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Cutting tool data representation and exchange —

Part 100: Definitions, principles and methods for reference dictionaries

Représentation et échange des données relatives aux outils coupants —

Partie 100: Définitions, principes et méthodes pour les dictionnaires de référence

Reference number
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Contents

Page

Foreword ... v
Introduction ... vii
1 Scope ... 1
2 Normative references ... 1
3 Terms and definitions ... 2
4 Data element type specification attributes ... 3
4.1 General ... 3
4.2 Information model of a data element type ... 4
4.3 Data element types - Identifying attributes ... 5
4.3.1 General ... 5
4.3.2 Code ... 5
4.3.3 Version number ... 6
4.3.4 Date of current version ... 6
4.3.5 Revision number ... 7
4.3.6 Date of current revision ... 7
4.3.7 Preferred name ... 7
4.3.8 Synonymous name ... 8
4.3.9 Short name ... 8
4.3.10 Preferred symbol ... 8
4.3.11 Synonymous symbol ... 8
4.4 Data element types - Semantic attributes ... 9
4.4.1 General ... 9
4.4.2 Definition ... 9
4.4.3 Date of original definition ... 10
4.4.4 Note ... 10
4.4.5 Remark ... 10
4.4.6 Formula ... 10
4.4.7 Figure ... 11
4.4.8 Source document of Data Element Type definition ... 11
4.5 Data element types - value attributes ... 11
4.5.1 General ... 11
4.5.2 Data type ... 12
4.5.3 Value format ... 14
4.5.4 Unit of measure ... 15
4.5.5 Value list ... 15
4.6 Relationship attributes ... 17
4.6.1 General ... 17
4.6.2 Condition data element type ... 17
4.6.3 Data element type class ... 18
5 Class specification ... 18
5.1 General ... 18
5.2 Class specification attributes ... 19
5.3 Information model of a class ... 19
5.4 Class - Identifying attributes ... 20
5.4.1 General ... 20
5.4.2 Code ... 20
5.4.3 Version number ... 20
5.4.4 Date of current version ... 21
5.4.5 Revision number ... 21
5.4.6 Date of current revision ... 21

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5.4.7 Preferred name **22**
5.4.8 Short name **22**
5.5 Class – Semantic attributes **22**
5.5.1 General **22**
5.5.2 Definition **23**
5.5.3 Date of original definition **23**
5.5.4 Note **23**
5.5.5 Remark **24**
5.5.6 Drawing reference **24**
5.5.7 Source document of class definition **24**
5.6 External identification of classes and properties **24**
5.6.1 General **24**
5.6.2 Organisation identification scheme **25**
5.6.3 Organisation identifier **25**
5.6.4 Supplier code **25**
5.6.5 Identification of a class specified in another dictionary **25**
5.6.6 Identification of a property of a class specified in another dictionary **25**
Annex A (normative) **Information object registration** **26**
Annex B (informative) **Experience of developing a reference dictionary for ISO 13399** **27**
Annex C (informative) **The illustration of classes and properties** **39**
Annex D (normative) **Maintenance procedure** **43**
Annex E (informative) **The definition of connection interface features** **48**
Bibliography **51**

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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 document:

a) 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;

b) 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 13399-100 was prepared by Technical Committee ISO/TC 29, *Small tools*.

This second edition cancels and replaces the first edition (ISO/TS 13399-100:2004), which has been technically revised.

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]

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— *Part 100: Definitions, principles and methods for reference dictionaries* [Technical Specification]

— *Part 150: Usage guidelines* [Technical Specification]

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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 principles and methods for the construction of reference dictionaries for data related to cutting tools with defined cutting edges. The purpose of this part of ISO 13399 is to provide a specification for the creation of the reference dictionaries that support the use of the general information model defined in ISO 13399-1. This specification is based on the example of IEC 61360-1. Informal advice on the creation of the reference dictionaries is provided in Annexes B, C, D and E.

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 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, *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*.[1]

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.

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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

— 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

— the management of cutting tool information from multiple sources and for multiple applications.

Different companies use different business models to determine their need for the communication of information about their products. For example, one cutting tool manufacturer 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.

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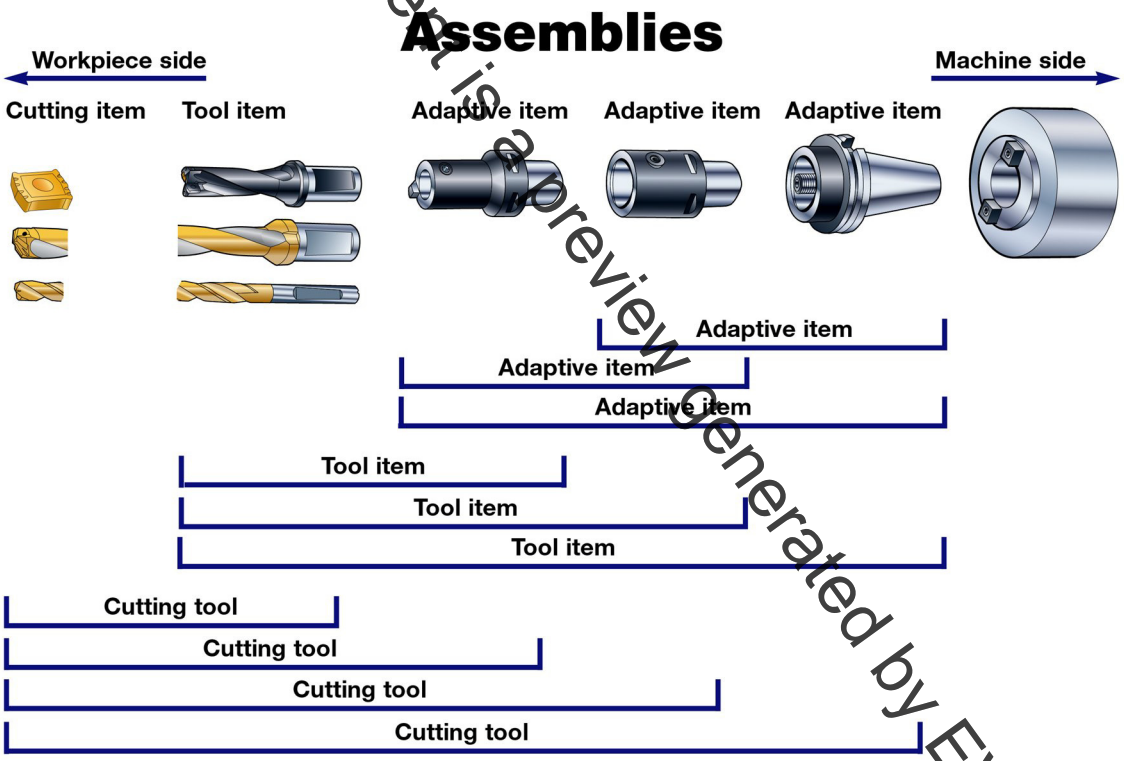

Figure 1 — Possible assemblies of the components of a cutting tool

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Cutting tool data representation and exchange —

Part 100:
Definitions, principles and methods for reference dictionaries

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1 Scope

This part of ISO 13399 defines the principles and methods for creating unambiguous identifications and definitions of the items and their properties relating to cutting tools in computer-sensible dictionaries to be used for reference by the information model defined in ISO 13399-1.

It is applicable to:

— the specification of data element types, their identifying, semantic and value attributes;

— the specification of item classes, their identifying and semantic attributes;

— the specification of feature classes, their identifying and semantic attributes.

It is not applicable to:

— information model for cutting tools;

— classifications and definitions of items and data element types relating to cutting tools;

— the association between properties and items in a classification.

NOTE 1 The information model for cutting tools is defined in ISO 13399-1.

NOTE 2 The classification of items relating to cutting tools, the definitions of items and data element types and the association of properties to items are defined in ISO 13399-2, ISO 13399-3, ISO 13399-4, ISO 13399-50 and ISO 13399-60.

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 31 (all parts), *Quantities and units*[1)]

ISO 6093, *Information processing — Representation of numerical values in character strings for information interchange*

ISO 9735, *Electronic data interchange for administration, commerce and transport (EDIFACT) — Application level syntax rules*

1) To be replaced by ISO 80000.

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ISO/IEC 10646, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)*

IISO 13584-25, *Industrial automation systems and integration — Parts library — Part 25: Logical resource: Logical model of supplier library with aggregate values and explicit content*

ISO 13584-26, *Industrial automation systems and integration — Parts library — Part 26: Logical resource: Information supplier identification*

ISO 13584-42, *Industrial automation systems and integration — Parts library — Part 42: Description methodology: Methodology for structuring part families*

IEC 61360-1, *Standard data element types with associated classification scheme for electronic components — Part 1: Definitions — Principles and methods*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61360-1 apply.

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