ABSTRACT

Fixtures are defined as special purpose devices used to hold the workpiece during machining. It is reported that the cost of fixturing contributes the cost of manufacturing as high as 20 to 30% in the cost of product. There are two ways to reduce this cost, (1) by using reconfigurable fixtures and (2) by using computer aided fixture design. Many flexible fixturing systems have been proposed, such as modular fixtures, fixtures with phase change material, adjustable fixtures, etc. However only the modular fixtures are adopted by the industries, but they have also limitations of high capital cost and requirement of skilled manpower. On this background, adjustable fixtures for part family are promising because of the increased product variety and reduced product life. Adjustable fixtures are one of the varieties of flexible fixtures which reduce the cost of design, the blocked inventory, cost of fixturing and storage space required.

Even though some computer aided fixture design methodologies have been proposed, most of them are based on rules inference also they give only conceptual solution and not a complete solution for adaptation. The fixture design systems based on CBR have worked on case representation and case retrieval. However the case modification and case evaluation is lacking. No expert system for adjustable fixture design for part family is reported; therefore expert system based adjustable fixture design based on Case-Based Reasoning (CBR) is still considerable.

The research is aimed at studying the key technologies of Computer Aided Adjustable Fixture Design (CAAFD) suitable for small to medium industries engaged in the processing of the components of the same part family. A prototype software for CAAFD has been developed in VB-6 and integrated with CAD package CATIA. The fixture design knowledge is stored in the form of cases, which can be enriched and can be read and edited easily.

Keywords: Reconfigurable Manufacturing, Computer Aided Fixture Design, Adjustable Fixtures, Part Family, CBR Expert Systems