BUSINESS PLAN

CEN/TC 290
DIMENSIONAL AND GEOMETRICAL PRODUCT SPECIFICATION AND VERIFICATION

EXECUTIVE SUMMARY

Scope of CEN/TC 290

Standardization in the field of macro and micro-geometry specification including dimensional and geometrical tolerancing, surface properties and the related verification principles, measuring equipment and calibration requirements.

Business Environment

CEN/TC 290 activities takes place in a market where :

- the quality management systems according to the ISO 9000-series (including supporting standards) is of high priority to industry ;
- increasingly sophisticated use of metrology is applied to verify functionally relevant workpiece requirements ;
- the use of CAD/CAM-systems prevails ;
- the use of out-sourcing and sub-contracting is increasing ;
- the ISO GPS system (geometrical product specifications) is the means of communication whereby designers, production engineers and metrologists exchange unambiguous information about the functional requirements of products ;
- the ISO GPS system documentation may be regarded as the basis of a binding contract.

There is an increasing demand for highly sophisticated functions of workpieces at an economic price. This forces designers to detail the specifications to a degree where nothing is left open. To fulfil this, it is necessary to improve the current system of ISO GPS-standards where the standard definitions can result in different interpretations or are insufficient for the purpose.

Benefits

The published standards since the creation of CEN/TC 290 help to reduce costs through continuous improvement of product quality enabled by better specification and control.

Priorities

CEN/TC 290 provides an improved ISO GPS system to establish tools for the economic management of variability in products and processes. This will be achieved by the use of a more precise method of expressing workpiece functional requirements, complete and well defined specifications, and integrated verification approaches. This improved ISO GPS system will clarify the current practices and be harmonized with the work of other relevant structures. This harmonization will, for example, enable better integration with 3D CAD/CAM/CAQ-systems.

The committee's focus is set on the next generation of the ISO GPS system language, in which the integrated ISO GPS system for specification and verification of workpiece geometry will become an improved engineering tool for product development and manufacturing. This ISO GPS system is necessary, as companies are rapidly moving ahead with new technologies, new manufacturing processes, new materials and visionary products in an environment of international outsourcing.

1 BUSINESS ENVIRONMENT OF CEN/TC 290

1.1 Description of the Business Environment

The following political, economic, technical, regulatory, legal, societal and/or international dynamics describe the business environment of the industry sector, products, materials, disciplines or practices related to the scope of this CEN/TC, and they may significantly influence how the relevant standards development processes are conducted and the content of the resulting standards:

CEN/TC 290 activities takes place in a market where:

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- Increasingly sophisticated use of metrology is applied to verify functionally relevant workpiece requirements;
- The use of CAD/CAM-systems prevails;
- The use of out-sourcing and sub-contracting is increasing;
- The ISO GPS (geometrical product specifications) system is the means of communication in which designers, production engineers and metrologists exchange unambiguous information of what are the functional requirements of products;
- The ISO GPS system documentation may be regarded as the basis of a binding contract.

There is an increasing demand for highly sophisticated functions of workpieces at an economic price. This forces designers to detail the specifications to a degree where nothing is left open. To fulfill this, it is necessary to improve the current system of ISO GPS-standards where the standard definitions can result in different interpretations or are insufficient for the purpose.

1.1.1 Political

CEN/TC 290 is striving to provide a complete set of European Standards. They are based on an international consensus on the ISO GPS system thus ensuring a well based set of uniform basic standards in support of all branches of industry. In particular they support international, regional and national standards on product design and safety and the uniform global realization of the ISO 9000- standards on quality assurance.

1.1.2 Economical

In economic terms, the application of the ISO GPS system is important to ensure the fulfilment of the specified function of the workpiece and the final assembly (product). Incorrect and ambiguous definitions of the ISO GPS system-requirements constitute a high economic risk for industry and can lead to disputes between companies. Empirical data shows that almost 80% of the costs of a product are engaged during the design phases and initial production phases of that product.

1.1.3 Technical

Computer based technology is increasing and the opportunity for human interaction is thus reduced. There is, therefore, a need to model relevant knowledge for integration into CAD/CAM/CAQ -systems. As this applies to the ISO GPS system, itcalls for unambiguous definitions of ISO GPS system requirements.

Potential users are industry in general, primarily the segments producing engineered

mechanical parts. These users need to be provided with globally standardized tools for communicating ISO GPS system unambiguously.

Developers of CAD/CAM/CAQ-software and systems as well as manufacturers of measuring equipment are user segments providing the ISO GPS system tools in support of the primary users.

CEN/TCs providing standards for the above user segments will be advised of the status of the ISO GPS system- standardization and receive the assistance and close cooperation of CEN/TC 290. Special attention will be given to those CEN/TCs which are handling ISO GPS system-related matters within their Scopes and in the field of application of their standards.

1.1.4 International factors

The importance of international trade in the market sector has been addressed, together with an analysis of related ongoing international standardisation activities (especially within ISO/TC 213) and their economic impact. Consequently, the work programme and not least the priorities of CEN/TC 290 are based on those of ISO/TC 213 and have been determined largely by the market environment.

1.2 Quantitative Indicators of the Business Environment

The following list of quantitative indicators describes the business environment in order to provide adequate information to support actions of the CEN /TC:

The market size for ISO GPS system standards is almost impossible to evaluate. The fundamental nature of ISO GPS system makes it a born prerequisite for the specification of any imaginable product within the mechanical engineering disciplines. Each employee in industry working in a design, manufacturing, metrology and quality assurance department is a user or potential user of ISO GPS system standards.

Almost all companies use sketches and drawings when designing a product and use tolerancing of the geometrical characteristics of that product and they all use measuring equipment to assess the validity of the manufactured product. If this statement is taken as a fact, the market share of ISO GPS system standards amounts to 100%. World employment for mechanical engineers is expected to grow about as fast as the average for all occupations through 2010, with information technology, biotechnology and nanotechnology opening up a whole world of opportunities.

Some countries such as France have initiated large programmes to develop ISO GPS system infrastructures and others such as UK are proposing it.

2 BENEFITS EXPECTED FROM THE WORK OF CEN/TC 290

Proper implementation of the ISO GPS system and its planned improvements:

- will *reduce costs* by avoiding the manufacture of inadequate workpieces due to incompletely defined specifications;
- is a prerequisite for the continuous improvement of *product quality* and *time to market*;
- will enable *optimum economical allocation* of resources amongst specification, manufacturing and verification;

- within a company is important for *surviving in global competition*.

A cautious estimate is that the reduced costs alone could be as much as 10 % to 20 %.

3 PARTICIPATION IN CEN/TC 290

All the CEN national members are entitled to nominate delegates to CEN Technical Committees and experts to Working Groups, ensuring a balance of all interested parties. Participation as observers of recognized European or international organizations is also possible under certain conditions. To participate in the activities of this CEN/TC, please contact the national standards organization in your country.

4 OBJECTIVES OF CEN/TC 290 AND STRATEGIES FOR THEIR ACHIEVEMENT

4.1 Defined objectives of CEN/TC 290

CEN/TC 290 objectives are to provide an open forum for all CEN member bodies and external liaisons for the processing, implementation and maintenance of CEN Standards relevant to ISO GPS system. It will facilitate European and international trade and sustain long term world-wide co-operation and enable a standardized set of ISO GPS system-communication tools which enables industry to exploit optimally advanced technology and technical know-how.

CEN/TC 290's task is the standardization in the field of macro and micro-geometry specification including dimensional and geometrical tolerancing, surface properties and the related verification principles, measuring equipment and calibration requirements.

The committee's focus is set on the next generation of the ISO GPS system language, in which the integrated ISO GPS system for specification and verification of workpiece geometry will become an improved engineering tool for product development and manufacturing. This ISO GPS system is necessary, as companies are rapidly moving ahead with new technologies, new manufacturing processes, new materials and visionary products in an environment of international outsourcing.

The objective of the improved ISO GPS system is to provide tools for the economic management of variability in products and processes. This will be achieved by the use of a more precise method of expressing workpiece functional requirements, complete and well-defined specifications, and integrated verification approaches.

This improved ISO GPS system will clarify the current practices and be harmonized with the work of other Technical Committees. This harmonization will, for example, enable better integration with 3D CAD/CAM/CAQ systems. The improved ISO GPS system will be based on the experiences from the use of current practices and traditions. The legal and technical contents of existing drawings will be left intact, realizing that there is a vast domain of existing specifications, which cannot be changed without the explicit or implicit consent of those responsible.

4.2 Identified strategies to achieve CEN/TC 290's defined objectives

4.2.1 History

Formerly, most companies had their design and manufacturing facilities on the same site. This facilitated a high degree of mutual understanding between designer, workshop and

metrologists. In such an environment, the shortcomings of technical drawings, manufacture, verification procedures, and the related standards were not critical to the success of the product. Today where such environments still exist, this is still true. However, now that outsourcing is becoming increasingly common, this understanding cannot be present, thus forcing the technical documentation to be much more precise.

Furthermore, technology has improved with increasing demands for the manufacture of more precise parts at less cost. For companies with design and manufacturing facilities on the same site, the old tools of dimensioning and tolerancing may still be valid, but not necessarily the optimum for all new designs. These increasing demands require more flexibility in the standards which must provide a broad variety of tools of dimensioning and tolerancing in the ”standards-toolbox” including already established tools as well as the development of new tools. Consequently, the ISO GPS system standardization of the past, present and future represents an evolution – not a revolution – leading to a more mathematical and scientific basis of standardization building on the already established craft based foundation of past standards enabling a better interface to scientific knowledge of product functions.

Furthermore, it is recognized that there are two metrology systems in ISO GPS system:

- conventional metrology based on hard gauging (surface plates, dial gauge indicators etc.), and
- digital computational metrology based on sampled points and computer software analysis (CMMs etc).

The addition of digital computation extends conventional metrology and makes it much more flexible, since by using computers, almost any perceived measurand can be calculated. The challenge is to mathematize the conventional measurands so they are applicable in both systems. Further many mathematized conventional measurands can be split into more diagnostic measurands in digital computational metrology to give a very flexible toolbox of measurement techniques (e.g. runout can be split into location, form and waviness in a single measurement using digital computational metrology).

4.2.2 Present situation

CEN/TC 290 has been adopting most of the ISO standards developed by ISO/TC 213, under Vienna Agreement, ISO lead. This answers the strategy of CEN/TC 290 to provide companies a unique set of European and International standards used worldwide.

The priorities of CEN/TC 290 cover the definition of European priorities to be taken into account in the work of ISO/TC 213 and the incitement to an active participation of European countries in ISO/TC 213.

CEN/TC 290 will remain a flat organization without Working Groups.
Physical or web-meetings will be organized if needed or requested by the European Member Bodies.

Communication is done via the website of CEN/TC 290 available on a livelink platform. Hence all European National member bodies have an easy access to the documents and on-going work.

CEN/TC 290 has a liaison with CEN/TC 352 "Nanotechnologies" for all issues related to the measurement of nano-objects. The aim if this liaison is to ensure that CEN/TC 352 is aware of the ISO GPS standards.

Moreover BAS (Bosnia and Herzegovina) is a member of CEN/TC 290. BAS is a CEN affiliate. Affiliation with CEN is available to a National Standards Body, which is a member (or corresponding member) of ISO and which represents or has the ambition to represent all parties concerned in an evolving market industry. CEN affiliates belong to a EU neighbouring country which has links with EU or EFTA in relation to technical scientific political and social conditions. CEN affiliates may participate in the General Assembly and in technical bodies. They receive all technical and general documentation from CEN.

4.3 Environmental aspects

The work of CEN/TC 290 has an indirect impact on the environment.

For example the management of tolerances and surface texture in motor vehicles engineering contributes in reducing pollutants and fuel consumption.
For the transport of goods, improving the texture of ship hulls reduces hydrodynamic trail and reduces fuel consumption of ships.

ISO GPS system has also an indirect impact in the field of renewable energies:
- reducing friction loss allows improving wind turbine power performance;
- the control of crystalline surface texture improves the performance of solar panels.

5 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE CEN/TC 290 WORK PROGRAMME

The progress of CEN/TC 290 work is dependent on the work of ISO/TC 213.

Many European experts are already actively participating in the work of ISO/TC 213. However other European countries are strongly invited to nominate experts to take an active part in the drafting of ISO GPS standards.