



19MCE401 - PROCESS PLANNING AND PRODUCT DEVELOPMENT
STUDY NOTES

UNIT 1 - INTRODUCTION TO PROCESS PLANNING

TOPIC 5 - STEPS IN PROCESS SELECTION

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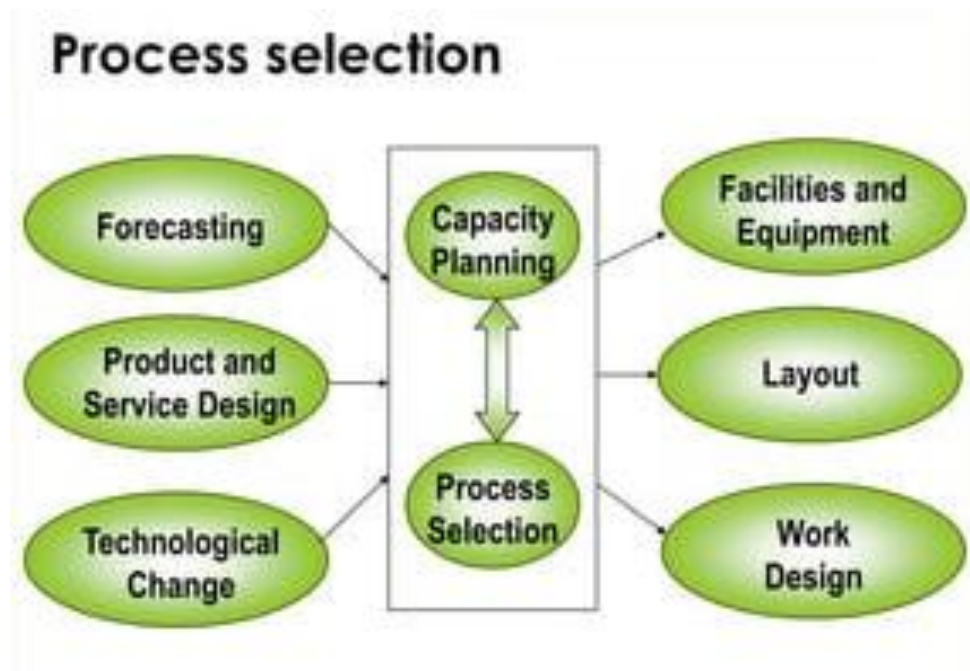
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Process Selection:

Processes convert inputs into outputs. Process selection refers to deciding on the way production of goods or services will be organized. It affects the entire organization and its ability to achieve its mission and effective supply chain system.



For some mechanical design engineers, manufacturing process selection is the last thing they think about during the design process. This is a very bad way to work. The best approach is to keep manufacturing concerns in mind throughout the entire design process. This will result in a design that is easier and less costly to produce.

There are hundreds of manufacturing processes. You are likely to already be familiar with the most common, e.g.: casting, forming, moulding and machining.

For any given product, there will be multiple manufacturing processes that you'll need to select from. The process you choose will depend on many factors called the process selection drivers.

These process selection drivers include the following:

- ★ Quantity of the product
- ★ Cost for tooling, manufacturing machines and equipment



- ★ Time required for processing
- ★ Level of skilled labour required
- ★ Process supervision
- ★ Energy consumption
- ★ Availability of material and cost of material
- ★ Capabilities required to processes material
- ★ Product dimensions and size
- ★ Surface finish required
- ★ Design tolerances
- ★ Waste produced by the process
- ★ Maintenance costs
- ★ Other costs

An experienced manufacturer will have a good idea of all the process selection drivers mentioned above. Depending on the product design and manufacturing considerations, a good manufacturer will be able to guide you through the selection process.





Follow the simple procedure below to select the appropriate manufacturing process for a product:

STEP 1: Selection criteria

The first step in manufacturing process selection is to establish selection criteria based on key process selection drivers: manufacturing volumes, value of the product, part geometry, required tolerances, and required material. The material choice will be very effective in narrowing your options down. This is because many processes work exclusively with certain materials. For example, injection moulding can only be used with polymers, whilst die casting can only be used with metals. Your material choice will instantly rule out a vast number of unsuitable processes.

The expected manufacturing volume will further narrow down your process options. For a large quantity, a manual production process like manual machining would be completely impractical. Instead, you would need to consider an automated process such as moulding. The geometry and tolerances required for a product will also filter out many processes that would be unable to achieve the desired accuracy.

STEP 2: Identify processes

After applying STEP 1, a smaller range of processes will be available. At this point you should ideally work with an experienced manufacturer to identify those processes that can satisfy the required quantity, material requirements, and part geometry.

STEP 3: Evaluate processes

After identifying the potential processes for manufacturing a product, it is time to evaluate them based on less broad parameters, such as process capability, processing time, tooling and equipment cost, degree of automation available, skill required for operation, waste produced after processing, and post processing required. It is a good idea to create a decision matrix with a score or value for each of these important elements.

STEP 4: Selection

You should now be able to use the weighted decision matrix you created in STEP 3 to identify the best process for your application. If you carefully evaluate each element, giving extra weight to those elements that are most important, the result will be a single process that will produce the part required to the standard required for an acceptable cost of production.



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Process selection in process planning is a complex and critical task that requires a systematic approach. By following these essential steps, manufacturers can make informed decisions that lead to cost-effective, high-quality production processes aligned with product requirements and sustainability goals. Continuous evaluation and adaptation are key to maintaining competitiveness and product excellence in the dynamic manufacturing landscape.

Reference Video:

https://youtu.be/mLakJ77O4_s?si=lordildVni6yJ1Mz