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Technical product documentation (TPD) — General requirements of mechanical product digital manuals

Documentation technique de produits (TPD) — Exigences générales pour manuels numériques des produits mécaniques

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Foreword

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This document was prepared by Technical Committee ISO/TC 10, *Technical product documentation*, Subcommittee SC 6, *Mechanical engineering documentation*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Technical product documentation (TPD) — General requirements of mechanical product digital manuals

1 Scope

This document specifies the composition, basic principles, preparation process, general requirements, detailed requirements, publication and application requirements, and management requirements of mechanical product digital manuals.

This document is intended to be used for guidance in the preparation of digital manuals, which provide guidance in the use, repair and maintenance of products. It is also intended to be used for reference in production and manufacturing.

This document does not specify function or data structure of any specific software.

This document applies to the preparation of mechanical product digital manuals based on service bills of material and modularized technical information.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16792:2015, *Technical product documentation — Digital product definition data practices*

ISO 17599:2015, *Technical product documentation (TPD) — General requirements of digital mock-up for mechanical products*

IEC 82079-1:2012, *Preparation of instructions for use — Structuring, content and presentation — Part 1: General principles and detailed requirements*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
digital manual
document that describes product information, whose contents are organized in a structured way, mainly expressed by three-dimensional models, published in either electronic or paper form and used to guide the use, repair and maintenance of products

3.2
engineering bill of materials
list of part numbers and assemblies that make up the design engineering configuration that contains the raw stock size and the material specification

[SOURCE: ISO 10303-240:2005, 3.4.3, modified — the article “the” is deleted.]

3.3
service bill of materials
bill about the items and quantities of the complete machine, components, parts and their service attributes, which is listed based on demands of after-sale service

3.4
data element
basic unit of data, of which the definition, identification, expression or allowable value may be stipulated by a set of properties known as metadata

3.5
data module
independent and complete data unit that describes the structure, performance and operational steps of mechanical products using models, text, pictures, audio and video

3.6
template
electronic document with a fixed format for preparing digital manuals

3.7
service bill of materials for product type
bill for product type about the items and quantities of the complete machine, components, parts and their service attributes, which is listed based on demands of after-sale service

3.8
configuration information
requirements for product or service design, realization, verification, operation and support

[SOURCE: ISO 10007:2017, 3.5]

3.9
service bill of materials for product instance
bill for product instance about the items and quantities of the complete machine, components, parts and their service attributes, which is listed based on demands of after-sale service

4 Abbreviations

BOM	bill of materials
DE	data element
DM	data module
EBOM	engineering bill of materials
ERP	enterprise resource planning
MES	manufacturing execution system
PDM	product data management
PT-SBOM	service bill of materials for product type
PI-SBOM	service bill of materials for product instance
SBOM	service bill of materials

5 Composition of digital manuals

Digital manuals usually include:

a) parts manual, which includes:

- chapters and directories;
- models or pictures;
- material lists;
- tool lists;
- parts lists.

b) operation, repair and maintenance manual, which includes:

- chapters and directories;
- operation information;
- repair and maintenance information.

c) safety manual, which includes:

- chapters and directories;
- warning levels;
- warning labels;
- warning text.

d) others, for example, an accompanying list.

6 Basic principles

Preparation of digital manuals shall meet the following basic principles:

a) Descriptions of products in digital manuals shall be consistent with the actual states of the corresponding products.

b) Expression and style of information in digital manuals shall be suitable for displaying, viewing, understanding and expanding.

c) The digital manual shall be easily maintained.

d) Information in digital manuals shall be kept safe by using access authority right limits.

e) Digital manuals shall be able to be installed and run in a network environment.

7 Preparation process

7.1 Relationship of data

Use the engineering bill of materials (EBOM), models and other data (e.g. production date) to create a service bill of materials (SBOM), data elements (DEs), data modules (DMs) and a template; from these a digital manual can be generated and released. This usually includes a parts manual, an operation, repair and maintenance manual, a safety manual and an accompanying list. See Annex A, Figure A.1 for the relationship between data at each preparation stage of a digital manual.

7.2 Information preparation

Information needed before preparation of digital manuals shall include but not be limited to:

— early-stage summaries of maintenance;

— EBOM and models;

— maintenance requirements.

7.3 Preparation of digital manuals

7.3.1 Preparation of SBOM

SBOM shall include but not be limited to:

a) structure, which shall include but not be limited to:

— layer of structure, which indicates the layered state of components and parts;

— node, which indicates all components and parts;

— quantity, which indicates the quantity of components and parts.

b) content, which shall include but not be limited to:

— material number, which indicates the serial number of components and parts;

— version, which indicates the version of components and parts;

— name, which indicates the name of components and parts;

— archived information, which includes product ID, production order information;

— service attributes, which indicates the defined service attributes of components and parts.

NOTE Service attributes not only extract some attributes from EBOM, but can also add other attributes according to actual needs, such as replacement cycles.

See Annex B, Figure B.1 for the preparation process of SBOM.

7.3.2 Preparation of DE

As the basic element in a digital manual, DE mainly includes:

— models, which shall be able to be linked to corresponding nodes of SBOM and vice versa;

— text;

— pictures, which shall support link functionality;

— audio, which includes non-verbal sounds, warning sounds and an interpreter's voice;

— video, which shall support link functionality.

See Annex C, Figure C.1 for the preparation process of models. See Annex D, Figure D.1 for the preparation process of DE.

7.3.3 Preparation of DM

DM is the smallest presentation unit of digital manuals. It shall contain a complete set of technical information, may be composed of one or more (kinds of) DEs and may be managed by codes. It mainly includes:

— DM of description, which shall describe the product information such as structures, functions, principles and purposes;

— DM of operation, which shall describe the necessary information for product installation and operation;

— DM of maintenance planning, which shall describe product maintenance planning information, including information needed by preventive maintenance;

— DM of faults, which shall describe fault phenomena and methods to diagnose and exclude faults;

— DM of procedures, which shall describe all kinds of procedure information, for example product maintenance or repair procedure;

— DM of processes, which shall describe the logic to organize other DMs;

— DM of illustrated parts, which shall describe parts lists and legend information.

See Annex E, Figure E.1 for the preparation process of DM.

7.3.4 Preparation of templates

Templates shall include but not be limited to:

— template of parts manual;

— template of operation, repair and maintenance manual;

— template of safety manual;

— template of accompanying list.

See Annex F, Figure F.1 for the preparation process of templates.

7.4 Release of digital manuals

Digital manuals may be released in various forms, such as HTML or Microsoft® Word[1]. After release, output information may include:

— parts manual;

— operation, repair and maintenance manual;

— safety manual;

— other, for example, packing list.

1) Microsoft® Word is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of this product.

8 General requirements

8.1 Compiling requirements

The compiling of digital manuals shall meet the following requirements:

a) Different parts of a digital manual may be separately prepared according to the maintenance characteristics of products.

b) The structure tree of digital manuals shall be formed from SBOM, so that users can quickly browse the technical information.

c) Technical information of digital manuals shall be organized using the form of DMs. If necessary a database of safety information may be built as well.

d) Design parameters, such as length, width, height, weight of mechanical products, shall be derived from the models and inserted into the specified location in digital manuals.

e) Service lists for typical repair parts (e.g. engines, pumps and motors), typical materials (e.g oils, fats and sandpaper) and tools shall be provided.

f) When the structure or performance of the mechanical products changes, the digital manual shall be updated in accordance with 11.2.4.

8.2 Data requirements

Digital manual data shall meet the following requirements:

a) Data source for the same data shall be unique.

b) Once SBOM, DEs and DMs have been built, they shall be used repeatedly.

c) Product model information and component parameters and attribute information shall be accurately associated with service bill of materials for product type (PT-SBOM) from the design system.

d) Configuration information of the product shall be accurately associated with service bill of materials for product instance (PI-SBOM) from product data management (PDM) or enterprise resource planning (ERP) system.

e) Production date, batch, ID and important parts information of mechanical products shall be accurately associated with PI-SBOM from the production order.

8.3 Content and presentation requirements

The content and presentation requirements shall be in accordance with the requirements of IEC 82079-1:2012, Clause 5 and Clause 6.

9 Detailed requirements

9.1 SBOM requirements

9.1.1 Preparation principles

Preparation of SBOM shall meet the following principles:

a) SBOM shall remain consistent with the product state in the whole product life cycle.

b) Attributes and structures of SBOM shall meet the preparation requirements of digital manuals.