19MCE401 - PROCESS PLANNING AND PRODUCT DEVELOPMENT

STUDY NOTES

UNIT 1 - INTRODUCTION TO PROCESS PLANNING

TOPIC 9 - BALANCING

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Methods of Process planning:

The two general methods / approaches to process planning are

1. Manual process Planning and

    (i) Traditional approach

    (ii) Workbench approach

2. Computer Aided Process Planning

    (i) Retrieval CAPP system

    (ii) Generative CAPP system

MANUAL PROCESS PLANNING

(i)Traditional approach

In traditional process planning systems, the process plan is prepared manually. The task involves examining and interpreting engineering drawing. Making decisions on machining process selection, equipment selection, operations sequence, and shop practices. The manual process plan is very much dependent on the skill, judgment and experience of the process planner. That's why, if different planners were asked to develop a process plan for the same part, they would probably come up with different plans. The traditional process planning usually involves the following three stages, are:

Stage 1: The process planner interprets the component/product drawing using his own experience and intuition. Taking into account the type of resources available, he decides on how the component / product should be made. He lists the sequence of operations to be carried out in order to manufacture the product.

Stage 2: The process planner refers the manual to decide on tools, feeds, speeds. etc., for each element of each operation, Also the specific operation setup times and operation times for each operation are calculated using the manual.

Stage 3: Finally, the resulting process plan is documented as a routing sheet.

Workbook Approach

1.The workbook approach is a modified version of traditional approach of process planning that uses the developed workbook for preparing route sheet.

2.In this approach, the workbooks of predetermined sequence of operations for possible elements of operations of components / products arc developed. Once the drawing interpretation is carried out, the suitable predetermined sequence of operations is selected from the developed workbook and the details are documented in the route sheet.

Advantages of Manual Process Planning:

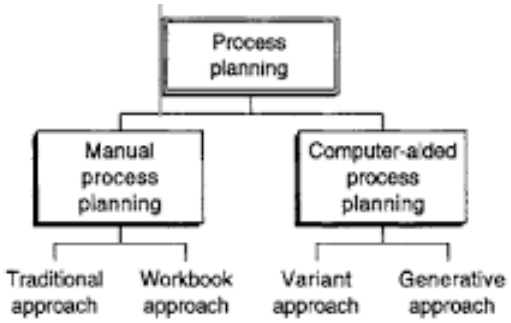
The advantages of employing manual process planning are as follows:

(i) Manual process planning is very much suitable for small scale companies with few processes plans to generate.
(ii) This method is highly flexible.
(iii) This requires low investment costs.

Disadvantages of Manual Process Planning:

The disadvantages of manual process planning include the following:

(i) Manual process planning is a very complex and time-consuming job requiring a large amount of data.
(ii) This method requires the skilled process planner.
(iii) More possibilities for human error because this method depends on the planner's skill, judgement and experience.
(iv) It increases paper work.
(v) Inconsistent process plans result in reduced productivity.
(vi) It is not very responsive to changing manufacturing environment, new processes, new tooling, new materials, etc.



COMPUTER AIDED PROCESS PLANNNG (CAPP):

1. In order to overcome the drawbacks of manual process planning, the computer-aided process planning (CAPP) is used.
2. With the use of computers in the process planning, one can reduce the routine clerical work of manufacturing engineers.
3. Also, it provides the opportunity to generate rational, consistent and optimal plans.
4. In addition, CAPP provides the interface between CAD and CAM.

Benefits of CAPP:

The benefits of implementing CAPP include the following

1. Process rationalization and standardization: CAPP leads to more logical and consistent process plans than manual process planning.
2. Productivity improvement: As a result of standard process plan, the productivity is improved (due to more efficient utilization of resources such as machines, tooling, stock material and labour).
3. Product cost reduction: Standard plans tend to result in lower manufacturing costs and higher product quality.
4. Elimination of human error.
5. Reduction in time: As a result of computerizing the work, a job that used to lake several days, is now done in a few minutes.
6. Reduced clerical effort and paper work.
7. Improved legibility: Computer-prepared route sheets are neater and easier to read than manually prepared route sheets.
8. Faster response to engineering changes: Since the logic is stored in the memory of the computer.
9. Incorporation of other application programs: The CAPP program can be interfaced with other application programs, such as cost estimating and work standards.

Approaches of CAPP

The two basic approaches or types of CAPP system are

1. Retrieval CAPP system

2. Generative CAPP system

Retrieval CAPP system

A retrieval CAPP system, also called a variant CAPP system, has been widely used in machining applications.

The basic idea behind the retrieval CAPP is that similar parts will have similar process plans. In this system, a process plan flit a new part is created by recalling, identifying aid retrieving an existing plan for a similar part and making the necessary modifications for the new part. Procedure for Using Retrieval CAPP System A retrieval CAPP system is based on the principles of group technology (GT) and past classification and coding. In this system, for each part family a standard process plan (i.e., route sheet) is prepared and stored in computer files. Through classification and coding, a code number is generated. These codes are often used to identify the part (amity and the associated standard plan. The standard plan is retrieved edited for the new part.

Advantages of Retrieval CAPP system

1. Once a standard plan has been written, a variety of parts can be planned.
2. Comparatively simple programming and installation (compared with generative CAPP systems) is required to implement a planning System.
3. The system is understandable, and the planner has control of the final plan.
4. It is easy to learn and easy to use.

Drawbacks of Retrieval CAPP System

1. The components to be planned are limited to similar components previously planned.
2. Experienced process planners are still required to modify the standard plan for the specific component.