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ROUTINE MATERIAL DECISIONS""; ""SUPPORTING INNOVATIVE MATERIALS SELECTION IN DESIGN""; ""SUMMARY""; ""4 Information Technologies Pertinent to the Materials Selection Process""; ""DATABASES AND KNOWLEDGE BASES""; ""Levels of Representation""; ""Issues Concerning Knowledge-Base Development""
""Definition of Knowledge Bases""""Development of Knowledge Bases""; ""Construction of Knowledge Bases""; ""Issues Concerning Database Development""; ""MODELING AND ANALYSIS SYSTEMS""; ""Geometric Reasoning""; ""Process Modeling""; ""Modeling of Abstraction of Downstream Constraints""; ""Measurement Modeling""; ""Quantitative Nondestructive Evaluation""; ""Damage-Tolerant Design""; ""Probability of Detection""; ""Issues Concerning Implementing Modeling and Analysis Systems""; ""5 Conclusions and Recommendations""; ""STRATEGIES FOR OVERCOMING BARRIERS""
""Database and Knowledge-Base Barriers""""Structural Design Modeling Technology Barriers""; ""GENERAL CONCLUSIONS AND RECOMMENDATIONS""; ""References""; ""Appendix A: Glossary of Acronyms""; ""Appendix B: Case Studies Reviewed by the Committee""; ""Appendix C: Review of Selected Knowledge-Representation Techniques and Tools""; ""CASE-BASED REASONING""; ""CONSTRAINT-BASED REASONING""; ""ACTIVE DATA DICTIONARIES""; ""DATABASES""; ""FUZZY LOGIC""; ""GEOMETRIC AND MICROSTRUCTURAL INFORMATION REPRESENTATION""; ""HYPERDOCUMENTS""; ""MACHINE LEARNING""; ""MATHEMATICAL RELATIONS""
""NEURAL NETWORKS""""OBJECTS AND TAXONOMIES""; ""REASONING WITH UNCERTAINTY""; ""RULE-BASED REASONING""; ""SPATIAL SYNTHESIS AND LAYOUT""; ""STRUCTURE SELECTION""; ""TRUTH MAINTENANCE""; ""Appendix D: Knowledge-Based Integrated Design System""; ""INTRODUCTION""; ""THE CASE STUDY""; ""Appendix E: An Intelligent Knowledge System for Selection of Materials for Critical Aerospace Applications""; ""INTRODUCTION""; ""VISION OF THE SYSTEM""; ""TECHNOLOGIES INCLUDED IN THE SYSTEM""; ""Conceptual Model of an Intelligent-Knowledge-System""; ""IKSMAT Architecture and Operating Capabilities""
""STATUS OF DEVELOPMENT AND BARRIERS TO IMPLEMENTATION""

Sommario/riassunto

The selection of the proper materials for a structural component is a critical activity that is governed by many, often conflicting factors. Incorporating materials expert systems into CAD/CAM operations could assist designers by suggesting potential manufacturing processes for particular products to facilitate concurrent engineering, recommending various materials for a specific part based on a given set of characteristics, or proposing possible modifications of a design if suitable materials for a particular part do not exist. This book reviews the structural design process, determines the elements, and capabilities required for a materials selection expert system to assist design engineers, and recommends the areas of expert system and materials modeling research and development required to devise a materials-specific design system.