CHAPTER 3

SCOPE AND OBJECTIVES

3.1 INTRODUCTION

While reviewing the literature on various selection procedures the following observations have been made:

- It has been found that there are differences in the various approaches in the selection procedures.

- Some researchers emphasized the impact of process capabilities on selection of NTMPs, whereas others focused on Material applications and shape Applications, which is not appropriate to their case leading to unsatisfactory results.

- There is a lack of structured approach for a design engineer to select appropriate NTMPs which suit the specific requirements.

- The survey also highlighted the need to have an on-line approach for instant knowledge up gradation of NTMPs to yield the required results based on the updated knowledge.

- This called for a serious need for a Web – Enabled Knowledge Base System (WEKBS), which integrates all the parameters that gives a comprehensive and systematic approach towards selection of appropriate NTMPs with due consideration to update the knowledge bank.
In today’s competitive environment, it is necessary to have a WEKBS for the selection of appropriate NTMPs with a clear correlation regarding process characteristics to yield with the required results.

In line with the Information Technology (IT) revolution, access to knowledge bank for various development works and practices is phenomenal and fast. Alternatively, innovation and creativity in delivering the available knowledge are the issues and many a time design engineers apply practices which do not suit their requirements and hence fail. Moreover the presence of many standard tables, books, and websites, etc. have confused the design engineers in selecting the appropriate Non-Traditional Machining Processes (NTMPs). This necessitated a Web Enabled Knowledge Base System (WEKBS) exclusively to select appropriate NTMPs to meet challenges faced by design engineers and be successful in their endeavour to be the key players in the decision-making process.

3.2 SCOPE

The scope of the present investigation is as follows:

1. To create the knowledge base for various NTMPs and their selection criteria with performance figures,
2. To utilize the knowledge base to rank the suitable NTMPs for the given user’s limiting requirements, and
3. To update the knowledge base with the recent technological developments in the NTMPs and various selection procedures.
3.3 OBJECTIVES

The objectives of the proposed system are as follows:

1. To identify various NTMPs that are currently practiced in the industry,
2. To study the various characteristics that are considered for the chosen NTMPs,
3. To establish inter-relationship data between the selection parameters and the various NTMPs,
4. To create performance tables for each selection criteria with respect to each NTMPs,
5. To create a knowledge base using the information gathered by various selection parameters applicable to the NTMPs,
6. To categorize the knowledge base into four different capsules, namely material application, shape application, process capabilities, and process economy,
7. To input the limiting requirements from the user for a particular machining problem,
8. To query the knowledge base and find matching entries for the given limiting requirements,
9. To analyze and evaluate the performance of the NTMPs for the given limiting requirements,
10. To rank the available shortlisted processes based on their performance weightage obtained from the knowledge base, and
11. To display the list of the most suitable NTMPs for the given machining problem.
3.4 WEB-ENABLED KNOWLEDGE BASE SYSTEM

In this study, a web enabled knowledge base system for selection of appropriate Non-Traditional Machining Processes (WEKBS-NTMPs) has been proposed to achieve the objectives of this research work. Using this system, the users can select appropriate NTMPs, which meet the limiting requirements on material type, shape application, process capability, and economic factors. The users can also evaluate the performance of different NTMPs by obtaining the ranking based on the performance criteria from this system. Design and manufacturing engineers who are geographically separated but well connected by the Internet can use this system to realize process selection. This web enabled selection system for NTMPs can cut down the product cost, enhance the product quality, and decrease the product lead-time considerably. Web technology has immense potential to develop a collaborative design and manufacturing environment. It simplifies the sharing of process knowledge and provides intelligent decision making in a collaborative way through the Internet.

The proposed knowledge-based system follows a three-tier architecture having Client browser, Web server, and Database components. The development environment includes Apache Web Server, MySQL Database with PHP as server-side scripting language, and Extensible Hyper Text Markup Language (XHTML) on client-side for creating the dynamic web pages.

The proposed software includes two major modules namely ‘Expert module’ and ‘Selection module’. The Expert module is responsible for creating and managing the knowledge base of NTMPs. Selection module makes the selection of most suitable NTMPs for the given user requirements with the help of the knowledge base. The Expert module has restricted access and only the registered experts who are authorized to login the system can
update the knowledge base, based on the recent developments and their newly acquired expertise in the field of NTMPs. But all authorized users can access the Selection module, feed the relevant limiting requirements as input and obtain the selection results dynamically. The intuitive web user-interface provides the users an easy-to-use and interactive environment for making the selection process while keeping the knowledge base up-to-date. The object-oriented, cost-effective, and platform-independent approach gives the affordable solution for collaborative decision making system.

3.5 SUMMARY

With the problems that have been identified, focus has been made to determine the solutions to the above problems by scheming the scope and objectives for this piece of research work. The detailed report on methodology of developing a web-enabled knowledge base system to achieve the objective of this research work is presented in Chapter 4.