

Engine and Auxiliary Systems

Edited by
Prof. Dr. A.K.M. Mohiuddin



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Chapter 3

Thermal design of mechanical devices using expert system

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Introduction

The types of specifications and limitations over a design of many mechanical devices may vary vastly. Conventional programs developed for the design may face problems in handling all the specifications and restrictions. In such programs, the designer finds it difficult to use his discretion and experience to satisfy the user's needs (Agrawal et al., 1989).

An expert system besides having the ability to solve problems must possess the following characteristics:

- a. Must engage in a dialogue with the user to acquire the relevant details of the problems.
- b. Must be able to explain its problem-solving process.
- c. Must be easily modifiable to take care of new discoveries in the domain or lacunae in its performance.
- d. Must be able to deal with partial information. When all the required details to solve a problem are not available, it still does the best that is possible. In other words, the solutions degrade gracefully rather than suddenly and completely (Sangal, 1985).

These characteristics of an expert system give it an edge over conventional programs from the viewpoints of both the knowledge engineer and the user.

The proposed procedure of expert system development is based on the most popular rule-based system or production system, and is very interactive and user-friendly. It will issue questions to the user at every step, giving sufficient help wherever possible. The questions asked by the system will be of two types- mandatory and optional. There will be three major components: (a) a knowledge base consisting of if-then rules, facts and question rules, (b) a current context or facts pertaining to the particular problem being solved by the system, and (c) an interpreter that decides about the order of application of if-then rules, facts and question-rules.