

BUNKER FUEL FOR MARINE ENGINES

A Technical
Introduction

Nigel Draffin

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Dedication

This book is dedicated to my wife Chris and my sons, David and William, who put up with years of ‘an absent husband’ and ‘an absent dad’ whilst I acquired the experience and understanding to write this book yet who never insisted that I should seek a more conventional lifestyle.

Nigel Draffin



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FOR MARINE ENGINES**
A Technical Introduction

by
Nigel Draffin

First Edition

Foreword by
Dr Rudolph Kassinger

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Foreword

Nigel Draffin is a natural teacher who loves the industry to which he has dedicated almost 50 years of his life. In his latest book, *Bunker Fuel for Marine Engines – A Technical Introduction*, he has written a comprehensive sequel to John Lamb's seminal treatise, *Petroleum and its Combustion in Diesel Engines*. This book, first published in 1955 and long out of print, now has a worthy successor which encompasses another 57 years of history in the bunker fuel sector during which there have been dramatic developments in main and auxiliary diesel engine design, vessel types and other technological advances.

In *Bunker Fuel for Marine Engines – A Technical Introduction*, Nigel once again gets right down to the basics to describe the most complex of issues in a simple, direct style. In this book he sheds light on the complicated relationship between ships' engines and the marine fuels that power them, and he provides the reader with a solid introduction to a subject which every supplier or user of marine fuels would do well to understand.

If you have ever looked at a message from a ship describing an onboard fuel-related problem and wondered what on earth it means, or if you have ever wondered why there are so many different machines in a ship's engine room, then this book is written for you.

Bunker fuel is the life-blood of the ship. It provides the energy for propulsion, electrical power, heating, cooling, cargo care (including passengers) and for the operation of the onboard pneumatic and hydraulic equipment.

A ship's engine room is a place of refuge for engineers but a place of mysteries to most others. Nigel Draffin embarks on a technical tour around the equipment that will be found there, from main and auxiliary engines to generators, refrigerating plant and other fuel-using machines. This is a chance to look underneath the bonnet or hood and, perhaps for the first time, to recognise what makes this equipment work and why some fuel problems are more significant than others.

He takes the reader through the process of burning fuel onboard, from storage of fuel to dealing with the exhaust, before looking at the different types of diesel engine and their specific fuel requirements. He looks at gas turbines, fuel cells and developments in shore power, and covers boilers, fuel and accommodation heating and incinerators, before also looking at waste heat recovery systems.

Fuel types and bunker quality standards are succinctly reviewed, as well as blending, storage and onboard fuel treatment, where the work of separators, purifiers, clarifiers, decanters, homogenisers, filters and other engine room kit is explained. Fuel heating, pumps, fuel measurement and storage are also amply covered.

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Importantly, the book looks at emissions and how they might be controlled, and also at unconventional fuels such as biodiesel, shale oil, liquefied and compressed natural gas, liquefied petroleum gas and even coal.

As someone who has been deeply involved with marine fuels for even longer than Nigel Draffin has, I can see that this book is a valuable addition to the growing library of useful books on marine fuels. I suggest that this volume should have a place onboard ship or on the shelves of a shipowner, charterer or bunker supplier. It seems to me that the more people able to access and understand the information contained in this book, the fewer fuel-related engine problems might be expected. And for seafarers, and for those involved in any way in shipping, this can only be a good development.

Dr Rudolph Kassinger

Westfield, New Jersey
May 2012

Preface

I have always wanted to write a book that introduced the non-specialist to the fascinating world of how ships work. In this book I have focused on the engine room and on the equipment that heats, treats and burns fuel.

My intention is to explain what goes on in this space, how the machinery works and integrates with the ship's functions, and why the way we source, supply, treat and use fuel is so significant for the efficient, economic and environmentally acceptable operation of ships.

This book is not a textbook for marine engineers, nor is it an academic reference book for serious study. It is a book that may prove a useful companion for non-specialists when they are confronted with comment or detail they do not immediately understand.

If I have oversimplified, or if my explanations are in any way misleading, then I apologise in advance but would plead the need to keep things clear and simple.

Nigel Driffin

May 2012

About the author

Bunker Fuel for Marine Engines – A Technical Introduction is Nigel Draffin's fifth book on marine fuels and one of the first to address technical issues in bunkering since John Lamb's iconic *The Running and Maintenance of the Marine Diesel Engine* written in 1927 and *Petroleum and its Combustion in Diesel Engines*, written in 1955.

Nigel has been involved in shipping for almost 50 years and with the commercial bunker market for over 25 years. After joining Shell Tankers as an apprentice engineer in 1966, he progressed through the ranks, serving on all classes of vessel, including very large crude carriers (VLCCs) and liquefied natural gas (LNG) tankers.

He came ashore in 1979 to join the newbuilding department of Shell International Marine. After two years of new construction in Ireland, South Korea and the Netherlands, he transferred to Shell's Research & Development unit, specialising in control systems, fuel combustion and safety systems.

In 1986, Nigel moved to the commercial department as a bunker buyer and economics analyst. In 1988, he was promoted to be Head of Operational Economics, responsible for all of the fuel purchased for the Shell fleet, the operation of the risk management policy and the speed/performance of the owned fleet. In March 1996, he joined the staff of E.A.Gibson Shipbrokers Ltd in the bunker department, and became the manager. In 2006, this department merged with US-based broking house LQM Petroleum Services, where Nigel is currently Senior Broker and Technical Manager.

Nigel is a founder member of the International Bunker Industry Association (IBIA) and has served several times on its council of management and executive board. In April 2012, he was elected Chairman and is a member of the Education Working Group. He is also the author of IBIA's *Basic Bunkering Course*. He is the Director of both the *Oxford Bunker Course* and the *Oxford Bunker Course (Advanced)*. Nigel is a member of the Institute of Marine Engineering Science and Technology and Past Master of the Worshipful Company of Fuellers.

Nigel's bunker books have been sold all over the world and continue to contribute enormously to the knowledge and understanding of hundreds of newcomers to the industry.

Llewellyn Bankes-Hughes
Managing Director
Petrospot Limited

May 2012

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Special thanks are due to Dr Rudy Kassinger who gave encouragement as soon as he knew that I was going to write the book.

Many colleagues in IBIA, LQM and elsewhere have answered my questions and made suggestions that have contributed to the scale and scope of this volume. My thanks must also go to the students on the *Oxford Bunker Course* and other training events for asking an endless flow of questions that provided much of the inspiration for the content.

I would also like to note the help and support of two senior engineers from Shell Tankers and Shell International Marine, Arthur Findlater and David Cusdin, who gave me encouragement and inspiration during my career. They have now passed on and I only regret that I was never able to tell them how much their guidance helped me at the time.

I extend my thanks to Llewellyn Bankes-Hughes and his team at Petrosport for pressing me into writing this fifth book on bunkering. Particular thanks are due to Alison Cutler, Cheryl Marshall and Lesley Bankes-Hughes for designing, producing and bringing the book to life.

Nigel Draffin

May 2012

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