The Mechanics of Mechanical Watches and Clocks

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1. Auflage 2012. Buch. xi, 179 S. Hardcover
ISBN 978 3 642 29307 8
Format (B x L): 15,5 x 23,5 cm
Gewicht: 456 g

Preface

Invented some 600 years ago, the mechanical watch and clock still fascinates millions of people old and young around the world today. Arguably, the mechanical watch is the most complex micro mechanical device that represents the climax of mechanical engineering and craftsmanship. When we encounter a mechanical watch, we try to look at its motion and listen to its sound. For those with an engineering background and/or a deeper interest, a question will then follow: How do they work? In the past 300 years, there have been a number of books and many hundreds of articles written about all aspects of the mechanical watch and clock. However, few examine the mechanics of the mechanical watch and clock in the context of modern mechanics.

Following the rules of economics, public interest generates business opportunities and profits. It is estimated that the mechanical watch and clock industry is a 10 billion US dollars per year industry. It is dominated by Switzerland, followed by Japan and China. In the past few years, we were fortunate to work on the design and manufacture of the mechanical watch and hence, had learnt the mechanical watch and clock in great detail. We wish to share our understanding with the readers of this monograph. It should be pointed out that the book is not for the design of the mechanical watch and clock, but for its mechanics. Also, the book is written not for the general public but for those who possess a proper background. Specifically, the required background knowledge includes calculus and mechanics at the university level.

Looking back, we remember the difficulties of working on the design and manufacture of the mechanical watch. One of the difficulties was understanding its mechanics. To overcome this difficulty, much effort has been spent. In some sense, the book is a collection of three Ph.D. theses, two M.Phil. theses and a number of B.S. Final Year Project reports and several papers from our Postdoctoral Associates. Following is a partial list of contributors:

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It is a joy to understand such a complex device and to make it work. We wish to share this joy with the reader.

Hong Kong, April 2012

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