A Computer-Aided Approach to Implementation of Concurrent Engineering Practice

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Abstract

As concurrent engineering has recently emerged as an important philosophy in the global manufacturing environment, various approaches have been implemented to shorten product development time, improve product quality, and reduce manufacturing costs. In this paper, we develop a computer-aided concurrent design system in which product design, process design and manufacturing system design are simultaneously generated at an early design stage of a product life cycle. As an interdisciplinary collaboration area in nature, the proposed system consists of four major modules; (1) product design module which performs feature-based redesign processes, (2) process design module which presents knowledge-based optimal process plans, (3) system design module which provides optimal plant layouts by simulation analysis, and (4) central control module which integrates the above three modules by resolving any intermodule conflicts. We construct a prototype of the concurrent design system in the PC windows environment using a geometric modeling kernel, an object-oriented expert system shell, an animated simulation package, and a database management system to finally apply the integrated system package to mechanical part designing and manufacturing companies to demonstrate the effectiveness of the proposed system.