BUSINESS PLAN

CEN/TC 184
Advanced technical ceramics

EXECUTIVE SUMMARY

Technical Committee CEN/TC 184 is engaged in standardization in the field of advanced technical ceramics, including classification, terminology, sampling and test methods. The methods of test are concerned with physical, chemical and textural properties of ceramic powders, monolithic ceramics, ceramic composites (including fibres) and ceramic coatings.

CEN/TC 184 seeks to develop and maintain relevant and up to date standards, which will support the needs of industry and back up relevant legislation.

CEN/TC 184 liaises with other European and international bodies to ensure its standards take due account of related work being undertaken elsewhere, particularly international committee ISO/TC 206.

1 BUSINESS ENVIRONMENT OF THE CEN/TC 184

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:

In the field of advanced technical ceramics, a mandate was established in 1989, to emphasise the importance of the development of new materials, the promotion of their acceptance, the need to create a link between research and development and standardization and, in general, to optimize the use of resources available in Western Europe.

The technical ceramics industry has attracted enormous interest from academic establishments, from government departments wanting to provide the ‘seed corn’ for growth and from large companies sensing the emergence of major business opportunities. Estimates of market size and growth predictions often cannot be compared due to the lack of clarity in defining what is included and, importantly, which products are specifically excluded. However, some market trends are discernible.

The growth of electronic devices has fuelled an increase in worldwide demand for electroceramics with a growth rate in excess of both inflation and of the increase in gross domestic product (GDP) for the major industrial countries. The increase for structural ceramics has been patchy, with some successes, e.g. ceramics for automotive catalyst supports, off-set by disappointments like the lack of penetration of ceramics into engines. The common features are the application-led demand for new products and materials, the technical complexity of some applications and the necessity for cost effectiveness, bearing in mind alternative solutions. It is in these potential applications that the lack of standard methods of test for determining properties has been a barrier to the use of advanced technical ceramics by design engineers.

In recent years there has been a rationalization of the European suppliers of advanced technical ceramics into medium and large size groups, driven by the significant investment required for capital equipment and technology. It is, however, predicted that the demand for advanced technical ceramics will continue to grow at rates which exceed the rate of inflation and the growth of GDP of the main producing countries.

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 activities of CEN/TC 184 relate primarily to advanced technical ceramics for mechanical and structural applications, which divide into three main classes.

The largest number of applications is satisfied by monolithic ceramic components, produced in a wide range of materials, sizes and shapes. Many of them are taking the place of lower performance materials, e.g. metals and plastics, but there is growing use of monolithic advanced technical ceramics as first choice materials or as substitutes for earlier types of technical ceramic.

Applications of monolithic ceramics include seals & bearings, wear protection, cutting tool tips, biomedical implants, catalyst supports, membranes & filters (porous materials), electrical & electronical devices, lasers, semiconductor processing including laminated materials, optical fibre networks and armour. More recent applications are parts for non-ferrous metallurgy, heat exchanger and micro reactors. The European market is estimated to be worth about 2 billion Euros.

Ceramic matrix composite materials combine the excellent properties of both their ceramic reinforcements and their matrices to provide high performance advanced technical ceramics for the most demanding applications.

These include strong, lightweight and thermally stable components for satellites and large telescopes; durable, lightweight thermo-structural components for advanced high temperature process equipment and for brakes on high speed/heavy duty aeroplanes, trains and vehicles; thermal and nuclear radiation resistant, lightweight structural components for aerospace engines (gas turbines & rocket motors) and nuclear furnaces.

Ceramic coatings represent an economically efficient method of applying the benefits from advanced technical ceramics to a wide range of existing industrial components and consumer goods. The work of CEN/TC 184 has concentrated on thin film ceramic coatings (<~ 10 µm thick) while other CEN TSs are developing standards for thick film coatings including ceramics.

As the market for advanced technical ceramics has developed it has become international, if not global, in character. Europe was the early leader in developing the technologies and applications for the three main classes of advanced technical ceramics described above. The subsequent rapid advances in the U.S.A. were supported by government investment in new materials for military applications. The market for mechanical and structural applications was much slower to develop in Japan, where the main emphasis was on electro-ceramics.

However, the growth of formal government, industrial and technical links in the field of advanced technical ceramics between the U.S.A. and Japan, sometimes in support of U.S. legislation, has resulted in the leadership in monolithic ceramics passing to Japan. Consequently, the Japanese and U.S. governments have supported the formation of ISO/TC 206 on advanced technical (“fine”) ceramics to strengthen their market position by using their standards for international product specification. Therfore, there is still a need for CEN standards to promote the single internal market for monolithic advanced technical ceramics.

Eurpoe’s position as world leader in ceramic matrix composite technology is being maintained and market growth is being facilitated by the development of CEN standards. The successful application of these materials is particularly driven by the European aero-space and high-speed land transport industries. Other national or international activities in standards making for this class of advanced technical ceramics are not well advanced, but any reduction in European activity would diminish Europe’s technical lead and market position.

For thin film ceramic coatings much of the activity is undertaken by subcontractors offering specialized coating services. While the three largest international organizations providing vapour deposition coating services are Europe based with centers located in more than one country, much of the activity is undertaken by small independents (e.g. in Germany – 40 SMEs). Much of this activity has been driven by high growth rates in this market sector, which has also resulted in greater numbers of manufacturers of PVD and CVD equipment in Europe.

There is, however, a marked absence of product and performance standards in the area and this is considered an important growth limiting factor, particularly for component applications where long life under adverse conditions is essential and where condition monitoring is difficult or impossible. Again, CEN has taken the lead in providing standards but ISO/TC 206 is becoming active in this field. At present it becomes more important to accompany the work of ISO/TC 206 and to introduce European interests into ISO standards.

2 BENEFITS EXPECTED FROM THE WORK OF THE CEN/TC

As indicated above a continuous growth in applications of advanced technical ceramic across a wide range of technological sectors will require the laying down of a considerable supporting infractructure which will include technical standards relating to the products and processes concerned. The business environment described in 1 above may be expected to benefit from progress in the work of CEN/TC 184 and its ISO counterpart, ISO/TC 206. This activity has the potential to contribute greatly to the harmonization of national and regional standards for advanced technical ceramics. In particular, the requirement for most CEN members to adopt European Standards as their national standards plays a significant part in aligning requiremements across Europe.

3 PARTICIPATION IN THE CEN/TC

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 THE CEN/TC AND STRATEGIES FOR THEIR ACHIEVEMENT

4.1 Defined objectives of the CEN/TC

To develop standards for advanced technical ceramics, to adjust the work programme to meet market needs and to work in coordination and cooperation with ISO/TC 206 on appropriate projects.

These objectives will contribute to eliminate technical barriers to trade and facilitate the internal EU market.

Completing test methods for materials and initiating test methods for applications will serve to harmonize the terms of reference in the sector thus facilitating understanding between parties.

Meeting these objectives will also serve to enable international diffusion of the standards, thus developing the global market.

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

CEN/TC 184 was set up in 1989 with a mandate specifically to bring together research and development and standardization. The mandate emphasized the importance of the development of new materials and generally to optimize the use of resources available in Western Europe to promote that innovation. This has been followed by a second mandate in 1993 (M/076).
CEN/TC 184 will pursue the following strategies to achieve its objectives:

(i) electronic working, including website-based activity;

(ii) use of the Vienna Agreement, whereby duplication of effort between CEN/TC 184 and ISO/TC 206 will be avoided;

(iii) in common with the majority of international standards work, the use of English as the working language up to the time of issue of a draft for public enquiry;

(iv) liasion with appropriate other bodies, at present including:

ISO/TC 206	Fine Ceramics
ISO/TC 164	Mechanical testing of metals
ISO/TC 107	Metallic and other inorganic coatings
ISO/TC 33	Refractories
CEN/TC 187	Refractory products and materials
CEN/TC 240	Thermal spraying and thermally sprayed coatings
ASTM C 28	Advanced ceramics.

To further the liaison between CEN/TC 184 and ISO/TC 206, European meetings will be held ‘back to back’ when possible. It may be noted that the European members of ISO/TC 206 have an influence on the direction of that committee and that CEN/TC 184 is potentially a forum for rationalizing the European participation in the international committee.

New proposals are based on national and international standards or industry practice, as well as proposals from TC 184 itself. Where no reference document exists, a project is developed by a working group or the sub-committee. The work is agreed by the technical committee and prestandards monitored to ensure they meet the criteria for confirmation as European standards.

4.3 Environmental aspects

As every product and every test method has an impact on the environment during all stages of its life-cycle, there is a need to reduce any potential adverse impact by taking into account environmental issues in standards.

It is therefore necessary to understand how the product interacts with the environment during its life-cycle, including emissions to air, discharges to water and soil.

CEN/TC 184 should take into conisederation:

- the precautionary principle and
- environmental and human health protection and safety aspects

whenever a new standard is drafted or an existing product standard is revised or intended to be revised. Furthermore, at any stage in the standard development process, experts are encouraged to include environmental issues in their comments.

The use of Good Laboratory Practice (GLP) will help prevent pollution when using analytical test methods.

Standards should include processes, practices, techniques, materials and products to avoid, reduce or at least control the creation, emission or discharge of any type of pollutant, or waste, in order to reduce adverse environmental impact.

For example, hazardous, toxic or otherwise harmful substances and materials prescribed in standards should be substituted by other less harmful substances and materials, whenever possible and feasible.

Devellopingstandards the precautionary principle will be taken into account by focusing on options and solutions rather than on risk.

The integration of environmental aspects into product development can also be considered involving material reuse, recycling and recovery at end-of-life.

CEN/TC 184 should develop robust and properly validated standards, while recognising the limitations of existing scientific capacity and knowledge to identify potential impacts. In order to take account of the diversity of products and their specific environmental impacts, as well as the need for relevant environmental knowledge, CEN/TC 184 should try to make every reasonable effort to invite environmental experts to participate in the work.

5 FACTORS AFFECTING COMPLETION AND IMPLEMENTATION OF THE CEN/TC 184 WORK PROGRAMME

Shortage of resource and/or lack of expertise

The technical committee has experienced problems finding replacements for retiring technical experts and convenors and is aware of gaps in technical knowledge within working groups. However, some progress has been made recently to remedy this. Nevertheless, many working group members have difficulty finding time to complete what is an ambitious work programme. They also experience financial problems traveling to meetings though meetings are acknowledged as the beat means of progressing work.