TECHNICAL SPECIFICATION

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Cutting tool data representation and exchange —

Part 60:
Reference dictionary for connection systems

Représentation et échange des données relatives aux outils coupants —

Partie 60: Dictionnaire de référence pour les systèmes de connexion

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Foreword

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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order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn.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again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.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 13399-60 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 connection systems of cutting tools 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.

Assemblies
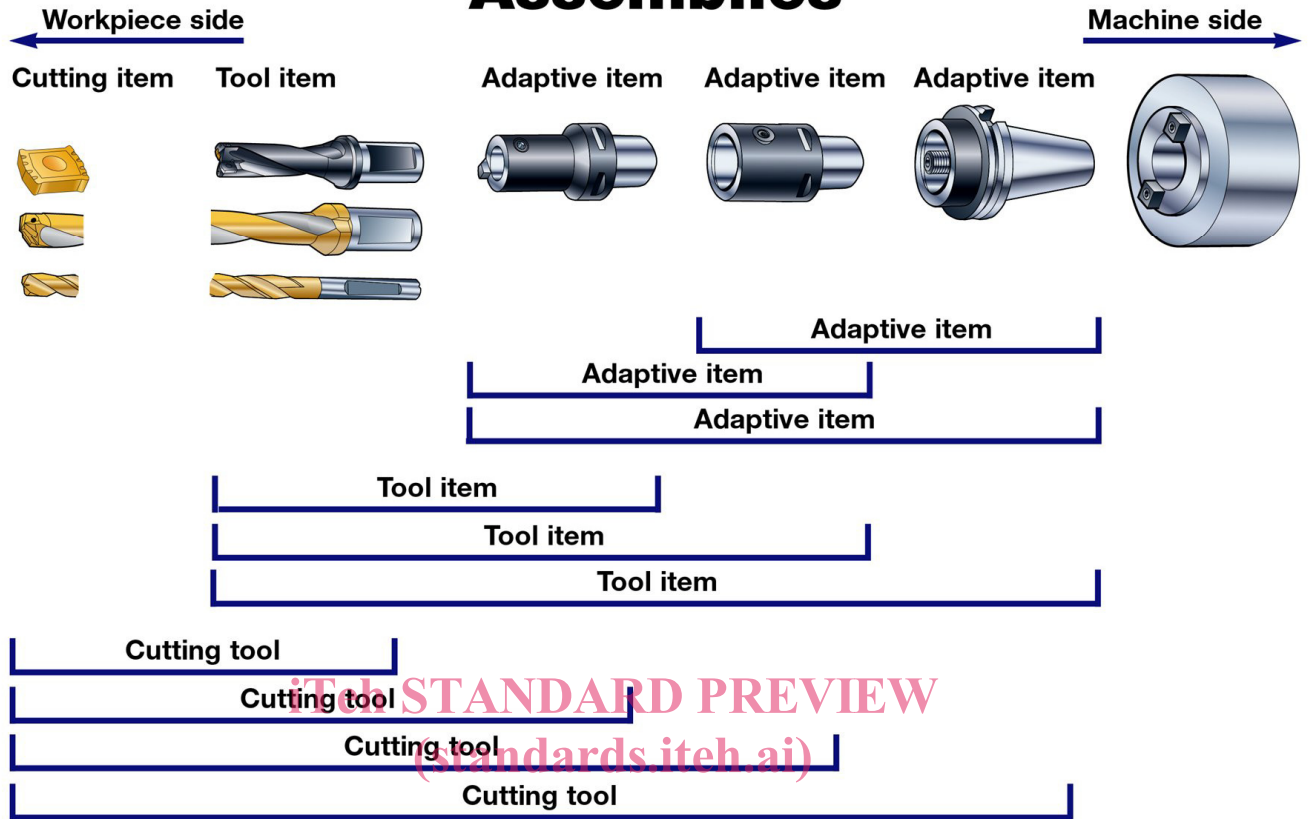
Figure 1 — Examples of different types of assemblies of items

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Cutting tool data representation and exchange —

Part 60:
Reference dictionary for connection systems

1 Scope

This part of ISO 13399 specifies a reference dictionary for connection systems 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 connection systems for cutting tools, with an associated classification scheme,

b) definitions and identifications of the data element types that represent the properties of connection systems 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 connection systems for cutting tools;

— standard data that represent the various properties connection systems for cutting tools;

— standard data that represent domains of values used for properties of connection systems 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;

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

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[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.

— implementation methods other that 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 reference systems and common concepts, 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.

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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 and which is a member of the domain established by an entity data type

[ISO/TS 13399-2]

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

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[ISO 3002-1]

3.20
ontology
explicit and consensual specification of concepts of an application domain independent of any use of these concepts

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[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/TS 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   "connection interface feature" is the name of a concept in the ontology. **connection_interface_feature** is the identifier of the class in the dictionary that represents the concept.

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   connection_interface_feature

connection_interface_feature is a generic family of those parts of a tool item or assembly item that form a coupling to another tool item or assembly item or machine tool. Definitions and further sub-division of these classes can be found in Annex C.

connection_interface_feature has the following subclasses: [2]

— **ABS_System_Komet**;

— **AIF_Adjustable_Interface_Dihart**;

— **AWN_Prisma_connection_Schwanog**;

— **BFA_drill_chuck_connection**;

— **BKA_boring_head_connection**;

— **BKC_boring_head_connection_Coromant**;

— **BRP_Bridgeport_connection**;

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[2]   The identifications for some of these entities are derived from commercial trade names and company names that may be protected. Their use in this part of ISO 13399 is justified by their being in common use with no accepted generic alternatives. This information is given for the convenience of users of this part of ISO 13399 and does not constitute an endorsement by ISO of these products.

— **BTS_Block_Tool_System_Coromant**;

— **BUF_boring_and_chamfer_system**;

— **CBC_Coromant_bridge_connection**;

— **CCB_Coromant_CoroBore**;

— **CCM_Coromant_Cap_Mounting**;

— **CCS_Coromant_Capto_system**;

— **CDB_Coromant_Duobore**;

— **CFB_Coromant_Fine_Boring**;

— **CKB_Kaiser_bore_connection**;

— **CKS_Kaiser_shank_connection**;

— **CMB_Coromant_Modular_boring**;

— **CMS_Coromant_Modular_Serrated_mounting**;

— **FCM_Flexible_Coupling_Modular**;

— **FDA_milling_arbor_connection**;

— **FLC_flange_connection_Coromant**;

— **FLK_flange_connector_Kennametal**;

— **FTS_Flexible_Tooling_System_Kennametal**;

— **GMS_Graflex_Modular_System_SECO**;

— **GRL_Granlund_connection**;

— **HEE_HE-/HF-system_EMUGE**;

— **HFS_head_fitting_system_Mapal**;

— **HSK_hollow_taper_shank**;

— **HSZ_hollow_cylindrical_shank**;

— **HTS_deep_drilling_system**;

— **KKG_stub_taper**;

— **KKH_cartridge_interface**;

— **KMB_Kennametal_ModBore_system**;

— **KMC_Kennametal_cartridge_mounting**;

— **KMM_Kennametal_Micro_system**;

— **KMT_KM-UTS_system_Kennametal/Widia**;

— **KRS_Kennametal_Romicron_system**;

— **KVT_KV_system_Kennametal**;

— **MBS_Multi_Blade_System_Coromant**;

— **MCS_modular_cartridge_system_Kennametal**;

— **MEG_metric_taper**;

— **MKG_Morse_taper**;

— **MVS_modular_connection_system_Wohlhaupter**;

— **NCT_Novex-NC-Tools_Walter**;

— **PMC_prismatic_connection_Coromant**;

— **PMD_prismatic_connection_standard**;

— **PMK_prismatic_connection_Kennametal**;

— **PMS_prismatic_connection_SECO**;

— **RFX_Rotaflex_system_Widia**;

— **SAC_screw_ connection_Coromant**;

— **SBA_SBA-system_Komet**;

— **SCA_SECO_cartridge_mounting**;

— **SCR_SECO_crownlock_connection**;

— **SKG_Steep_taper**;

— **SMM_SECO_minimaster**;

— **SMS_SECO_modular_serrated_connection**;

— **SPK_holding_arbor**;

— **SRT_SECO_R2_shank**;

— **STH_automotive_shank**;

— **SWB_quick_change_connection**;

— **SZB_collet_shortened_design_Biax**;

— **SZC_collet_connection_Coromant**;

— **SZD_collet_connection_standard**;

— **SZE_collet_connection_Erikson**;