

Preface

This book intends to provide an overview and introduction into the physical and operational mechanism of the air transportation system. To think about new aircraft technologies or new airline business models, it is of paramount importance to understand the major interdependencies and interactions between the main stakeholders like airline, airport, air navigation services and aircraft manufacturer.

Compared to other publications on air transportation the focus is on the basic and major technical and operational characteristics of different technologies and procedures to show the functional principles. The functional and process-oriented perspective on air transportation seems to be a key for future developments and progress.

Therefore, the book starts with an introduction to the definition of the air transportation system and its main stakeholder.

A historical look back on the development of the air transportation system highlighting the big steps forward is given in Chap. 2.

Methods to predict the future of aviation, such as scenario technique and market forecasts of the various manufacturers, are presented in Chap. 3.

Chapter 4 gives an overview of governmental rules and organizations, which directly affect air transportation. The safety philosophy of aviation is presented with an introduction to the certification of aircraft and ATM-systems. Also, security as an upcoming major issue is addressed.

Chapter 5 presents an introduction to the physics of flight and the principles of aircraft design. Also, boundaries and limitations of aircraft operations are discussed. A discussion of various aircraft configurations including an outlook to unconventional future configurations closes this chapter.

Chapter 6 is dedicated to the aircraft manufacturer. A focus is put on the organization and development process in international companies. The cashflow and economical assessments of aircraft programmes are also part of this chapter. Finally, the actual supply chain and the role of the engine manufacturer is addressed.

Ways of how an aircraft is operated by an airline are discussed in Chap. 7. The development of global operation strategies is discussed including the different

concepts of low-cost carrier and flag carrier. The relevance of alliances, fleet planning and network development is investigated as well. Also, pricing and ticketing are part of this chapter as well as the role of aircraft maintenance.

Chapter 8 addresses the airport as a major stakeholder. Principal airport concepts and layout are introduced and the various operations on an airport around the aircraft, especially during turn around and taxiing are presented.

The airspace structure and the principal air traffic management processes are part of Chap. 9. Also, the basics of navigation and guidance technologies including the modern satellite-based systems Gallileo and GPS are presented. The safety issues of aircraft separation and wake vortex are also part of this section.

Chapter 10 is dedicated to the environmental boundaries of air transportation. The principles of climate impact and atmospheric implications are presented. Also noise as one of the most significant environmental impacts is discussed. Within this context, emission trading concepts and fees are also presented.

Air transport and its competitors are highlighted in Chap. 11 discussing future challenges. The role of high-speed trains as automotives is investigated and also the impact of new communication technologies on the air transport market is described.

The book closes with an outlook to future challenges and perspectives of air transportation in Chap. 11.

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