TECHNICAL REPORT

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Geometrical product specification (GPS) — Masterplan

Spécification géométrique des produits (GPS) — Schéma directeur

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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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 14638, which is a Technical Report of type 3, was prepared by Technical Committee ISO/TC 3, *Limits and fits*, and has been based on studies carried out by the Joint Harmonization Group of ISO/TC 3, *Limits and fits*, ISO/TC 10, *Technical drawings, product definition and related documentation*, Subcommittee SC 5, *Dimensioning and tolerancing*, and ISO/TC 57, *Metrology and properties of surfaces*.

The content of ISO/TR 14638 is the status of the standardization on Geometrical Product Specifications covered by the scopes of the above Technical Committees and Subcommittee.

Introduction

Geometrical Product Specifications, abbreviated GPS, defines - i.e. on an engineering drawing - the shape (geometry), dimensions and surface characteristics of a workpiece which ensure optimum functioning of the workpiece in question, together with the dispersion around the optimum where the function is still satisfactory.

The manufacturing will nevertheless produce workpieces which are not perfect and which will show some deviation from the optimum and from one another.

These workpieces will be measured in order to compare them with the specification.

There is a need to relate

- the workpiece imaginated by the designer,
- the workpiece as manufactured,
- the knowledge of the workpiece as measured - the actual workpiece.

To obtain this relationship and to allow mutual interpretation, standards have been developed in the field of GPS dealing with basic definitions, symbolic representation, measurement principles etc.

For many years, these GPS standards have been prepared by Technical Committees (TCs) within ISO and have been issued as soon as specific needs were emerging, but sometimes a global view was missing. This results in standards with a different approach and presentation, and sometimes with contradictions. There are also gaps between the standards.

Recognizing this fact the Joint Harmonization Group of ISO/TC 3, *Limits and fits*, ISO/TC 10/SC 5, *Dimensioning and tolerancing*, and ISO/TC 57, *Metrology and properties of surfaces* (abbreviated ISO/TC 3-10-57/JHG) tasked with the harmonization of the standards of ISO/TC 3, ISO/TC 10/SC 5 and ISO/TC 57, decided to structure the standards dealing with GPS according to a Masterplan which shall be used for future standardization.

Geometrical product specification (GPS) — Masterplan

1 Scope

This Technical Report establishes the overview of the international standardization of Geometrical Product Specification (GPS). It explains the concept of GPS and provides a Masterplan of GPS including the existing standards and standards to be issued in the field which is the responsibility of ISO/TC 3, ISO/TC 10/SC 5 and ISO/TC 57.

It also mentions GPS standards and standardization activities outside the field of responsibility of the above mentioned technical committees (TCs). This is done in order to give complete information about the status of international GPS standards. The non ISO/TC 3, ISO/TC 10/SC 5 and ISO/TC 57 standards are only referred to as examples and do not intend to be a complete and exhaustive list of complementary GPS standards.

This Technical Report provides information to the industrial user of ISO GPS standards and to other TCs within ISO, which are using the concept of GPS standards in their International Standards or are producing complementary ISO GPS standards, in order to improve the common understanding and use of GPS.

2 Concept of Geometrical Product Specifications

The concept of GPS:

- covers several kinds of standards, some are dealing with the fundamental rules of specification (*Fundamental GPS standards*), some are dealing with global principles and definitions (*Global GPS standards*), some are dealing directly with the geometric characteristics (*General* - and *Complementary GPS standards*), see figure 1.

- covers several kinds of geometric characteristics such as size, distance, angle, form, location, orientation, roughness, etc. (see chains of *General GPS standards* numbered 1 through 17 in figure 1).

- covers workpiece characteristics (tolerance classification) as results of several kinds of manufacturing processes and the characteristics of specific machine elements (see chains of *Complementary GPS standards* numbered A1 through A7 and B1 through B3 in figure 1).

- occurs at several steps in the development of a product: design, manufacturing, metrology, quality assurance, etc.

The concept is graphically illustrated on figure 1 indicating four different types of GPS standards, which in total is designated the *GPS matrix model*.