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Geometrical product specifications (GPS) — Partition —

Part 2:
Nominal model

Spécification géométrique des produits (GPS) — Partition —

Partie 2: Modèle nominal

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 213, *Geometrical product specifications and verification*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 290, *Geometrical product specification and verification*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 18183 series can be found on the ISO website.

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.

Introduction

This document is a geometrical product specification (GPS) standard and is to be regarded as a general GPS standard (see ISO 14638). It influences chain links B, C and E of all the chains of standards in the ISO GPS matrix model.

The ISO GPS matrix model given in ISO 14638 gives an overview of the ISO GPS system, of which this document is a part. The fundamental rules of ISO GPS given in ISO 8015 apply to this document and the default decision rules given in ISO 14253-1 apply to specifications made in accordance with this document, unless otherwise indicated.

For more detailed information on the relation of this document to other standards and the ISO GPS matrix model, see Annex A.

This document applies the concepts from ISO 18183-1[1)] in specifying the partition of the nominal model.

1) Under preparation. Stage at the time of publication: ISO/FDIS 18183-1:2023.

Geometrical product specifications (GPS) — Partition —

Part 2: **Nominal model**

1 Scope

This document specifies the methods used to obtain partition of a nominal model.

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 18183-1[2)], *Geometrical product specifications (GPS) — Partition — Part 1: Terms, definitions and basic concepts*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18183-1 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 Partition concepts

Selection, simplification and subdivision operations are an inherent and necessary part of nominal model generation in solid and geometrical modelling (such as CAD), see Clause 4 for details, whereas in the more traditional generation of drawings these operations may be inherent but currently require additional human activity to identify and record the relevant information.

NOTE In the future, smart systems will also be required to identify and record the relevant information in autonomous manufacturing systems from the more traditional generation of drawings, solid and geometrical models. Human intelligence will not be required for the interpretation of the specification and calculation of the required set of partitioned features for the verification. This document gives such rules for the nominal model.

These operations are already in practice; this document just uses the concepts of selection, simplification and subdivision operations to define partitioned features in the specification. Furthermore, by the duality principle they shall also be used to define the associated partitioned features in the verification (see ISO 18183-3[3)] for more details).

Both the drawings and geometrical models are inherently composed of surfaces, faces, edges, blend edges and vertices. These provide an initial partition of the nominal model through the single surface concept. For example, Figure 1 shows two views of a simple three-dimensional geometrical product, composed of eight two-dimensional faces, several one-dimensional edges and 12 zero-dimensional vertices. These faces, edges and vertices provide an inherent subdivision of the nominal model into

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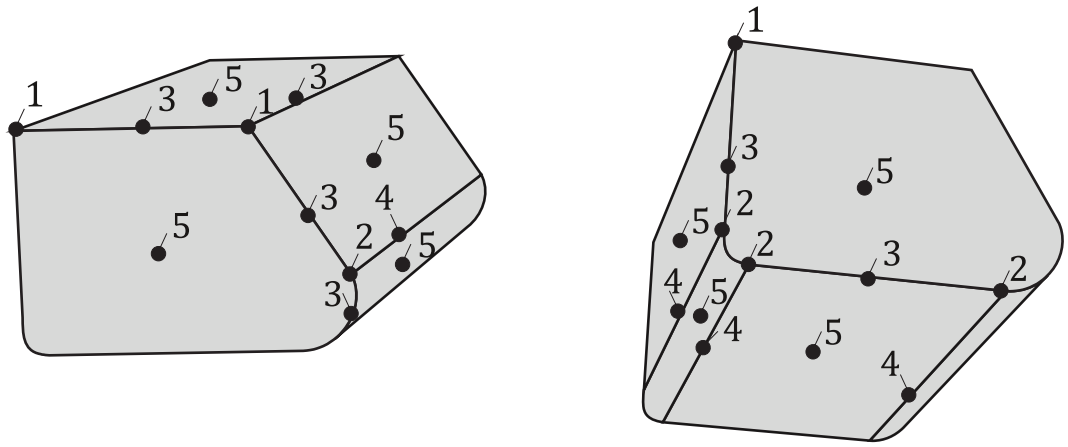
features. The eight blend vertices in the lower half of the figure create four blend edges, while the four sharp vertices in the top half of the figure create four sharp edges.



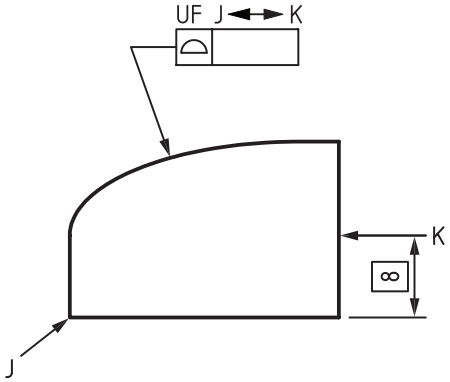
Key

1 sharp vertex
2 blend vertex
3 sharp edge
4 blend edge
5 face

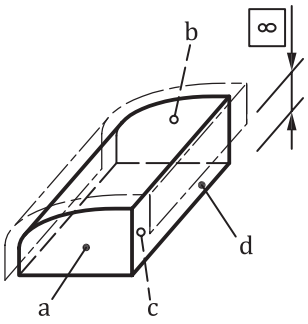
Figure 1 — Features on two views of a 3D geometrical product

The operations of selection, simplification and subdivision perform a combination of some features or a subdivision of some features into sub-features (required to define the required partition). The following examples show how the operations of selection, simplification and subdivision can be used to define these sub-features.

EXAMPLE 1 In Figure 2, the faces around the outside of the part are selected, simplified and subdivided.



a) Example of restricted feature



b) Interpretation: the long-dashed line outlines the tolerance feature

NOTE 1 In Figure a), the toleranced feature is the upper surface starting at the line J and finishing at the line K.

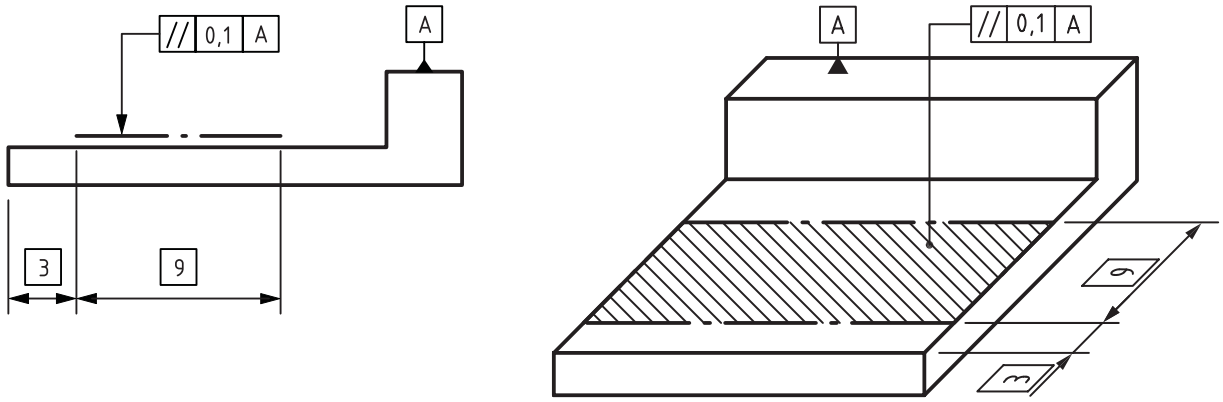
NOTE 2 In Figure b), surfaces a, b, c and the lower part of d are not covered by the specifications.

NOTE 3 The symbols mean that the indicated surfaces are simplified.

SOURCE ISO 1101:2017, Figures 60 and 61.

Figure 2 — Example of simplification

EXAMPLE 2 In Figure 3, an ISO GPS specification of a surface with area is shown. In order to identify the specific area on which the parallelism tolerance is relevant, the surface has to be selected and subdivided.

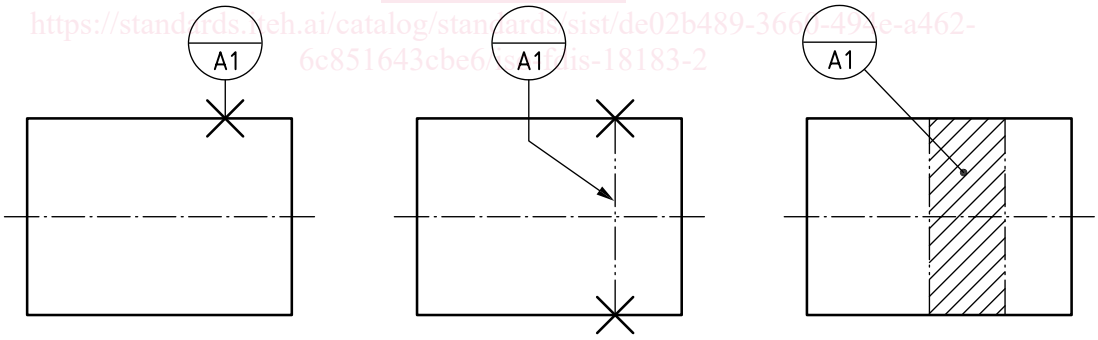


a) 2D **b) 3D**

SOURCE ISO 1101:2017, Figure 58.

Figure 3 — Example of subdivision

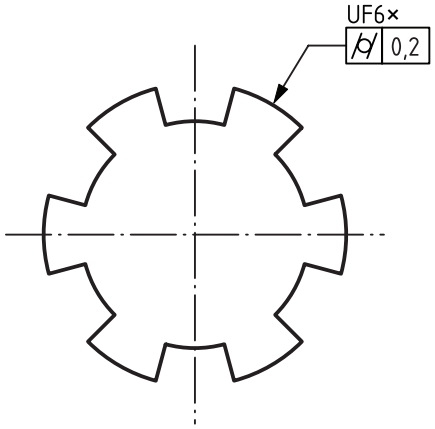
EXAMPLE 3 In Figure 4, a face on the surface of a part is selected and point, area and line features are subdivided to identify datum targets in Figure 4.



SOURCE ISO 5459:2011, Figures 12, 13 and 14.

Figure 4 — Subdivision for datum targets

EXAMPLE 4 In Figure 5, non-adjacent features shown are selected and simplified in order to apply the combined zone cylindricity tolerance.



SOURCE ISO 1101:2017, Figure 48.

Figure 5 — Simplification of selected features for cylindricity evaluation

5 Default nominal partition

If not otherwise specified, the initial set of partitioned features, which is derived from the nominal model partitioned into a set of single surfaces, shall be the default nominal set of partitioned features, see ISO 18183-3.

NOTE ISO 8015 defines the rule of the geometrical element; the described partition is in accordance with the rule of the geometrical element. The default partition is no more granular than the single geometrical element.

6 General information

Annex A shows the relationship of this document to the ISO GPS matrix model.