DEVELOPMENT OF AN EXPERT SYSTEM FOR THE DETERMINATION OF INJECTION MOULDING PARAMETERS OF THERMOPLASTICS

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In this thesis, an Expert System (ES) called EX-PIMM is developed for the determination of injection moulding parameters of thermoplastic materials. The system has a modular structure, and it consists of three modules. The first module is used to select best Plastic Injection Moulding Machine(s) (PIMMs) for the given thermoplastic resin and defined part. The second module is used to select best thermoplastic resin(s) for the given PIMM and defined part. The last module can be considered as the combination of other modules. It is used for the determination of the optimum number of cavities for the given machine and material, and defined part. There are totally 623 PIMMs and 27 thermoplastics in the machine and material databases, respectively.

The primary objective of this research was to develop an interactive and modular expert system for shop-floor use that can be used by an average end-user (operator) and produce all feasible (acceptable) solutions to the end-user. For this purpose, all rules and facts related to the parameters of injection moulding process have been acquired from experts and sources. After that, all these knowledge have been implemented at an expert system shell, called GoldWorks, to construct the Knowledge-Based Expert System (KB-ES). The developed system is able to interact with database files that are created in Lotus 1-2-3 database program to reach solutions.

The developed system has a modular structure. Each module has its own Knowledge Base (KB) which contains related rules and functions required to reach conclusions. During run-time, each module uses only its own KB. There are some miscellaneous KBs in the system. These files are used to load necessary tools into memory such as graphic interface, Lotus 1-2-3 interface, etc. All KBs were written in LISP language. Lotus 1-2-3 database files include several thermoplastic resins and PIMMs for the selection process. A special "award" system was also created for the PIMMs and thermoplastic resins which are satisfactory for the given job.

The developed system is an interactive one. In other words, the end-user can directly enter all necessary data to the developed system, and can also change some machine and/or material specifications during run-time of the system. Therefore, this provides end-users to customize the developed system and to make the system independent from the algorithm.