II

(Acts whose publication is not obligatory)

COUNCIL

COUNCIL DECISION

of 9 September 1991

adopting a specific programme of research and technological development in the field of industrial and materials technologies (1990 to 1994)

(91/506/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 130q (2) thereof,

Having regard to the proposal from the Commission (1),

In cooperation with the European Parliament (2),

Having regard to the opinion of the Economic and Social Committee (3),

Whereas, by Decision 90/221/Euratom, EEC (4), the Council adopted a third framework programme for Community activities in the field of research and technological development (1990 to 1994), specifying, *inter alia,* the activities to be pursued for developing the scientific knowledge and technical know-how needed by the Community, in particular to carry out its role in the field of industrial and materials technologies; whereas this Decision should be taken in the light of the grounds set out in the preamble to that Decision;

Whereas Article 130k of the Treaty stipulates that the framework programme shall be implemented through scientific programmes developed within each activity;

Whereas the Joint Research Centre (JRC) for its part contributes, by means of its own programme, to the realization of these activities;

Whereas it is necessary for the Community and Europe as a whole to react appropriately to the challenges confronting them at international level in the field of innovative industrial and materials technologies;

Whereas, pursuant to Article 4 and Annex I to Decision 90/221/Euratom, EEC the amount deemed necessary for the whole framework programme includes an amount of ECU 57 million for the centralized dissemination and exploitation of results, of be divided up in proportion to the amount envisaged for each specific programme;

Whereas Decision 90/221/Euratom, EEC provides that a particular aim of Community research must be to strengthen the scientific and technological basis of European industry, particularly in strategic sectors of advanced technology, and to encourage it to become more competitive at the international level; whereas it also provides that Community action is justified where research contributes, *inter alia,* to the strengthening of the economic and social cohesion of the Community and to the promotion of its overall harmonious development, while being consistent with the pursuit of scientific and technical excellence; whereas the programme of research in the field of industrial and materials technologies should contribute to the achievement of these objectives;

(1) OJ No C 174, 16. 7. 1990, p. 28 and OJ No C 14, 22. 1. 1991, p. 12.
(2) OJ No C 19, 28. 1. 1991, p. 165 and OJ No C 240, 16. 9. 1991.
(3) OJ No C 41, 18. 2. 1991, p. 46.
(4) OJ No L 117, 8. 5. 1990, p. 28.

Whereas it is a matter of urgency that a specifically European industrial potential be created or consolidated in the technologies in question; whereas the beneficiaries must be research establishments, undertakings, including small and medium-sized enterprises (SMEs), and other bodies established within the Community which are most likely to achieve these objectives;

Whereas SMEs should be involved to the maximum extent possible in this programme; whereas account should be taken of their special requirements without prejudice to the scientific and technical quality of the programme;

Whereas in addition to the specific programme concerning human resources and mobility, it is necessary to encourage the training of research workers and engineers in the context of this programme;

Whereas the social, human and environmental impact 90/221/Euratom, EEC, any technological hazards should be assessed in the context of this programme;

Whereas basic research must be encouraged as far as necessary throughout the Community;

Whereas it is necessary, as provided in Annex II to Decision 90/221/Euratom, EEC, to promote basic technical research, the integration of new technologies by user industries and the acquisition of the scientific and technical knowledge necessary for establishing standards and codes of good practice facilitating the transfer of these technologies;

Whereas the Scientific and Technical Research Committee (Crest) has been consulted,

HAS ADOPTED THIS DECISION:

Article 1

A specific research and technological development programme for the Community in the field of industrial and materials technologies, hereinafter referred to as the 'programme', as defined in Annex I, is hereby adopted for a period running from 9 September 1991 to 31 December 1994.

Article 2

1. The funds estimated as necessary for the execution of the programme amount to ECU 663,3 million, including expenditure on staff and administration amounting to ECU 35 million.

2. An indicative allocation of funds is set out in Annex II.

3. Should the Council take a decision in implementation of Article 1 (4) of Decision 90/221/Euratom, EEC, this Decision shall be adapted accordingly.

Article 3

Detailed rules for the implementation of the programme and the amount of the Community's financial contribution are set out in Annex III.

Article 4

1. In the second year of implementation of the programme, the Commission shall review it and submit a report on the results of its review to the European Parliament and the Council; the report shall be accompanied, where necessary, by proposals for amendment of the programme.

2. At the end of the programme, an evaluation of the results achieved shall be conducted for the Commission by a group of independent experts. This group's report, together with any comments by the Commission, shall be submitted to the European Parliament and the Council.

3. The reports referred to in paragraphs 1 and 2 shall be established having regard to the objectives set out in Annex I to this Decision and in accordance with Article 2 (4) of Decision 90/221/Euratom, EEC.

Article 5

1. Contracts concluded by the Commission shall govern the rights and obligations of each party, in particular the arrangements for the dissemination, protection and exploitation of research results, in accordance with the provisions adopted pursuant to Article 130k (2) of the Treaty.

2. A work programme shall be drawn up in accordance with the aims set out in Annex I and updated where necessary. It shall set out the detailed objectives and types of projects to be undertaken, and the financial arrangements to be made for them. The Commission shall draw up calls for proposals for projects on the basis of the work programme.

Article 6

1. The Commission shall be responsible for the implementation of the programme. It shall be assisted by a Committee composed of representatives of the Member States and chaired by the representative of the Commission.

2. The representative of the Commission shall submit to the Committee a draft of the measures to be taken. The Committee shall deliver its opinion within a time limit which the Chairman may lay down according to the urgency of the matter. The opinion shall be delivered by the majority provided for in Article 148 (2) of the Treaty as regards adoption of decisions which the Council is required to adopt on a proposal from the Commission. The votes of the representatives of the Member States within the Committee shall be weighted in the manner set out in that Article. The Chairman shall not vote.

3. The Commission shall adopt the measures envisaged when they are in accordance with the opinion of the Committee.

4. If the measures envisaged are not in accordance with the opinion of the Committee or if no opinion is delivered, the Commission shall, without delay, submit to the Council a proposal relating to the measures to be taken. The Council shall act by a qualified majority.

5. If, on the expiry of a period of three months from referral of the matter to the Council, the Council has not acted, the proposed measures shall be adopted by the Commission.

Article 7

1. The procedure laid down in Article 6 shall apply to :

— the preparation and updating of the work programme referred to in Article 5 (2),

— the contents of the calls for proposals,

— the assessment of the projects provided for in Annex III and the estimated amount of the Community's contribution to them where this amount exceeds ECU 0,75 million,

— departures from the general rules set out in Annex III,

— the participation in any project by non-Community organizations and enterprises referred to in Article 8 (1) and (2),

— any adaptation of the indicative allocation of the amount set out in Annex II,

— the measures to be undertaken to evaluate the programme,

— arrangements for the dissemination, protection and exploitation of the results of research carried out under the programme.

2. Where, pursuant to the third indent of paragraph 1, the amount of the Community contribution is less than or equal to ECU 0,75 million, the Commission shall inform the Committee of the projects and of the outcome of their assessment.

The Commission shall also inform the Committee of the implementation of the accompanying measures, including the feasibility premiums, the cooperative research projects and the concerted actions referred to in Annex III.

Article 8

1. The Commission is authorized to negotiate, in accordance with Article 130n of the Treaty, international agreements with third country members of COST, in particular member countries of the European Free Trade Association (EFTA) and Central and Eastern European countries with a view to associating them with the whole or part of the programme.

2. Where framework agreements for scientific and technical cooperation have been concluded between the Community and European non-Member States, bodies and enterprises established in those countries may, in accordance with the procedures laid down in Article 6 and on the basis of the criterion of mutual benefit, be allowed to become partners in a project undertaken within the programme.

No contracting body based outside the Community and participating as a partner in a project undertaken under the programme may benefit from Community financing for this programme. Such bodies shall contribute to the general administrative costs.

Article 9

This Decision is addressed to the Member States.

Done at Brussels, 9 September 1991.

For the Council

The President

W. KOK

ANNEX I

SCIENTIFIC AND TECHNICAL OBJECTIVES AND CONTENT

This specific programme fully reflects the approach embodied in the third framework programme in terms of scientific and technical objectives and reasons.

Paragraph 1 (2) of Annex II to the framework programme, with the exception of the provisions relating to measurement and testing (for which another specific programme exists), form an integral part of the present specific programme.

The principal objective is to contribute to the revitalization of European manufacturing industry by reinforcing its scientific and technological basis by means of research and development work. It is important to promote in all Member States basic technical research, the integration of new technologies by user industries and the acquisition of the scientific and technical knowledge necessary for establishing standards and codes of good practice facilitating the transfer of these technologies.

The advanced technologies necessary cover the whole life cycle of materials, and are intended to reduce the lead time between the idea and the product and improve manufacturing processes. Research work will be undertaken in the field of raw materials, recycling, new and improved materials, design and manufacture. Research will be closely linked and will therefore not be carried out in an isolated manner but in accordance with a systematic approach. The proposed research work will help to consolidate and take further technological developments made within the Community, and use resources more efficiently. A special effort will be made to help small and medium-sized enterprises to become more involved in transnational research, develop links with other undertakings and universities and manage their technical resources better. Cooperative research will be introduced to resolve technical problems common to groups of small and medium-sized enterprises which do not have their own research facilities.

The environment aspects of products and processes and the working environment will be included as strategic elements in all parts of the programme. This will require links with other programmes covering the environment, health and measurements and testing to take account of advances in risk assessment and toxicology.

The aeronautical technologies research that began with the Brite/Euram programme will be continued taking account of harmonization, standardization, safety and environmental aspects. Specific aeronautical research and applications will be dealt with under Area 3. Research of a generic nature will be dealt with under Areas 1 and 2 of the programme.

The supporting measures cover the transfer of technologies and the training activities carried on in each area. They comprise specific measures intended to increase the potential for participation of organizations established in all regions in Community research and development (R&D) activities in the field of industrial and materials technologies and also their ability to make use of the results. They include training activities, closely linked to activities under the programme, to increase the levels of the qualifications of researchers and engineers on subjects linked to the programme; they also include measures intended to ensure that opportunities are taken and the results used, including those leading to standardization. They also cover information exchange systems for those taking part in the programme and those taking part in Eureka projects. Specific information on projects will be supplied in close cooperation with the Community Research and Development Information Service (Cordis). These measures will supplement existing activities at Community, national and international level and will take account of the requirements of subsidiarity and economic and social cohesion.

The activities will be coordinated with, *inter alia*, the computer-integrated production and micro-electronic materials areas in the specific programme on information technology, the recycling area in the specific programme on the environment and the programmes on non-nuclear energies and measurement and testing.

The following is an indicative description of the content of the programme based on and taking account of the above elements.

In the areas listed, the research effort will be in relation to its strategic and economic interest and foreseeable developments.

Area 1: Materials — raw materials

The objective is to contribute to improving the performance of materials at a cost which permits competitive industrial exploitation over a broad range of applications not restricted to a few high-performance items.

As regards raw materials, research will seek to improve the technologies necessary to ensure the supply of resources, including technologies to locate and extract deposits, processing and treatment by economic means that are safe and environmentally acceptable.

Recycling technologies will be the subject of research covering the whole materials cycle, with emphasis being placed on the savings to be made and positive integration into the environment.

Research aimed at the use of advanced materials at a more favourable cost over a whole range of applications will be encouraged with a view to broad diffusion of these materials outside their initial application fields as well.

The accent will be on the innovative use of industrial minerals and natural stone for the construction industry, metals and industrial materials, including prospecting, exploitation, recovery, transformation, production and recycling.

Raw materials

Here the goal is the improvement of existing processes and mastering of new and pre-competitive technologies.

Research will address the development of methods for process application and testing of technologies so improving yield and enabling new mines to open and others to become more economic.

Special attention will be given to integrated techniques and modelling for prospecting mineral deposits and for the exploitation and processing of minerals and rocks, and in particular of those resources of a complex nature containing basic and strategically important metals.

Research will be pursued to provide a better understanding of integrated systems to underpin advanced prospecting methods for hidden deposits. As regards mining and quarrying techniques, work will be undertaken in the field of new and improved drilling technologies for cost-effective prospecting and exploitation as well as in the field of automation, extracting processes and metallurgical/mineralogical treatment (pyrometallurgical and hydrometallurgical processing). Research will also be needed to produce basic and strategic metals, high purity metals, fired clay, industrial minerals and natural stone for the construction industry. Research will also be carried out in the area of chemical, physical and biological separation technologies. Special attention will be directed to pre-normative research concerned with occupational safety conditions and the environmental impact of the exploitation technologies to be developed.

Recycling

The goal of this activity is to reinforce the scope and effectiveness of recycling technologies with the economic and strategic consequences of the loss of wastage of many metals and materials, including those in short supply, being minimized. The environmental damage arising from harmful effluents will be reduced.

Research will involve a comprehensive analysis of cycles from raw materials to recycling, via the finished product, and the analysis will take account not only of economic and energy factors but also of environmental problems. It will also cover industrial waste.

A particular goal is the development of new process technologies for meeting the challenge of exploiting the residues, particularly waste and scrap containing conventional as well as precious and strategic metals, arising from the major branches of the manufacturing and processing industry. Attention will also be directed to the complex challenge of recycling composite and advanced materials.

Research on technologies for physical and/or chemical treatment of residues which contain metals will be encouraged in order to increase the scale and efficiency of recycling and increase the applicability of recycled materials. Research will also cover pyrometallurgical and hydrometallurgical technologies and refining applied to processing of complex residues, composites and other new materials, alloys and multi-element scraps.

New and improved materials and their processing

The goal of this activity concerns developments in materials and their processing, including conventional mass commodity materials with enhanced properties and performance at a reasonable cost, advanced structural materials for high performance systems, advanced functional materials, surface engineering and joining technology.

In the field of conventional mass commodity materials, including construction materials, attention will be given to production and quality control technologies and to new and improved materials and their applications. Attention will also be given to long-term behaviour prediction, including reliability. Methods will be developed to enable the designer to take into account, from the outset, environmental and consumer acceptability.

Encouragement will be given to research on materials performance through better properties of application and use and more precise specification and more appropriate use, by means in particular of reliable data bases, and research on combinations of advanced materials for use in major industrial applications.

Research will be directed to new developments or radical innovations in advanced materials for key applications which may also have important spin-off effects in other industrial areas. It will also consider the use of advanced materials in a broad range of applications.

Particular emphasis will be placed on developing materials with specified properties, exploiting advances in understanding of the effects of structure. Techniques for tailoring materials towards precise requirements will be addressed and should result in an improvement of R&D effectiveness in this field.

For metallic materials, efforts will be directed to seeking new applications for high-value materials (e. g. speciality ferrous and non-ferrous alloys, superalloys, intermetallic compounds, refractory metals) customized for complex design specifications and particularly demanding service conditions.

With regard to technical ceramics, attention will be directed to the improved control of microstructure and processing technologies and to the fundamental problems associated with reliability and brittleness.

For polymer materials, research will aim at a better understanding of the relationships between structure, morphology and properties. The development of new and improved processing technologies for producing reliable components will also be addressed in order to extend the application of this class of materials. In particular, research will aim at developing technical thermoplastics which retain their mechanical properties at higher temperature and which can be produced through low-cost thermal-processing.

In composite engineering, the technologies needed to address the problems associated with series production will be tackled.

In the case of superconductors, the challenge is to increase the maximum critical current density and capacity together with advances in application technologies, including cable production, formation and reliability.

Research will also be directed to studying and developing new bio-compatible materials for special applications.

Pre-normative work needed to accelerate the applicability of new materials will include research relating to their classification together with their characterization to establish performance and minimize their impact on health and the environment.

Area 2 : Design and manufacturing

The objective is to improve the capability of industry to design and manufacture products which are, at the same time, of high quality, easy to maintain, highly competitive and environmentally and socially acceptable.

Since all industrial production forms part of a system for any given application, the system must be optimized so that the quality and reliability required for a product is achieved at minimum cost.

Research will be directed to the application of advance enabling disciplines such as physics and chemistry, mechanics, optics, acoustics, fluid dynamics, mathematical modelling and process engineering, and their integration into new technological developments such as optomatronics (optics, materials and electronics), mechatronics (mechanical engineering, computing and electronics), microtechnology and micro- and nanostructural engineering, including molecular engineering.

Special consideration will be given to the modernization of traditional industry to active involvement of SMEs, with their particular know-how and as experimental shop floors.

Design

Research on design will address the impact on product performance, reduction of design time, manufacturing and life cycle costs. This approach will link the information requirements inherent in the engineering design process (material product form, fabrication and function) with the organizational procedures and the human factors that underline the process.

Research will address failure modes and defect analysis, by modelling techniques based on fracture mechanics, tribology, fluid dynamics, corrosion analysis, etc. Implementation of these design approached may require the adaptation of software tools for specific applications.

Design research will, in particular, be directed towards :

— improved performances of manufacturing operations ;

— improved product quality control, reliability and maintenance ;

— the reduction of whole-life costs by means of recycling and re-use ;

— improved modelling/simulation and rapid-prototyping techniques with a broad application field supporting the engineering design process, addressing product validation and optimizing and predicting service behaviour ;

— improved control over energy consumption in industrial applications.

In offering the advantage of spreading the best practice, projects will, wherever possible, contribute to the generation and development of standards and good design practice.

Manufacturing

Research on the quality of manufacturing will address the use of efficient and cost-effective manufacturing processes and integrate other aspects, including the design interface, quality control maintenance of facilities and the working environment.

Research will be directed at developing flexible small-batch production technologies and also at mass production technology in order to meet an emerging need for identical technical products in large quantities. In particular, appropriate materials application and related technologies, such as those for precision engineering or incorporation of speciality materials into a mass-production environment, will be addressed as well as technologies for shaping, machining and assembly of miniaturized and/or complex components.

Other research objectives will include the adaptation of established CIM systems to meet the special needs of industry and particularly those of SMEs. Research will aim to improve NET or near NET shaping and forming processes in order to reduce costly and environmentally damaging wastes.

Research in chemical engineering will develop system approaches. Subjects of study could include process modelling, separation technology, molecular engineering, catalysis and surface science and technology and chemical sensors. Fundamental research into mixing and stirring, and particle and powder technology will be supported in order to develop a better understanding than is provided by current empirical approaches. Research will also be directed to providing the understanding of particular processes as a basis for software tailored to particular needs.

Area 3 : Aeronautics research

The objectives of this specific activity are to contribute to strengthening the technology base of the European aeronautical industry ; to contribute to the knowledge base which supports actions to minimize environmental impact and enhance the safety and efficiency of aircraft operations ; and to promote further cooperation between large high-technology companies and smaller companies, SMEs and research institutions/universities throughout the Community.

Research activities will be pursued in the following fields :

(a) environment related technologies, in which attention will be focused upon reduction of exterior and interior noise and upon reduction of exhaust emissions from aircraft ;

(b) technologies of aircraft operation, in which attention will be focused upon maintenance technologies, health and usage monitoring, crashworthiness, fire risk control and cockpit interfaces to the air traffic control system ;

(c) aerodynamics and aerothermodynamics, in which attention will be focused upon computational fluid dynamics (CFD), techniques of drag reduction by laminar flow for subsonic and supersonic transport, propulsion integration and the internal aerothermodynamics of turbo-machinery ;

(d) aeronautical structures and manufacturing technologies, in which attention will be focused upon structural and materials application techniques relevant to primary aircraft structures and highly loaded high-temperature components and upon manufacturing processes particular to aeronautical applications ;

(e) avionic system technologies, in which attention will be focused upon techniques for design, integration and evaluation of high integrity avionic systems, particular techniques for sensing, monitoring and control of air vehicle systems, problems of man-machine interaction and flight-deck performance optimization ;

(f) mechanical, utility and actuation technologies, in which attention will be focused upon particular techniques for optimization and the exploitation of new technology in aircraft mechanical systems, aircraft utility systems and in aircraft actuation sub-systems.

In implementing this work, particular emphasis will be placed upon cross-fertilization and transfer of technology, especially for Member States not already having large aeronautical industries.

ANNEX II

INDICATIVE ALLOCATION OF FUNDS DEEMED NECESSARY

(in millions of ecus)

	Allocation
Area 1: Materials — raw materials	
1. Raw materials and recycling	80
2. Materials	228,8
Area 2: Design and manufacture	301,5
Area 3: Aeronautics research	53 (1)
Total	663,3 (2)

(1) The amount intended for aeronautics research is provided for a period of three years.

(2) Including expenditure on staff amounting to ECU 20 million and administrative expenditure totalling ECU 15 million.

An amount deemed necessary of ECU 6,7 million, not included in the ECU 663,3 million, will be earmarked as the contribution from the specific programme on industrial and materials technologies to the centralized scheme for the dissemination and exploitation of results.

An additional amount of ECU 78 million will be allocated to JRC research in the field of materials and raw materials, including an amount of ECU 0,78 million representing the JRC contribution to the centralized scheme for dissemination under this specific programme.

10 % of the total will be allocated to basic research and 2 % to training.

The allocation between Areas 1 and 2 does not exclude the possibility that projects may come under both areas.

ANNEX III

RULES FOR IMPLEMENTING THE PROGRAMME

1. The Commission will implement the programme on the basis of the scientific and technical content described in Annex I.

2. The rules for implementing the programme, referred to in Article 3, comprise research and technological development projects, cooperative research projects, concerted actions and accompanying measures (including feasibility premiums). Selection of projects must take account of the criteria listed in Annex III to Decision 90/221/Euratom, EEC and of the objectives set out in Annex I to this programme.

— **Research projects**

The projects will be the subject of shared-cost research and technological development contracts and Community financial participation which will not normally be more than 50 %. Universities and other research centres participating in shared-cost projects will have the option of requesting, for each project, either 50 % funding of total expenditure or 100 % funding of the additional marginal costs.

Shared-cost research projects must, as a general rule, be carried out by participants established within the Community. Projects in which, for example, universities, research organizations and industrial firms, including small and medium-sized enterprises, may take part must provide, as a general rule, for the participation of at least two partners, independent of each other and established in different Member States. These two partners will normally be industrial firms except in the case of projects in the field of basic research. Where basic research is undertaken by a group consisting solely of research centres and universities, industrial support will be sought.

Contracts relating to shared-cost research projects must as a general rule be concluded following a selection procedure based on calls for proposals published in the *Official Journal of the European Communities.*

— **Cooperative research projects**

Cooperative research is intended for a group of undertakings, in particular SMEs, which do not have their own research facilities, in order to resolve common technical problems. One or more outside organizations (research associations, universities or undertakings) will be appointed to carry out the research.

50 % of the research costs of these projects will be covered for a period normally not exceeding two years. These projects must be submitted by undertakings which are to take part in planning and piloting the research and implementing the results.

— **Concerted actions**

Concerted actions consist of action by the Community to coordinate the individual research activities carried out in the Member States. They may benefit from funding of up to 100 % of coordinating expenditure.

— **Accompanying measures, including feasibility premiums**

(i) The accompanying measures referred to in Article 7 and described in Annex I will in particular be implemented through :

— the organization of seminars, workshops and scientific conferences,

— internal coordination through the creation of integrating groups,

— specialized training programmes, with the emphasis being placed on multi-disciplinarity,

— an information exchange system,

— promotion of the exploitation of results,

— independent scientific and strategic evaluation of the operation of the projects and the programme.

(ii) Feasibility premiums are subsidies of up to ECU 30 000, covering up to 75 % of the costs of research lasting a maximum of nine months and intended to determine the feasibility of an innovative device, concept or process. Such premiums are reserved for independent, technologically based SMEs established within the Community. Their purpose is to help SMEs to demonstrate their capacities to potential partners in future proposals for collaboration. The results of such research should become the basis for an SME's participation in an association seeking finance for an applied industrial research proposal under the industrial and materials technologies programme.

3. The knowledge acquired in the course of the projects will be disseminated both within the specific programme and by means of a centralized activity, pursuant to the Decision referred to in Article 4 (3) of Decision 90/221/Euratom, EEC.