

# Preface

This textbook provides, in a compact form, the fundamental knowledge in the science of railway operation in a close connection with signalling principles and traffic control technologies. It was written both as a tutorial for students of railway-related programs and as a reference for people in the industry.

But different from most other railway-related textbooks, it does not explain how the railway works in a single country. Due to the historical development, the operating procedures and terms of the railways in different countries differ significantly, probably much more than in any other field of technology. Even very basic terms and definitions may vary extremely. First, there are essential differences between the North American railways and railways that follow European operating procedures. And second, even within Europe, operating procedures and signalling principles differ significantly between railways that follow rather the British and those that follow rather the German principles. And, as if this were not enough, in many countries there are also differences between the operating principles of the standard railway networks and light rail systems.

But, regardless of these differences in the operating philosophies, the basic principles of movements of railway vehicles are always the same. Although written from a European point of view, this book tries a generic look at railway operation without concentrating on the operating philosophy of a single railway. But where it makes sense, it is always mentioned if an operating procedure or signalling principle could only be found in a specific country or groups of countries. After an introductory chapter on basic terms and definitions, the second chapter provides some background on train movement dynamics. The following chapters on train separation and interlocking principles form the main part of the book. Other chapters cover capacity research, scheduling, and traffic management.

The terminology used in this book is neither pure British nor pure North American. I always tried to choose generic terms that are understood

everywhere. The experience from using this textbook as a tutorial for railway courses in different parts of the world have approved this concept. For a better understanding, a glossary was added with definitions of more than 200 basic terms of railway operation and control.

For the 4<sup>th</sup> edition, the content was thoroughly revised considering current developments in railway signalling and control technologies. In the chapter on capacity research, there is now a more comprehensive explanation of the background behind analytical methods and simulation and of the strategies to apply these methods. In the section on automatic train protection, a paragraph on the Chinese Train Control System (CTCS) was added. So, with ETCS, CTCS, and PTC, all communication-based train control systems used in mainline operations worldwide are now covered.

The information presented in this book is in no way intended to supersede or negate any rules, regulations, or instructions of government bodies or railway companies. Further, it is not intended to conflict with any currently effective manufacturers operating, application, or maintenance instructions and/or specifications.

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