A review of “Design for manufacturability: A systems approach to concurrent engineering and ergonomics” edited by M. Helander and N. Nagamachi

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Edited by M. Helander and M. Nagamachi.

The casual reader could be forgiven for being unsure as to the nature of this book if left to rely entirely upon the title. Human-centred Computer Integrated Manufacturing might be more descriptive of the editors' main themes which form the basis of the book originate from the International Ergonomics Association conference on Human Factors in Design for Manufacturability and Process Planning held in Hawaii in 1990. The papers have been edited and updated and have also been augmented by four commissioned chapters.


Naturally there is considerable variation in style and content of the different chapters, and for this review one paper from each section has been selected for brief comment.

In Section I, Siemieniuch adopts a particularly refreshing and honest approach to appraising the Alvey 'Design to Product' concept which aims for total computer automation of the design and manufacture of a product. This provides an object lesson in the changing context of research work from the early eighties, when it was felt that many if not most human decision making activities in manufacturing could be replaced by intelligent computer systems, to today's realisation that this might be neither possible nor desirable.

Section II should perhaps be titled Design for Assembly as this one manufacturing process dominates the 6 papers in the section. Typical of the sentiments expressed are those by Mital and Morse who discuss the evidence that the re-design of products to accommodate robotic assembly can result in their manual assembly being more cost effective. The third section consists of three industrial case studies where design for manufacturability principles were used to improve productivity whilst minimising operators' physical strain. Parson's re-evaluation of the famous 60 year old Hawthorne studies makes interesting reading and, as the editors point out, makes us question why there has been no study of similar stature to investigate the effects of new technology and automation.

The logistics of manufacturing are receiving considerable attention both as a research topic and as practical methods for improving manufacturing efficiency. Section IV addresses this area with three papers covering Just-in-Time (JIT) manufacturing, Total Quality Management and production planning. Myazaki's paper briefly overviews the concepts and methods of JIT and illustrates how JIT is highly dependent on the successful implementation of human aspects from simple low-technology aids giving performance indicators to production workers through to group working and individual job satisfaction. As the editors note: 'Maybe (this approach) is reflective of the respect for the individual in the Japanese society? Something to ponder for the rest of us!' The final section is perhaps a little out of place when put alongside the preceding sections. It is primarily concerned with describing methodologies which have general use across most domains of ergonomics, and which represent research techniques rather than the manufacturing applications of the remainder of the book. Most of the chapters in the section do however relate to manufacturing through appropriate case studies. A strong argument is made for the need to study humans in real work situations, rather than for artificial laboratory experiments. De Keyser's paper sets the scene for this section by tracing the history of research in human work from the early sixties and establishes three major themes for current research: the accomplishment of strategic goals, creating change in companies and basic research on information processes.

Collections of papers from a conference can often lead to an unsatisfactory book due to incomplete coverage of a topic, differences in style and presentation and over-emphasis on certain issues. Some of these characteristics are evident in this book, but it appears that the editors have successfully transformed conference proceedings into a coherent publication. Selectivity in publishing twenty papers from the original 60 presented at the conference and the commissioning of four additional chapters has obviously helped in this achievement. The editors have provided an excellent review of the papers in the form of an introduction and this helps to establish the overall feeling that the authors are trying to re-assert the value and importance of humans in an area where high technology has had many successes, but much of the immediately foreseeable progress may be made through better use of human resources.

The origins of the book make it an ideal resource for those researching the field, and teachers of manufacturing and ergonomics will find useful source material. It is less likely to be suitable as a textbook, and those in manufacturing who believe that a few ergonomics techniques can be picked up from a book and simply implemented will be disappointed.