Process Engineering For Sheet-Metal Die Development

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ABSTRACT:

During the last several decades, there has been considerable interest in automating the process planning function by computer systems. Shop people knowledgeable in manufacturing processes are gradually retiring. An alternative approach to process planning is needed, and CAPP systems provide this alternative. Today, manufacturing environment has become more complex and competition has become more intense. In manufacturing, the goal is to produce components that meet the design specifications. The design specification ensures the functionality aspect. Next step to follow is to assemble these components into final product. CAPP plays a bridge between design and manufacturing by translating design specification into manufacturing process detail. Hence, the main focuses of this paper to interpret the basic study of CAPP system for die making process.

1. INTRODUCTION:

Process planning is responsible for the conversion of design data to work instructions through the specification of the process parameters to be used as well as those machines capable of performing these processes in order to convert the piece part from its initial state to final form. The output of the planning includes the specification of machine and tooling to be used, the sequence of operations, machining process planning (CAPP).CAPP uses computer software to determine how a part is to be made. If group technology is used, parts are grouped into part families according to how they are to be manufactured. For each part family, a standard process plan is established. Products and their components are designed to perform certain specific functions. Each product has some design specifications which ensure its functionality aspects. The task of manufacturing is to produce components such that they get together the design specifications. The process planning acts as a bridge between design and manufacturing by translating design specifications into manufacturing process in detail. The process planning answers the questions regarding required information and activities involved in transforming raw materials into a finished product. The process starts with the selection of raw material and ends with the completion of part. Synergy results in when CAM is integrated with CAD to form CAD/CAM systems than a stand alone CAD or CAM systems. In such a system CAPP becomes a direct connection between design and manufacturing.

Literature Review

[1] (By Krishnan Ramaswami, January 1997) "Process planning for shape deposition manufacturing".

This Paper presents a developed methodology for quality improvement in manufacturing organizations and focuses on the process planning issues in Shape Deposition Manufacturing. The major issues in process planning for SDM involves the generation of 3-D layers and generation of deposition and CNC cutter paths for these 3-D layers. this is include an analysis tool in order to calculate defect probability, a statistical measurement of computer aided process planning(CAPP) to prevent the defects and complexity of process planner

[2] (By S.K. Gupta, D.A. Bourne, K.H. Kim, and S.S. Krishnan, 1998) "Automated process planning for sheet metal bending".

This paper describes a model which has been developed to direct and generate is designed to facilitate and structure the use of we describe a generative process planning system for robotic sheet metal bending press-brakes. This process planning system employs a distributed planning architecture. Currently, our system consists of a central operation planner and three specialized domain special planners: tooling, grasping, and moving. The central operation planner proposes various alternative partial sequences and each specialized planner evaluates them based on its objective function. The central operation planner uses state-space search techniques to optimize the operation sequence. Once a CAD design is given for a new part, the system automatically determines: the operation sequence, the tools and robot grippers needed, the tool layout, the grasp positions, the gage and the robot motion plans for making the part. The distributed architecture allows us to develop an open-architecture environment for doing generative process planning and encapsulate the specialized knowledge in specialized planners.

[3] (Dr. Thomas R. Kramer, 2006**)** "Process planning for a milling machine from a feature based design".

This & its application has made a significant impact both in academic and industrial Circles over the last three decades. This paper tries to follow the journey of processing from its inspection as a newly developed mode.. Research Facility, metal parts are machined automatically from a feature-based design. A simple two-and-a-half dimensional part may be designed and machined within an hour, allowing half the time for design input. With a design already in hand, the VWS software (which is written in LISP and runs on a Sun computer) will automatically prepare a process plan for a milling machine for making a part of the given design. The heart of the process plan is a list of machining operations to be carried out. The operations are selected by the system from among its repertoire of 21 possible operations. The process plan also includes a header and a list of tool requirements. The process plans produced by the system are later used as input to an automatic NC-coding system which writes code for the milling machine's controller.

[4] (By M. Tisza, 2007**)** "Recent achievements in computer aided process planning and numerical modeling of sheet metal forming processes".

In this paper, a conceptual framework to apply many techniques for implementing the high is Presented. Also paper gives the idea how to During the recent 10-15 years, Computer Aided Process Planning and Die Design evolved as one of the most important engineering tools in sheet metal forming, particularly in the automotive industry. This emerging role is strongly emphasized by the rapid development of Finite Element Modeling, as well. The purpose of this paper is to give a general overview about the recent achievements in this very important field of sheet metal forming and to introduce some special results in this development activity. The purpose of this paper is to give a general overview about the recent achievements in this very important field of sheet metal forming and to introduce some special results in this development activity.

[5](By T.N. Wong, 2008) "Development of a knowledge-based automated process planning system".

This paper presents a new productivity model and a methodology for improving the productivity of product by CAD/CAM integration. It defines productivity as the process sequence of the total number of produced parts to the total machines time required to produce those parts. In Addition, a methodology to improve Productivity of manufacturing product through integration of

CAD/CAM. Using this system, machining processes and sequence can also be generated automatically.

[6] (By Sankha Deb, Kalyan Ghosh, 2011) "An integrated and intelligent computer-aided process planning methodology for machined rotationally symmetrical parts"

This paper represents the steps in implementation of very positive results. The benefits of are substantial the research work reported in this paper is aimed at developing an integrated and intelligent CAPP methodology for machined rotationally symmetrical parts. Two important aspects of process planning, namely the machining operations selection and the set-up planning have been automated by this methodology. In addition, a methodology has been developed to efficiently extract the required data from the CAD model of the part and then feed it to the two process planning g modules. For machining operations selection, a novel back-propagation ANN methodology has been developed by prestructuring it with prior domain knowledge in the form of thumb rules.

Objective:

Identify and develop the best process sequence for the Die with the most suitable machining operation/s. Identify the resting, location, orientation and clamping faces of the stock material while the raw material passes through these phases to be converted into a finished Die. Recommend these `tooling' faces for developing appropriate and necessary holding and machining fixtures while the Die is being manufactured. Harmonize the process with the available physical and human resources of the concerned Tool-Room for producing the Die in the most economic and effective manner.

For this dissertation work the scope can be recorded as below:

- Develop Process Plan
- Explore the utility of CAPP for Process Engineering for the component
- Operation Sheets for each component
- Documentation and review

Experimentation/ Validation:

Historical data would be used for reference while trying to evolve an improved process of manufacturing. The new process would be implemented on the Operation sheets and picture sheets are duly approved. The process would be allowed to run for a fixed number of batches and the results/ feedback would be documented for the same**.** The process sheet would then be reviewed, modified and released for the production needs.

References:

[1] By Krishnan Ramaswami January 1997 "Process planning for shape deposition manufacturing",

[2] By S.K. Gupta, D.A. Bourne, K.H. Kim, and S.S. Krishnan," Automated process planning for sheet metal bending operations",

[3] By Dr. Thomas R. Kramer, Guest Worker, National Bureau of Standards, & Research Associate, Catholic University, "Process planning for a milling machine from a feature-based design",

[4] BY M. TISZA, Department of Manufacturing Technologies, Research Group of Hungarian Academy of Sciences, University of Miskolc, 3515 Miskolc-Egyetemváros, Hungary "Recent achievements in computer aided process planning and numerical modeling of sheet metal forming processes", * Corresponding author: E-mail address: tisza.miklos@uni-miskolc.hu **Received 30.03.2007; published in revised form 01.09.2007**

[5] Lecturer Department of Industrial & Manufacturing Systems Engineering University of Hong Kong, "Development of a knowledge-based automated process planning system", By T.N. Wong",

[6] By Sankha Deb, Department of Mechanical Engineering, Indian Institute of Technology Kharagpur, Kharagpur-721302, India "An integrated and intelligent computer-aided process planning methodology for machined rotationally symmetrical parts",