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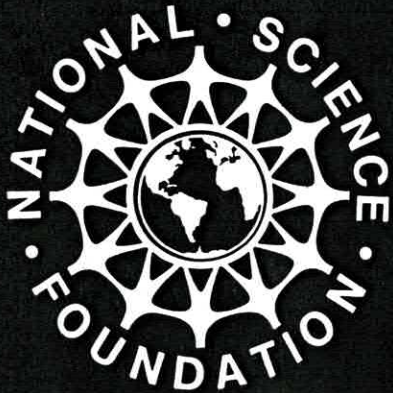
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Directorate for Engineering
Washington, D.C. 20550

Program Announcement

**ENGINEERING
RESEARCH CENTERS**

Fiscal Year 1985

Deadline for Receipt of Proposals:
October 1, 1984

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1984/85

NATIONAL SCIENCE FOUNDATION

Program Announcement

ENGINEERING RESEARCH CENTERS

(Centers for Cross-Disciplinary Research in Engineering)

The Directorate for Engineering plans to initiate a new program to support Engineering Research Centers in Fiscal Year 1985. The goal of the Centers program is to develop fundamental knowledge in engineering fields that will enhance the international competitiveness of U.S. industry and prepare engineers to contribute through better engineering practice. Engineering education and research are key elements in improving U.S. industrial productivity and they must be firmly linked in the Centers. The Centers will be supported to meet a need for providing cross-disciplinary research opportunities for faculty and students, for providing fundamental knowledge which can contribute to the solution of important national problems, and for preparing engineering graduates with the diversity and quality of education needed by U.S. industry.

While the Centers will differ from one another, they should all share three defining characteristics: First, they should provide for working relations between students and faculty on the one hand, and industry engineers and scientists on the other. Second, their programs should emphasize the synthesis of engineering knowledge; they should seek to integrate different disciplines in order to bring together the requisite knowledge, methodologies, and tools to solve issues important to engineering practitioners. Third, the programs must contribute to the increased effectiveness of all levels of engineering education.

The Centers are to be located at academic research institutions where they are expected to promote strong links between research and education. Cooperation with other academic institutions, such as nearby colleges without major engineering research programs but involved in the education of engineering undergraduates, will be encouraged in future years; however, this is not necessarily expected in the initial proposal.

Each Center should focus on a particular subject area of national importance. Examples of subject areas include systems for data and communications, computer-integrated manufacturing, computer graphics design, biotechnology processing, materials processing, transportation, and construction. These examples are given only to illustrate concerns which a Center may address, proposing institutions are invited to identify the subject area and focus of their

proposed Center as well as the approach they consider would best address the area in accordance with the interests and capabilities of the campus and affiliated institutions. However, the Centers are expected to include the following features:

- Provide research opportunities to develop fundamental knowledge in areas critical to U.S. competitiveness in world markets. The focus of the Center should be on a major technological concern of both industrial and national importance.
- Involve a team effort of individuals from various backgrounds, possessing different engineering or scientific skills, where such effort can contribute more to the focus and goals of the Center than would occur with individually funded research projects. Hence, the nature of the Center's research would be cross-disciplinary.
- Emphasize the systems aspects of engineering and help educate and train students in synthesizing, integrating, and managing engineering systems.
- Provide experimental capabilities not available to individual investigators because of large instrumentation acquisition costs, requirements for a large number of skilled technicians, or other maintenance and operating requirements.
- Include in the Center the participation of engineers and scientists from industrial organizations in order to focus the activities on current and projected industry needs. State and local agencies or government laboratories involved in engineering practice may also be participants. The development of new methods for the timely and successful transfer of knowledge to industrial users is expected.
- Include a significant education component involving both graduate and undergraduate students in the research activities of the Center. Student participation in the activities of the Center would expose future engineers to many aspects of engineering rather than one specific field and better prepare them for the systems nature of engineering practice. Codification of new knowledge generated at the Center and continuing edu-

Programs described in this announcement are in Category 47.041 (Engineering Science) of the "Catalog of Federal Domestic Assistance."

cation of practicing engineers may be another component.

- Strive to involve at least 10 percent of its home institution's graduate engineering students at both master's and doctoral levels. The Center's program should also have a substantial impact on undergraduate engineering students. The faculty required to attend to the needs of 10 percent of the graduate engineering students will depend on the size of the institution. A minimum faculty commitment of three full-time equivalent (FTE) positions is probably essential. It is anticipated that faculty staffing will be supplemented by engineers provided by industry.

Who May Submit

U.S. academic institutions with engineering research and education programs are invited to submit proposals. Proposals involving multi-institutional arrangements are also eligible.

The Foundation welcomes proposals on behalf of all qualified engineers and scientists and strongly encourages women, minorities, and the physically handicapped to participate fully in the program described in this announcement.

Principal Investigator

The individual designated as principal investigator will be responsible for management and staffing; procurement, use, and maintenance of equipment; and the research funds for the Center.

Deadlines

Proposals are due October 1, 1984. Awards are planned for the following July.

Evaluation of Proposals

Proposals will be evaluated in several stages which may include mail and panel review, site visits, and several levels of NSF review. NSF plans to provide verbatim copies of the early stage reviews or site visit reports to institutions to solicit proposal revisions or responses to these reviews or reports as input to later stages of the review. Proposals may be declined at any point in the review process after the initial peer review.

Criteria used to evaluate proposals are fully described in the NSF document *Grants for Scientific and Engineering Research* (NSF 83-57). The four criteria are: (1) research performance competence, (2) intrinsic merit of the research, (3) utility or relevance of the research, and (4) effect of the research on the infrastructure of science and engineering. Within these general criteria, specific consideration will be given to the following items in evaluating how the proposed center will meet the objectives of this program:

- Nature and importance of the subject area which will be the focus of the Center.

- Proposed plans to assure that research of high quality and intrinsic merit will be supported by the Center.
- Integration of the Center into the education of engineers, both at the undergraduate and graduate level. Continuing education of practicing engineers may be another important factor.
- Participation of engineers and scientists from industrial organizations involved in engineering practice and their expected contribution to identifying and reaching the goals of the Center.
- Cross-disciplinary nature of the Center, the extent to which individuals from varying backgrounds and expertise are involved and how they are involved, the rationale for supporting a Center rather than providing individual investigator support through other sources.
- The need for and advantage of sharing expensive or specialized equipment proposed for the Center and how such equipment will contribute to the study of the problem.
- Management plan for operation of the Center to assure the program will be of highest quality, including the qualifications of the principal investigator, mechanisms for selecting research projects, allocating funds and equipment, recruiting staff, and dissemination and utilization of research results.

Awards

Awards will be made as continuing grants for an initial duration of five years. NSF's total budget for FY85 for these Centers is \$10 million. The first year budget for each Center will be for start up. Once fully developed, it is anticipated that the Centers' average annual budget for salaries, operating costs, equipment, and supply expenditures would normally be expected to range between \$2.5 to \$5 million. The actual number of Centers funded in the first year will depend on the merit and responsiveness of the proposals received.

Centers and affiliated programs will be recommended for funding by a peer review panel chosen by NSF. Three years after they are established, the Centers will be reviewed by essentially the same panel. This evaluation will determine if the Center is meeting the goals and objectives proposed, including the quality of research and the extent of industrial participation, and will be used to determine whether NSF will continue to support the Center fully for the remaining two years or provide decreased funding to terminate the Center at the end of the grant. It is anticipated that successful Centers will be funded beyond the initial five year period, subject to satisfactory peer review.

Support of the Engineering Research Centers program is contingent upon the availability of funds for this purpose. This announcement does not obligate NSF to make any awards if such funding is not available.

Proposal Format

The proposal should be prepared following the guidelines contained in the NSF document *Grants for Scientific and Engineering Research* (NSF 83-57) and the instructions which follow in this announcement.

Each proposal should reflect the unique combination of the proposing institution's interests and capabilities and discuss the features of the proposed Center in sufficient detail to be evaluated in accordance with the criteria listed in this announcement. The normal 15 page proposal limit will not be imposed; but since reviewers may be asked to review more than one proposal, lengthy proposals are not recommended. Each proposal should contain the following:

- (1) NSF Cover Page (NSF 83-57 Appendix II).
- (2) Supplementary Information—Principal Investigator(s)/Project Director(s) NSF Form 1153 (NSF 83-57 Appendix III) *
- (3) Table of Contents with page numbers keyed to the major sections of the proposal.
- (4) Abstract (200 words) which gives a brief description of the goals and objectives of the proposed Center and the subject to be addressed.
- (5) Detailed description of the proposed Center. This will be the main body of the proposal and should include a description of the operational goals and unique characteristics of the proposed Center, the proposed engineering research thrusts with emphasis on the cross-disciplinary nature of the various participating organizations and researchers, a statement on research planning for future years which describes potential areas to be explored and possible new directions, a description of existing facilities and programs likely to be closely allied to the Center, and a description of student involvement and the potential impact of the Center in providing a diverse education for engineers. The involvement of engineers and scientists from industrial organizations and other affiliated organizations should be fully described.
- (6) Description of equipment and accessories requested for each year including the itemized cost of each item and a total cost (indicate institution cost share, if any). Provision for maintenance and technical personnel should also be discussed. The need for the equipment must be fully justified and the reasons why any similar research equipment presently located at the institution is not available or appropriate for the goals of the Center should be provided.
- (7) Biographical information on the principal investigator and all faculty members or other individuals from affiliated institutions who will be directly involved in the formation, development, or use of the Center. A list of publications for the last two years should be included for each of these individuals.

* Submission of Form 1153 is optional

- (8) A statement of current and pending research support for each individual included in item (7) above. (NSF 83-57 Appendix VI)
- (9) A description and management plan of the administrative structure of the proposed Center both internally and in relation to the total institution structure. An organization chart should be included. The plan should clearly describe the procedures to be used to assure that research of the highest quality is performed at the Center.
- (10) A proposed budget (NSF 83-57 Appendix V) for each year of the Center's operation. A separate schedule showing the total operating budget of the Center both from NSF funds and other sources, including the institution's own share of funds should also be included for each year.

Where and How to Submit Proposals

Twenty copies of the proposal should be submitted to:

Division of Data Support Services
Attn: Engineering Research Centers Program
National Science Foundation
Washington, D.C. 20550

One copy of the proposal must be signed by the principal investigator and an official authorized to commit the institution in business and government affairs.

Additional Information

Copies of *Grants for Scientific and Engineering Research* (NSF 83-57) are available at no cost from:

Publications Unit, Room 233
National Science Foundation
Washington, D.C. 20550

For technical inquiries, contact the appropriate Engineering Division Director in the area of interest. The four Engineering Divisions and the telephone numbers of the Division Directors are:

Chemical and Process Engineering (202-357-9606)

Civil and Environmental Engineering (202-357-9545)

Electrical, Computer, and Systems Engineering (202-357-9618)

Mechanical Engineering and Applied Mechanics (202-357-9542)

For administrative inquiries, contact the Staff Associate, Office of the Deputy Assistant Director for Engineering, (202-357-9834).

The Foundation provides awards for research in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for such findings or their interpretation.