

Industrializing American Shipbuilding: The Transformation of Ship Design and Construction, 1820-1920

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Review

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Thiesen, William H. *Industrializing American Shipbuilding: The Transformation of Ship Design and Construction, 1820-1920*. University Press of Florida, \$59.95 ISBN 813029406

The Evolution of Shipbuilding

America Becomes a Naval Force

In 1820, ships were built of wood, by eye, by artisans. In 1920, they were built of steel, from drawings, by factory workers. In **Industrializing American Shipbuilding**, William H. Thiesen describes how American shipbuilding changed from a craft to a heavy industry. While acknowledging the complexity of the transition and the multitude of contributing factors, he skillfully interweaves two main story lines—ship design and ship construction—and two main schools of thought, which he designates as practical and theoretical.

Practical ship design depended upon master craftsmen who learned their skills through apprenticeship and experience. To build a new vessel, the master shipwright would select an existing vessel as a model and build a replica by rule of thumb, possibly making a few improvements. Theoretical or scientific design began as a conscious effort to base naval architecture on the rationalism of system and mathematics. At first, the theoretical method was strongly empirical, but over time, scientific shipbuilders developed a body of knowledge about the behavior of iron and the best ways to use it in a ship's hull. As this knowledge accumulated, it became more common for it to be transmitted through formal education and publication rather than through apprenticeship or experience. Although the author does not explicitly say so, by the mid 1800s, British scientific ship design was well embarked on the transformation from job to profession that Bengt Abrahamsson labels professionalization. In America, by contrast, ship design through mid 1800s remained strongly practical. American artisans concentrated on the knowledge accumulated through experience, both that of the builders and that of the operators—the best test tank was the ocean.

A recurring theme of the early chapters is the divergence between Europe (primarily Britain) and America. In shipbuilding as in other fields, Americans prided themselves on being practical. They generally looked down upon European-style theorists and saw the British professionalization of naval architecture as antidemocratic, while the Europeans saw themselves as working intellectuals rather than mechanics. As long as incremental change was the rule, theory had little advantage—a practically designed vessel was unlikely to offer dramatic improvements over its predecessors, but it was equally unlikely to fail spectacularly.

The coming of steam and the screw propeller disrupted the equilibrium, and the introduction of iron destroyed it. The practical shipbuilder lost the benefits of design continuity in adapting old designs to new technologies, but the scientific designer could take better advantage of the increased range of technical options that stemmed from iron construction. While erroneous or incomplete theory sometimes led to an unsuccessful ship, scientific design had far more room to grow than did practical design.

A clear message from Thiesen's work is that advances in construction and organization were far less dependent upon theory than was design, and as might be expected, practical American shipbuilders were thus more likely to embrace them. By 1860, American wood shipyards had moved from rural to urban areas, where they took advantage of abundant labor, steam power, and advanced ideas of organization. The production methods evolved in these urban yards pushed wooden ship production as far as it could go technologically.

The organizational and managerial advances made by the large urban shipyards were vital, Thiesen notes, and iron shipyards adopted as many of the methods and technology from their urban wood counterparts as they could. Two caveats apply to this analysis. First, adoption appears to have been collective rather than unique to any particular shipyard. Thiesen notes that in Britain, some wood shipyards successfully transitioned from wood to iron construction but many did not. Similarly, in the United States, the lineage of many successful iron shipyards owed more to the machine shop than to the wood shipyard.

Second, while iron shipyards as organizations adopted methods and technology from urban wood shipbuilders, workers as individuals did not. Thiesen opines, If a woodworker faced the choice between unemployment and

becoming an ironworker, he probably made the transition, but George Micheal O'Har's study of shipbuilders in East Boston indicates that most entered unrelated (non-shipbuilding) trades. In all likelihood, some woodworkers moved to follow the wooden shipbuilding industry in its late-century retreat from urban centers. Wooden sailing ships for the coastal and long-haul trades would again be built in small yards, primarily in areas where wood was still plentiful and labor was cheap, while iron ships were being built in ever-larger urban yards.

The last chapters of the book discuss the convergence of British and American shipbuilding strengths to form a New American Style of Shipbuilding characterized by theoretical design methods and the latest in rationalized production processes. Driven predominantly by the efforts of naval officers who brought to the United States the [British] socio-technical system of theoretical shipbuilding, it was abetted by the perception of naval weakness that grew in the United States in the 1870s. From the 1870s through the early twentieth century, technology ran both ways—What the Americans gained in design methods and technology from Europe, they returned in new construction methods and technology. By the end of the century, US Navy yards were once again equal to the best civilian shipyards, and both were prepared for the intense industrial shipbuilding programs of the First World War.

The author's assessment of shipbuilding progress is both broad and deep. His introduction to the technologies that reduced or replaced manual labor, such as cranes, material handling systems, and electric and pneumatic tools, could be expanded into a valuable and interesting monograph. The work is copiously annotated and well informed by both archival and published sources.

The one exception is the treatment of the Civil War Navy, which does not seem to engage with recent literature. An example is the failed light draft monitor program. The author characterizes it simply as a case of what happens when a practical builder executes the design of a theoretical builder like [John] Ericsson, but the roles of theorist and practical engineer actually appear reversed. Master draftsman Ericsson's drawings of the light drafts were but sketches that show little detail, seemingly in tune with the practical tradition of building iron vessels without a set of drawings. By contrast, practical engineer Alban C. Stimers produced detailed drawings for every part of the light drafts and did not permit the contractors to use the outline draft and specification book to work ahead of the official drawings. Stimers's additions to the design were certainly unwise and the program was certainly a failure, but the author oversimplifies the

issues and his incorrect chronology skews his view of the light drafts.

The book incorporates several photographs that ably illustrate parts of the shipbuilding process. Although the book deals overwhelmingly with shipbuilding on the Atlantic coast, most of the photos appear to depict Great Lakes establishments, so a brief assessment of Great Lakes shipbuilding relative to the East Coast might be helpful.

Industrializing American Shipbuilding provides a well-researched look at a critical period of transition in one of America's most important industries. Maritime historians and general readers will find much to enjoy and to ponder in this wide-ranging book.

William H. Roberts, a retired surface warfare commander, received his Ph.D. in history from The Ohio State University. He is the author of "Now for the Contest": Coastal and Oceanic Naval Operations in the Civil War (University of Nebraska Press, ISBN 0803238614, \$39.95 hardcover) as well as Civil War Ironclads: The U.S. Navy and Industrial Mobilization (The Johns Hopkins University Press, ISBN 0801868300, \$49.00 hardcover) and USS New Ironsides in the Civil War (Naval Institute Press, ISBN 1557506957, \$49.95 hardcover).