THIRD TECHNICAL MEETING ON FISHING BOATS

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The Third Technical Meeting on Fishing Boats, arranged by the Food and Agriculture Or-ıization of the United Nations (FAO), convened in Goteborg, Sweden, October 23-29, 1965. x years had elapsed since the second such meeting, also arranged by FAO, convened in ome, Italy. Some 350 persons from 44 countries registered for the Third Meeting and 32 chnical papers were presented and discussed during the five days of technical sessions (Oc-ber 25-29).

The meeting was concerned with the improvement of the design and efficiency of small shing vessels (about 100 gross tons and less). The 1959 meeting had already dealt to a great tent with large fishing vessels. The 32 papers presented at the meeting along with written scussions were divided into the following main subjects: Techno-socio-economic boat prob-ıns, seakindliness and workability, engineering of inboards and outboards, new materials for ssels, design of boats under 20 gross tons, design of boats from 20 to 100 gross tons, and ecent developments of fishing vessels. Various topics were included in the presentations and iscussions were carried out under each major subject.

TECHNO-SOCIO-ECONOMIC BOAT PROBLEMS

It was brought out at the onset of the meeting by the Director of the FAO Fisheries Divi-ion that although much attention has been given to improvement of the design of small fishing essels throughout the years, much remains to be done. Since 80 percent of the world's fish atch is taken on or near the Continental Shelves, the grounds are fished readily and econom-ally by small vessels based on adjacent shores. The importance of small fishing vessels, ierefore, cannot be overemphasized. Their design must be the subject of continuous study ıd improvement in order that those living from the sea may prosper as steadily as those ving on the land.

We are all becoming aware that in many countries fishermen are in short supply. It was iite a surprise to those in attendance, however, to learn that Japan is experiencing consider-ɔle difficulty in this regard. During the past 10 years, the rate of increase in the Japanese onomy has been about 10 percent each year. Consequently, considerable numbers of fish-men have been attracted to other industries. The decrease in the number of Japanese fish-men, most notable in the high-seas fleet, jumped from about 2 percent per year during 1956-l to 5 percent during 1961-64. This has caused Japan to shift its emphasis from trying to oduce more fish, to trying to maintain present production levels with smaller crews. At-ntion now is centered on accomplishing this through increased mechanization, such as re-ıote-control systems of engines and propellers, as well as greater use of synthetic fiber nets increase efficiency, and plastic hulls to reduce costs.

Various other techno-socio-economic factors influencing the design of fishing vessels ere discussed, such as laws concerning equipment restrictions, vessel size, construction egulations, and licensing requirements for operating personnel.

SEAKINDLINESS AND WORKABILITY

During recent years, considerable attention has been devoted to developing devices and esigning fishing vessels to provide a steady platform for better and safer deck-working con-itions as well as more comfortable living conditions at sea. It was brought out that most of ıe world's boatyards today build fishing boats from memory, experience, and rule of thumb.

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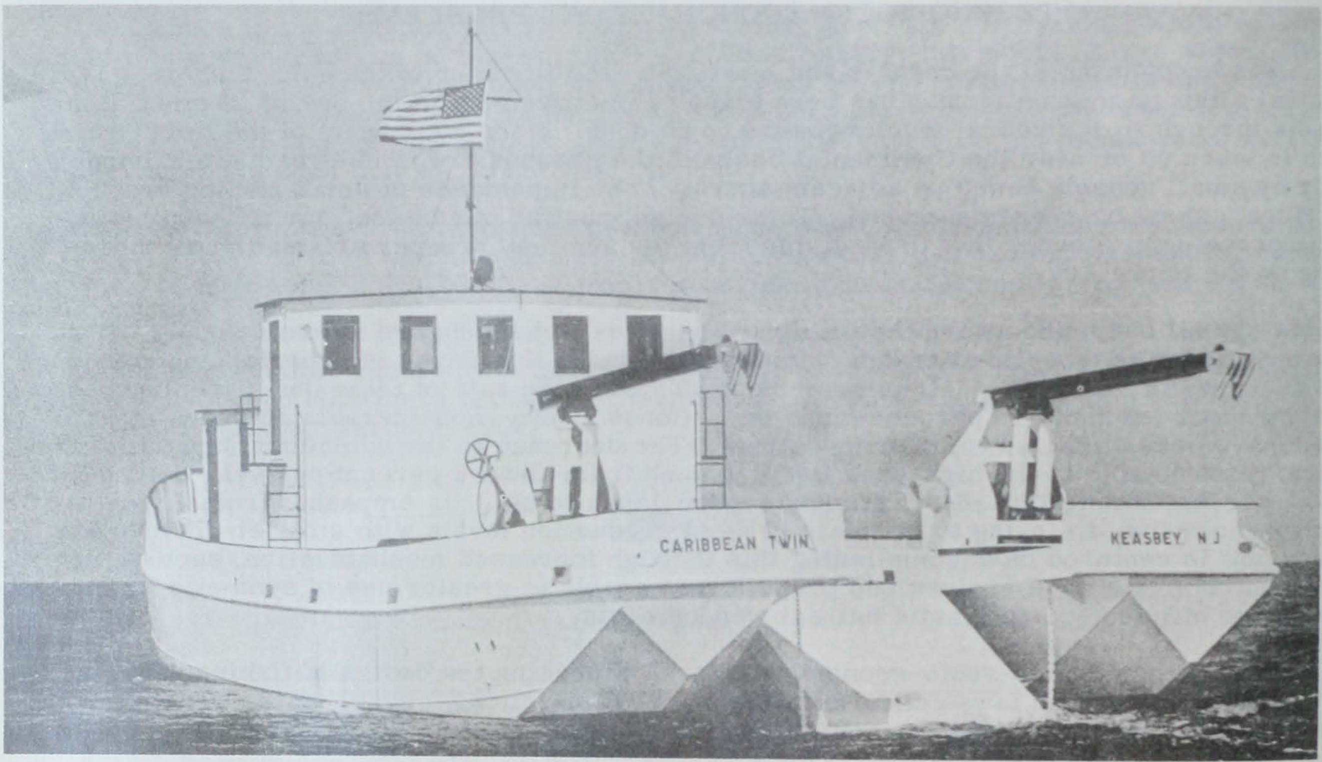
This, of course, slows down the improvement of designs of small bosts. Present procedures are quite understandable, however, when we consider that the development of the best hull form for a given set of operating circumstances would require months of work and perhaps 20 model tests. The tests alone would cost up to $20,000. By assembling model test data over many years, however, FAO had enough information to record performance data on punch cards for analysis by a computer. Accordingly, all performance information, plus dimensional description of the boats, namely, beam over draft, length over beam, fullness of midship section, and power requirements in relation to speed, were fed into a digital computer at the National Physical Laboratory, Teddington, England. The resulting analysis of some 600 boats enabled the development of a formula for estimating the performance of any boat falling within the range of the data. Next, FAO naval architects asked the computer to recommend designs for specific optimum vessels on the basis of the 600 samples. The resulting answers enabled the naval architects to make drawings for idealized trawlers of 40-, 55-, and 70-foot lengths. Twelve-foot scale models were made and tested intensively in tanks. All three sizes checked out according to the computer's calculations and performed as expected. Considerable optimism was voiced over this development. The possibilities of the computer method for simplifying and improving the accuracy of the design, as well as producing boats that will have maximum sea-keeping qualities and fishing performance, are almost beyond comprehension.



The Caribbean Twin, a 70-foot steel catamaran, designed and built specifically for commercial fishing.

The use of powered catamarans as fishing vessels was the subject of considerable discussion, which was focused on the 70-foot steel catamaran Caribbean Twin, recently constructed in the United States. Although the vessel is designed primarily as a stern-ramp shrimp trawler, she has completed a research charter for Columbia University and now is fishing shrimp out of Port Isabel, Tex. Catamarans and outriggers equipped with sails and paddles, or both, have been used for thousands of years. However, powered catamarans are relatively new and the Caribbean Twin is believed to be the first such vessel designed and built specifically for commercial fishing. Advantages of the catamaran over single-hulled craft of the same length that led to the construction of the Caribbean Twin are: the large working platform, greater seakindliness under most sea conditions, increased stability, excellent maneuverability because of the twin engines, 20 percent greater cargo capacity, 50 percent greater living capacity, and ease of conversion to a variety of types of fishing. Disadvantages lie in the increased cost (estimated at 15 percent) and the added cost and maintenance of a second diesel engine. Close tabs will be kept on operational experiences of this craft by many interested individuals.

At this point we might ask what has been done to develop devices to decrease roll thus providing a more steady working platform of small fishing vessels already constructed? Considerable discussion was devoted to recent work on application of passive free-surface tanks as roll damping devices, but no specific instance of installation or performance data aboard small fishing vessels was given. A rather simple device, commonly used for reducing the roll in vessels of the 30- to 75-foot range of the Pacific coast of the United States and Canada is the paravane-type stabilizer or "flopper stopper," suspended from outrigger poles. These have been used successfully in vessels to 86 feet long. It is estimated that on the U. S. Pacific Coast, nearly all salmon trollers, 90 percent of the albacore tuna trollers, and more than 50 percent of the otter trawlers use these stabilizers. The salmon troller uses stabilizers 24 hours a day while on the fishing grounds, and the albacore troller at night while drifting. Otter trawlers usually have stabilizers out while trawling. In recent years these devices have been used by most vessels engaged in the royal-red shrimp fishery off Florida's east coast and U. S. shrimp vessels off the northeast coast of South America. Their use permits dragging to be conducted during moderately rough sea conditions. Although one major boatyard building shrimp vessels includes paravane type stabilizers as standard equipment in all new construction, they are not always used when the vessels fish on the traditional Gulf of Mexico shrimp grounds. The use of these effective and inexpensive aids for roll damping has not yet spread to other fishing areas of the United States.

ENGINEERING OF INBOARDS AND OUTBOARDS

Discussions centered on the assumption that the approximate total number of fishing vessels is 1.5 million. Of the 70 percent, or about 1 million of those vessels still unmechanized, most are located in Asia, South America, and Africa. Until recently, small indigenous craft were mechanized by light inboard diesel engines ranging from 5 to 40 horsepower. Difficulties were encountered with inboard engines because of trouble with the stern gears either through poor design or, in well designed stern gear, poor boatbuilding and mishandling of boats. To avoid these problems, the outboard engine, characterized by being simple, easy to handle, safe, light, and comparatively cheap, was introduced. Continued success of outboards was found to depend a great deal on efficient engine servicing. It was believed by some that the market for outboard engines for small fishing boats is large enough to bring about an engine designed specifically for these vessels, but this has not taken place, and much remains to be done in this field.

NEW MATERIALS FOR VESSELS

As expected, discussions on materials for fishing vessels centered on Fiberglass Reinforced Plastic (FRP) and aluminum, which are rather recent newcomers in the construction of fishing vessels. Fiberglass Reinforced Plastic is now a proven hull material providing satisfactory service in commercial, naval, and pleasure craft throughout the world. Since 1946 in the United States, it has been used to construct 1 million pleasure craft and 2,000 naval craft. The largest fishing vessel to date of FRP has been a 74-foot side trawler constructed in South Africa, and the yard which built the vessel is contemplating construction of a 96-foot trawler. Plans call for construction of even larger fishing vessels of FRP in the foreseeable future.

At the present time, FRP for construction of fishing vessels is manufactured from two components, plastic polyester resin and a reinforcement of glass filaments. Although other plastics such as epoxy resins actually have more desirable physical and weathering characteristics, their current high price does not warrant their use for fishing vessels. Reported advantages of FRP over wood and steel are: less weight, excellent impact resistance, reduced maintenance, ease of repair, and excellent durability. In the United States, the cost of boats made of FRP is competitive with boats made of other materials if 5 or more hulls can be made at one time. Lloyds Register of Shipping has prepared provisional rules that must be met by fishing vessels of FRP between 20 and 100 feet. The requirements will be considered specially in each case for FRP fishing craft over 100 feet long.

Numerous aluminum fishing vessels are used by salmon gill-net fishermen, as seine skiffs on salmon purse seiners, and as purse boats in menhaden fishing. A 57-foot salmon purse seiner and a 64-foot Australian spiny lobster boat have been built. In addition, possible use of aluminum for fishing boat applications, other than the hull, such as deck houses on steel vessels and fish hold linings and pen boards, were discussed. When compared with steel and wood, aluminum is reported to have advantages of less maintenance, lighter weight, and it requires no paint. The initial cost, however, of a 51-foot trawler, was estimated to be about 15 to 20 percent higher than a wood hull. Throughout the discussions, participants were reminded constantly that wood still plays an important role in the construction of fishing vessels of various sizes, and will continue to do so for many years to come.

A revolutionary method of fitting ship hulls with developable or wraparound skins of continuous metal sheets caused considerable comment. The new method of hull construction would save as much as 25 percent in labor costs for the average steel-hulled boat. Instead of fitting curves to surfaces as currently practiced, the method proposes to fit surfaces to curves. The group was informed, however, that this new system for developing hull surfaces, so radically different from any used so far, would not be mastered immediately by naval architects only familiar with traditional systems.

DESIGN OF BOATS UNDER 20 GROSS TONS

The group found it particularly revealing that high-speed fishing vessels of 30 to 40 feet have become well established in the salmon gill-net fisheries of Oregon, Washington, British Columbia, and Alaska. It is estimated that 1,000 gill-netters with the same general type of hull form and speed (10-20 knots) are now in service. The form is characterized by fine forward sections to minimize pounding and flat after sections for most efficient planing with a comparatively heavy planing hull and limited (280) horsepower. With rising cost of labor and improvement in boats, it seems likely that before many years extra high-speed craft will become increasingly important, and this type of hull may find application in other parts of the world. Comprehensive papers were also presented on fishing boats for developing countries and improvement of dugout canoes and other indigenous small craft.

DESIGN OF BOATS FROM 20 TO 100 GROSS TONS

Interest in combination vessels of the U. S. Pacific Coast type is increasing throughout the world. This type of vessel, ordinarily under 100 gross tons, is designed to purse seine for salmon, trawl for groundfish and shrimp, long-line for halibut, troll for tuna and salmon, and fish crab pots. Interest in this type of vessel on a worldwide basis has been heightened by the recent interest in small stern trawlers throughout the world, as well as the realization that capability to engage in several types of fisheries provides increased opportunities for efficient year-round operation. When rigged for trawling, it has always been common practice for these vessels to locate the gallows at each stern quarter of the vessel, exactly as modern stern trawlers. The Pacific coast vessels, however, lift the cod end over the side for emptying. In recent years, these vessels have been fitted with drums, and the entire net, with the exception of the cod end, is wound on the drum. This system greatly simplifies the trawling operation and drums have been installed on nearly all Pacific coast trawlers. Considerable interest was also shown in the use of a standard Florida-type shrimp trawler for tuna purse-seining and fish-trawling operations in New England. Fishing tactics play an important role in the success of the operation. For example, through experience it was ascertained that oftentimes while the vessel was scouting for tuna, it would encounter only schools of herring or mackerel that could not be taken with the large-mesh tuna seine. To assure having the correct net on board, an airplane is used for fish-scouting operations while the vessel remains at dockside. The airplane scouts waters adjacent to Provincetown, Mass., during the morning. If tuna are spotted the pilot radios the vessel and the tuna seine is loaded; if mackerel or herring are spotted the other seine is loaded. The pilot circles the schools until the vessel arrives and sets the seine.

Interest has also increased in the construction of multipurpose combination fishing vessels in the Gulf of Mexico. The mushrooming offshore oil industry in the Gulf of Mexico has required great numbers of vessels to serve its needs. Oil survey vessels are used for seismic explorations, to transport cargo, to ferry workers to and from offshore drilling platforms, and for general utility work. Because of this growing industry, a style of vessel was developed that is readily adaptable for use in shrimp and industrial fish trawling as well as snapper fishing. Their simplicity of design tends to reduce the cost and enables them to be built by even the smallest shipyards in the Gulf of Mexico area. This type of vessel has considerable application in other areas of the world where oil explorations as well as fishing operations are carried out.

RECENT DEVELOPMENTS OF FISHING VESSELS

Many of the recent developments were discussed but the main item discussed under this topic was the trend toward smaller stern trawlers. It was indicated that designing a small stern trawler is often more difficult than designing a large one, because the problems are greater, often more controversial and the requirements are contradictory. For example, a small boat skipper wants the biggest boat with the lowest tonnage and price. He wants the ease of remote-control of operations, but he wants mechanical simplicity. He also wants a multipurpose vessel on which he can change operations while at sea. It was the general consensus that compromises will be effected and the future importance of small stern trawlers should not be underestimated.

CONCLUSIONS

Probably the most significant developments on a worldwide basis and brought out at the meeting were:

(1) Increased mechanization and increased efficiency of the fishing fleet of most countries will be necessary to offset the decreasing labor supply.

(2) More steady platforms would provide seakindliness and permit more mechanization.

(3) Use of computers in designing vessels is on a threshold of possible great development and will provide significant savings in time and money.

(4) Plastics (FRP) will be used more and more on a worldwide basis.

(5) Use of wraparound hull surface method may be significant in saving time and money.

(6) The use of combination vessels will increase considerably.

(7) The use of drums for trawl fishing will soon spread to many areas.

(List of papers presented at the Third Technical Meeting on Fishing Boats appears on page 10.)

LIST OF PAPERS PRESENTED AT THE THIRD TECHNICAL MEETING ON FISHING BOATS

Subject: TECHNO-SOCIO-ECONOMIC BOAT PROBLEMS

THE INFLUENCE OF SOCIAL AND ECONOMIC FACTORS ON DEVELOPMENT AND TECHNOLOGY IN THE FISHING SECTOR, by R. Hamisch, FAO.

TOPOGRAPHICAL FACTORS IN FISHING BOAT DESIGN, by K. Chidhambaram, India.

TECHNO-SOCIO-ECONOMIC PROBLEMS INVOLVED IN THE MECHANIZATION OF SMALL FISHING CRAFT IN JAPAN, by A. Takagi and Y. Hirasawa, Japan.

METHODE DE PROJET DES NOUVEAUX TYPES DE NAVIRES DE PECHE, by E. Gueroult, France.

Subject: SEAKINDLINESS AND WORKABILITY

A FREE SURFACE TANK AS AN ANIT-ROLLING DEVICE FOR FISHING VESSELS, by J. van den Bosch, Netherlands.

TECHNICAL SURVEY OF TRADITIONAL JAPANESE SMALL FISHING VESSELS, by N. Yokoyama, T. Tsuchiya, T. Kobayashi and Y. Kanayama, Japan.

A STATISTICAL ANALYSIS OF FAO RESISTANCE DATA FOR FISHING CRAFT, by D. Doust and J. Hayes, United Kingdom; and T. Tsuchiya, FAO.

NEW POSSIBILITIES FOR IMPROVEMENT IN THE DESIGN OF FISHING VESSELS, by J-O. Traung, FAO; D. Doust and J. Hayes, United Kingdom.

MEASUREMENTS ON TWO INSHORE FISHING VESSELS, by M. Hatfield, United Kingdom.

CATAMARANS AS COMMERCIAL FISHING VESSELS, by F. MacLear, United States.

Subject: ENGINEERING: INBOARDS

TECHNICAL EXPERIENCES OF MECHANIZATION OF INDIGENOUS SMALL CRAFT, by E. Kvaran, FAO.

ENGINE TYPES AND MACHINERY INSTALLATIONS, by C. Borgenstam, Sweden.

Subject: ENGINEERING: OUTBOARDS

OUTBOARD ENGINES IN COASTAL FISHING, by E. Estlander and N. Fuginami, FAO.

THE LOCATIONS AND SHAPE OF ENGINE WELLS IN DUGOUT CANOES, by T. Gillmer, United States; and O. Gulbrandsen, FAO.

Subject: MATERIALS

ALUMINUM AND ITS USE IN FISHING BOATS, by C. Leveau, United States.

DEVELOPABLE HULL SURFACES, by U. Kilgore, United States.

BOATYARD FACILITIES, by J. Fyson, FAO.

ALL PLASTIC FISHING VESSELS, by M. Takehana, Japan.

WOOD FOR FISHING VESSELS, by G. Pedersen, Denmark.

COMPARISON BETWEEN PLASTIC AND CONVENTIONAL BOATBUILDING MATERIALS, by D. Verweij, Netherlands.

A 110-FT. FIBERGLASS REINFORCED PLASTIC TRAWLER, by R. della Rocca, United States.

Subject: DESIGN OF BOATS UNDER 20 GROSS TONS

IMPROVEMENT OF DUGOUT CANOES AND OTHER INDIGENOUS SMALL CRAFT, by A. Thomas, Jamaica.

THE ADVANTAGES AND USES OF HIGH-SPEED FISHING CRAFT, by J. Brandlmayr, Canada.

FISHING BOATS FOR DEVELOPING FISHERIES, by P. Gurtner, FAO.

GREENLAND FISHING VESSELS AND CENTRALIZED DEVELOPMENT, by K. Rasmussen, Denmark.

Subject: DESIGN OF BOATS FROM 20 TO 100 GROSS TONS

REFRIGERATION FACILITIES IN SMALL FISHING BOAT, by S. Chigusa, Japan.

HYDRAULIC DECK MACHINERY, by F. Vibrans, Jr., and K. Bruttinger, United States.

RECENT UNITED STATES COMBINATION FISHING VESSELS, by L. Blount and E. Schaefers, United States.

SMALL STERN TRAWLERS, by W. Reid, Canada.

Subject: RECENT DEVELOPMENTS OF FISHING VESSELS

DEVELOPMENT OF JAPANESE STERN TRAWLERS, by T. Shimizu, Japan.

RECENT DEVELOPMENTS IN JAPANESE TUNA LONGLINERS, by J. Kazama, Japan.

NEW TRENDS IN STERN FISHING, by J. Minnee, Netherlands.

Note: See Commercial Fisheries Review, May 1965, p. 50; December 1965, p. 47.