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Geometrical product specifications (GPS) — Filtration —

Part 32: Robust profile filters: Spline filters

Spécification géométrique des produits (GPS) — Filtrage —

Partie 32: Filtres de profil robustes: Filtres splines

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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.

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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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 213, *Dimensional and geometrical product specifications and verification*.

This document cancels and replaces ISO/TS 16610-32:2009, which has been technically revised.

The main changes are as follows:

— conversion to a Technical Report;

— inclusion of spline filtration for non-uniform sampling points;

— addition of a generalized filter equation with a revision of the equation of the robust spline filter harmonizing the statistical estimator with that of ISO 16610-31;

— inclusion of a termination criterion of the iterations for the robust, therefore nonlinear, filter;

— addition of specifications of the tension parameter.

A list of all parts in the ISO 16610 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.

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Introduction

This document develops the terminology and concepts for spline filters. Spline filters have the advantage of being implementable for non-uniform sampling positions and for closed profiles. An example of application of spline filters is given in Annex A.

Robust filters are tolerant against outliers. Spline filters offer one method for form removal.

For more detailed information of the relation of this document to the filtration matrix and the ISO GPS standards, see Annex B and Annex C.

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Geometrical product specifications (GPS) — Filtration —

Part 32:
Robust profile filters: Spline filters

1 Scope

This document provides information on a generalized version of the linear spline filter for uniform and non-uniform sampling and the robust spline filters for surface profiles. It supplements ISO 16610-22, ISO 16610-30 and ISO 16610-31.

This document provides information on how to apply the robust estimation to the spline filter as specified in ISO 16610-22, as well as its generalized form for non-uniform sampling. The weight function chosen for the M-estimator is the Tukey biweight influence function as specified in ISO 16610-31.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

3.1
robust filter
filter that is insensitive against specific phenomena in the input data

Note 1 to entry: A robust filter is a filter that delivers output data with robustness.

Note 2 to entry: Robust filters are nonlinear filters.

[SOURCE: ISO 16610-31:2016, 3.1, modified — Definition revised and notes to entry added.]

3.2
spline
linear combination of piecewise polynomials, with a smooth fit between the pieces

[SOURCE: ISO 16610-22:2015, 3.1, modified — Note 1 to entry removed.]

3.3
spline filter
linear filter based on *splines* (3.2)

Note 1 to entry: An example of spline filter application is given in Annex A.

3.4
robust spline filter
robust filter (3.1) based on *splines* (3.2)

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