. . . NAVAL ARCHITECTURE AND MARINE ENGINEERING

by JUDITH ROBINSON

In 1881, one year before the *Technic* had its beginning, a young naval officer came from Annapolis to Ann Arbor as the first instructor in Marine Engineering. Here are many of the interesting developments as seen through the years, including one of the outstanding naval tanks in the country.

The Establishment of the Department of Naval Architecture and Marine Engineering at the University of Michigan

Marine Engineering in its earliest form was first taught here in 1881 when Mortimer E. Cooley, sent as a young naval officer to teach Steam Engines and Marine Engineering, joined the team of university instructors. At that time Marine Engineering was just an option branch of the Mechanical Engineering Department. In 1889, the College of Engineering altered the budget $2,000 in order to establish a full curriculum in Marine Engineering, and the course of Mechanical Engineering was changed to Mechanical Engineering and Iron Shipbuilding. This curriculum assumed the heading of the Department of Naval Architecture and Marine Engineering in 1900 when Herbert C. Sadler from the University of Glasgow, Scotland, joined the university staff as a junior professor of Naval Architecture and Marine Engineering. In 1904, the tank and all of it equipment, entirely designed by Prof. Sadler, was installed, which officially inaugurated the Department of Naval Architecture and Marine Engineering.

Resumé of the Instructors in this Department

Mortimer E. Cooley came to the University of Michigan in 1881, a young naval officer and graduate of Annapolis, to teach Steam Engines and Marine Engineering as head of the Mechanical Engineering Department. Professor Cooley became dean of the College of Engineering in 1900, the time the Department of N.A. and M.E. was first begun. That same year, Herbert C. Sadler, graduate of Glasgow University in N.A. and M.E., joined the department, contributing a tremendous amount to the complete establishment of the department and to the field of research. Herbert Sadler worked in the Clyde Ship yards for several years and then was appointed assistant professor of N.A. in Glasgow University before he accepted a position at the University of Michigan.

Prof. Sadler, after contributing in 1904 the complete plans for the naval tank, including the towing car, became the first chairman of the Dept. of N.A. and M.E. During his stay in this university, Prof. Sadler acted as consultant Naval Architect to the U.S. Shipping Board which was like the present-day Maritime Administration. He was an expert on problems of power and stability, and one of the first men in the development of scientific principles of ship form and resistance.

Sadler, during his professorship here, wrote many papers presented to the Society of Naval Architects and Marine Engineers covering such topics as: fluid friction, steam lines, propeller design, propeller position and efficiency, suction, resistance, and many others.

In 1915, Edward M. Bragg, a graduate of M.I.T., joined the university staff. Prof. Bragg lent a great deal to present theories of hull form and resistance. Representative topics of the many papers he presented to the S.N.A.M.E. are: model propellor experiments (1924, 28, 30), feather paddle wheels (1916), frictional resistance (1926), etc.

In 1918, Anders Linblad joined the department and taught the equivalent of our present-day courses of NA11, 12, 13, and 132. (At that time, there was no course equivalent to NA21.) Professor Linblad came from a job in Cleveland, Ohio, wth the American Shipbuilding Corporation and was giving a short course in N.A. at Case School of Applied Science. During his stay here, Prof. Linblad was mainly interested in tank testing and experimenting.

Professor Herbert C. Sandler became dean of the College of Engineering in 1928, and Prof. Bragg became head of the Dept. of N.A. and M.E. It was in this year that Henry C. Adams II became a professor in this department. Prof. Adams contributed many technical papers to the SNAME including such topics as the study of rolling of ships (1938), merchant marine personnel (1939), stability of vessels after damage (1932), subdivision of ships (1942), etc. Among the courses, Prof. Adams, together with Prof. Baier, taught the course comparable to present-day A137 which was then two one-hour courses.

In June 1933, Prof. Linblad left the

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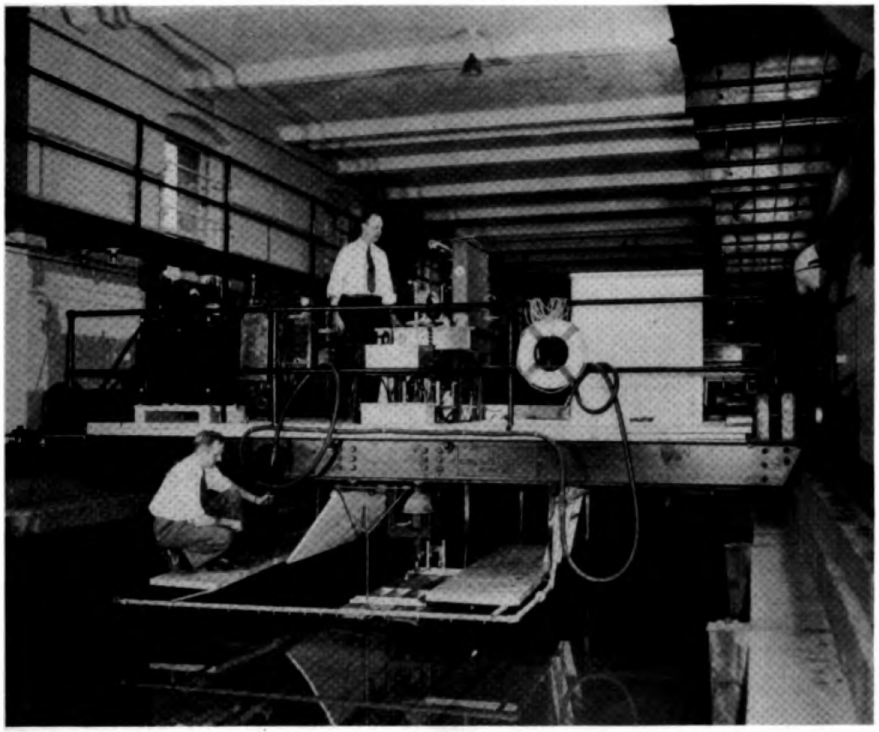
University of Michigan to accept a position as head of the Dept. of N.A. & M.E. at the University of Michigan.

During his stay at the University of Michigan, Prof. Baier, a 1914 Alumnus of Michigan, has contributed valuable reports to the SNAME and to this department, including form resistance (1935), efficient length (1934), self-unloaders (1938), propellor design (1934), launching (1942), variable-pressure water tunnels (1941), and many others. Prof. Baier has been consultant N.A. to the State of Michigan and to the Chief of Transportation of the War Dept.

Professor Edward M. Bragg retired in 1944 at which time Prof. L. A. Baier became head of the Department. It was this year that Charles W. Spooner joined the Mechanical Engineering Dept. and then later transferred to the Marine Engineering Dept. Prof. Spooner was a graduate of Cornell and received his masters in Mechanical Engineering at the University of Michigan.

In 1948, Professor Harry Benford, a 1940 University of Michigan alumnus, joined the department after working for several years as an estimator for the Newport News Shipbuilding and Dry Dock Company. Prof. Benford has contributed a great deal in the field of economics in ship design.

In June 1953, Prof. Spooner left the department and was replaced by Prof. Kenneth Maddocks. Prof. Maddocks left the university in 1956, the year that Prof. George West, graduate of the University of Michigan in 1949, joined this department.



The Naval Tank in West Engine is one of the country's largest.

Thus far in the history of this department, there has been an excellent team of instructors to impart their knowledge to future naval architects and Marine engineers.

The Building and Construction of the Naval Tank

The naval tank, entirely designed by the late Prof. Herbert C. Sadler, was built in 1904. It was ordinarily built 300 feet long, 22 feet wide, and 10 feet deep. Its sides and bottom are completely concrete, with the bottom arched and reinforced with expanded metal. A concrete bracket runs along the side to carry the rails for the towing car. At the South end are filters through which the tank is filled and a dry dock. At the end of the tank, running a distance of 133 feet, is a movable false bottom used for shoal water tests. At the north end is the 75-horsepower synchronous motor-generator which supplies enough constant power to the towing truck to move the car from 10 to 470 feet/minute in low gear and from 400 to 750 feet/minute in high gear.

In 1904, the last section of the tank had to be housed in a shed. West Engineering Building was made larger in 1908, and at that time 60 more feet, all housed but boarded over to make room for the Electrical Engineering lab, was added. When the Electrical Engineering lab was moved to East Engineering Building in 1948, the tank was unboarded for use. However, it was found to be defaulty in construction, evidently padded by the constructors back in 1908. The tank had to be completely emptied, reconditioned, and then the sides tarred before the full 360 feet of length could be used.

Models built in the early 1900's for this basin was made of paraffin wax with a small amount of beeswax. The models were cut and faired by machine after being cast from clay moulds. As might be expected, a great deal of difficulty was encountered with wax models in that they constantly changed shape, and thus had to be repaired or completely rebuilt during extensive use. It was not until later that wooden models were used as they are at present.

Many industrial companies contributed to the building of this naval tank. The Russel Wheel and Foundry Company of Detroit contributed the towing car; The Carnegie Steel Company contributed the rails for the car; The General Electric Company offered a special price for the motors and generators; and the Standard Oil Company contributed one ton of paraffin wax for the building of the models.

This model basin has tested everything from a seven foot dinghy to a floating dry dock. The tank has aided in the development of barges, towboats, fireboats, U.S. Shipping Board boats, submarines, yachts, trawlers, cup defenders, and many other commercial vessels.