AI System Support for Conceptual Design

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AI System Support for Conceptual Design

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With 169 Figures

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INTRODUCTION

Conceptual design is often considered to be the most important step in the whole product development process, the reason being that more than half of the total life cycle cost is committed and the product quality determined at this stage. A poorly conceived design concept can never be compensated for at the manufacturing stage or via marketing policies. The design process at the conceptual stage is inherently a complex activity, due to the need to satisfy many requirements and comply with diverse types of constraints. Individual designers very often restrict themselves in a situation where they are not able to tackle large and complex systems partly because of a lack of sufficient suitable information and partly because of the limited availability of appropriate computer support tools.

There is a growing awareness that designers can benefit substantially from computer support during conceptual design and this is being driven by three factors:

- An understanding of the importance of early decisions in the overall success and profitability of a product or scheme,
- The growth in the complexity of products and their interdisciplinary nature especially in the design of mechatronic products,
- The need to provide AI support to the designer as the numbers of those trained and educated to such functions reduces.

This book consists of a collection of papers delivered to the Lancaster International Workshop on Engineering Design, all of which represent significant contributions to the advancement of computer support for conceptual design. The contributions are not “wish lists” of proposed research, which are becoming rather fashionable, but reports of solid achievements in the field. Also included are two major contributions from industry, which outline the need for conceptual design tools and their potential impacts. Many of the papers cover advanced application of artificial intelligence, 3D solid modelling, simulation and many aspects of on-line support.

The concept of this book and the associated workshop was born in the realisation of the need to produce a clear presentation of the formative research.

We would very much like to thank all those who have contributed to this book both from academia and industry. Our particular thanks go to the staff of the Lancaster EDC, especially Jan Anderson, who has worked so hard to ensure its success.

John E.E. Sharpe
Lancaster March 1994

CONTENTS

Introduction

John E.E. Sharpe

Adaptive Search and Optimisation

1. An Adaptive Machine Learning System for Computer Supported Conceptual Engineering Design
M J Hague, A Taleb-Bendiab & M J Brandish 1
2. The Application of Genetic Algorithms to Conceptual Design
M G Hudson & I C Parmee 17
3. Solution Clustering with Genetic Algorithms and DFA: An Experimental Approach
S D Santillan-Gutierrez & I C Wright..... 37

Handling of Geometric Data and Knowledge

4. Handling of Positional Information in a System for Supporting Early Geometric Design
X Guan & K J MacCallum 54
5. An Architecture for the Intelligent Support of Knitwear Design
C Eckert & M Stacey..... 71

Knowledge Based Reasoning

6. Representing Conceptual Design Knowledge with Multi-Layered Logic
K Clibbon, E Edmonds & L Candy 93
7. A Synthetic Reasoning Method Based on a Physical Phenomenon Knowledge Base
M Ishii & T Tomiyama 109
8. Design Model: Towards an Integrated Representation for Design Semantics & Syntax
L B Keat, C L Tan & K Mathur 124

Integrated Intelligent Support for Conceptual Design

9. Égide: A Design Support System for Conceptual Chemical Process Design
R Bañares-Alcántara, J M P King & G H Ballinger 138
10. Development of an Integrated AI System for Conceptual Design Support
M X Tang 153
11. Integrated Platform for AI Support of Complex Design (Part I): Rapid Development of Schemes from First Principles
R H Bracewell, R V Chaplin, P M Langdon, M Li, V K Oh, J E E Sharpe & X T Yan 170
12. Integrated Platform for AI Support of Complex Design (Part II): Supporting the Embodiment Process
R H Bracewell, R V Chaplin, P M Langdon, M Li, V K Oh, J E E Sharpe & X T Yan 189
13. A Computerized Tool to Create Concept Variants from Function Structures
D Brady & N P Juster 208

Interactive Knowledge Support

14. Integrated Innovative Computer Systems for Decision Support in Bridge Design
C J Moore & J C Miles 227
15. 'MODESSA', A Computer Based Conceptual Design Support System
T Kersten 241
16. Interactive Knowledge Support to Conceptual Design
L Candy, E A Edmonds & D J Patrick 260
17. A Support System for Building Design - Experiences and Convictions from the Fabel Project
B Bartsch-Spörl & S Bakhtari 279

Intelligent Management of Design Procedures

18. Conflict Management in an Interdisciplinary Design Environment
V Oh & J E E Sharpe 298
19. A Fuzzy Thesaurus for Semantic Integration of Design Schemes
I Mirbel 319

20.	Managing Design and Manufacturing Constraints in a Distributed Industrial Environment: The Creation of a Managed Environment for Engineering Design <i>A Medland</i>	336
21.	Computer Support for Design Team Decisions <i>D G Ullman & D Herling</i>	349

AI Support of Detail Design

22.	Use of Visualisation and Qualitative Reasoning in Configuring Mechanical Fasteners <i>G Zhong & M Dooner</i>	362
23.	Conceptual Design of Polymer Composite Assemblies <i>J K McDowell, T J Lenz, J Sticklen & M C Hawley</i>	377
24.	Conceptual Design for Mechatronics <i>H P Hildre & K Aasland</i>	390
25.	Reasoning and Truth Maintenance of Casual Structures in Interdisciplinary Product Modelling and Simulation <i>X-T Yan & J E E Sharpe</i>	405

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