

Preface

This book aims to introduce various aspects of ship construction starting from ship types, material of construction, welding technology to accuracy control. This book is the outcome of my experience of teaching Ship Construction and Welding Technology, Design and Construction of Ocean Structures, Marine Construction and Repair Techniques as regular and elective courses in undergraduate and graduate curricula during about past 30 years in the Department of Ocean Engineering and Naval Architecture at IIT Kharagpur. While teaching and working in this field, I felt the lack of a suitable book covering the various basic aspects of ship types, its structural components, materials, and aspects of its welding and dimensional control. This inspired me to get on this job and provide the budding naval architects with a comprehensive book on ship construction and welding. The contents of the book have been logically organized and spread over 21 chapters.

It starts with introducing to the novice reader the various types of ships based on cargo type and functionality and also the basic characteristics of shipbuilding industry. It then goes on to describe the various loads experienced by the ship structure and thereby working out suitable structural arrangement to sustain these loads. This forms the background to the introduction of the types of framing system, basic structural components, structural subassemblies and assemblies. All of these are explained with necessary illustrations and details. The book then goes on to work out the midship sections of some of the most widely used ship types, explaining the design strategy based on functionality. The book also includes the aspects of structural compensation for unavoidable discontinuities in ship structure.

Next the book covers various aspects of material of construction. It includes material description, classification requirements and different methods of steel material preparation. Subsequently different methods of metal cutting, plate and section forming are introduced along with the concept of line heating for obtaining compound curvature plates.

The reader is then introduced to various welding techniques related to shipbuilding industry. Here different fusion welding methods, power sources, effect of welding process parameters, metal transfer mechanism are discussed in detail. The solid-state welding technique suitable for aluminum welding has also been

incorporated. The formation of weld-induced residual stresses and distortion has also been explained in detail. It then goes on to present in-process distortion control and mitigation techniques such as heat sinking, thermo-mechanical tensioning, etc. suitable for ship structural units. Finally, the book introduces various possible welding defects that one is likely to encounter in welded structures and explains the nondestructive testing methods those are relevant to ship construction.

With all the construction done, it is necessary to have a suitable mechanism to know the ranges of variations in structural fabrication so that one can quantitatively target the end product accuracy. To address this aspect a chapter on accuracy control has been included in this book.

I believe the contents of this book should prove useful to the students of naval architecture and ocean engineering as well as the shipbuilding professionals.

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