

Preface

This book presents the results of extensive research in computer-supported decision processes in engineering, carried out over many years by the author and his collaborators. The author has cooperated with designers in Poland and in Germany. Very often there was university–industry cooperation for the building of specific software for certain engineering tasks.

The majority of the concepts, for example “the designer’s personal assistant” and the decomposition and coordination of multicriteria decision problems, evolved through cooperation with designers in this field. The author, while working together with them, understood that this group of people is characterised by a strong individualism and that the range of applied approaches and methods is wide.

The most significant influences on the author’s opinions through contact with the designers were the lectures he delivered for more than 12 years for post-graduate studies on computer-aided design in machinery. The lectures included seminars which required the creation of concepts for an individual computer support system for decision processes, generally well known to the designers who participated in the lectures. In the theoretical part the characteristics of the actual computer-aided design and engineering (CAD and CAE) tools were depicted, whereas in the practical part the students created concepts of computer environments for the realisation of design projects in their own professional work. The task was confined to the expression of the design process. This was followed by the development of a concept for the implementation of different computer technologies in the next stages of their processes. The lectures were attended annually by 15 to 25 participants, allowing the teacher the opportunity to cover quite a wide spectrum of real industrial design processes. The majority of students worked in machine industries with different production outputs and product ranges: from aircraft components to a production line for the spraying of car bodies, and from the development of mobile aerial systems to the production of lightbulbs. Several concepts worked out during the seminars were later realised in practice.

It remains to be added that the lectures were conducted flexibly and openly and did not aim at systematic design according to a certain design theory. Although elements of different schools were taught, it was left entirely to the students to choose.

Many of the problems that were subjects of the lectures were later picked up and further developed by ordinary students and research students. Looking at the multitude of solutions of the design processes, the author drew the conclusion that the designers’ individualism and internal personal factors play an essential role. Because of that it became important to notice the permanent development of individual engineering knowledge, its richness in facets and its constant evolution. Another observation is the omnipresent re-using of previous processes, their forms of description and the adjustment of the modelling. In spite of certain limitations, often creative

elements with the freedom to create new processes could be observed. This mostly worked by using well-known tools, that is, existing and reliable sub-processes.

Interesting was the relationship between designing and the multicriteria optimisation methods. It became obvious that the multicriteria optimisation methods presented as decision-making theory were widely accepted in connection with everyday decision problems.

All of this brought forth a palette of applications based on production realities, which existed at least as prototypes. Some found application in real life, some were implemented within larger projects, and others became the beginnings of a product that is still being developed.

Apart from the direct working collaboration there were many discussions, comments and suggestions.

A good deal of the work that formed the backbone of this book was realised by my research students Pior Cichocki and Maciej Gil.

Various problems concerning the computer tools were solved by my colleagues and collaborators of the computer techniques team at the Institute of Machine Design Fundamentals at the Warsaw University of Technology: Janusz Bonarowski, Jacek Jusis, Bogusław Kozicki, Grzegorz Linkiewicz, Witold Marowski, Stanisław Skotnicki, and Jerzy Wróbel.

Many problems were solved practically by numerous students, research students and participants of the post-graduate studies.

I would like to thank everyone mentioned above for taking part in the research.

Also many thanks to my “English advisers”, my wife Antonia and our friends Sophie and Chris Klimiuk who made every endeavour to give my book its final shape.



<http://www.springer.com/978-1-85233-741-4>

IPA — Concepts and Applications in Engineering

Pokojski, J.

2004, VIII, 172 p., Hardcover

ISBN: 978-1-85233-741-4