
Preface to the German Edition

Quidquid agis prudenter agas, respice finem

Safety is a basic human need. That is why a modern society must ensure that industrial production is safe. The task of engineers dedicated to process and plant safety is to achieve this. They ensure that plants are designed for safety and built and operated safely and that people have safe work places. Only if this is fulfilled is the operation of industrial plants ethically acceptable.

Safety means that hazards are kept small. However, there is no possibility to eliminate them completely; for whatever is possible will occur with a certain probability.

In order to make technical systems safe, the probability of hazards must be reduced as far as possible. This requires a structured approach which is based on experience as well as experimental and theoretical findings. In this book, the approach for analyzing and designing safe process plants is described. Starting points are possible hazards from material properties and operating conditions. The focus is placed on the qualitative and quantitative modelling of technical systems and the simulation of physical and chemical processes during operation and accidents. The material presented is extended and complemented by a number of examples and case studies, which refer to real plants or events.

A characteristic of analyses of process and plant safety is that the interdependencies within the technical system, the influence of its components on one another and human interventions must be accounted for. A further characteristic is the stochastic nature of the processes to be analyzed, which renders it, for example, impossible to predict the moment of occurrence of an accident. These aspects are duly addressed.

Process and plant safety is interdisciplinary. Just as for building and operating a plant process, mechanical, electrical, and civil engineering as well as informatics have to be combined, plant safety needs these disciplines, too. This makes the

selection of topics difficult and shows that experts for safety, who cannot possibly have a command of all these areas of knowledge, should address safety tasks in cooperation with specialists of the areas mentioned.

The selection of topics follows that of the model curriculum “Process and Plant Safety” of ProcessNet. My gratitude goes to my colleagues, Profs. A. Schönbacher, H. W. Brenig, H. U. Moritz, and J. Schmidt as well as to Dr. O. Klais for instructive and vivid discussions when elaborating the curriculum and deciding on unavoidable omissions.

Safety needs foresight. It should not derive from trial and error as it did in the earliest days of engineering. An important tool is the elaboration of scenarios, i.e. potential developments of the future. This requires thought experiments to be performed, which must be based on a broad background of knowledge in engineering and natural sciences as well as of experimental results and the simulations of accidents.

The book provides students and practitioners with the necessary tools for analyzing processes and plants and designing them for safety. It makes use of knowledge in mathematics, physics, chemistry, as well as of thermal and fluid dynamics, as taught during the first semesters of engineering courses.

The text is based on courses which I have been offering for more than a decade and a half at the Otto-von-Guericke-Universität Magdeburg. Discussions with collaborators and students have contributed to it. I thank them for their dedication.

I gratefully acknowledge the expert advice of Professors U. Stephan and Y. Ding, and Drs. J. F. Bremen, V. Schröder, D. Jablonski, and Arizal, as well as that of Dipl.-Ing. P. Guterl and Dipl.-Stat. J. Peschke. To Dr. Arizal I am also obliged for the technical implementation of a large part of the figures. My profound gratitude is expressed to all the experts from industry who granted me access to their plants and shared their knowledge of industrial practice with me.

My thanks go to the Springer Verlag for the good co-operation and fine presentation of the book.

The author hopes that the book enables students and practitioners to acquire knowledge of modern methods of safety analysis and to contribute to the safety of processes and plants by using them. In doing so they should follow the advice from classical antiquity which I have placed in front “Whatever you do, do it with intelligence and with the outcome in mind.”

Preface to the English Edition

The preparation of the translation gave me the opportunity to correct a number of minor mistakes and to occasionally formulate concepts in a somewhat clearer language. Wherever possible, German references were replaced by English ones. All of this should be of benefit to the reader.

Schönebeck (Elbe), Spring 2014

Ulrich Hauptmanns

Process and Plant Safety

Hauptmanns, U.

2015, XV, 665 p. 207 illus., Hardcover

ISBN: 978-3-642-40953-0