

# Kinematic Structural Synthesis of Mechanisms Using Knowledge-Based Systems

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## Abstract

This paper presents a knowledge-based systems approach to the automation of the conceptual synthesis of mechanisms. The system utilizes a procedure for synthesizing design alternatives based on the principle of separation of structure from function. This principle in turn resolves the problem of knowledge representation of design alternatives through the use of graph structures which are then evaluated using a set of heuristic rules. The expert system presented in this paper has been implemented and tested for the conceptual synthesis of variable-stroke engines and robot-hands kinematic structures. The system has shown the capability of producing numerous design alternatives for these two applications, and has provided consistent results based on the evaluation rules. It has also provided the designer with immediate feedback on the viability of any given design alternative and the reasons behind that decision. ©1995 *The American Society of Mechanical Engineers*

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