

Man-made island airports. The popularity of man-made islands for new airport construction will have a significant impact on the ocean industries equipment market. The best known of these projects is the Kansai International Airport, but there are plans for similar airports in Nagoya and several airports in Nagoya and other undisclosed areas as well as for expansion of Haneda International Airport in Tokyo.

Demand for equipment for environmental and hydrographic surveys, and subsequent monitoring are one aspect. However, this type of airport may also yield several unconventional possibilities related to underwater security and anti-terrorist systems.

Coastal area utilization. The Ports and Harbour Bureau's theme for the 1990s is to "focus on the waterfront," to make the ocean waterfront a larger part of the average Japanese person's everyday life. Projects include developing and upgrading marinas as well as other waterfront facilities and reclaiming areas for a variety of uses ranging from leisure projects to industrial and business centres.

The Poseidon floating platform is one emanation of this focus. The joint Ministry of Transport/JAMSTEC program is currently in the second stage of tests of a floating platform designed to support normally landbased structures such as office buildings or an airport. Chains link the floating system to the seabed approximately 40 m below. This platform was sea-tested for four years off the coast of Yura Peninsula in Yamagata prefecture and is currently being dismantled and examined for structural stress and metal erosion.

The tests show that, for facilities up to one square kilometre in area, the system is more economical than a man-made island. The structure may be able to enter a practical-use stage within the next five to six years. The only drawback foreseen for Poseidon-type floating structures is that, unlike land, the platforms decrease in value over time. This would tend to limit their use to temporary structures.

Marine construction. A general increase in marine construction is expected. It will include roads, bridges and underwater tunnels as well as coastal development of resorts and marinas. In addition, there will be a trend for harbour facilities to be built further offshore than in the past. This will increase the demand for environmental and survey work since the environmental protection regulations are exceptionally strict in these areas and significantly more research is required.

Research on sub-sea mineral resources. A great deal of research is still necessary to understand the amount of mineral resources available in Japan's ocean economic zone. Nevertheless, cobalt-rich crusts, magnesium nodules and deposits of marine polymetallic sulfides and other minerals and compounds have already been discovered. The depth of the deposits creates a major problem when considering large volume mining, however, and feasibility studies of industrial exploitation of such minerals and materials have not yet been completed.

Additional research. MITI and the Ministry of Transportation are investigating the feasible utilization of wave energy conversion and ocean thermal energy conversion.

Fishery-related research has recently increased as the fishing industry continually seeks new ways to replenish the ocean's depleted living resources. Potential activities cover all phases of operations such as fishing grounds and fish farm maintenance and improvements as well basic research.

Considerable research and development is required to support all these activities. Typical projects could include feasibility studies, environmental impact studies, fisheries research and oceanographic and defence-related research.

3 Market Size and Structure

Domestic Market

The ocean industry equipment market peaked in 1982 at ¥745 billion. There was a 25 per cent decrease the following year and this downward trend continued until 1988. In 1989, following a slight recovery, the value was ¥229 billion. Several factors have contributed to this situation, including the lack of overall marine construction, the decrease of man-made island construction, strong resistance exerted by fishing unions to any ocean development not related to the increase of fishery resources, and the decrease in domestic oil exploration activities.

Statistics on the value of domestically produced equipment and sales of imported equipment since 1980, are presented in Table 1. Because of the lack of documentation and non-differentiation of imports and domestically manufactured equipment, the statistics include equipment from both groups.

Equipment categories are further defined in Table 2. Marine space use equipment (for living/working structures) was valued the highest in 1988 at