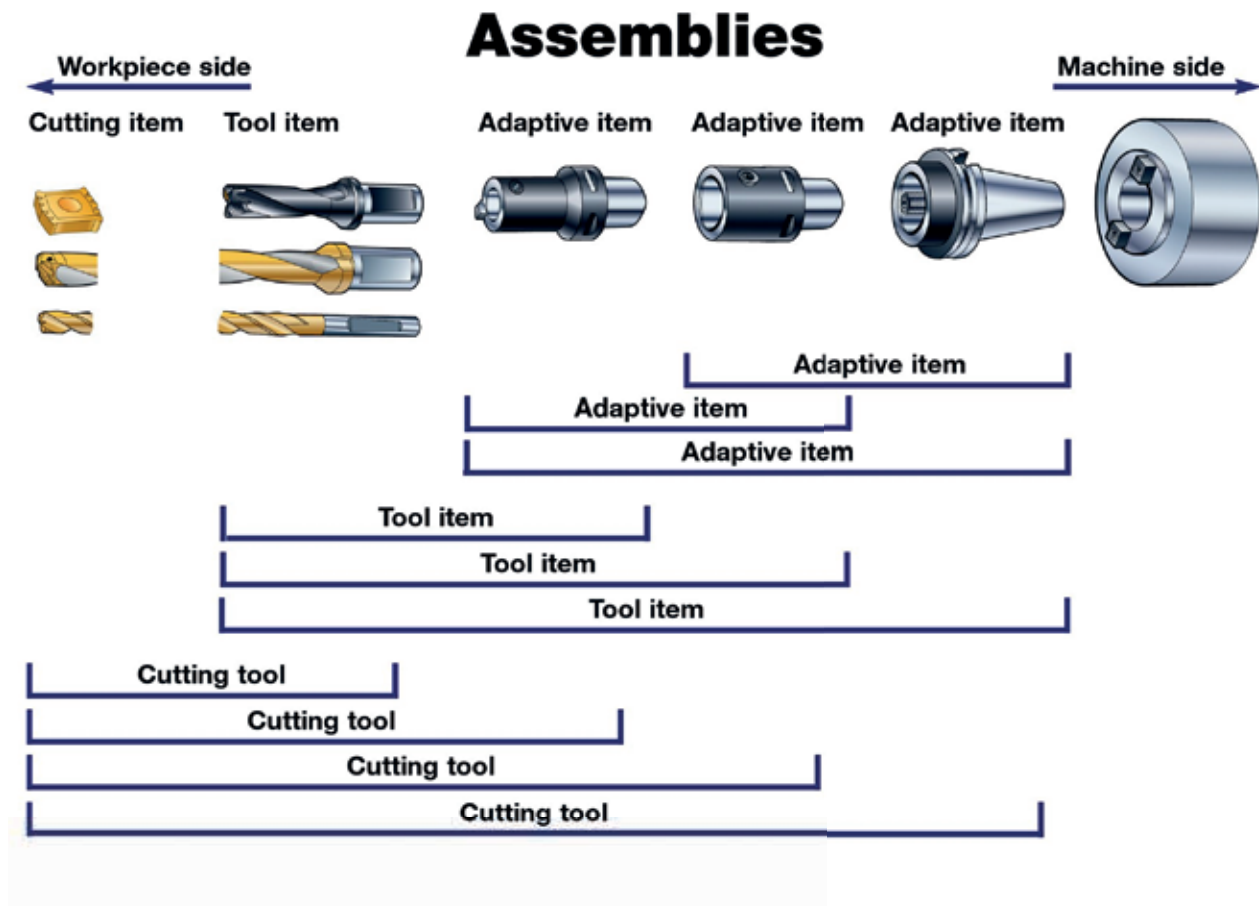


Figure A.1 — Possible assemblies of the components of a cutting tool

Since the content of those dictionaries evolves according to industrial innovations and constant improvement of technology in cutting tools, a Maintenance Agency has been established for the purposes of:

- correcting errors in the entries of existing classes and properties;
- adding new properties to existing classes;
- adding new classes and their properties;
- managing the status of those properties and classes;
- migrating the dictionary to subsequent editions of the ISO 13399 series.

The name, address and contact information of the Maintenance Agency is available at: https://www.iso.org/maintenance_agencies.html.

The reference dictionaries are available in the form of EXPRESS files on the website of the Maintenance Agency. These files are considered complementary to this document; they can be freely downloaded and used for cutting tool data representation and exchange.

The following permission notice and disclaimer shall be included in all copies of this EXPRESS schema ("the Schema"), and derivations of the Schema:

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THIS SCHEMA HAS BEEN MODIFIED FROM THE SCHEMA DEFINED IN THE ISO 13399 SERIES, AND SHOULD NOT BE INTERPRETED AS COMPLYING WITH THAT INTERNATIONAL STANDARD.

A.2 Information object registration

A.2.1 Document identification

In order to provide for unambiguous identification of an information object in an open system, the object identifier:

{iso technical specification 13399 part (3) version (3)}

is assigned to this document. The meaning of this value is defined in [ISO/IEC 8824-1](#) and is described in ISO 13584-1.

A.2.2 Dictionary identification

The dictionary defined in this document is assigned the object identifier:

{iso technical specification 13399 part (3) version (3) object (2) tool items (2)}

Annex B (informative)

Classification table

[Table B.1](#) shows the classification structure of the generic families in the dictionary with an expanded structure for the classes of connection interface feature, cutting operation, reference system, tool item feature, and tool item type. The purpose of [Table B.1](#) is to show the relationships between the classes of cutting items and the other classes in the ISO 13399 series.

NOTE 1 Cutting item feature classes and related properties can be used for tool items. They are defined in [ISO/TS 13399-2](#).

NOTE 2 [Annex C](#) contains the definition of all the classes that are relevant to tool items and definitions of those classes of reference systems that are used in the definition of the properties of tool item types.

Table B.1 — Classification table

Classification structure		Parent	BSU
cutting tool library		Root	71CE7A72B6DA7
	adaptive item type	71CE7A72B6DA7	71EAD37F18F34
	adjustment	71CE7A72B6DA7	71ED884159C90
	assembly item type	71CE7A72B6DA7	71CE7A795C05C
	bolt hole circle	71CE7A72B6DA7	71E02520881F1
	connection interface feature	71CE7A72B6DA7	71DF8C37D9115
	coolant supply	71CE7A72B6DA7	71DF8C3C065EB
	cutting data association	71CE7A72B6DA7	72719B234F9E0
	cutting item feature	71CE7A72B6DA7	71DD6C82F72DA
	cutting item type	71CE7A72B6DA7	71D1AA6C8FC75
	cutting operation	71CE7A72B6DA7	71DFF83D21D50
	boring	71DFF83D21D50	71DFF83D3B0A4
	broaching circular	71DFF83D21D50	71DFF83D551E3
	broaching linear	71DFF83D21D50	71DFF83D6FA17
	counterboring	71DFF83D21D50	71DFF83D897BB
	countersinking	71DFF83D21D50	71DFF83DB5E40
	drilling	71DFF83D21D50	71DFF83DD3EAA
	drilling deep hole	71DFF83D21D50	71DFF83E498D2
	drilling step	71DFF83D21D50	71DFF83E67286
	grooving	71DFF83D21D50	71DFF83E92592
	milling face	71DFF83D21D50	71DFF83EA9476
	milling profile	71DFF83D21D50	71DFF83EE1225
	milling shoulder	71DFF83D21D50	71DFF83EF5A57
	milling slot	71DFF83D21D50	71DFF83F249B1
	parting	71DFF83D21D50	71DFF83F56124
	reaming cylindrical	71DFF83D21D50	71DFF83F6CC6E
	reaming profile	71DFF83D21D50	71DFF83F888E5
	slitting	71DFF83D21D50	71DFF83FA2ED7

Classification structure		Parent	BSU
	threading external	71DFF83D21D50	71DFF83FB8E3A
	threading internal	71DFF83D21D50	71DFF83FE65D6
	trepanning	71DFF83D21D50	71DFF84016666
	turning external	71DFF83D21D50	71DFF84041924
	turning internal	71DFF83D21D50	71DFF8404F82C
	cutting tool	71CE7A72B6DA7	71CE7A7A5038B
	dependency	71CE7A72B6DA7	727CE22063F8E
	flange	71CE7A72B6DA7	71EC5A767182E
	keyway	71CE7A72B6DA7	71DF5C026BCE7
	locking mechanism	71CE7A72B6DA7	71EBAB85BB5FA
	reference system	71CE7A72B6DA7	71CF2968F7A9E
	coordinate system in process	71CF2968F7A9E	72B87923CF339
	coordinate system workpiece side	71CF2968F7A9E	71EF00655FB61
	cutting reference point	71CF2968F7A9E	71CF29A40396A
	feed direction primary	71CF2968F7A9E	71ED6A7959A34
	irregular insert position	71CF2968F7A9E	71D1A2CB23A32
	master insert	71CF2968F7A9E	71D0808DA853B
	mirror plane	71CF2968F7A9E	71D19F532AC75
	mounting coordinate system	71CF2968F7A9E	72B87923B9440
	primary coordinate system	71CF2968F7A9E	71D188F129725
	prismatic adaptive item position	71CF2968F7A9E	71D19F4A9D1AE
	prismatic tool item position	71CF2968F7A9E	71D10668FA109
	regrinding	71CF2968F7A9E	71EAC81A64368
	regular insert position	71CF2968F7A9E	71D0181931BAE
	round adaptive item position	71CF2968F7A9E	71DF0A33D2E7A
	round tool item position	71CF2968F7A9E	71D19F4B58F60
	theoretical sharp point	71CF2968F7A9E	71FAE7B6D87BC
	tool cutting edge plane	71CF2968F7A9E	71DF0A34A8156
	tool feed plane	71CF2968F7A9E	71DF0A38E1098
	tool rake plane	71CF2968F7A9E	71DF0A3C6BB36
	xy-plane	71CF2968F7A9E	71D188FC65486
	xyw-plane	71CF2968F7A9E	71ED6E3F268C6
	xz-plane	71CF2968F7A9E	71CF29A3CDE2F
	xzw-plane	71CF2968F7A9E	71ED6E3E9AECB
	yz-plane	71CF2968F7A9E	71D188F971983
	yzw-plane	71CF2968F7A9E	71ED6E3F84723
	runout axial	71CE7A72B6DA7	71EDD2B84143C
	runout radial	71CE7A72B6DA7	71EDD2B858274
	tool item feature	71CE7A72B6DA7	71DD70376771D
	chip management	71DD70376771D	71DF8C3FD03AF
	drill point	71DD70376771D	71DF8C5B8F7B5
	guide pilot feature	71DD70376771D	71E019C497CDF
	pilot drill feature	71DD70376771D	71EE070754DE2
	tool hub	71DD70376771D	71DF5C02D0271
	tool item type	71CE7A72B6DA7	71E01A004C775

Classification structure		Parent	BSU
	broach	71E01A004C775	71E01A04C377D
	cylindrical broach	71E01A04C377D	71E0250E32A07
	disk broach	71E01A04C377D	71E01A082DE72
	prismatic broach	71E01A04C377D	71E01A0838E9B
	tapered broach	71E01A04C377D	71E01A081855D
	burr tool	71E01A004C775	71E02C544BABE
	cartridge	71E01A004C775	71D1066F279AD
	drill	71E01A004C775	71E01A00BD93C
	centre drill	71E01A00BD93C	71E01A073CA28
	chamfer drill	71E01A00BD93C	71E01A069566C
	conical drill	71E01A00BD93C	71E01A0751456
	core drill	71E01A00BD93C	71FAE7AAE8247
	counterbore drill	71E01A00BD93C	71E01A06BF88D
	countersink drill	71E01A00BD93C	71E01A06A8A08
	deep hole drill	71E01A00BD93C	71E01A065F635
	pilot drill	71E01A00BD93C	71E01D8A88F65
	step drill	71E01A00BD93C	71E01A067F73C
	trepanning drill	71E01A00BD93C	71E01A0769982
	twist drill	71E01A00BD93C	71E01A0608FE4
	feed-out tool, machine operated	71E01A004C775	7272127CBD7B8
	mill	71E01A004C775	71E01A008D13F
	double half side mill	71E01A008D13F	71EF07DFC283C
	end mill	71E01A008D13F	71E01A05D27A8
	face mill	71E01A008D13F	71E01A05B627B
	half side mill	71E01A008D13F	71E01A05EA320
	ring mill	71E01A008D13F	71E01A0600702
	slab mill	71E01A008D13F	71E01A0540BE7
	slotting cutter	71E01A008D13F	71EF07E037025
	threading grooving mill	71E01A008D13F	71EF07E083383
	ream	71E01A004C775	71E01A04A8AEC
	cylindrical reamer	71E01A04A8AEC	71E01A07BC535
	profile reamer	71E01A04A8AEC	71E01A07ECCCF
	stepped reamer	71E01A04A8AEC	71E01A07FF350
	tapered reamer	71E01A04A8AEC	71E01A07D2A1B
	rotating borer	71E01A004C775	71E0251F304E1
	threading die	71E01A004C775	71E01A04F70F7
	cylindrical die	71E01A04F70F7	71E01A0E4EE75
	hexagonal die	71E01A04F70F7	71E01A0E79239
	threading tap	71E01A004C775	71E01A04E0236
	conical tap	71E01A04E0236	71E01A0E34C7F
	cylindrical tap	71E01A04E0236	71E01A0A5355D
	turn	71E01A004C775	71E01A05104CF
	boring bar	71E01A05104CF	71E01A0E9CBA9
	prismatic tool holder	71E01A05104CF	71E01A0E85121
	system tool	71E01A05104CF	71E01A0EAF067

Classification structure		Parent	BSU
	tool thread external	71CE7A72B6DA7	71FC1D22BF4CD
	tool thread internal	71CE7A72B6DA7	71FC1D25097D7

Annex C (informative)

Class definitions

C.1 Content and presentation

The content of this annex is limited to the classes of connection interface feature, cutting operation, reference system, tool item feature, and tool item type.

The layout of the information for each class in this annex is:

BSU Code – version number Revision number

Preferred name Short name

Definition

NOTE

REMARKS

Subclasses:

Properties:

NOTE 1 Cutting item feature classes and related properties can be used for tool items. They are defined in [ISO/TS 13399-2](#).

C.2 Classes

71DF8C37D9115-003 002

connection interface feature connect

Family of features of those parts of a tool item or adaptive item that forms a coupling to another tool item or adaptive item or machine tool

Properties:

71D102AE3B252 connection code machine side

71D102AE8A5A9 connection code workpiece side

71E03063ABD6E drive size

71EAC48CAD407 connection depth

71EBB342CC751 coolant supply property

71EBBE32903BD form type

71EBDBF130AE6 side

71ED6E16D5978 connection unit basis

71FC193318002 connection size code (deprecated)

726E2FCE0826C counterbore depth connection bore
726E2FCF353DE counterbore diameter connection bore
726E3E82E53A6 connection code type machine side
726E3E83D7357 connection code type workpiece side
726E3E84DD902 connection code form type machine side
726E3E8558953 connection code form type workpiece side
726E3E863255C connection protruding length
72719B2BD8041 tolerance class connection diameter machine side
727212846FDA5 connection code form output side
727212869DDE2 connection code type output side
7272379A5F325 connection diameter workpiece side
7272379AD9C85 functional diameter
72724DE6DABFF drive length
727BE508AAB46 connection thread nominal size machine side
727BE5090F9AA connection thread nominal size workpiece side
727C2BCBC1684 connection size code workpiece side
727C2BCCC5596 connection size code machine side
7280553C9A894 connection unit base precision machine side
7280605902AD1 connection unit base precision workpiece side
72807E3576AAE connection diameter minimum workpiece side
72807E35DE582 connection diameter maximum workpiece side
72807E366B041 connection size code minimum workpiece side
72807E36B6C92 connection size code maximum workpiece side
729A91ABE3690 connection unit base precision minimum workpiece side
729A91AC5433F connection unit base precision maximum workpiece side
729A91AD69059 tolerance class connection diameter minimum workpiece side
729A91ADE068B tolerance class connection diameter maximum workpiece side

71DFF83D21D50-001 001

cutting operation ctp

Removal of material from a workpiece by a defined cutting edge or edges

Subclasses:

71DFF83FE65D6 threading internal

71DFF83FB8E3A threading external

71DFF8404F82C turning internal

71DFF83D3B0A4 boring

71DFF83F249B1 milling slot

71DFF83EA9476 milling face

71DFF83F6CC6E reaming cylindrical

71DFF83E67286 drilling step

71DFF84041924 turning external

71DFF84016666 trepanning

71DFF83F56124 parting

71DFF83EE1225 milling profile

71DFF83EF5A57 milling shoulder

71DFF83F888E5 reaming profile

71DFF83DB5E40 countersinking

71DFF83E498D2 drilling deep hole

71DFF83D6FA17 broaching linear

71DFF83D551E3 broaching circular

71DFF83D897BB counterboring

71DFF83DD3EAA drilling

71DFF83FA2ED7 slitting

71DFF83E92592 grooving

71DFF83D3B0A4-001 001

boring brg

Changing the diameter of an existing hole in a workpiece with one or more passes of a cutting tool

71DFF83D551E3-001 001

broaching circular bchc

Changing the dimensions of an existing surface profile by a single circular motion of a cutting tool

71DFF83D6FA17-001 001

broaching linear bchl

Changing the dimensions of an existing surface profile by a single linear motion of a cutting tool

71DFF83D897BB-001 001

counterboring ctbg

Creating an enlarged section of a hole to provide concentric holes with the transitory shoulder between the holes at 90 degrees to the axis of the holes

71DFF83DB5E40-001 001

countersinking cntsg

Creating an enlarged section of a hole to provide concentric holes with the transitory shoulder between the holes at an angle to the axis of the holes

71DFF83DD3EAA-001 001

drilling drg

Creating a new cylindrical hole in a workpiece where the depth of the hole is normally less than ten times the diameter of the hole

NOTE Either the cutting tool or the workpiece can rotate.

71DFF83E498D2-001 001

drilling deep hole dpdg

Creating a new cylindrical hole in a workpiece where the depth of the hole is normally more than ten times the diameter of the hole

71DFF83E67286-001 001

drilling step drlsp

Creating a new hole with more than one diameter by a single operation

71DFF83E92592-001 001

grooving gvg

Creating multiple connected surfaces on a circular section of a workpiece

71DFF83EA9476-001 001

milling face mlfc

Creating a single flat external surface on a workpiece by a rotating tool

NOTE The feed is achieved by the motion of the workpiece or by the motion of the cutting tool or by the combination of both motions.

71DFF83EE1225-001 001

milling profile mlprf

Creating curved surfaces on a workpiece by a rotating cutting tool

NOTE The feed is achieved by the motion of the workpiece or by the motion of the cutting tool or by the combination of both motions.

71DFF83EF5A57-001 001

milling shoulder mlshd

Creating perpendicular connected surfaces on a workpiece by a rotating cutting tool

NOTE The feed is achieved by the motion of the workpiece or by the motion of the cutting tool or by the combination of both motions.

71DFF83F249B1-001 001

milling slot mslst

Creating multiple connected surfaces in the workpiece by a rotating cutting tool

NOTE The feed is achieved by the motion of the workpiece or by the motion of the cutting tool or by the combination of both motions.

71DFF83F56124-001 001

parting part

Separating a rotating workpiece into two parts with a stationary cutting tool

71DFF83F6CC6E-001 001

reaming cylindrical rmcyl

Changing the diameter of an existing cylindrical hole to achieve a close tolerance on the diameter and to improve the surface finish

71DFF83F888E5-001 001

reaming profile rmprf

Changing the diameter of an existing profiled hole to achieve a close tolerance on the diameter and to improve the surface finish

71DFF83FA2ED7-001 001

slitting sltg

Separating a stationary workpiece into two parts with a rotating tool

71DFF83FB8E3A-001 001

threading external thext

Creating a screw thread on the external surface of a workpiece with a cutting tool

NOTE This operation includes: die threading, thread turning, and thread milling operations.

71DFF83FE65D6-001 001

threading internal thint

Creating a screw thread on an internal surface of a workpiece with a cutting tool

NOTE This operation includes: tapping, thread turning and thread milling operations.

71DFF84016666-001 001

trepanning trpg

Creating a new annular hole that leaves the central portion of the hole intact

NOTE The central portion can be left attached to the workpiece or detached.

71DFF84041924-001 001

turning external trnext

Creation of a new external surface on a rotating workpiece with a stationary cutting tool

71DFF8404F82C-001 001

turning internal trnint

Creating a new internal surface on a rotating workpiece by a stationary cutting tool

727CE22063F8E-001 003

dependency dep

Feature class containing properties for dependency purposes

NOTE See [ISO/TS 13399-150:2008](#), 3.17.

Properties:

727CE220F2360 index

727CE23A47ADB location

71EC5A767182E-001 001

flange flange

Projecting rim or edge on the outside of an object

Properties:

71EC61D7F2071 flange diameter internal

71EC61D8A1771 flange diameter

71EEF53809764 flange thickness

71EEF5384E141 flange height

71EEF5387E914 flange width

71F90EA1ED67E flange location

71DF5C026BCE7-001 001

keyway kwy

Slot in which a shaped piece of metal can be inserted to transfer torque between two connected items

Properties:

71D0841ADC9E0 keyway width

71EBAB85BB5FA-001 001

locking mechanism lock

Device that can be actuated to secure the coupling of two items together

Properties:

71DF153B14F02 torque

71EBBA9B56D06 actuation force

71EBBA9BCB5F2 actuation method

71CF2968F7A9E-001 001

reference system refsys

Family of items that provide a reference basis for the definitions of properties

NOTE The convention for all the reference systems is the tool-in-hand system.

Subclasses:

71CF29A40396A cutting reference point

71D19F532AC75 mirror plane

71D188F971983 yz-plane

71DF0A38E1098 tool feed plane

71DF0A34A8156 tool cutting edge plane
71ED6A7959A34 feed direction primary
71D0181931BAE regular insert position
71D188F129725 primary coordinate system
71D19F4B58F60 round tool item position
72B87923CF339 coordinate system in process
71ED6E3E9AECB xzw-plane
71ED6E3F84723 yzw-plane
71EF00655FB61 coordinate system workpiece side
71D1A2CB23A32 irregular insert position
71FAE7B6D87BC theoretical sharp point
72B87923B9440 mounting coordinate system
71EAC81A64368 regrinding
71CF29A3CDE2F xz-plane
71ED6E3F268C6 xyw-plane
71DF0A3C6BB36 tool rake plane
71DF0A33D2E7A round adaptive item position
71D0808DA853B master insert
71D188FC65486 xy-plane
71D10668FA109 prismatic tool item position
71D19F4A9D1AE prismatic adaptive item position

71CF29A3CDE2F-001 001

xz-plane xzp

Plane in the coordinate axis system that contains the X and Z axes with the normal of the plane in the positive Y direction

71CF29A40396A-001 001

cutting reference point crp

Theoretical point of the tool from which the major functional dimensions are taken

NOTE For the calculation of this point the following cases apply:

Case 1. Tool cutting edge angle $\leq 90^\circ$ - the point is the intersection of: the tool cutting edge plane, the tool feed plane, and the tool rake plane

Case 2. Tool cutting edge angle $> 90^\circ$ - the point is the intersection of: the tool feed plane, a plane perpendicular to tool feed plane and tangential to the cutting corner, and the tool rake plane.

Case 3. ISO tool styles D and V with only axial rake. The point is the intersection of: a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool rake plane.

Case 4. Round inserts -

- a) One feed direction parallel to the tool axis, primary used for turning tools. The point is the intersection of: a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool rake plane;
- b) One feed direction perpendicular to the tool axis, primarily used for milling tools. The point is the intersection of: a plane perpendicular to the primary feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool rake plane;
- c) Two feed directions, one parallel to the tool axis and one perpendicular to the tool axis with two cutting reference points. Each point is the intersection of: a plane perpendicular to its feed direction and tangential to the cutting edge (tangential point), a plane parallel to the feed direction through the tangential point, and the tool rake plane.

REMARKS In Case 3, the theoretical sharp corner of the insert and the cutting reference point are on the plane that is perpendicular to the tool feed plane.

71D0181931BAE-002 002

regular insert position ripos

Location of a regular cutting item on the primary coordinate system

NOTE 1 The cutting edges are placed on the XY plane of the primary coordinate system with the insert located in the XY quadrant; the major cutting edge is on the positive x axis; and the theoretical sharp point of the major cutting edge of the insert that is closer to the origin point on the Y axis.

NOTE 2 The definition applies to right-hand inserts. The position of left-hand inserts is as mirrored through the YZ-plane.

REMARKS The diagrams illustrate the positions for different shapes of inserts.

71D0808DA853B-003 002

master insert minst

Nominal replaceable cutting item used for defining the dimensions of a cutting tool

NOTE A master insert can substitute for either a regular or an irregular insert and uses the position of the item that it replaces.

REMARKS Definitions making use of a master insert also apply to solid and brazed tools.

Properties:

71CE7A96BC122 insert included angle

71CE7A9DFA23A insert length

71CE7A9F0C79F insert shape code

71CE7A9F5308C insert thickness

71CE7A9FB11C3 insert width

71CEAEBF2A69F insert seat size code

71CF29872F0AB hand

71FD1E2EDD973 cutting point translation X-direction

71FD1E2F66B38 cutting point translation Y-direction

71D10668FA109-002 002

prismatic tool item position ptipos

Location on the primary coordinate system of a tool item with planar sides

NOTE Applies to right-handed tools. Left hand items are as defined for right hand items but mirrored through the YZ-plane.

REMARKS The base of the tool item shall be coplanar with the XZ-plane; the normal for the base of the item shall be in the -Y direction; the rear backing surface shall be coplanar with the YZ-plane; the normal for the rear backing surface shall be in the -X direction; the end of the item shall be coplanar with the XY-plane; the normal for the end of the item shall be in the -Z direction; the rake face of the primary cutting item shall be completely visible in the XZ quadrant for cartridges; the top of the axial adjustment screw shall be coincident with XY-plane.

71D188F129725-002 002

primary coordinate system pcs

Right-handed rectangular Cartesian system in three dimensional space with three principal axes labelled X, Y and Z

71D188F971983-001 001

yz-plane yzp

Plane in the primary coordinate system that contains the Y and Z axes with the normal of the plane in the positive X direction

71D188FC65486-001 001

xy-plane xyp

Plane in the primary coordinate system that contains the X and Y axes with the normal of the plane in the positive Z direction

71D19F4A9D1AE-002 001

prismatic adaptive item position paip

Location on the primary coordinate system of an adaptive item with planar sides

NOTE Applies to right-handed adaptive items. Left hand items are as defined for right hand items but mirrored through the YZ-plane.

REMARKS The base of the adaptive item shall be coplanar with the XZ-plane; the normal for the base of the item shall be in the -Y direction; the rear backing surface shall be coplanar with the YZ-plane; the

normal for the rear backing surface shall be in the -X direction; the end of the item shall be coplanar with the XY-plane; the normal for the end of the item shall be in the -Z direction if with a bore; then the vector of the bore of the item that points in the Z direction shall also point towards the workpiece side.

71D19F4B58F60-002 002

round tool item position rtipos

Location on the coordinate axis system of a tool item with non-planar sided cross section

NOTE Applies to right-handed tools. Left hand items are as defined for right hand items but mirrored through the YZ-plane.

REMARKS The axis of the tool item shall be colinear with the Z-axis; the vector of the shank that points in the Z direction shall also point towards the workpiece side; the drive slots or clamping flats, if present, shall be parallel with the XZ-plane; the contact surface of the coupling, the gauge plane or the end of the cylindrical shank shall be coplanar with the XY-plane; the rake face of the primary cutting item shall be visible in the XZ quadrant if a bore is present; the vector of the bore of the item that points in the Z direction shall also point towards the workpiece side.

71D19F532AC75-003 002

mirror plane mplane

YZ-plane in the primary coordinate system

71D1A2CB23A32-002 002

irregular insert position irpos

Location of an irregular cutting item on the primary coordinate system

NOTE 1 The cutting edges are in the xy-plane with the insert located in the XY quadrant, the cutting profile is pointing in the negative Y direction, the physical extremity of the cutting profile is on the positive X axis and the extreme physical point of the insert is on the Y axis.

NOTE 2 The definition applies to right-hand inserts. The position of left-hand inserts is as mirrored through the YZ-plane.

71DF0A33D2E7A-003 002

round adaptive item position raip

Location on the primary coordinate system of an adaptive item with a non-planar sided cross section

NOTE Applies to right-handed adaptive items. Left hand items are as defined for right hand items but mirrored through the YZ-plane.

REMARKS The axis of the adaptive item shall be colinear with the Z axis; the vector of the shank that points in the Z direction shall also point towards the workpiece side; the drive slots or clamping flats, if present, shall be parallel with the XZ-plane the contact surface of the coupling; the gauge plane or the end of the cylindrical shank shall be coplanar with the XY-plane if with a bore; then the vector of the bore of the item that points in the Z direction shall also point towards the workpiece side.

71DF0A34A8156-002 001

tool cutting edge plane tcep

Plane perpendicular to the XZ-plane through the major cutting edge of a master insert or of a solid tool

71DF0A38E1098-002 001

tool feed plane tfp

Plane perpendicular to the XZ-plane and that is parallel to the primary feed direction of the tool and that is tangential to the cutting corner of a master insert or of a solid tool

71DF0A3C6BB36-001 001

tool rake plane trp

Plane that contains the cutting edges of a master insert or of a solid tool

71ED6A7959A34-001 001

feed direction primary fdp

Direction of movement of a cutting tool to achieve the main cutting function of the tool

71ED6E3E9AECB-001 001

xzw-plane xzwp

Plane in the primary coordinate system related to the xz-plane in the primary coordinate system by the rotation angle $KAPPA$ about the Z-axis in a counter-clockwise direction and a distance XZWD from the origin of the coordinate axis system

NOTE The xzw-plane, the xyw-plane and the yzw-plane are mutually perpendicular.

Properties:

71ED6E4A7EFBA $kappa$

71ED6E4F7A8CF xzw plane distance

71ED6E3F268C6-001 001

xyw-plane xywp

Plane in the primary coordinate system related to the xy-plane in the primary coordinate system by the rotation angle PHI about the X-axis in a counter-clockwise direction and a distance XYWD from the origin of the primary coordinate system

NOTE The xzw-plane, the xyw-plane and the yzw-plane are mutually perpendicular.

Properties:

71ED6E4AE850B phi

71ED6E4F42626 xyw plane distance

71ED6E3F84723-001 001

yzw-plane yzwp

Plane in the primary coordinate system related to the yz-plane in the coordinate axis system by the rotation angle ρ about the Y-axis in a counter-clockwise direction and a distance YZWD from the origin of the coordinate axis system

NOTE The xzw-plane, the xyw-plane and the yzw-plane are mutually perpendicular.

Properties:

71ED6E4B254E5 ρ

71ED6E4FA83F6 yzw plane distance

72B87923B9440-001 001

mounting coordinate system mcs

Axis system defining the assembly position of an item towards a coordinate system workpiece side (CSW) of another item

72B87923CF339-001 001

coordinate system in process cip

Axis system for a rotational tool as a reference for the tool path located on the center line at the most front cutting point of a tool item

71EF00655FB61-002 002

coordinate system workpiece side csw

Right-handed rectangular Cartesian system in three dimensional space with three axes labelled XW, YW and ZW that are the intersections of the xyw-plane, the xzw-plane and the yzw-plane respectively

71FAE7B6D87BC-002 001

theoretical sharp point tsp

Intersection in the tool rake plane of the two planes that are perpendicular to the XZ-plane through the major and the minor cutting edges of a cutting item

71EAC81A64368-002 002

regrinding rgnd

Modifying the shape of a component of a cutting tool to restore the original shape or to create a new shape

Properties: