

CONSTRUCTION INDUSTRY INSTITUTE®

EXAMINATION OF THE SHIPBUILDING INDUSTRY

Construction Industry Institute

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Examination of the Shipbuilding Industry

**Prepared by
Construction Industry Institute
Examination of the Shipbuilding Industry Research Team**

**Research Summary 232-1
July 2007**

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The University of Texas at Austin.

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Printed in the United States of America.

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Executive Summary

The global shipbuilding industry has undergone a dramatic transformation over the past two decades. The industry has reinvented itself from one that traditionally built one-off, stick-built constructed products to one that has introduced the use of standardization, modularization, automation, design reuse through product families and interim products, and extensive supply chain integration. The result is the achievement of providing low cost, short delivery products in a highly competitive, low margin marketplace.

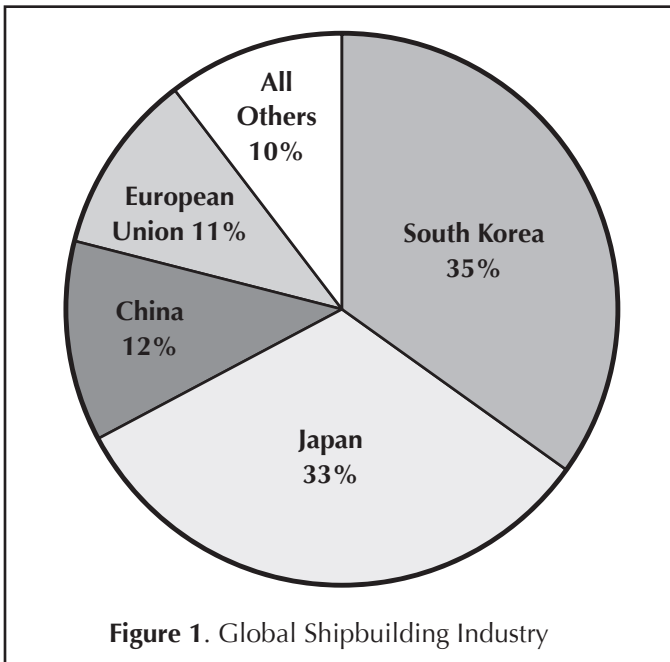
While the U.S. shipbuilders dominated commercial shipbuilding worldwide as little as 50 years ago, it now maintains a small market share below one percent. Although commercial shipping has largely left U.S. shores, military shipbuilding has remained a domestic staple for the shipyards. Through the use of modularization, automation, and product families, the U.S. shipyards have been able to enjoy, to a small degree, the benefits of new technology and processes. However, the high degree of product variability and heavy customer interaction often negates many of these benefits.

CII funded this research effort with the primary objective to evaluate the practices and processes used by the industry leaders in Europe and Asia and to establish a list of those practices that have made the greatest impact in allowing these companies to achieve lower costs and shorter delivery schedules. The study compares a modern commercial ship design and assembly process map to several generic construction process maps. The resulting information outlines the key enablers necessary to implement a successful model of the shipbuilding industry to the construction industry.

The goal here is not to implement a solution, but to establish the characteristics by which the European and Asian shipbuilding industry evolved into worldwide leaders in the low cost, short delivery commercial ship market. This publication summarizes the research and points out key factors that might be transferable from shipbuilding to the engineering and construction industry.

Introduction

In the past two decades European and Asian shipbuilding has captured the lion's share of the commercial shipbuilding market. The majority of this market share was captured from U.S. shipyards that as recently as 50 years ago dominated all shipbuilding worldwide. Through the use a structured design and assembly plan that utilizes ship class standardization, design reuse, an interim product structure, automation and robotics, modularization, single ownership and single-location assembly, and strong supply chain integration, the European and Asian participants are now the leaders in the worldwide shipbuilding market with low cost and short delivery. American shipbuilding, conversely, struggles. Consequently, U.S. shipyards constitute less than one percent of the worldwide commercial shipbuilding market share (see Figure 1).



Commercial shipping has largely left U.S. shores. Military shipbuilding remains the focus domestically, and while it allows for modularization, the lack of standardization, the ever-changing weapons technology, and high exchange of customer information during design makes this sector an expensive one. To address this situation, the National Shipbuilding Research Program (NSRP) was chartered to reduce the cost of building Navy warships.

Research Objectives

The purpose of this study was to examine the shipbuilding industry with respect to design and fabrication, the integration of these activities, and the functioning of supply chains. Through this process, the CII research team planned to identify techniques that are potentially transferable to construction and to quantify the potential impacts. Other objectives are listed below.

- From published sources, develop a representative process map of the typical modern commercial ship design and assembly processes.
- Compare the representative shipbuilding map to several generic construction project process maps (design and construction) as consistent with CII member firms and the expertise of the research team's members.
- Determine any significant differences, in particular in the use of CII-recommended practices or related practices.

The Shipbuilding Industry

The success of the commercial shipbuilding industry, particularly in Asia, has not come without growing pains. It has taken the most successful companies several decades to perfect those processes that have made them the leaders in a competitive industry.

The origins of shipbuilding worldwide were traditionally based on “stick build” design (see Figure 2). Ships were actually built of wood, and built piece by piece. The process was highly labor intensive and produced in sequentially ordered steps. Work was generally accomplished in multiple