

Application of Computer Aided Process Planning in Manufacturing Industries

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Abstract— In today's economy, products and processes tend to increase in complexity of design and functionality. Furthermore, they are in need of high-sophisticated manufacturing and assembly processes. On the other hand, increasing competition results in the demand for shorter product life cycles and forces companies to cut down development and delivery times. Thus, modern manufacturing has to adapt to new requirements of this dynamic environment. In this context, innovative information technologies in general and flexible as well as adaptive concepts for process planning and production control in particular are of increasing importance for business success. Among the whole manufacturing cycle of a product, a sequence of manufacturing stages needs to be optimized using the increasingly available computing resources. Computer aided process planning is seen as the missing link between CAD and CAM, which relates to the translation of design tolerances into manufacturing tolerances to be executed in the shop floor. In this paper, the general topic of process planning, the implementation and theoretical foundation of CAPP, the role of CAPP in concurrent engineering (CE), various classifications of CAPP systems and its application in job shop type of industries is presented.

Index Terms— Process planning; concurrent engineering; job shops; computer aided process planning

I. INTRODUCTION

Process planning is a task of transforming design specifications into manufacturing instructions. This task includes identification of machines and tools, operations and their sequence, and selection of machining parameters. In manual process planning a process plan for a new part is created by identifying and retrieving an existing plan for a similar part (sometimes called a master part) and making the necessary modifications for the new part. And if there is no plan existing for a similar product the process planner will prepare a new one from scratch using his experience and knowledge of the production plant capacity. Usually in organizations that use manual process planning the process plans are not kept in a form that allows their retrieval based on their design and manufacturing similarities. The usual traditional trend is to arrange the design and process plan documents based on their work order number, which fails to categorize the products according to their process similarity. This leads to the need for computerized systems that will allow the process planning function to be performed either totally or partially by a computer, providing the user with optimum process plans in a quick consistent fashion. CAPP works best when it is direct connection between CAD and CAM. i.e. CAPP is the linkage between the CAD module and the CAM module, which confers it a special place in the computer integrated manufacturing CIM system. Input data information for computer aided process planning system will be formalized part description (half – finished product description and finished part description) and production size. Whereas output data information is known to be a formalized description of the planned process. A retrieval CAPP system, also called a variant CAPP system, is based on the principles of group technology (GT) and parts classification and coding. In this type of CAPP, a standard process plan (route sheet) is stored in computer files for each part code number. The standard route sheets are based on current part routings in use in the factory or on an ideal process plan that has been prepared for each family. It should be noted that the development of the data base of these process plans requires substantial effort [1].

Before a retrieval CAPP system is used for process planning, a significant amount of information must be compiled and entered into the CAPP data files. This is what is referred to as the “preparatory