



19MCE401 - PROCESS PLANNING AND PRODUCT DEVELOPMENT
STUDY NOTES

UNIT 2 - PROCESS PLANNING ACTIVITIES

TOPIC 1 - PROCESS PARAMETERS

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Process Parameters:

Process parameters in manufacturing refer to the various variables and conditions that directly or indirectly affect the outcome of a manufacturing process. These parameters are crucial for maintaining product quality, consistency, and efficiency. Controlling and optimizing these parameters is essential for achieving desired results in manufacturing. Here are some common process parameters in manufacturing:

Temperature: Temperature control is crucial in many manufacturing processes, such as casting, welding, and heat treatment. It can affect material properties, phase changes, and reaction rates.

Pressure: Pressure is a critical parameter in processes like injection moulding, extrusion, and chemical reactions. Proper pressure control ensures product quality and safety.

Flow Rate: Controlling the flow rate of fluids or materials is essential in processes like pumping, mixing, and chemical reactions. It affects the rate at which materials are processed.

Speed: The speed of moving parts or the rate at which a process operates can significantly impact product quality and production rates. Examples include cutting speed in machining or conveyor belt speed in assembly lines.

Time: Process time is the duration a product or material spends in a specific manufacturing step. Accurate timing is crucial for ensuring consistency and meeting production schedules.

Humidity: In certain manufacturing processes, such as pharmaceuticals and food production, humidity levels can affect product quality, stability, and shelf life.

pH Level: pH is vital in chemical processes. It can influence reaction rates, product purity, and the overall success of chemical reactions.

Concentration: The concentration of reactants or components in a solution or mixture can significantly impact the outcome of chemical reactions and product quality.

Voltage and Current: Electrical manufacturing processes, such as electroplating and welding, rely on precise control of voltage and current levels.

Material Properties: Material properties like hardness, viscosity, and elasticity can be considered as inherent process parameters. These properties impact how materials behave during manufacturing.



Tolerance Limits: Manufacturing processes often have tolerance limits, which define acceptable variations in dimensions or other attributes. These limits are critical for ensuring product quality.

Tool Wear and Maintenance: Parameters related to tool wear, such as tool life and sharpness, are essential in machining processes. Regular maintenance schedules also affect process performance.

Environmental Conditions: Factors like ambient temperature, humidity, and cleanliness of the manufacturing environment can affect process outcomes.

Feed Rate: In machining and material removal processes, controlling the rate at which the material is fed into the machine is crucial for achieving desired results.

Material Pre-treatment: Surface preparation, cleaning, and coating processes are critical for many materials before they undergo further manufacturing steps.

Quality Control Parameters: Parameters related to inspection and testing, such as measurement methods and acceptance criteria, are essential for maintaining product quality.

Safety Parameters: Safety-related parameters, such as the presence of safety interlocks and emergency stop mechanisms, are critical for protecting workers and equipment.

Effective control and monitoring of these process parameters are often achieved through automation and advanced control systems. Manufacturers continually analyze and adjust these parameters to optimize production efficiency, reduce defects, and ensure consistent product quality.

The process planning involves the various activities such as drawing interpretation, material evaluation and process selection, selection of machines and tooling, setting process parameters, selection of work holding devices, selection of quality assurance and inspection methods, cost estimating and documenting the details using route sheets.



Process Parameters	Parameter designation	Levels		
		1	2	3
Cutting Speed(rpm)	A	2200	2400	2800
Feed rate(mm/min)	B	850	1000	1200
Depth of cut(mm)	C	0.2	0.4	0.6

Process parameters:

- Cutting speed
- Feed rate and
- Depth of cut

In the upcoming lectures we will go deeper into the process parameters.

