



Handbuch der Raumfahrttechnik (Handbook of Space Technology)

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5., Revised and Expanded Edition 01/2019
944 Pages, with complete in color. Hardcover with e-book Inside

Language: German

With a lift-off weight of 2,7 kg the handbook has gained more substance than ever before and has well exceeded the title “hand”-book, however easy usage is facilitated by providing a free e-book version (registered download) with each hardcopy purchase to use search- and link features of your computer.

“For many reasons, the moon is returning to the focus of space agencies as an exploration target. As for our neighboring planet Mars, diverse activities exist in Europe as well as internationally. In order to meet the challenges of the space science discipline, only a few decades young, excellent engineers are needed to advance the development of mission-critical technologies, the operation of satellites in the depths of space or constellations in orbit and to develop new approaches to ensure the usability of the near-Earth orbit. Future generations of space travelers and space probes will fly into space carried by their accumulated knowledge.

This handbook will serve as an excellent reference for the multitude of tasks to be considered in the development of space systems both during education and study and afterwards during the practical application for innovative space exploration system designs.” (Foreword, Thomas Reiter, Alexander Gerst, ESA Astronauts).

This invaluable fifth edition of the handbook has long passed the character of a handbook - it is the most advanced, up-to-date encyclopedic edition of the evolution of space technologies since the beginning of modern space exploration. Initially focused on European developments, the experience gained over many years of international collaborations has contributed to the global character of the handbook.

The central chapter "Spacecraft Subsystems" (chapter 4) covers all subsystem and design aspects of satellites and space vehicles and their components in a sound and comprehensive manner. This chapter is supplemented by an introductory historical overview (chapter 1), the space fundamentals (chapter 2) such as orbit mechanics, aerothermodynamics and reentry, as well as the treatment of current issues such as debris treatment and -avoidance. A detailed chapter (chapter 3) deals with development and current status of launchers, available launch infrastructures and launch vehicle qualification processes. Easy to read charts provide a global overview of the available (as of 2018) and planned performance comparison of launch capabilities between global space agencies and private industry (including Russia and China).

A very detailed chapter (chapter 5) is dedicated to international human spaceflight activities (space conditions, life-support systems, RVD).

A very comprehensive chapter (chapter 6) is dedicated to mission operations of manned and unmanned missions: satellite operations, control center systems and tools, ground station networks, and manned missions with prospective future lunar and mars missions i.e., centralized, decentralized

international mission operation, communication interfaces, qualification, testing and simulation facilities.

A chapter, not necessarily expected in a space technology handbook - and as in this form also not otherwise published, a very detailed chapter (chapter 7) is dedicated to space science. Written by Prof. Dr. Bernd Feuerbacher (former IAF President and Project Scientist of the two German SpaceLab Missions), an outstanding scientist with many years of practical international space experience, provides a complete overview of research goals and methods, experimental equipment, objectives **and results** of space exploration and weightlessness research achieved worldwide since the early days of scientific space flight.

Chapter 8, "Design of a spacecraft" deals with mission concepts and architecture, system design and integration, environmental simulation and test concepts and illustrates the principles with practical examples such as CubeSat, microsattellites, the European Galileo-navigation satellite system and other radar satellites.

The final chapter 9 delves deeply into the internationally applied principles of space project management: description of the standardized project phases and project management (based on ESA standards), quality management, cost management and finally deals with international space law like liability obligations and risks.

Of great benefit are the detailed bibliographical references accompanying each chapter and in some cases also links to further Internet pages, as well as the provided table of Contents (TOC) and the attached indexes: Acronyms and Abbreviations, Symbol List and a perfect Index list which makes navigation in the book extremely easy.

A personal spot check of the Index-test of current subjects yielded the following results (headlines in the book are in German):

Debris (Space Debris 83,127,131, Weltraummüll 83, Weltraumschrott 888, Weltraumtrümmer 127)
3D-Printing (3D-Druckverfahren 239, 242)

Interfaces (ICD 490,TOC: 6.4.1.3. Abstimmung der Schnittstellen zu den internationalen Partnern)
Standards (ECSS-Standards, 813)

Internationale Standards (no entry)

Cubesats (Growing capabilities 750 ff)

Private Space Industry (Falcon 9, 152, TOC 3.1.5.1. „Aktuelle Trägersysteme“, and 5.3.2.1 Dragon/Cygnus)

Return to the Moon & Beyond (no entry in Index , TOC: 3.1.5.2: Konzepte für die Zukunft)

With the help of the Index list and the table of contents (TOC) one can almost always reach the desired destination quickly and often find references to more detailed literature or websites. Search engines for the e-book reader will certainly be even more successful in finding keywords (unfortunately could not be tested by the reviewer).

The Handbook belongs on the PC of each “space- student” (e-book), into the office of each “arrived” space-engineer, even in the mission operations control rooms for back-ground information, it belongs onto the public library shelves and into the private library of space aficionados as well as retired space-buffs to study proudly the breathtaking progress space technology has made in such a short period of time - because it is currently the only technically oriented space handbook which covers completely and totally up-to-date all instrumental developments and operations techniques, methods and processes – even scientific experimentation principles and important results from the very beginning up to the present (2018) not only from an European point of view but covering all important global

technological insights gained by a long history of cooperative collaboration among almost all of the main spacefaring nations for advancing space technology for robotic- and human spaceflight missions for the benefit of the next generations.

Note: Unfortunately only an earlier issue (issue 3) of the “Handbook of Space Technology” is available in English, however a combination of the new e-book version together with free internet translation capabilities might help to reduce the gap for individual chapters.

April 2019, Joachim J. Kehr, Editor SpaceOps News for the “Journal of Space Operations & Communicator”
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