
**Cutting tool data representation
and exchange —**

**Part 50:
Reference dictionary for reference
systems and common concepts**

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

*Partie 50: Dictionnaire de référence pour les systèmes de coordonnées
et les concepts communs*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 13399-50 was prepared by Technical Committee ISO/TC 29, *Small tools*.

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

- *Part 1: Overview, fundamental principles and general information model*
- *Part 2: Reference dictionary for the cutting items* [Technical Specification]
- *Part 3: Reference dictionary for tool items* [Technical Specification]
- *Part 4: Reference dictionary for adaptive items* [Technical Specification]
- *Part 5: Reference dictionary for assembly items* [Technical Specification]
- *Part 50: Reference dictionary for reference systems and common concepts* [Technical Specification]
- *Part 60: Reference dictionary for connection systems* [Technical Specification]
- *Part 100: Definitions, principles and methods for reference dictionaries* [Technical Specification]

Introduction

ISO 13399 provides the means to achieve an electronic representation of cutting tool data by providing the information structure needed to describe various data about cutting tools and cutting tool assemblies. It is intended to facilitate the use, manipulation and exchange of cutting tool data within and between manufacturing, distribution and usage.

This part of ISO 13399 defines the terms, properties and definitions for reference systems and other common concepts that are shared with several components of a cutting tool with defined cutting edges. The purpose of this part ISO 13399 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 tool to remove workpiece material through a shearing action at the cutting edge(s) of the tool. Cutting tool data are characteristics of the cutting tool and its use that must be known and evaluated in order to make manufacturing decisions and to perform manufacturing operations.

ISO 13399 includes the data representation of 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 solid endmill), assembled tools (e.g. boring bars, indexable drills and indexable milling cutters), adaptors (e.g. milling arbor and chucks), components (e.g. shims, screws and clamps) or any combination of the above can be exchanged.

Possible assemblies of the components of a cutting tool are illustrated in Figure 1.

The cutting tool data described include, but are not limited to, geometrical and dimensional data, identification and designation data, miscellaneous and spare part data, cutting material data, and component connectivity.

The use of the tool information model established by ISO 13399 will provide increased productivity for the user in the same way as do the tools. The effective management of tool information will improve the management of the tools themselves. Use of the tool information model will enable the identification of the “right” tool in every operation — from tool purchase, through planning, set-up in machine-tools, maintenance and reuse of the tools — with short lead times and with high reliability and product quality. Tool users will benefit from improved support from the tool vendors who will be able to provide a standard information product to accompany the tool products. Computer interfaces for information exchange will be more efficient.

The objective of ISO 13399 is to provide the means to represent the information that describes cutting tools in a computer-sensible form that is independent of any particular computer system. Such a representation will facilitate the processing and exchange of cutting tool data within and between different software systems and computer platforms and support the application of this data in manufacturing planning, cutting operations and the supply of tools. The nature of this description makes it suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases and for archiving. The methods that are used for these representations are those developed by ISO TC 184, *Industrial automation systems and integration*, SC 4, *Industrial data*, for the representation of product data by using standardized information models and reference dictionaries.

An information model is a formal specification of types of ideas, facts and processes which together describe a portion of interest 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. Everyone in a communication process must 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 and 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 produced when it is populated with the data items and their values that are applicable to a particular example of that situation.

This part of ISO 13399 uses the following resources developed by ISO TC 184/SC 4:

- a) the EXPRESS language according to ISO 10303-11 for defining the information model;
- b) the file format for data exchange derived from the model and defined in ISO 10303-21;
- c) the data dictionary defined in ISO 13584.

ISO 13399 is intended for use by manufacturers, tool vendors or producers, and developers of manufacturing software, among others. It provides a common structure for exchanging data about cutting tools (see Figure 1), and is intended to allow or improve several capabilities, including

- provision of a common set of definitions for use in describing cutting tools and cutting tool assemblies,
- the integration and sharing of cutting tool and assembly data between software applications,
- direct import of vendor cutting tool data into customer databases or applications, and
- a reduction in the level of effort required for manufacturers to maintain accurate and current 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 could regrind its customers' tools while another could allow its customers to do the regrinding and provide the information to enable them to do so. Therefore, the two cutting tool manufacturers could have a different set of cutting tool properties to communicate using the information model and dictionaries provided by ISO 13399.

ISO 13399 defines only that information which could be communicated; it does not specify what information must be communicated.

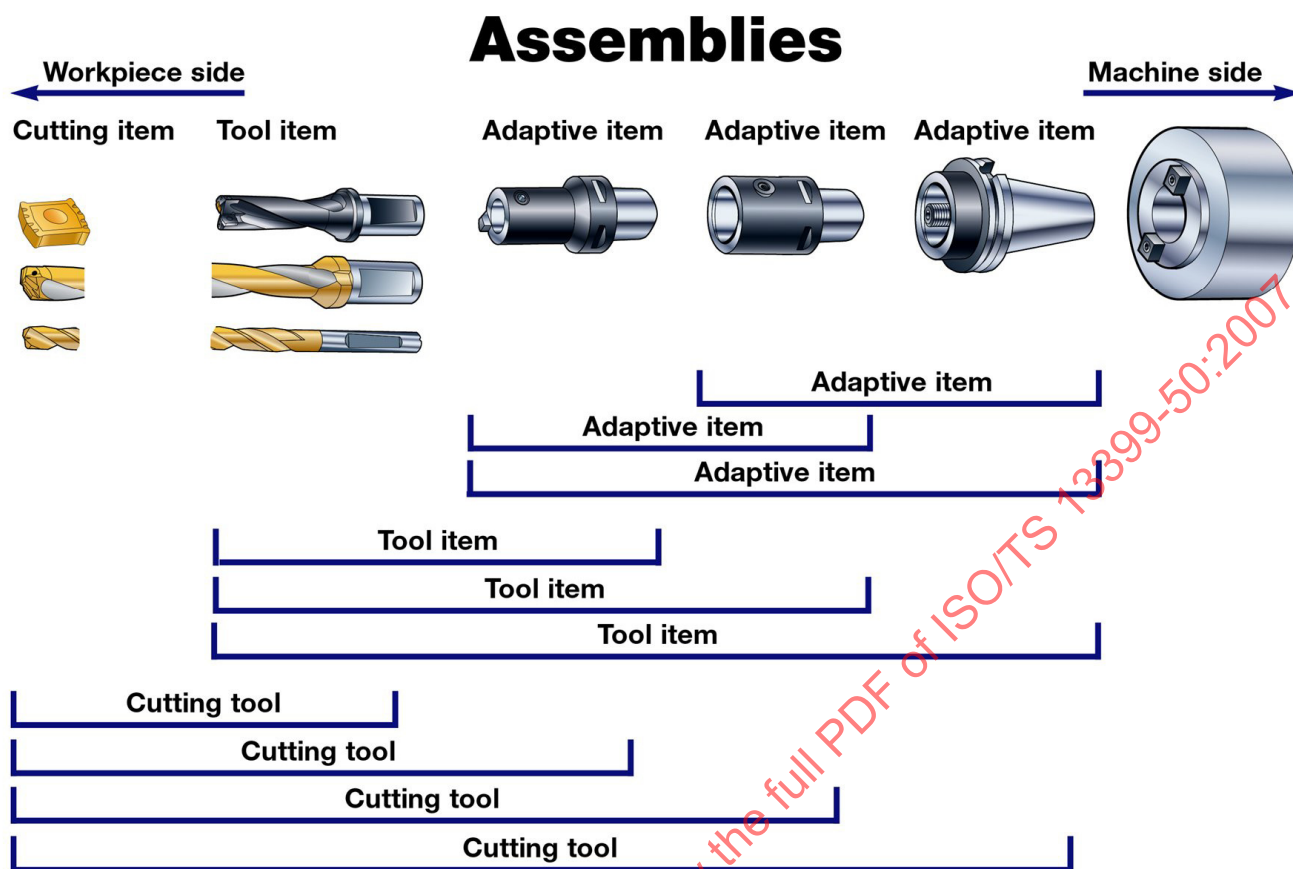


Figure 1 — Examples of different types of assemblies of items

Cutting tool data representation and exchange —

Part 50:

Reference dictionary for reference systems and common concepts

1 Scope

This part of ISO 13399 specifies a reference dictionary for reference systems and common concepts for cutting tools, together with their descriptive properties and domains of values.

This part of ISO 13399 specifies a reference dictionary that contains

- a) definitions and identifications of the classes of reference systems and common concepts for cutting tools, with an associated classification scheme,
- b) definitions and identifications of the data element types that represent the properties of reference systems and common concepts for cutting tools,
- c) definitions and identifications of domains of values for describing the above data element types.

Each class, property or domain of values of this application domain constitutes an entry of the reference dictionary defined in this part of ISO 13399. 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 13399-1.¹⁾

The following is within the scope of this part of ISO 13399:

- standard data that represent the various classes of reference systems and common concepts for cutting tools;
- standard data that represent the various properties of reference systems and common concepts for cutting tools;
- standard data that represent domains of values used for properties of reference systems and common concepts for cutting tools;
- a single implementation method by which the standard data defined in this part ISO 13399 can be exchanged (see ISO 10303-21).

The following is not within its scope:

- specialized or expert knowledge on the design and use of cutting tools;
- rules used to determine the information that should be communicated;

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 SC 3D, and in its extensions according to ISO 13584-24 and ISO 13584-25.

- applications where these standard data may be stored or referenced;
- implementation methods other than the one defined in this part of ISO 13399 by which the standard data can be exchanged and referenced;
- information models for cutting tools;
- definitions of classes and properties for cutting items, tool items, assembly items, adaptive items, or for connection systems, these being covered by other parts of ISO 13399.

2 Normative references

The following referenced documents are indispensable for the application 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 13399-100, *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 13399-100 and the following apply.

3.1 applicable property

property that is defined for some family of items and that applies to any member of this family

[ISO 13584-24]

3.2 basic semantic unit

entity that provides an absolute and universal identification of classes and data element types in an application domain

[ISO 13584-42]

3.3 chip

material removed from a workpiece by a cutting process

[ISO/TS 13399-2]

3.4 cutting tool

device or assembly of items for removing material from a workpiece through a shearing action at the defined cutting edge or edges of the device

NOTE A cutting tool could be the assembly of one or more adaptive items, a tool item and several cutting items on a tool item. See Figure 1.

[ISO 13399-1]

3.5**data**

representation of facts concepts or instructions in a formal manner suitable for communication, interpretation or processing by human beings or computers

[ISO 10303-1]

3.6**data element type**

unit of data for which the identification, description and value representation have been specified

[ISO 13584-42]

3.7**data exchange**

storing, accessing, transferring and archiving of data

[ISO 10303-1]

3.8**data type**

domain of values

[ISO 10303-11]

3.9**dictionary**

structured set of entries with one and only one meaning corresponding to each entry and one and only one entry identifying a single meaning

[ISO 13584-511]

NOTE

In ISO 13399, a dictionary is a formal and computer-sensible representation of an ontology.

3.10**entity**

class of information defined by its attributes that establishes a domain of values defined by common attributes and constraints.

NOTE

Adapted from ISO 10303-11.

3.11**entity data type**

representation of an entity

[ISO 10303-11]

3.12**entity instance**

named unit of data that represents a unit of information within the class defined by an entity

NOTE

It is a member of the domain established by an entity data type.

[ISO 10303-11]

3.13

family of items

simple or generic family of items

[ISO 13584-42]

3.14

generic family of items

grouping of simple or generic families of items for the purpose of classification or for associating common information

[ISO 13584-42]

3.15

implementation method

means for computers to process or exchange data

[ISO 10303-1]

3.16

information

facts, concepts or instructions

[ISO 10303-1]

3.17

information model

formal description of a bounded set of information to meet a specific requirement

[ISO 10303-1]

3.18

machine side

identification of a direction pointing towards the machine

3.19

machined surface

surface produced by the action of a cutting tool

[ISO 3002-1]

3.20

ontology

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

[ISO 13584-511]

NOTE In ISO 13399 a dictionary is the formal and computer-sensible representation of an ontology.

3.21

property

characteristic of a product or process that may be represented by a data element type

NOTE Adapted from ISO 13584-42.

3.22**simple family of items**

set of items in which each item may be described by the same group of properties

[ISO 13584-42]

3.23**visible property**

property that is defined for some family of items that may or may not be applicable to the different members of the family

[ISO 13584-42]

3.24**workpiece**

object on which a cutting action is performed

[ISO 13399-2]

3.25**workpiece side**

identification of a direction pointing towards the workpiece

[ISO/TS 13399-2]

4 Abbreviated terms

BSU basic semantic unit

DET data element type

5 Representation of the ontology concepts as dictionary entries

In the following subclauses, 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 bold, lower-case characters with multiple words linked by an underscore character.

EXAMPLE “coolant supply” is the name of a concept in the ontology. **coolant_supply** is the identifier of the class in the dictionary that represents the concept.

Each classified item in the following subclauses is associated with its definition from the dictionary.

Each entry in the dictionary, whether 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.

The structure of the classification is summarized in Annex B. The complete definitions of the classes in this part of ISO 13399 are provided in Annex C. The properties applicable to these classes are defined in Annex D.

5.1 Common concepts

The following subclauses identify and define features of cutting tools that are shared between several types of components of the cutting tool.

5.1.1 adjustment

An **adjustment** is a device for making an alteration to achieve a different position.

adjustment has the following subclasses:

- **adjustment_axial**;
- **adjustment_radial**.

5.1.1.1 adjustment_axial

An **adjustment_axial** is a device for making an alteration to achieve a different position in a direction parallel to the longitudinal axis of a component.

5.1.1.2 adjustment_radial

An **adjustment_radial** is a device for making an alteration to achieve a different position in a direction perpendicular to the longitudinal axis of the component.

5.1.2 bolt_hole_circle

A **bolt_hole_circle** is an arrangement of holes in a circle to enable a bolted connection

5.1.3 coolant_supply

A **coolant_supply** is a system of channels to supply a liquid or gas to reduce the temperature of the cutting operation.

NOTE The fluid could be a liquid or a gas.

5.1.4 cutting_operation

A **cutting_operation** is a generic family of actions that remove material from a workpiece. The actions included in the generic class are not exclusive and other actions may be possible. The intention of ISO 13399 is to avoid, if possible, the association of a particular type of tool with a particular cutting operation. These concepts are included in the dictionary so that they can be referenced from the information model defined in ISO 13399-1. **Cutting_operation** has the following simple subclasses:

- **boring**;
- **broaching_circular**;
- **broaching_linear**;
- **counterboring**;
- **countersinking**;
- **drilling**;
- **drilling_deep_hole**;
- **drilling_step**;
- **grooving**;

- **milling_face;**
- **milling_profile;**
- **milling_shoulder;**
- **milling_slot;**
- **parting;**
- **reaming_cylindrical;**
- **reaming_profile;**
- **slitting;**
- **threading_external;**
- **threading_internal;**
- **trepanning;**
- **turning_external;**
- **turning_internal.**

5.1.4.1 boring

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

5.1.4.2 broaching_circular

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

5.1.4.3 broaching_linear

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

5.1.4.4 counterboring

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

5.1.4.5 countersinking

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.

5.1.4.6 drilling

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.

5.1.4.7 drilling_deep_hole

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.

5.1.4.8 drilling_step

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

5.1.4.9 grooving

Creating multiple connected surfaces on a circular section of a workpiece.

5.1.4.10 milling_face

Creating a single flat external surface on a workpiece by means of 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.

5.1.4.11 milling_profile

Creating curved surfaces on a workpiece by means of 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.

5.1.4.12 milling_shoulders

Creating perpendicular connected surfaces on a workpiece by means of 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.

5.1.4.13 milling_slot

Creating multiple connected surfaces in the workpiece by means of 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.

5.1.4.14 parting

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

5.1.4.15 reaming_cylindrical

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

5.1.4.16 reaming_profile

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

5.1.4.17 slitting

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

5.1.4.18 threading_external

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

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

5.1.4.19 threading_internal

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.

5.1.4.20 trepanning

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 can be detached.

5.1.4.21 turning_external

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

5.1.4.22 turning_internal

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

5.1.5 cutting_tool

A **cutting_tool** is a device or assembly of items for removing workpiece material through a shearing action at the edge or edges of the device.

NOTE A cutting tool could be an assembly of one or more adaptive items a tool item and several cutting items on a tool item.

5.1.6 flange

A **flange** is a projecting rim or edge on the outside of an object.

NOTE Adapted from the Concise Oxford English Dictionary.

5.1.7 keyway

A **keyway** is a slot in which a shaped piece of metal can be inserted to transfer torque between two connected items.

5.1.8 locking_mechanism

A **locking_mechanism** is a device that can be actuated to secure the coupling together of two items.

5.1.9 regrinding

A **regrinding** is the process of modifying the shape of a component of a cutting tool either to restore the original shape or to create a new shape.

5.1.10 runout_axial

A **runout_axial** is a variation in the location of the end surface of the cutting reference point of a rotating tool item or the end surface of an adaptive item.

5.1.11 runout_radial

A **runout_radial** is a variation in the location of the circumference of a rotating tool item or adaptive item.

5.1.12 tool_thread_external

A **tool_thread_external** is a continuous and projecting helical ridge of uniform section on an external cylindrical or conical surface.

tool_thread_external has the following subclasses:

- **thread_metric_external;**
- **thread_inch_external;**
- **thread_trapezoidal_external.**

5.1.13 tool_thread_internal

A **tool_thread_internal** is a continuous and projecting helical ridge of uniform section on an internal cylindrical or conical surface.

tool_thread_internal has the following subclasses:

- **thread_metric_internal;**
- **thread_inch_internal;**
- **thread_trapezoidal_internal.**

5.2 reference_system

reference_system is a generic family of items that provides a basis for the definitions of properties.

reference_system has the following subclasses:

- **coordinate_axis_system;**
- **coordinate_axis_system_workpiece_side;**
- **cutting_reference_point;**
- **feed_direction_primary;**
- **irregular_insert_position;**
- **master_insert;**
- **mirror_plane;**
- **prismatic_adaptive_item_position;**

- **prismatic_tool_item_position**;
- **regrinding**;
- **regular_insert_position**;
- **round_adaptive_item_position**;
- **round_tool_item_position**;
- **theoretical_sharp_point**;
- **tool_cutting_edge_plane**;
- **tool_feed_plane**;
- **tool_rake_plane**;
- **xy_plane**;
- **xyw_plane**;
- **xz_plane**;
- **xzw_plane**;
- **yz_plane**;
- **yzw_plane**.

NOTE **coordinate_axis_system**, **mirror_plane**, **irregular_insert_position**, **regular_insert_position**, **round_insert_position**, **xy_plane**, **xz_plane**, **yz_plane** are identified and defined in ISO/TS 13399-2. The entities and their definitions are repeated here with the expectation that they will be removed from future editions of ISO 13399-2.

5.2.1 **coordinate_axis_system**

The **coordinate_axis_system** is a right-handed rectangular Cartesian coordinate system in three-dimensional space with three principle axes labelled X, Y and Z.

5.2.2 **coordinate_axis_system_workpiece_side**

The **coordinate_axis_system_workpiece_side** is a right-handed Cartesian coordinate 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.

5.2.3 **cutting_reference_point**

The **cutting_reference_point** is the theoretical sharp point of the cutting tool from which the major functional dimensions are taken.

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**.

NOTE 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**.

— Case 4 a): For round inserts with one feed direction parallel to the tool axis, primarily 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**.

— Case 4 b): For round inserts with one feed direction perpendicular to the tool axis, primarily used for milling cutters, 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 c): 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**.

5.2.4 feed_direction_primary

A **feed_direction_primary** is the direction of movement of a cutting tool to achieve the main cutting function of the tool.

5.2.5 irregular_insert_position

The **irregular_insert_position** identifies the location of an irregular cutting item on the coordinate axis system where:

- 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;
- the extreme physical point of the insert is on the Y axis.

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

5.2.6 master_insert

A **master_insert** is a 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.

5.2.7 mirror_plane

The **mirror_plane** is the **xz_plane** in the **coordinate_axis_system**.

5.2.8 prismatic_adaptive_item_position

A **prismatic_adaptive_item_position** identifies the location of an adaptive item with planar sides where:

- the base of the adaptive item shall be coplanar with the xy plane;
- the normal for the base of the item shall be in the $-Z$ direction;
- the rear backing surface shall be coplanar with the xz plane;
- the normal for the rear backing surface shall be in the $+Y$ direction;
- the end of the item shall be coplanar with the yz plane;
- the normal for the end of the adaptive item shall be in the $+X$ direction;

If the item has a bore, then the vector of the bore of the item that points in the $-X$ direction shall also point towards the workpiece side.

NOTE This definition applies to right-handed adaptive items. Left-handed adaptive items are defined for right-handed items but mirrored through the xz plane.

5.2.9 prismatic_tool_item_position

A **prismatic_tool_item_position** identifies the location of a tool item with planar sides where:

- the base of the tool item shall be coplanar with the xy plane;
- the normal for the base of the tool shall be in the $-Z$ direction;
- the rear backing surface shall be coplanar with the xz plane;
- the normal for the rear backing surface shall be in the $+Y$ direction;
- the end of the tool shall be coplanar with the yz plane;
- the normal for the end of the tool shall be in the $+X$ direction;
- the rake face of the primary cutting item shall be completely visible in the $-XY$ quadrant of the coordinate axis system;

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

For cartridges, the top of the axial adjustment screw shall be coincident with the yz plane.

5.2.10 regrinding

A **regrinding** is a modifying of the shape of a component of a cutting tool to restore the original shape or to create a new shape.

5.2.11 regular_insert_position

A **regular_insert_position** identifies the location of a regular insert on the coordinate system where:

- the cutting edges are placed on the XY plane;
- the insert is located in the XY quadrant;
- the major cutting edges is on the +X axis
- the extreme **theoretical_sharp_point** is on the Y axis.

NOTE This definition applies to right-handed inserts. The location of left-handed inserts is as mirrored through the xz plane.

5.2.12 round_adaptive_item_position

A **round_adaptive_item_position** identifies the location of a round adaptive item on the coordinate system where:

- the axis of the adaptive item shall be collinear with the X axis;
- the vector of the shank that points in the -X direction shall also point towards the workpiece side;
- the cutting height shall be measured from the xy plane;
- the drive slots or clamping flats, if present, shall be parallel with the xy plane;
- the contact surface of the coupling and the gauge plane or the end of the cylindrical shank;
- if there is a bore, then the vector of the bore that points in the -X direction shall also point towards the workpiece side.

NOTE The conditions listed above apply to right-handed adaptive items. Left-handed adaptive items are defined for right-handed items but mirrored through the xz plane.

5.2.13 round_tool_item_position

A **round_tool_item_position** identifies the location on the coordinate reference system of a tool item with non-planar sided cross section where:

- the axis of the tool item shall be collinear with the X axis;
- the vector of the shank that points in the -X direction shall also point to the workpiece side;
- the cutting height shall be measured from the xy plane;
- the drive slots or clamping flats, if present, shall be parallel with the xy plane;
- the contact surface of the coupling, the gauge plane or the end of the cylindrical shank shall be coplanar with the yz plane;
- the rake face of the primary cutting item shall be visible in the -XY quadrant of the coordinate axis system.

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 xz plane.

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

5.2.14 theoretical_sharp_point

The **theoretical_sharp_point** is the intersection in the tool rake plane of the two planes that are perpendicular to the xy_plane through the major and the minor cutting edges of a cutting item.

5.2.15 tool_cutting_edge_plane

The **tool_cutting_edge_plane** is the plane perpendicular to the xy plane through the major cutting edge of a master insert or of a solid tool.

5.2.16 tool_feed_plane

The **tool_feed_plane** is the 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.

5.2.17 tool_rake_plane

The **tool_rake_plane** is the plane that contains the cutting edges of a master insert or of a solid tool.

5.2.18 xy_plane

The **xy_plane** is the plane in the **coordinate_axis_system** that contains the X and Y axes with the normal of the plane in the positive Z direction.

5.2.19 xyw_plane

The **xyw_plane** is the plane in the **coordinate_axis_system** that is related to the **xy_plane** by a rotation angle Φ about the X axis in an anticlockwise (counter-clockwise) direction and by a distance $XYWD$ from the origin of the **coordinate_axis_system**.

NOTE The **xzw_plane** , the **xyw_plane** and the **yzw_plane** are mutually perpendicular.

5.2.20 xz_plane

The **xz_plane** is the plane in the **coordinate_axis_system** that contains the X and Z axes with the normal of the plane in the positive Y direction.

5.2.21 xzw_plane

The **xzw_plane** is the plane in the **coordinate_axis_system** that is related to the **xz_plane** by a rotation angle κ about the Z axis in an anticlockwise (counter-clockwise) direction and by 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.

5.2.22 yz_plane

The **yz_plane** is the plane in the **coordinate_axis_system** that contains the Y and Z axes with the normal of the plane in the positive X direction.

5.2.23 yzw_plane

The **yzw_plane** is the plane in the **coordinate_axis_system** that is related to the **yz_plane** by a rotation angle RHO about the Y axis in an anticlockwise (counter-clockwise) direction and by 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.

6 Properties for reference systems and common concepts

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 may be applicable to reference systems and common concepts, 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 The value domains for properties are specified in ISO/TS 13399-100.

Table 1 — Property names and identification codes

Property name	Identification code (BSU)	Property name	Identification code (BSU)
actuation force	71EBBA9B56D06	actuation method	71EBBA9BCB5F2
adjustment datum	71EBBE66AA8A3	adjustment deviation lower	71EBBE67E4BD6
adjustment deviation upper	71EBBE682E490	adjustment direction	71EBBE6A5BF09
adjustment increment	71EBBE7266DA2	adjustment limit maximum	71EBBE664BCBD
adjustment limit minimum	71EBBE668A8F3	adjustment range	71EBBE72A6287
body clearance depth	71EAC81F88336	bolt hole circle count	71ED6E58E5A62
chamfer corner property	71DD700D27A8A	chisel edge angle	71EAC82B2A50E
chisel edge length	71EAC82ADE5EA	clearance angle axial	71EAC83CD450B
clearance angle radial	71EAC83B73825	coolant entry centre line distance	71EBDBF22CF58
coolant entry diameter	71CF2985AA87C	coolant entry inclination angle	71EBDBF2CEE6A
coolant entry rotation angle	71EBDBF289BB9	coolant entry style code	71CF2985DCED3
coolant entry thread size	71D07558CEF8A	coolant exit diameter	71CF298AA8D1F
coolant exit style code	71CF2985FC5FC	coolant exit thread size	71D075633189D
coolant pressure	71EAC478A4164	coolant radial entry thread size	71CF298963036
coolant ring seat width	71CF298EB6D72	cutting point translation X direction	71FD1E2EDD973
cutting point translation Y direction	71FD1E2F66B38	diameter access hole	71EBB2F865924
diameter bolt circle	71EAC0DECE78F	drill back taper	71EAC81AD9AE1
flange diameter	71EC61D8A1771	flange height	71EEF5384E141
flange location	71F90EA1ED67E	flange thickness	71EEF53809764
flange width	71EEF5387E914	fluted land width	71EAC8210DF36
hand	71CF29872F0AB	inscribed circle property	71D1C82A5036D
insert included angle	71CE7A96BC122	insert interface code	71CE7A9936610
insert length	71CE7A9DFA23A	insert mounting style code	71CE7A97711B8

Table 1 (continued)

Property name	Identification code (BSU)	Property name	Identification code (BSU)
insert seat size code	71CEAEBF2A69F	insert shape code	71CE7A9F0C79F
insert thickness	71CE7A9F5308C	insert width	71CE7A9FB11C3
kappa	71ED6E4A7EFBA	keyway width	71D0841ADC9E0
margin width	71EAC828C8308	overall length minimum	71EBC1E8857BE
phi	71ED6E4AE850B	rho	71ED6E4B254E5
rounded corner property	71DD7011A3D86	runout axial	71ED6A70807F7
runout axial adjustment	71D0845C77193	runout radial	71DF8C660035E
runout radial adjustment	71D0846298D19	thread diameter	71E02C5C2EED3
thread hand	71E033FCBB61C	thread length	71FC209CD4A91
thread pitch	71CEAEC08D4B0	thread starts	71FC06ABEA7D3
threads per inch	71D1A6AAC8707	torque	71DF153B14F02
web taper	71EAC823D95A7	web thickness	71EAC82313165
wiper edge property	71CED022114EC	xyw plane distance	71ED6E4F42626
xzw plane distance	71ED6E4F7A8CF	yzw plane distance	71ED6E4FA83F6

Annex A (normative)

Information object registration

A.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 (50) version (1)}

is assigned to this part of ISO 13399.

The meaning of this value is as defined in ISO/IEC 8824-1 and described in ISO 13584-1.

A.2 Dictionary identification

The dictionary defined in this part of ISO 13399 is assigned the object identifier:

{ISO technical specification 13399 part (50) version (1) object (1) reference systems (1)}

Annex B (informative)

Classification structure

Table B.1 shows the classification structure of the generic families in the dictionary with an expanded structure for the classes of reference systems and other common concepts. The purpose of the table is to show the relationships between the classes related to reference systems, common concepts and the other classes in ISO 13399.

NOTE Annex C contains the full definition of all the classes that are relevant to reference systems and common concepts.

Table B.1 — Classification structure

Classes	Parent class	Class BSU
cutting tool library	Root class	71CE7A72B6DA7
adaptive item type	71CE7A72B6DA7	71EAD37F18F34
adjustment	71CE7A72B6DA7	71ED884159C90
adjustment axial	71ED884159C90	71ED88419A97C
adjustment radial	71ED884159C90	71ED8841BA543
assembly item type	71CE7A72B6DA7	71CE7A795C05C
bolt hole circle	71CE7A72B6DA7	71E02520881F1
connection interface feature	71CE7A72B6DA7	71DF8C37D9115
coolant supply	71CE7A72B6DA7	71DF8C3C065EB
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

Table B.1 (continued)

Classes	Parent class	Class BSU
reaming profile	71DFF83D21D50	71DFF83F888E5
slitting	71DFF83D21D50	71DFF83FA2ED7
threading external	71DFF83D21D50	71DFF83FB8E3A
threading internal	71DFF83D21D50	71DFF83FE65D6
trepanning	71DFF83D21D50	71DFF84016666
turning external	71DFF83D21D50	71DFF84041924
turning internal	71DFF83D21D50	71DFF8404F82C
cutting tool	71CE7A72B6DA7	71CE7A7A5038B
flange	71CE7A72B6DA7	71EC5A767182E
keyway	71CE7A72B6DA7	71DF5C026BCE7
locking mechanism	71CE7A72B6DA7	71EBAB85BB5FA
reference system	71CE7A72B6DA7	71CF2968F7A9E
coordinate axis system	71CF2968F7A9E	71D188F129725
coordinate axis 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
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

Table B.1 (continued)

Classes	Parent class	Class BSU
tool item type	71CE7A72B6DA7	71E01A004C775
tool thread external	71CE7A72B6DA7	71FC1D22BF4CD
thread inch external	71FC1D22BF4CD	71FC20991AEE8
thread metric external	71FC1D22BF4CD	71FC2098BC963
thread trapezoidal external	71FC1D22BF4CD	71FC209969F43
tool thread internal	71CE7A72B6DA7	71FC1D25097D7
thread inch internal	71FC1D25097D7	71FC209ACEA25
thread metric internal	71FC1D25097D7	71FC209A5C7F3
thread trapezoidal internal	71FC1D25097D7	71FC209B39D51

Annex C (informative)

Class definitions

The content of this annex is limited to the classes of common concepts and the reference systems required to define the properties of these classes.

The information for each class is presented as follows:

BSU Code – version number	Revision number
Preferred name	Short name
Definition	
NOTE	
REMARKS	
Illustration reference: Figure Annex.illustration number	
Properties:	
Subclasses:	

71ED884159C90-1 1

adjustment

adj

device for making an alteration to achieve a different position

Properties:

71EBBE664BCBD-1	adjustment limit maximum
71EBBE668A8F3-1	adjustment limit minimum
71EBBE66AA8A3-1	adjustment datum
71EBBE67E4BD6-1	adjustment deviation lower
71EBBE682E490-1	adjustment deviation upper
71EBBE6A5BF09-1	adjustment direction
71EBBE7266DA2-1	adjustment increment
71EBBE72A6287-1	adjustment range

Subclasses:

71ED88419A97C-001 adjustment axial

71ED8841BA543-001 adjustment radial

71ED88419A97C-1 1**adjustment axial adjax**

device for making an alteration to achieve a different position in a direction parallel to the longitudinal axis of a component

71ED8841BA543-1 1**adjustment radial adjra**

device for making an alteration to achieve a different position in a direction perpendicular to the longitudinal axis of the component

71E02520881F1-1 1**bolt hole circle bhcirc**

arrangement of holes in a circle to enable a bolted connection

Properties:

71EAC0DECE78F-1 diameter bolt circle

71EBB2F865924-1 diameter access hole

71ED6E58E5A62-1 bolt hole circle count

71DF8C3C065EB-1 1**coolant supply cool**

system of channels to supply a fluid to reduce the temperature of the cutting operation

NOTE The fluid could be a liquid or a gas.

Properties:

71CF2985AA87C-1 coolant entry diameter

71CF2985DCED3-1 coolant entry style code

71CF2985FC5FC-1 coolant exit style code

71CF298963036-1 cool rad entry thrd size

71CF298AA8D1F-1	coolant exit diameter
71CF298EB6D72-1	coolant ring seat width
71D07558CEF8A-1	coolant entry thread size
71D075633189D-1	coolant exit thread size
71EAC478A4164-1	coolant pressure
71EBDBF22CF58-1	coolant entry centre line distance
71EBDBF289BB9-1	coolant entry rotation angle
71EBDBF2CEE6A-1	coolant entry inclination angle

71DFF83D21D50-1 **1**

cutting operation **ctp**

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

Subclasses:

71DFF83D3B0A4-001	boring
71DFF83D551E3-001	broaching circular
71DFF83D6FA17-001	broaching linear
71DFF83D897BB-001	counterboring
71DFF83DB5E40-001	countersinking
71DFF83DD3EAA-001	drilling
71DFF83E498D2-001	drilling deep hole
71DFF83E67286-001	drilling step
71DFF83E92592-001	grooving
71DFF83EA9476-001	milling face
71DFF83EE1225-001	milling profile
71DFF83EF5A57-001	milling shoulder
71DFF83F249B1-001	milling slot
71DFF83F56124-001	parting
71DFF83F6CC6E-001	reaming cylindrical
71DFF83F888E5-001	reaming profile
71DFF83FA2ED7-001	slitting

71DFF83FB8E3A-001	threading external
71DFF83FE65D6-001	threading internal
71DFF84016666-001	trepanning
71DFF84041924-001	turning external
71DFF8404F82C-001	turning internal

71DFF83D3B0A4-1 **1**

boring **brg**

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

71DFF83D551E3-1 **1**

broaching circular **bchc**

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

71DFF83D6FA17-1 **1**

broaching linear **bchl**

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

71DFF83D897BB-1 **1**

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

71DFF83DB5E40-1 **1**

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-1 1

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.

71DFF83E498D2-1 1

drilling deep hole **dpg**

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

71DFF83E67286-1 1

drilling step **drisp**

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

71DFF83E92592-1 1

grooving **gvg**

creating multiple connected surfaces on a circular section of a workpiece

71DFF83EA9476-1 1

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.

71DFF83EE1225-1 1

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.

71DFF83EF5A57-1 **1**

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.

71DFF83F249B1-1 **1**

milling slot **mlslt**

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.

71DFF83F56124-1 **1**

parting **part**

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

71DFF83F6CC6E-1 **1**

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

71DFF83F888E5-1 **1**

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

71DFF83FA2ED7-1 **1**

slitting **sltg**

separating a stationary workpiece into two parts with a rotating tool

71DFF83FB8E3A-1 1

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.

71DFF83FE65D6-1 1

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.

71DFF84016666-1 1

trepanning **trpg**

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

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

71DFF84041924-1 1

turning external **trnext**

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

71DFF8404F82C-1 1

turning internal **trnint**

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

71CE7A7A5038B-1 1

cutting tool **tool**

Device or assembly of items for removing workpiece material through a shearing action at the edge or edges of the device

NOTE A cutting tool could be an assembly of one or more adaptive items a tool item and several cutting items on a tool item.

71EC5A767182E-1**1****flange****flange**

projecting rim or edge on the outside of an object

Properties:

71EC61D8A1771-1 flange diameter

71EEF53809764-1 flange thickness

71EEF5384E141-1 flange height

71EEF5387E914-1 flange width

71F90EA1ED67E-1 flange location

71DF5C026BCE7-1**1****keyway****keyway**

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

Properties:

71D0841ADC9E0-1 keyway width

71EBAB85BB5FA-1**1****locking mechanism****lock**

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

Properties:

71DF153B14F02-1 torque

71EBBA9B56D06-1 actuation force

71EBBA9BCB5F2-1 actuation method

71CF2968F7A9E-1**1****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:

71CF29A3CDE2F-001	xz plane
71CF29A40396A-001	cutting reference point
71D0181931BAE-001	regular insert position
71D0808DA853B-001	master insert
71D10668FA109-001	prismatic tool item position
71D188F129725-001	coordinate axis system
71D188F971983-001	yz plane
71D188FC65486-001	xy plane
71D19F4A9D1AE-001	prismatic adaptive item position
71D19F4B58F60-001	round tool item position
71D19F532AC75-001	mirror plane
71D1A2CB23A32-001	irregular insert position
71DF0A33D2E7A-001	round adaptive item position
71DF0A34A8156-001	tool cutting edge plane
71DF0A38E1098-001	tool feed plane
71DF0A3C6BB36-001	tool rake plane
71EAC81A64368-001	regrinding
71ED6A7959A34-001	feed direction primary
71ED6E3E9AECB-001	xzw plane
71ED6E3F268C6-001	xyw plane
71ED6E3F84723-001	yzw plane
71EF00655FB61-001	coordinate axis system workpiece side
71FAE7B6D87BC-001	theoretical sharp point

71D188F129725-1 **1**

coordinate axis system **pcs**

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

71EF00655FB61-1

1

coordinate axis 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

71CF29A40396A-1

1

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 $> 90^\circ$ — 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.

Illustration reference: Figures F.1, F.2, F.3.

71ED6A7959A34-1

1

feed direction primary **fdp**

movement of a cutting tool in the direction that achieves the main cutting function of the tool

Illustration reference: Figures F.2, F.3.

71D1A2CB23A32-1 1

irregular insert position **irpos**

cutting edges in the xy plane with the insert located in the XY quadrant, the cutting profile pointing in the negative Y direction, the physical extremity of the cutting profile on the positive X axis and the extreme physical point of the insert on the Y axis

NOTE The definition applies to right-handed inserts. The position of left-handed inserts is as mirrored through the xz plane.

Illustration reference: Figure F.10.

71D0808DA853B-1 1

master insert **minst**

nominal replaceable cutting item 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 and brazed tools.

Properties:

71CE7A96BC122-1	insert included angle
71CE7A97711B8-1	insert mounting style code
71CE7A9936610-1	insert interface code
71CE7A9DFA23A-1	insert length
71CE7A9F0C79F-1	insert shape code
71CE7A9F5308C-1	insert thickness
71CE7A9FB11C3-1	insert width
71CEAEBF2A69F-1	insert seat size code
71CED022114EC-1	wiper edge property
71CF29872F0AB-1	hand
71D1C82A5036D-1	inscribed circle property
71DD700D27A8A-1	chamfer corner property
71DD7011A3D86-1	rounded corner property
71FD1E2EDD973	cutting point translation X direction
71FD1E2F66B38	cutting point translation Y direction

71D19F532AC75-1

1

mirror plane**mplane**

xz plane in the coordinate axis system

Illustration reference: Figures F.5, F.7, F.9.

71D19F4A9D1AE-1

1

prismatic adaptive item position**paip**

location of an adaptive item with planar sides

The base of the adaptive item shall be coplanar with the xy plane; the normal for the base of the item shall be in the –Z direction; the rear backing surface shall be coplanar with the xz plane; the normal for the rear backing surface shall be in the +Y direction; the end of the item shall be coplanar with the yz plane; the normal for the end of the item shall be in the +X direction; if with a bore, then the vector of the bore of the item that points in the –X direction shall also point towards the workpiece side.

NOTE Applicable to right-handed adaptive items. Left-handed items are as defined for right-handed items but mirrored through the xz plane.

71D10668FA109-1

1

prismatic tool item position**ptipos**

location of a tool item with planar sides

The base of the tool item shall be coplanar with the xy plane; the normal for the base of the item shall be in the –Z direction; the rear backing surface shall be coplanar with the xz plane; the normal for the rear backing surface shall be in the +Y direction; the end of the item shall be coplanar with the yz plane; the normal for the end of the item shall be in the +X direction; the rake face of the primary cutting item shall be completely visible in the –X/–Y quadrant; for cartridges, the top of the axial adjustment screw shall be coincident with the yz plane.

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

Illustration reference: Figure F.4.

71EAC81A64368-1

1

regrinding**rgnd**

modifying the shape of a component of a cutting tool to restore the original shape (or to create a new shape)

Properties:

71EAC81AD9AE1-1 drill back taper

71EAC81F88336-1 body clearance depth

71EAC8210DF36-1 fluted land width

71EAC82313165-1	web thickness
71EAC823D95A7-1	web taper
71EAC828C8308-1	margin width
71EAC82ADE5EA-1	chisel edge length
71EAC82B2A50E-1	chisel edge angle
71EAC83B73825-1	clearance angle radial
71EAC83CD450B-1	clearance angle axial
71EBC1E8857BE-1	overall length minimum

71D0181931BAE-1 1

regular insert position **ripos**

location of a regular insert on the coordinate system where the cutting edges are placed on the xy plane with the insert located in the XY quadrant, the major cutting edge is placed on the positive X axis and the extreme theoretical sharp point of the insert is on the Y axis

NOTE The definition applies to right-handed inserts. The position of left-handed inserts is as mirrored through the xz plane.

Illustration reference: ISO/TS 13399-2:2005, Annex G.

71DF0A33D2E7A-1 1

round adaptive item position **raip**

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

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

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

Illustration reference: Figure F.6.

71D19F4B58F60-1

1

round tool item position**rtipos**

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

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

NOTE Applicable to right-handed tools. Left-handed items are as defined for right-handed items but mirrored through the xz plane.

Illustration reference: Figure F.8.

71FAE7B6D87BC-1

1

theoretical sharp point**tsp**

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

Illustration reference: Figures F.2, F.3.

71DF0A34A8156-1

1

tool cutting edge plane**tcep**

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

Illustration reference: Figures F.2, F.3.

71DF0A38E1098-1

1

tool feed plane**tfp**

plane perpendicular to the xy 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

Illustration reference: Figures F.2, F.3.

71DF0A3C6BB36-1

1

tool rake plane**trp**

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

Illustration reference: Figures F.2, F.3.

71D188FC65486-1 1

xy plane **xyp**

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

71ED6E3F268C6-1 1

xyw plane **xywp**

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

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

Properties:

71ED6E4AE850B-1 phi

71ED6E4F42626-1 xyw plane distance

71CF29A3CDE2F-1 1

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

71ED6E3E9AECB-1 1

xzw plane **xzwp**

related to the xz plane in the coordinate axis system by the rotation angle KAPPA about the Z axis in an anticlockwise (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-1 kappa

71ED6E4F7A8CF-1 xzw plane distance

71D188F971983-1 1

yz plane **yzp**

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

71ED6E3F84723-1**1****yzw plane****yzwp**

related to the yz plane in the coordinate axis system by the rotation angle RHO about the Y axis in an anticlockwise (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:

71ED6E4B254E5-1 rho

71ED6E4FA83F6-1 yzw plane distance

71EDD2B84143C-1**1****runout axial****rnoutax**

variation in the location of the end surface of the cutting reference point of a rotating tool item or the end surface of an adaptive item

Properties:

71D0845C77193-1 runout axial adjustment

71ED6A70807F7-1 runout axial

71EDD2B858274-1**1****runout radial****rnoutrd**

variation in the location of the circumference of a rotating tool item or adaptive item

Properties:

71D0846298D19-1 runout radial adjustment

71DF8C660035E-1 runout radial

71FC1D22BF4CD-1**1****tool thread external****thdex**

continuous and projecting helical ridge of uniform section on an external cylindrical surface

Properties:

71CEAEC08D4B0-1 thread pitch

71D1A6AAC8707-1 threads per inch

71E02C5C2EED3-1 thread diameter

71E033FCBB61C-1	thread hand
71FC06ABEA7D3-1	thread starts
71FC209CD4A91-1	thread length

Subclasses:

71FC2098BC963-001	thread metric external
71FC20991AEE8-001	thread inch external
71FC209969F43-001	thread trapezoidal external

71FC20991AEE8-1 1

thread inch external **thinex**

external tool thread with dimensions conforming to ISO 725

71FC2098BC963-1 1

thread metric external **thmtex**

tool thread with dimensions conforming to ISO 724

71FC209969F43-1 1

thread trapezoidal external **thtzex**

external tool thread with dimensions conforming to ISO 2904

71FC1D25097D7-1 1

tool thread internal **thit**

continuous and projecting helical ridge of uniform section on a cylindrical or conical internal surface

Properties:

71CEAEC08D4B0-1	thread pitch
71D1A6AAC8707-1	threads per inch
71E02C5C2EED3-1	thread diameter
71E033FCBB61C-1	thread hand
71FC06ABEA7D3-1	thread starts
71FC209CD4A91-1	thread length

Subclasses:

71FC209A5C7F3-001 thread metric internal

71FC209ACEA25-001 thread inch internal

71FC209B39D51-001 thread trapezoidal internal

71FC209ACEA25-1 1**thread inch internal thinit**

internal screw thread with dimensions conforming to ISO 725

71FC209A5C7F3-1 1**thread metric internal thmtin**

internal screw thread with dimensions conforming to ISO 724

71FC209B39D51-1 1**thread trapezoidal internal thtzin**

internal screw thread conforming to the dimensions in ISO 2904

Annex D (informative)

Property definitions for reference systems and common concepts

The presentation of the entries in this annex is as follows:

BSU – version number	Revision number	Value format
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data type group	data type	unit identifier
-----------------	-----------	-----------------

preferred name	short name	SYMBOL
----------------	------------	--------

synonymous name

definition

NOTE

source of definition

BSU of condition property = name of condition property

Code value = meaning of code

Source of code definition

Illustration reference: Figure <Annex.illustration number>

Visible class:

Applicable classes:

NOTE 1 An entry might not necessarily contain all the information specified.

NOTE 2 The value formats of properties are specified in ISO 13399-100.

71EBBA9B56D06-1	1	NR2 S..3.3
-----------------	---	------------

simple	real measure	N
--------	--------------	---

actuation force	lmaf	LMAF
-----------------	------	------

linear force needed to actuate a locking mechanism

NOTE The actuation force could be applied either to lock or unlock the mechanism.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAD37F18F34-1 adaptive item type

71EBAB85BB5FA-1 locking mechanism

71EBBA9BCB5F2-1 **1** **X 17**

simple non-quantitative code

actuation method **lam** LAM

description of how the locking mechanism is actuated

auto = automatic

man = manual

Visible class:**71CE7A72B6DA7-1 cutting tool library****Applicable classes:**

71EAD37F18F34-1 adaptive item type

71EBAB85BB5FA-1 locking mechanism

71EBBE66AA8A3-1 **1** **X 17**

simple string

adjustment datum **adjdm** ADJDM

theoretically exact plane to which the adjustment deviations or the adjustment limits are referred

ISO 286-1

Visible class:**71CE7A72B6DA7-1 cutting tool library****Applicable classes:**

71ED884159C90-1 adjustment

71EBBE67E4BD6-1 **1** **NR2 S..3.3**
 simple real measure mm

adjustment deviation lower **adjdvl** ADJDVL

algebraic difference between a minimum limit of adjustment and the adjustment datum

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EBBE682E490-1 **1** **NR2 S..3.3**
 simple real measure mm

adjustment deviation upper **adjdvu** ADJDVU

algebraic difference between a maximum limit of adjustment and the adjustment datum

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EBBE6A5BF09-1 **1** **X 17**
 simple non-quantitative code

adjustment direction **adjdr** ADJDR

direction of movement of an item measured with respect to the functional dimensions

axl = axial deviation of the functional length

rdl = radial deviation of the functional width or cutting diameter

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EBBE7266DA2-1 **1** **NR2 S..3.3**

simple real measure mm

adjustment increment **adjin** ADJIN

smallest step by which a movement can be made

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EBBE664BCBD-1 **1** **NR2 S..3.3**

simple real measure mm

adjustment limit maximum **adjlx** ADJLX

greatest permissible movement from the adjustment datum

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EBBE668A8F3-1 **1** **NR2 S..3.3**

simple real measure mm

adjustment limit minimum **adjln** ADJLN

least permissible movement from the adjustment datum

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EBBE72A6287-1 **1** **NR2 S..3.3**

simple real measure mm

adjustment range **adjrg** ADJRG

distance between the adjustment limit minimum and the adjustment limit maximum

Illustration reference: ISO/TS 13399-3:2006, Figure E.17.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71ED884159C90-1 adjustment

71EAC81F88336-1 **1** **NR2 S..3.3**

simple real measure mm

body clearance depth **bcdp** BCDP

radial distance from the leading edge of the land to the portion of a fluted land reduced in diameter to provide diameter clearance

NOTE Twice the value of the body clearance depth subtracted from the cutting diameter equals the body clearance diameter.

ISO 5419

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A05D27A8-1 end mill

71E01A0608FE4-1 twist drill

71E01A067F73C-1 step drill

71E01A069566C-1 chamfer drill

71E01A06A8A08-1 countersink drill

71E01A06BF88D-1 counterbore drill

71E01A0751456-1 conical drill

71EAC81A64368-1 regrinding

71FAE7AAE8247-1 core drill

71ED6E58E5A62-1 **1** **NR1..1**

simple integer

bolt hole circle count **bhcc** BHCC

number of bolt hole circles on a connection interface feature

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E02520881F1-1 bolt hole circle

71DD700D27A8A-1 **1** **X1**

simple boolean

chamfer corner property **ccp** CCP

possession of a chamfered corner

71DD6C8802580-1 = corner identity

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DD700BFD9B9-1 grooving parting profile

71DDA089C8D1E-1 specific profile insert

71EAC82B2A50E-1 **1** **NR2 S..3.3**

simple real measure deg

chisel edge angle **cea** CEA

obtuse angle between the chisel edge and a line from the cutting reference point to the corresponding chisel edge corner

NOTE The angle is measured in a plane perpendicular to the tool item axis.

ISO 5419

Illustration reference: Figure E.5.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAC81A64368-1 regrinding

71EAC82ADE5EA-1	1	NR2 S..3.3
simple	real measure	mm

chisel edge length **cel** CEL

length of the edge formed by the intersection of the flanks

ISO 5419

Illustration reference: Figure E.5.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAC81A64368-1 regrinding

71EAC83CD450B-1	1	NR2 S..3.3
simple	real measure	deg

clearance angle axial **alp** ALP

angle between the flank of the major or minor cutting edge and a plane parallel to the yz plane passing through that cutting edge measured in the xz plane

NOTE This property is applicable to tool items.

ISO 3002-1

Illustration reference: ISO/TS 13399-3:2006, Figure E.23.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D1066F279AD-1 cartridge
 71E01A008D13F-1 mill
 71E01A00BD93C-1 drill
 71E01A04A8AEC-1 ream
 71E01A04C377D-1 broach
 71E01A05104CF-1 turn
 71EAC81A64368-1 regrinding

71EAC83B73825-1 **1** **NR2 S..3.3**

simple real measure
 deg

clearance angle radial **alf** ALF

angle between the flank of the major or minor cutting edge and a plane parallel to the xz plane passing through that cutting edge measured in the yz plane

NOTE This property is applicable to tool items.

ISO 3002-1

Illustration reference: ISO/TS 13399-3:2006, Figure E.23.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D1066F279AD-1 cartridge
 71E01A008D13F-1 mill
 71E01A00BD93C-1 drill
 71E01A04A8AEC-1 ream
 71E01A04C377D-1 broach
 71E01A05104CF-1 turn
 71EAC81A64368-1 regrinding

71CF298963036-1 1 X 17

simple string

coolant radial entry thread size crnt CRNT

identifier for the thread at the radial coolant entry on the machine side.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71EBDBF22CF58-1 1 NR2 S..3.3

simple real measure mm

coolant entry centre line distance cecid CECID

dimension between the tool item axis or the adaptive item axis and the axis of the coolant entry supply feature measured radially perpendicular to the item axis

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71CF2985AA87C-1 1 NR2 S.7.3

simple real measure mm

coolant entry diameter cnd CND

dimension of the opening through which coolant can enter the machine side of a tool item or an adaptive item

NOTE If there is a thread at the opening, then the property coolant entry thread size must be used instead of this property.

Illustration reference: Figure E.1.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71EBDBF2CEE6A-1 **1** **NR2 S..3.3**

simple real measure deg

coolant entry inclination angle **ceia** CEIA

angle between the tool item axis or the adaptive item axis and the coolant entry supply feature measured in a plane that is colinear with the coolant entry rotation angle and perpendicular to the yz plane

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71EBDBF289BB9-1 **1** **NR2 S..3.3**

simple real measure deg

coolant entry rotation angle **cera** CERA

angle between the xy plane and a line between the axis of the coolant entry supply feature and either the tool item axis or the adaptive item axis measured in the negative direction (clockwise)

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71CF2985DCED3-1 **1** **NR1 S..1**

simple non-quantitative integer

coolant entry style code **cncs** CNCSC

identifier for the arrangement for the entry of the coolant supply

0 = without coolant

1 = axial concentric entry

2 = radial entry

3 = axial concentric and radial entry

4 = axial concentric entry on circle

5 = radial entry before adaptor

6 = decentral over flange

7 = decentral over flange and axial

8 = decentral over slots on the shank

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71D07558CEF8A-1 **1** **X 17**

simple string

coolant entry thread size **cnt** CNT

identifier for the thread at the axial coolant entry on the machine side.

NOTE If there is no thread at the opening, then the property coolant entry diameter must be used instead of this property.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71CF298AA8D1F-1 **1** **NR2..7.3**

simple real measure mm

coolant exit diameter **cxd** CXD

dimension of the opening through which coolant can exit the workpiece side of a tool item or an adaptive item

Illustration reference: Figure E.1.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71CF2985FC5FC-1 **1** **NR1 S..1**

simple non-quantitative integer

coolant exit style code **cxsc** CXSC

identifier for the arrangement for the exit of the coolant supply

0 = no coolant exit

1 = axial concentric exit

2 = radial exit

3 = axial inclined exit

4 = axial concentric on circle

5 = axial inclined exit with nozzle, adjustable

6 = decentral exit with nozzles, adjustable

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71D075633189D-1 **1** **X 17**

simple string

coolant exit thread size **cxt** CXT

identifier for the thread at the coolant exit on the workpiece side.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71EAC478A4164-1 **1** **NR2 S..3.3**

simple real measure MPa

coolant pressure **cp** CP

pressure of the coolant media at the entry of the tool item or adaptive item

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71CF298EB6D72-1	1	NR2..7.3
simple	real measure	mm

coolant ring seat width **crw** CRW

space needed to mount a coolant ring.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C3C065EB-1 coolant supply

71FD1E2EDD973-1	1	NR2..7.3
simple	real measure	mm

cutting point translation x-direction **ctx** CTX

difference in the direction of the X axis between the cutting reference point and the theoretical sharp point

Illustration reference: Figure F.3.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D1AA486FF89-1	equilateral equiangular
71D1AE11B8B77-1	equilateral non-equiangular
71D0808DA853B-1	master insert
71D1AE120D96E-1	non-equilateral equiangular
71D1AA489FD6E-1	non-equilateral non-equiangular
71DDA089C8D1E-1	specific profile insert

71FD1E2F66B38-1 1 NR2..7.3

simple real measure mm

cutting point translation y-direction **cty** CTY

difference in the direction of the Y axis between the cutting reference point and the theoretical sharp point

Illustration reference: Figures F.2.and F.3.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D1AA486FF89-1	equilateral equiangular
71D1AE11B8B77-1	equilateral non-equiangular
71D0808DA853B-1	master insert
71D1AE120D96E-1	non-equilateral equiangular
71D1AA489FD6E-1	non-equilateral non-equiangular
71DDA089C8D1E-1	specific profile insert

71EBB2F865924-1 1 NR2 S..3.3

simple real measure mm

diameter access hole **dah** DAH

dimension of a hole through an item to provide access to a screw or other feature

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E02520881F1-1 bolt hole circle

71EAC0DECE78F-1 1 NR2 S..3.3

simple real measure mm

diameter bolt circle **dbc** DBC

diameter of a circle on which the centres of cylindrical or threaded holes are placed to form a connection between a tool and an adaptive item

Illustration reference: Figure E.3.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E02520881F1-1 bolt hole circle

71EAC81AD9AE1-1 **1** **X 17**

simple string

drill back taper **dbt** DBT

reduction in diameter from the outer corners towards the shank expressed by the ratio of the reduction in diameter and the length of measurement

ISO 5419

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A0608FE4-1 twist drill

71EAC81A64368-1 regrinding

71EC61D8A1771-1 **1** **NR2 S.3.3**

simple real measure mm

flange diameter **df** DF

dimension between two parallel tangents on the outside edge of a flange

Illustration reference: Figure E.4.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A04A8AEC-1 ream

71E01A0540BE7-1 slab mill

71E01A05B627B-1 face mill

71E01A05D27A8-1 end mill

71E01A05EA320-1 half side mill

71E01A0608FE4-1 twist drill

71E01A067F73C-1 step drill

71E01A069566C-1 chamfer drill

71E01A06A8A08-1 countersink drill

71E01A06BF88D-1 counterbore drill

71E01A0751456-1 conical drill

71E01A0769982-1 trepanning drill

71E0251F304E1-1 rotating borer

71EC5A767182E-1 flange

71EF07DFC283C-1 double half side mill

71EF07E037025-1 slotting cutter

71EF07E083383-1 threading grooving mill

71EEF5384E141-1 **1** **NR2 S..3.3**

simple real measure mm

flange height **flgh** FLGH

greatest dimension across a rectangular projecting rim or edge

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EC5A767182E-1 flange

71F90EA1ED67E-1 **1** **NR2 S..3.3**

simple real measure mm

flange location **flgl** FLGL

distance from the designated coordinate system to the front of a projecting rim or edge

NOTE 1 For flanges on the machine side of an item, the distance is measured from the yz plane to the front side of the flange (the flange face farthest from the yz plane).

NOTE 2 For flanges on the workpiece side of an item, the distance is measured from the yzw plane.

REMARKS: For flanges on the workpiece side of an item, the front flange face is the connecting surface, therefore it is coincident with the yzw plane and the distance (FLGL) from the yzw plane is zero.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EC5A767182E-1 flange

71EEF53809764-1	1	NR2 S..3.3
simple	real measure	mm

flange thickness **flgt** FLGT

dimension through the body of a projecting rim or edge

Illustration reference: Figure E.4.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EC5A767182E-1 flange

71EEF5387E914-1	1	NR2 S..3.3
simple	real measure	mm

flange width **flgw** FLGW

least of the two largest dimensions across a rectangular projecting rim or edge

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EC5A767182E-1 flange

71EAC8210DF36-1	1	NR2 S..3.3
simple	real measure	mm

fluted land width **flw** FLW

distance between the leading edge of the margin and the heel

ISO 5419

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A0608FE4-1 twist drill

71E01A067F73C-1 step drill

71E01A0751456-1 conical drill

71EAC81A64368-1 regrinding

71FAE7AAE8247-1 core drill

71CF29872F0AB-1 **1** **X 1**

simple non-quantitative code

hand **hand** **HAND**

identifier used for the direction of rotation of rotating tool items and rotating adaptive items and for the position of the cutting edge of a stationary tool item and for the position of the connection used for a tool item or adaptive item with respect to the axis of the item and for the orientation of a replaceable cutting item with respect to the insert reference system and for the orientation of a clamp

L = left-hand

N = neutral (both) hand

R = right-hand

ISO 3002-1

Visible class:**71CE7A72B6DA7-1 cutting tool library****Applicable classes:**

71D0808DA853B-1 master insert

71E01A004C775-1 tool item type

71EC56B608ADC-1 insert wedge

71FAD54E2FE26-1 lever top clamp

71D1C82A5036D-1 **1** **X1**

simple boolean

inscribed circle property inclp INCLP

possession by a cutting insert type of an inscribed circle

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilat equiang

71D1AA489FD6E-1 nonequilat nonequiang

71D1AA6635E76-1 round insert

71D1AE11B8B77-1 equilat nonequiang

71D1AE120D96E-1 nonequilat equiang

71CE7A96BC122-1 1 NR2 S..3.3

simple real measure deg

insert included angle epsr EPSR

angle between the major and the minor cutting edges of a cutting item

Illustration reference: ISO/TS 13399-2:2005, Figures E.3, E.4, E.9, E.10, E.18.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equangular

71D1AE11B8B77-1 equilateral non-equangular

71D1AE120D96E-1 non-equilateral equiangular

71DDA089C8D1E-1 specific profile insert

71CE7A9936610-1 **1** **X 17**

simple string

insert interface code **iic** **IIC**

identifier for the condition that a particular replaceable cutting item can be mounted on a particular tool item

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AA6635E76-1 round insert

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DDA089C8D1E-1 specific profile insert

71E01A004C775-1 tool item type

71CE7A9DFA23A-1 **1** **NR2 S..3.3**

simple real measure mm

insert length **insl** **INSL**

largest dimension of a replaceable cutting item

Illustration reference: ISO/TS 13399-2:2005, Figures E.13, E.17, E.19.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DD700BC8BE2-1 ball nosed profile

71DDA089C8D1E-1 specific profile insert

71CE7A97711B8-1 1 NR1 S..4

simple non-quantitative integer

insert mounting style code ifs IFS

identifier for the method of holding a cutting item onto a tool item.

0 = Other clamping system

1 = Without fixing hole

2 = Cylindrical fixing hole

3 = Partly cylindrical, 40-60 deg countersink on one or two sides

4 = Partly cylindrical, 70-90 deg countersink on one or two sides

5 = Notch clamping

6 = Convex prismatic cross section

7 = Concave prismatic section

DIN 4000-95

Illustration reference: ISO/TS 13399-2:2005, Figure F.12.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AA6635E76-1 round insert

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DD7014BF2A1-1 fixing hole

71DDA089C8D1E-1 specific profile insert

71CEAEBF2A69F-1 **1** **X 17**

simple string

insert seat size code **ssc** SSC

identifier for the size of a replaceable cutting item and the seat on a tool item or an assembly item.

NOTE The value of this identifier depends on both the shape of the cutting item and the size of the cutting item.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1066F279AD-1 cartridge

71E01A00BD93C-1 drill

71E01A04A8AEC-1 ream

71E01A04C377D-1 broach

71E01A05104CF-1 turn

71E0251F304E1-1 rotating borer

71EAD70F1B95A-1 nest

71CE7A9F0C79F-1 **1** **X 17**

simple non-quantitative code

insert shape code **sc** SC

identifier for the shape of a regular insert.

0 = rhombic 75° included angle

A = parallelogram 85° included angle

B = parallelogram 82° included angle

C = rhombic 80° included angle

D = rhombic 55° included angle

H = hexagonal

K = parallelogram 55° included angle

L = rectangular

- M = rhombic 86° included angle
- O = octagonal
- P = pentagonal
- R = round
- S = square
- T = triangular 60° included angle
- V = rhombic 35° included angle
- W = trigon

ISO 1832:2004, Table 1.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

- 71D0808DA853B-1 master insert
- 71D1AA486FF89-1 equilateral equiangular
- 71D1AA489FD6E-1 non-equilateral non-equiangular
- 71D1AA6635E76-1 round insert
- 71D1AE11B8B77-1 equilateral non-equiangular
- 71D1AE120D96E-1 non-equilateral equiangular
- 71EAD70F1B95A-1 nest

71CE7A9F5308C-1	1	NR2 S..3.3
simple	real measure	mm
insert thickness	s	S

distance between the bottom and the cutting edge of a replaceable cutting item.

Illustration reference: ISO/TS 13399-2:2005, Figures F.1 to F.8.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AA6635E76-1 round insert

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DD700BC8BE2-1 ball nosed profile

71DDA089C8D1E-1 specific profile insert

71CE7A9FB11C3-1	1	NR2 S..3.3
simple	real measure	mm
insert width	w1	W1

distance between two sides of an insert when the inscribed circle cannot be used because of the shape of the insert.

Illustration reference: ISO/TS 13399-2:2005, Figures E.9, E.10, E.14, E.19.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DD700BC8BE2-1 ball nosed profile

71DDA089C8D1E-1 specific profile insert

71ED6E4A7EFBA-1	1	NR2 S..3.3
simple	real measure	deg
kappa	kap	KAP

rotation angle for the xzw plane anticlockwise (counter-clockwise) about the Z axis

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAD385E51A0-1 reducer

71EAD3871D313-1 converter

71EAD388173EE-1 driver

71ED6E3E9AECB-1 xzw plane

71D0841ADC9E0-1	1	NR2 S..3.3
simple	real measure	mm

keyway width **kww** KWW

nominal width of a keyway in a tool item and an adaptive item

Illustration reference: Figure E.2.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF5C026BCE7-1 keyway

71EAC828C8308-1	1	NR2 S..3.3
simple	real measure	mm

margin width **mw** MW

land

dimension of the cylindrical leading edge of the fluted land measured perpendicular to the leading edge

ISO 5419

REMARKS: Called "land" in ISO 5419.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAC81A64368-1 regrinding

71EBC1E8857BE-1 **1** **NR2 S..3.3**

simple real measure mm

overall length minimum **oaln** **OALN**

least allowable length of an item after regrinding

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A0E9CBA9-1 boring bar

71EAC81A64368-1 regrinding

71ED6E4AE850B-1 **1** **NR2 S..3.3**

simple real measure deg

phi **phi** **PHI**

rotation angle for the xyw plane anticlockwise (counter-clockwise) about the x-axis

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAD385E51A0-1 reducer

71EAD3871D313-1 converter

71EAD388173EE-1 driver

71ED6E3F268C6-1 xyw plane

71ED6E4B254E5-1 **1** **NR2 S..3.3**

simple real measure deg

rho **rho** **RHO**

rotation angle for the yzw plane anticlockwise (counter-clockwise) about the Y axis

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EAD385E51A0-1 reducer

71EAD3871D313-1 converter

71EAD388173EE-1 driver

71ED6E3F84723-1 yzw plane

71DD7011A3D86-1 **1** **X1**

simple boolean

rounded corner property **rcp** RCP

possession of a corner with a constant radius

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D0808DA853B-1 master insert

71D1AA486FF89-1 equilateral equiangular

71D1AA489FD6E-1 non-equilateral non-equiangular

71D1AE11B8B77-1 equilateral non-equiangular

71D1AE120D96E-1 non-equilateral equiangular

71DD700BE1D04-1 drilling profile

71DD700BFD9B9-1 grooving parting profile

71DD700C151B5-1 threading profile

71DDA089C8D1E-1 specific profile insert

71ED6A70807F7-1 **1** **NR2 S..3.3**

simple real measure mm

runout axial **rna** RNA

total variation of all cutting reference points from the yz plane measured in the direction of the X axis in a defined plane of rotation

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71EDD2B84143C-1 runout axial

71D0845C77193-1 **1** **NR2 S..3.3**

simple real measure microns

runout axial adjustment **adjar** ADJAR

magnitude of the range of adjustment parallel to the X axis to align cutting edges into the same axial position

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A008D13F-1 mill

71E01A00BD93C-1 drill

71EDD2B84143C-1 runout axial

71DF8C660035E-1 **1** **NR2 S..3.3**

simple real measure mm

runout radial **rnr** RNR

total indicator runout

total variation of all cutting reference points from the X axis measured perpendicular to the X axis in a defined plane of rotation

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DF8C5B8F7B5-1 drill point

71EDD2B858274-1 runout radial

71D0846298D19-1 **1** **NR2 S..3.3**

simple real measure microns

runout radial adjustment **adjrr** ADJRR

magnitude of the range of adjustment perpendicular to the X axis to align cutting edges to the same radial position

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71D1066F279AD-1 cartridge
 71E01A008D13F-1 mill
 71E01A00BD93C-1 drill
 71E01A081855D-1 tapered broach
 71EDD2B858274-1 runout radial

71E02C5C2EED3-1 **1** **NR2 S..3.3**
 simple real measure mm
thread diameter **td** TD

diameter of an imaginary cylindrical surface tangential to the crests of an external thread or to the roots of an internal thread

NOTE This definition applies to both internal and external threads.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A04E0236-1 threading tap
 71E01A04F70F7-1 threading die
 71FC1D22BF4CD-1 tool thread external
 71FC1D25097D7-1 tool thread internal

71E033FCBB61C-1 **1** **X 17**
 simple non-quantitative code
thread hand **thdh** THDH

direction of the screwing motion of a screw thread

LEFT = left-hand

RIGHT = right-hand

ISO 5408

Visible class:**71CE7A72B6DA7-1 cutting tool library****Applicable classes:**

71DD700C151B5-1 threading profile

71FC1D22BF4CD-1 tool thread external

71FC1D25097D7-1 tool thread internal

71FC209CD4A91-1	1	NR2 S..3.3
simple	real measure	mm

thread length	thlgth	THLGTH
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distance between the ends of a portion of an item that includes the full profile of a thread

Visible class:**71CE7A72B6DA7-1 cutting tool library****Applicable classes:**

71FC1D22BF4CD-1 tool thread external

71FC1D25097D7-1 tool thread internal

71CEAEC08D4B0-1	1	NR2 S..3.3
simple	real measure	mm

thread pitch	tp	TP
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axial distance between a point on a thread flank and the equivalent point of the immediately adjacent and corresponding flank

ISO 5408

Illustration reference: ISO/TS 13399-2:2005, Figures E.14, E.15, E.18.**Visible class:****71CE7A72B6DA7-1 cutting tool library****Applicable classes:**

71DD700C151B5-1 threading profile

71FC1D22BF4CD-1 tool thread external

71FC1D25097D7-1 tool thread internal

71FC06ABEA7D3-1 1 NR1 S..1

simple integer

thread starts thsts THSTS

number of starting points for a screw thread

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71FC1D22BF4CD-1 tool thread external

71FC1D25097D7-1 tool thread internal

71D1A6AAC8707-1 1 NR2 S..3.3

simple real

threads per inch tpi TPI

number of threads in a one inch length of a thread

Illustration reference: ISO/TS 13399-2:2005, Figure E.18.

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71DD700C151B5-1 threading profile

71FC1D22BF4CD-1 tool thread external

71FC1D25097D7-1 tool thread internal

71DF153B14F02-1 1 NR2 S..3.3

simple real measure Nm

torque tq TQ

rotational force applied to an item

Visible class:

71CE7A72B6DA7-1 cutting tool library

Applicable classes:

71E01A004C775-1 tool item type

71EBAB85BB5FA-1 locking mechanism