SLOVENSKI STANDARD
oSIST prEN 9300-100:2024

01-maj-2024

Aeronavtika - LOTAR Dolgotrajno arhiviranje in iskanje digitalne tehnične dokumentacije o izdelkih, kot so podatki o 3D, CAD in PDM - 100. del: Splošni pojmi za dolgoročno arhiviranje in pridobivanje 3D mehanskih CAD informacij

Aerospace series - LOTAR LOng-Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data - Part 100: Common concepts for long-term archiving and retrieval of 3D mechanical CAD information

Luft- und Raumfahrt - LOTAR Langzeitarchivierung und Bereitstellung digitaler technischer Produktdokumentationen beispielsweise 3D CAD und PDM Daten - Teil 100: Allgemeine Konzepte für die Langzeitarchivierung und Wiederverwendung von 3D CAD Mechanik-Informationen

Série aérospatiale - LOTAR Archivage long terme et récupération des données techniques produits numériques telles que CAD 3D et PDM - Partie 100 : Concepts communs pour l’archivage long terme et la récupération des données CAO mécaniques 3D

Ta slovenski standard je istoveten z: **prEN 9300-100**

ICS:

01.110	Tehnična dokumentacija za izdelke	Technical product documentation
35.240.30	Uporabniške rešitve IT v informatiki, dokumentiranju in založništvu	IT applications in information, documentation and publishing
49.020	Letala in vesoljska vozila na splošno	Aircraft and space vehicles in general

oSIST prEN 9300-100:2024 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
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Will supersede EN 9300-100:2018

English Version

Aerospace series - LOTAR LOng-Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data - Part 100: Common concepts for long-term archiving and retrieval of 3D mechanical CAD information

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 9300-100:2024) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 9300-100:2018.

The main changes with respect to the previous edition EN 9300-100:2018 are as follows:

— EN 9300-100 (P1), 07/2018 — Document updated for new generations of CAD method and tool. Contents in scope of other EN 9300 parts removed:

  — “Annex B (informative) Overview of the main types of CAD 3D mechanical information” has been removed,

  — “Annex C (informative) Overview of CAD mechanical assembly structure information” has been removed.

The annexes of EN 9300-100 provide an understanding of the principles of long-term archiving of CAD information. EN 9300-100 makes no claim that the listed principles are complete, and the Annexes should not be understood as a training lecture.

Annex A sums up the evolution of CAD systems.

Annex B proposes a template for the table of content for a part of the family EN 9300-1XX.

Annex B sums up the main issues to take into consideration for long term archiving of CAD 3D information.

Annex C provides general information for the definition of a representative sample of test cases to be used in a test plan.

Annex D describes examples of performance indicators used to manage the longevity of CAD archived Information.

Annex E gives an overview of maturity of the main components for long term archiving of CAD mechanical information.

Introduction

This document was prepared jointly by AIA, ASD-STAN, AFNeT, PDES, Inc. and the prostep ivip Association.

The prostep ivip Association is an international non-profit association in Europe. For establishing leadership in IT-based engineering it offers a moderated platform to its nearly 200 members from leading industries, system vendors and research institutions. Its product and process data standardization activities at European and worldwide levels are well known and accepted. The prostep ivip Association sees this document and the related parts as a milestone of product data technology.

PDES Inc is an international non-profit association in USA. The mission of PDES, Inc. is to accelerate the development and implementation of ISO 10303, enabling enterprise integration and PLM interoperability for member companies. PDES, Inc. gathers members from leading manufacturers, national government agencies, PLM vendors and research organizations. PDES, Inc. supports this document as an industry resource to sustain the interoperability of digital product information, ensuring and maintaining authentic longevity throughout their product lifecycle.

Readers of this document should note that all standards undergo periodic revisions and that any reference made herein to any other standard implies its latest edition, unless otherwise stated.

The Standards will be published under two different standards organizations using different prefixes. ASD-Stan will publish the standard under the number EN 9300–xxx. AIA will publish the standard under the number NAS 9300–xxx. The content in the EN 9300 and NAS 9300 documents will be the same. The differences will be noted in the reference documentation. For example, EN 9300 Geometric Dimensioning and Tolerancing will be referenced in ISO 1101 and ISO 16792, and for NAS 9300 the same information will be referenced in ASME Y 14.5M and ASME Y 14.41. The document formatting, etc., will follow that of the respective editorial rules of ASD-Stan and AIA.

1 Scope

1.1 Introduction

This document defines common fundamental concepts for long term archiving and retrieval of mechanical CAD information for elementary parts and assemblies. It details the “fundamentals and concepts” of EN 9300-003:2012 in the specific context of long-term archiving of CAD mechanical models.

Mechanical CAD information is divided into assembly structure and geometrical information, both including explicit and implicit geometrical representation, geometric dimensioning and tolerancing with form features.

The EN 9300-1XX family is organized as a sequence of parts, each building on the previous ones in a consistent way, each adding a level of complexity in the CAD data model. This includes the detailing of relationships between the essential information for the different types of CAD information covered by the EN 9300-1XX family.

As technology matures, additional parts will be released in order to support new requirements within the aerospace community.

1.2 In scope

The present part describes:

— the fundamentals and concepts for long-term archiving and retrieval of 3D mechanical CAD information;

— the document structure of the EN 9300-1XX family, and the links between all these parts;

— the qualification methods for long-term preservation of archived mechanical CAD information; more specially, principles for the CAD validation properties and for verification of the quality of the CAD archived file;

— specifications for the preservation planning of archived CAD information;

— specific functions for administration and monitoring of CAD archived mechanical models;

— the definition of archive information packages for CAD data.

1.3 Out of scope

The following are out of scope for this part:

— long-term archiving of CAD 2D drawings;

— other CAD specialization disciplines, such as electrical harnesses, composite.

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.

EN 9300 (all parts), *Aerospace series — LOTAR — LOng-Term Archiving and Retrieval of digital technical product documentation such as 3D, CAD and PDM data*

3 Terms, definitions and abbreviations

For the purposes of this document, the terms, definitions and abbreviations given in EN 9300-007 and the following apply.

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

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

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

4 Applicability

Refer to applicability of EN 9300-001:2024, Clause 4.

5 Fundamentals and concepts for long-term archiving of 3D mechanical CAD information

5.1 Introduction

The family of EN 9300-1XX standards is based on the principles that, over the last several decades, there have been major changes between the generations of CAD applications, resulting in change of the underlying representation of the CAD information, and there is a risk of further representational changes. Figure 1 illustrates this.

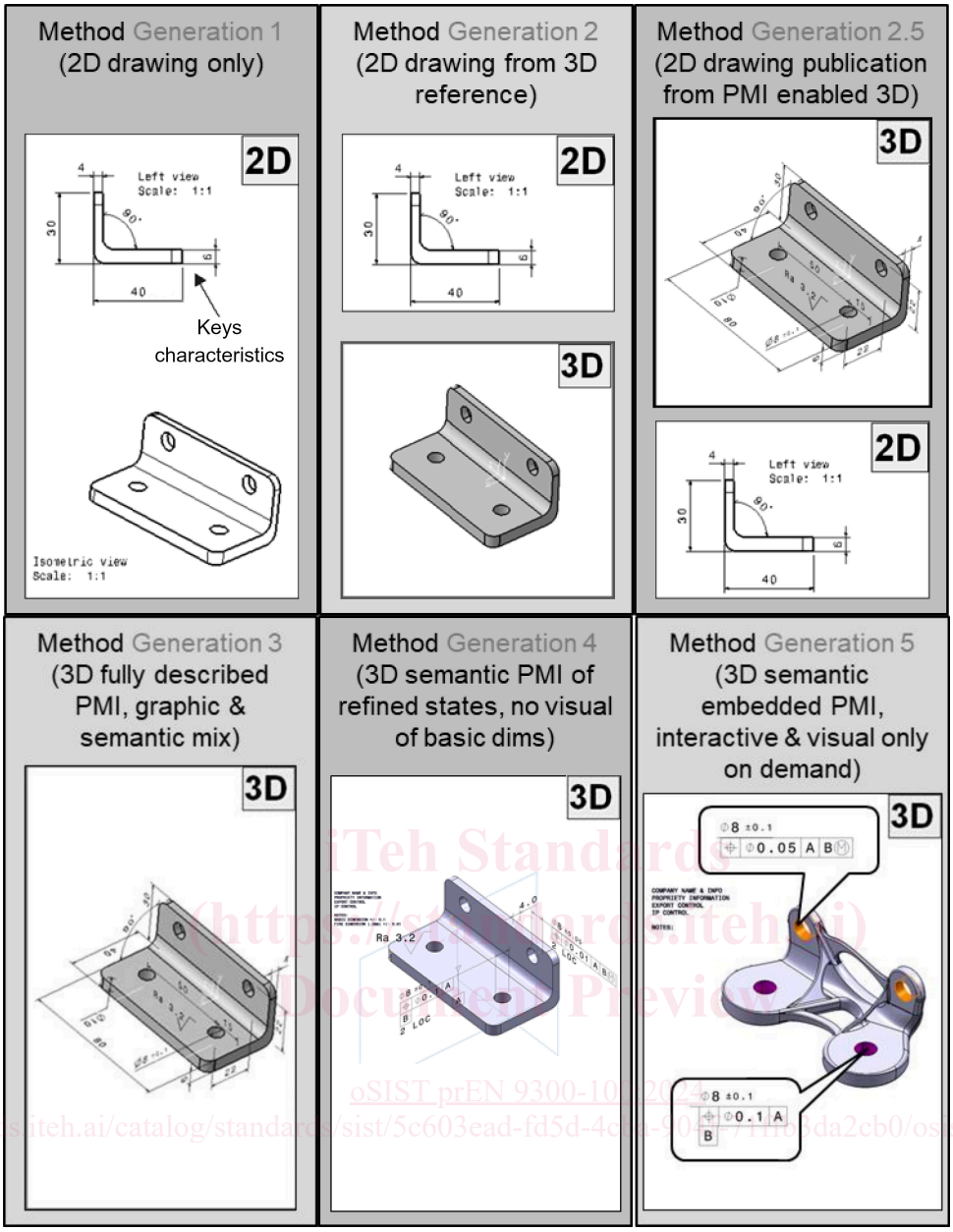

Figure 1 — Illustration of the major generations of CAD systems

NOTE Figure 1 illustrates:

— the first generation of CAD design method allowed the engineer to digitally create a 2D drawing (without a 3D model). The essential information as well as the Regulatory authority of the design intent is represented by the 2D drawing;

— the second generation of CAD design method is based primarily on the use of 3D models with the output being both 2D representation (drawings) and a 3D CAD data set to drive CAM/CAI. The Regulatory authority of the design intent is represented by the 2D drawing;

— the second generation and half of CAD design method is based on the 3D as principal authoring and the 2D is the published document. The 2D is the document for regulatory authority;

— the third generation of CAD design method is based on the use of parametric and relational design. The 3D model is fully annotated. The essential information as well as the Regulatory authority of the design intent is represented by the 3D model;

— the fourth generation of CAD design method is also based on the use of 3D annotated model but only the semantic PMI are explicitly modelled. The basic dimension have to be queried in the model. The essential information as well as the Regulatory authority of the design intent is represented by the 3D model;

— the fifth generation of CAD design method is represented by the totally semantic integration. The primary intent is the machine readability. The human-displayed information are totally on demand.

For more details, see:

— Annex A (informative) – The progressions of content within CAD Systems;

— Annex C (informative) – Considerations for long-term preservation of CAD 3D information;

— EN 9300-110;

— EN 9300-115.

Some algorithms within CAD applications used in the aerospace industry are proprietary and are not available to the public. These algorithms represent a competitive advantage to the CAD companies. This results in the fact that aerospace manufacturers cannot guarantee the access to all essential design intent in its native format, over the life of the product.

The EN 9300-100 describes the methods for preserving CAD mechanical essential information over time, recognizing that the mathematical representation may change between creation of the CAD information to its retrieval and hence, after importation, the archived file has to be qualified as acceptable to a level of precision requested by the business function.

5.2 CAD essential information: dependencies on the CAD methods used

Manufacturers may use different CAD methods for the definition of 3D components. The definition of a part may be based on:

— 2D drawing only, dimensioned and tolerance;

— 2D drawing with dimensions and tolerances authored in the 2D, derived from a CAD 3D exact model;

— 2D drawing derived from a CAD 3D exact model with dimensions and tolerances authored in the 3D;

— 3D with GD&T, fully dimensioned and tolerance;

— 3D with GD&T, partially dimensioned and tolerance;

— 3D with GD&T, dimension and tolerance not displayed by default but on demand.

Table 1 sums up the type of CAD information to archive, showing the type of CAD method used.

Table 1 — Type of CAD essential information to archive, depending on the CAD methods used

Use cases	Generation 1	Generation 2	Generation 2.5	Generation 3	Generation 4	Generation 5
Certification	Archive 2D	Archive 2D	Archive 2D and 3D	Archive 3D annotated model	Archive 3D annotated model	Archive 3D annotated model
Product liability	Archive 2D	Archive 2D	Archive 2D and 3D	Archive 3D annotated model	Archive 3D annotated model	Archive 3D annotated model
Support in operation	Archive 2D	Archive 2D and 3D	Archive 2D and 3D	Archive 3D annotated model	Archive 3D annotated model	Archive 3D annotated model
Reuse	Archive 2D	Archive 2D and 3D	Archive 2D and 3D	Archive 3D annotated model	Archive 3D annotated model	Archive 3D annotated model

If a company uses method 1 for mechanical design, this company may decide to archive the 3D CAD model to ease the reuse, but it is not mandatory and depends on its internal policy.

Table 2 — Requirement of category "Design method"

No.	Requirement
DM1	If a company uses the method 2 type of data, the 2D drawing shall be archived for certification and product liability. Optionally, 3D file can extend the archive package for the support and reuse.
DM2	If a company uses the method 2.5 type of data, the 2D drawing shall be archived for certification and product liability.
DM3	If a company uses the method 2.5 and 3D data are required by your company certification policy, the 3D data shall be archived in addition to the 2D drawing.
DM4	If a company uses method 3, 4 or 5 Long Term Archiving and Retrieval of 3D CAD with GD&T models is required.

5.3 Dependency of CAD essential information on use case

Following the regular enhancements of CAD applications, designers create new types of CAD information (see Annex A).

This document for long-term archiving and retrieval of CAD information cannot be defined and implemented in the abstract, but it shall be related to specific business requirements (see EN 9300-002:2018, Clause 6 "Key requirements") detailed by use cases (see EN 9300-003:2012, Figure 8: "Distinction of business requirements, business cases and use cases").

These use cases describe precisely the functions to be supported by the preserved information after retrieval. Consequently, they identify the essential information for archive specific to the use case, and the related mechanisms to validate the full process of preservation. This is illustrated by Figure 2 below.

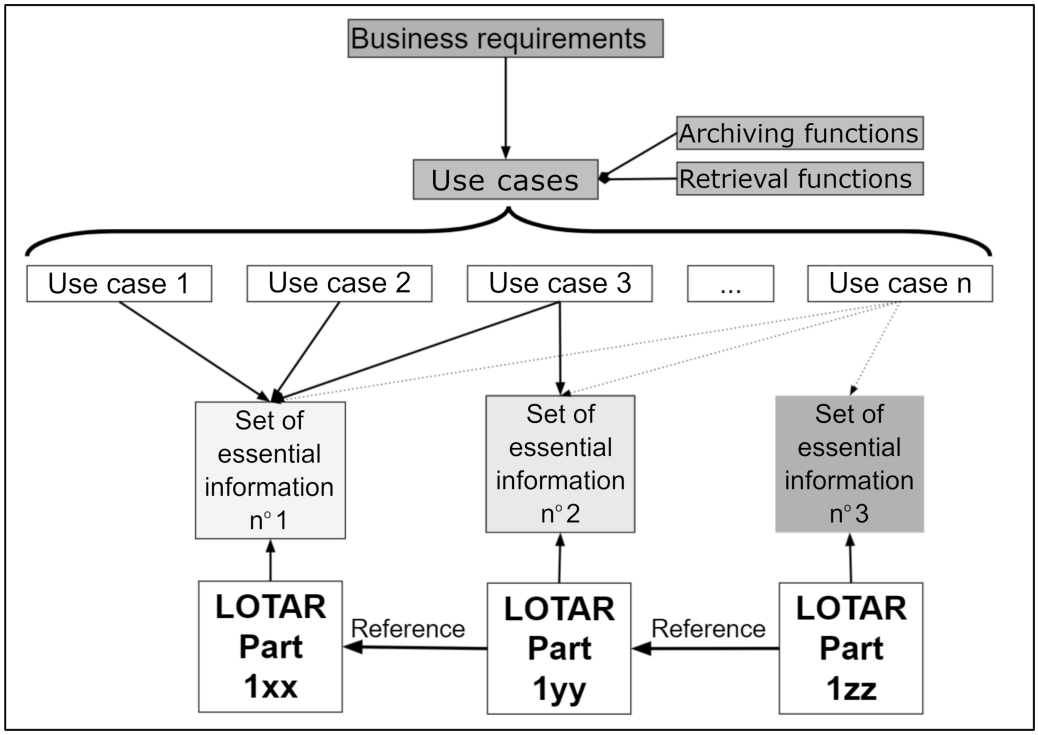

Figure 2 — Links between use cases, essential information and EN 9300-1XX parts

In this example, the part 1XX describes specifications for long-term archiving of a set of essential information n^{o} 1, allowing to support retrieval for use cases 1 and 2. Then, the part 1YY describes specifications for long-term archiving of a set of essential information n^{o} 2, including the set of essential information n^{o} 1, then supporting additional use cases 3 and 4. The figure also points out that both the functions to be supported after retrieval and the associated levels of quality depend of the policy of risk management of the aerospace manufacturer (see 5.5).

5.4 Use cases shared by different aerospace communities

Aerospace manufacturers share some common requirements, such as certification and product liability; these result in common use cases for retrieval. However, there are also strong differences in products and processes between aerospace manufacturers, depending on:

— the type of product (satellites, large civil airframe manufacturer, engines etc.);

— the type of customers (civil, defence);

— the related processes of support.

As a result, the aerospace community does not share a single set of use case. Some use cases are common only to a particular community of aerospace manufacturers, which may share the same legal constraints or business needs. Use cases specific to a company are not described; these may be related to a particular process, or part of a competitive advantage. Figure 3 illustrates the families of use case.

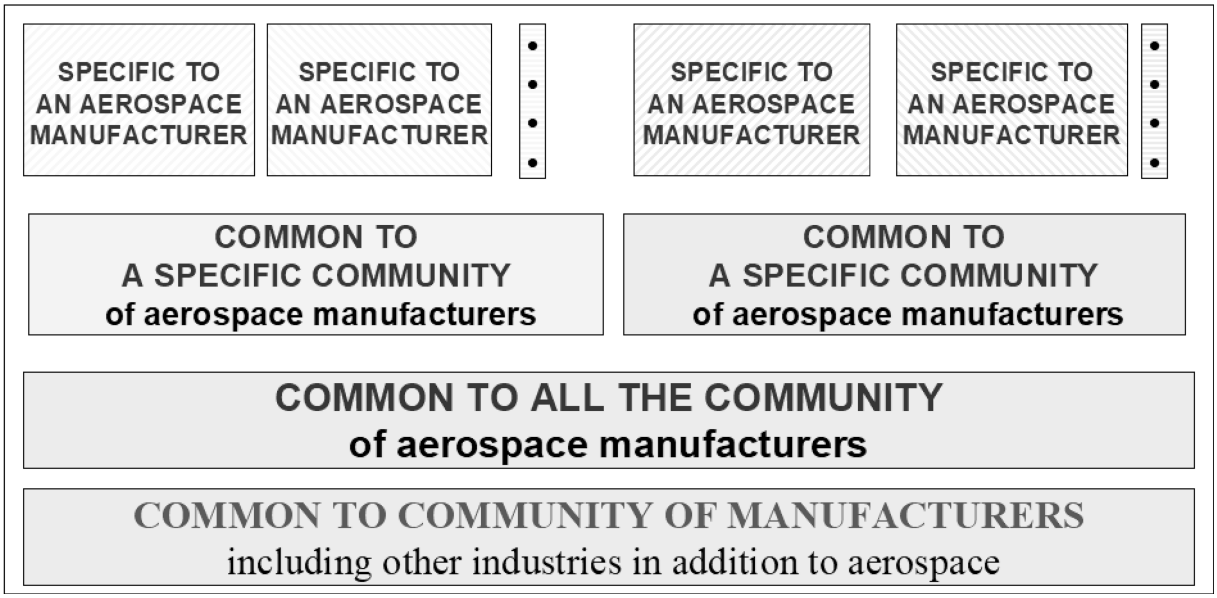

Figure 3 — Different levels of commonality of business requirements and use cases

The EN 9300-1XX standards describe requirements and use cases for long term archiving and retrieval of CAD mechanical information which are:

— common to all the community of aerospace manufacturers;

— common to a particular but broad community of aerospace manufacturers, with a scope clearly mentioned, and with the agreement of the aerospace community.

Some requirements are not shared by all the aerospace manufacturers.

Where a use case is shared by a particular community of aerospace manufacturers, the EN 9300 standard may be extended to include this case.

In the case of uses cases particular to a manufacturer, this manufacturer shall apply the fundamental concepts of the EN 9300 standards relevant to its needs and document the related process chain and essential information.

The section “business specification” of each specific part details the business requirements and the associated use cases.

5.5 Long-term archiving and retrieval of CAD as part of the company risk management

The use of 3D mechanical CAD information results to different risks for long term archiving compared to those encountered in the past for 2D drawings, such as information access and usability of the digital data content.

The EN 9300 standard defines rules and principles to be applied by the manufacturers. It defines, where possible, a mandatory set of verification rules for the CAD model, based on an open international format, and it defines also validation properties to be created during the ingestion and to be checked during the retrieval process (see EN 9300-005:2017).

For CAD information, these verification and validation rules are in most cases based on thresholds, the values of which are not fixed in the standard, since the results are subject to numerical errors in the algorithms of the CAD applications. The EN 9300-100 standard identifies the point where it may be adapted by each manufacturer, according to its own specific processes and products. It is the