

Industry and the National Sea Grant College Program

THE Congress, in 1966, passed the National Sea Grant College Act to provide support for new educational and research programs at selected colleges which would be directly applicable to the development of the resources in the waters contiguous to the United States. It would appear that those industries seeking to apply their talents and wares to these endeavors have, in principle, much to gain from the output of the Sea Grant Program. Hence, they should take an active interest in assisting colleges that have demonstrated competence in one or more of the disciplines applicable to marine developments to secure support under this program.

It is my understanding that Congress intends for the participating colleges to provide education, training of technicians, and specific studies, which will bridge the gap between the sciences and engineering so that the most effective means for performing the varied tasks in the oceans will be found. Thus, the immediate stress should be placed on extending or adapting technologies to the sea environment. There may be a tendency, in the interest of evolving very broad-based programs, to diffuse the initially limited funds (currently about 4 million dollars) over the entire "waterfront" rather than to concentrate the funds in those areas of engineering which bear directly on the extraction of both inorganic and organic resources from within and under our waters.

It would seem that support from national programs and large private funds frequently tends to be given to the large, well-established universities to further enhance their capabilities. This is often understandable from the viewpoint that many such centers have highly competent faculties and research staffs. However, one cannot help but wonder about the seemingly small fractional gain in abilities accomplished by awards of additional moneys to huge universities in contrast to the large improvement in the services which might be effected by the same size grant to smaller colleges that have demonstrated prerequisites.

There appears to be a proclivity to designate as Sea Grant Colleges only those having many pertinent departments in order to achieve highly integrated centers. This attitude seems sound in theory, provided that there is uniformity in the excellence of the various departments. Yet it may be much better to build up the specialties in separate schools where they are already able and to forego the sometimes nebulous advantages of integration of various departments in a few places. Certainly these alternatives and others are being weighed by those administering this new program under the aegis of the National Science Foundation (NSF). Industry should, at this crucial time, seek to give counsel to the able men in NSF who are now seeking to implement a balanced program throughout the country.

There are at least two direct ways in which corporations involved in the development of marine resources can serve their own, and the nation's, best interests. One is to indicate their technical evaluation of existing academic departments (indeed, NSF requires that such endorsements be submitted as part of a Sea Grant Program Proposal) and the other is to make known to the universities the important problems in all facets of endeavors in the oceans. In this way, both the professors and the students may be caught up in real-life rather than textbook problems.

Fortunately, in many colleges there already exist strong foundations in naval hydro- and structural mechanics as a result of the sustained support afforded by the Office of Naval Research, the Naval Engineering Center's General Hydromechanics Research

Program, and the Maritime Administration's University Research Program. A large portion of the output of the many and varied studies and craft developments is immediately applicable to the design of vessels, structures, and instruments needed by industry today. Without the U.S. Navy's interest in ship motion in realistic seas, little would be known today about the role of vessel geometry in the motions induced by rough water. Indeed, it has only been in the past two years that calculational and experimental techniques have been applied to achieve unusual ship forms with superior performance which also meet practical constraints.

Understandably, the Navy's interest in combatant ships has often forced their research and development along lines that do not embrace concepts applicable to commercial practice. This has been particularly true in the areas of submersibles, certainly prior to the Deep Submergence Systems Project. The need to reconnoiter near the bottom, to hold station and hover in currents has, until rather recently, been given scant attention. Consequently, little knowledge of the hydrodynamic forces and moments at large angles of attack is extant. Nor has there been any sustained research to discover configurations for submarines which would optimize their performance in maneuvering. As a matter of fact, the Navy has not developed any significantly advanced external hull configurations in many years. It is hoped that the Sea Grant Project will provide the means for accomplishing the research that is needed for a marked advance in all aspects of submersible design. The companies engaged in systems analysis should find a fertile field here, since submarines, like all ships, are a composite of compromises and certainly cannot be optimized solely with regard to hydromechanics.

The rapidly growing industrial development of craft, platforms, and all types of ocean-going equipment brings to the fore once again the need for enhancing existing mechanical and hydrodynamic test facilities. Indeed, serious thought ought to be given to construction of certain new test facilities which, unencumbered by militarily directed work, could be used exclusively for both basic and applied research of direct use to those industries and agencies concerned with the rational exploitation of the oceans. The erection of new facilities is presumably beyond the guidelines set up for the Sea Grant College Program—but without unfettered facilities, the necessary answers will not come forth in a timely fashion and the planning of future ocean work will lack the necessary predictive accuracy. It is significant that, in all other maritime nations, separate ship-hydrodynamic and ship-structural facilities exist for naval and commercial work. The lack of separate facilities in this country is certainly a weakness that should be of concern to those seeking to develop the full potential of this nation in wresting the wealths contained within and under its seas.

We hope that Sea Grant funding will not be overly diffused and that NSF, with guidance of industry, will "create" centers of excellence with emphasis on those disciplines needed for tomorrow's ocean engineering. The foundations prepared by the Navy and other agencies in universities and in industry should be enhanced and close attention should be paid to areas where naval interest has been low and industry's concern is high.

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