



19MCE401 - PROCESS PLANNING AND PRODUCT DEVELOPMENT
STUDY NOTES

UNIT 1 - INTRODUCTION TO PROCESS PLANNING

TOPIC 6 - PRODUCTION EQUIPMENT AND TOOLING SELECTION

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Production equipment and tooling selection:

Production equipment and tooling selection is a crucial aspect of the manufacturing industry that directly impacts product quality, efficiency, and overall cost-effectiveness. Here's a brief overview of the key considerations and steps involved in this process:

Assessment of Manufacturing Process:

Assessment of manufacturing refers to the process of evaluating and analyzing various aspects of a manufacturing operation to identify strengths, weaknesses, and opportunities for improvement. This assessment is crucial for optimizing processes, increasing efficiency, and achieving higher-quality products. Begin by thoroughly understanding the manufacturing process. This includes identifying the specific steps involved, materials used, and required tolerances. This assessment helps in determining the types of equipment and tools needed.

Define Requirements:

Clearly define the technical requirements and specifications for the equipment and tooling. Consider factors like production volume, part complexity, production speed, and quality standards. Requirements defining in tooling selection for the manufacturing industry involves specifying essential criteria such as tool type, size, precision, and material compatibility. Additionally, factors like production volume, cycle time, and cost constraints should be considered. These requirements ensure that the chosen tooling aligns with the manufacturing process, meets quality standards, maximizes efficiency, and remains within budget. Clear, well-defined requirements are essential to guide the selection process and ensure that the tooling enhances productivity and product quality while minimizing downtime and operational costs.

Budget Constraints:

Determine the budget available for equipment and tooling. This budget will play a significant role in narrowing down options and making cost-effective choices.

Research and Options:

Research different types of production equipment and tooling available in the market. Consider various manufacturers, models, and technologies. Evaluate both new and used equipment options.



Compatibility and Integration:

Ensure that the selected equipment and tooling are compatible with your existing machinery and processes. Integration with your current setup is essential to minimize downtime and maximize efficiency.

Quality and Reliability:

Prioritize quality and reliability. Look for equipment and tooling that are known for their durability and consistency in performance. Check for warranties and after-sales support.

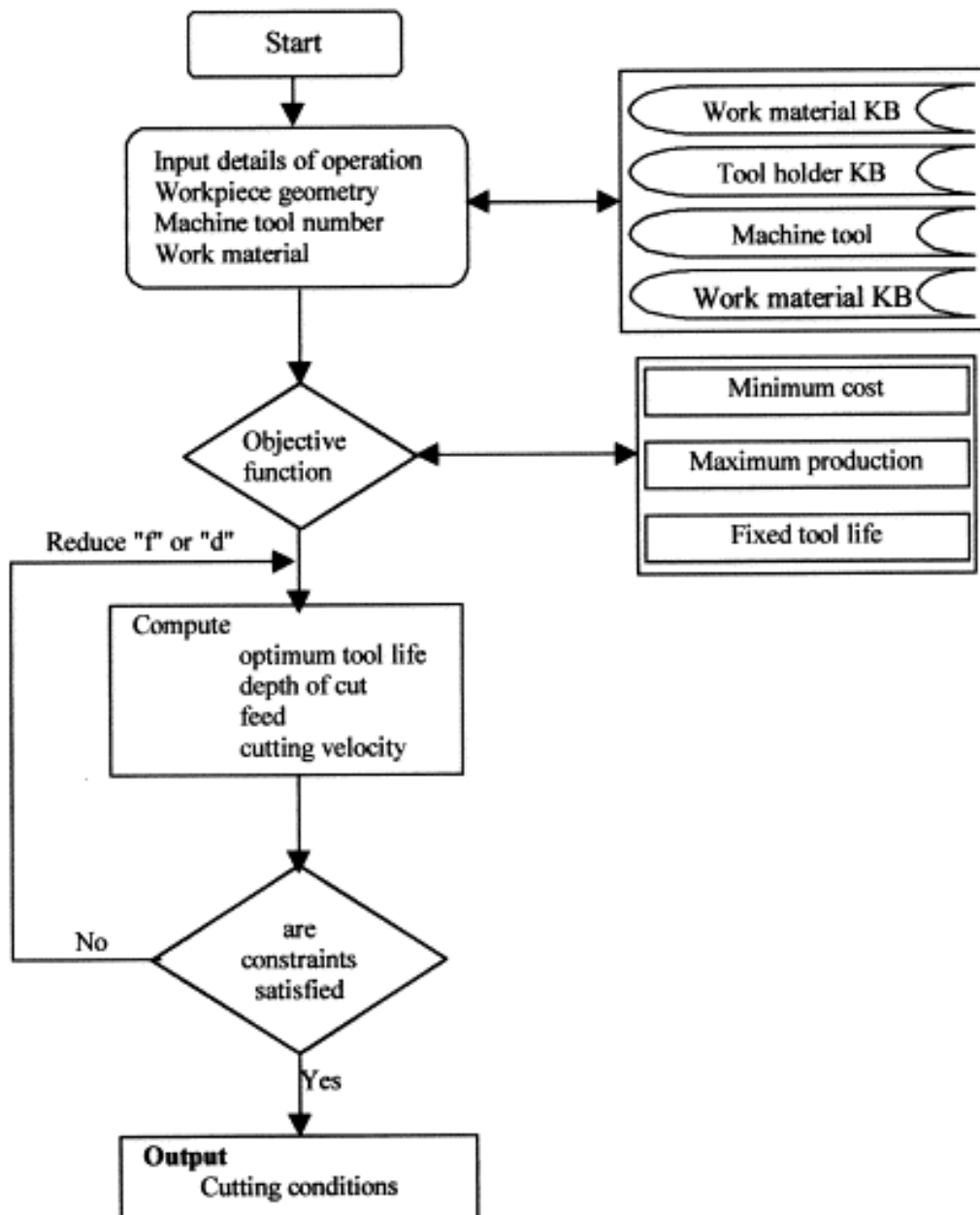


Figure 1. Production equipment and tooling selection



Efficiency and Productivity:

Assess how the equipment and tooling can enhance production efficiency. Consider factors such as automation capabilities, cycle times, and energy efficiency. Selecting production equipment and tooling for required quality and reliability involves several steps. Begin by defining precise quality standards and reliability targets. Research reputable manufacturers and suppliers with a track record of delivering dependable equipment. Evaluate equipment specifications, durability, and maintenance requirements to ensure they align with your quality goals. Seek user reviews and references to gauge real-world performance. Prioritize equipment with built-in quality control features. Perform rigorous testing and inspections during the selection process. Finally, consider long-term reliability through warranties and available support. Choosing equipment with a reputation for quality and reliability ensures consistent output and minimizes disruptions in your manufacturing process.

Maintenance and Repairs:

Evaluate the ease of maintenance and availability of spare parts for the chosen equipment and tooling. Downtime due to maintenance or repairs can impact production schedules.

Safety:

Ensure that the equipment and tooling meet safety standards and regulations. Safety should always be a top priority to protect workers and avoid accidents. When selecting a tool for production, prioritizing safety features is paramount. Firstly, consider ergonomic design to minimize operator strain and prevent musculoskeletal injuries. Ensure the tool has proper guards and safety shields to protect users from moving parts or potential projectiles. Anti-vibration technology is crucial to reduce hand-arm vibration syndrome risks. Electronic controls should have emergency stop functions and safety interlocks to halt operations when necessary. Additionally, temperature and overload sensors can prevent overheating and dangerous overuse. Always check for compliance with relevant safety standards and regulations, and provide proper training to operators to ensure safe tool usage in the production environment.

Training and Skill Requirements:

Consider the training and skill level required to operate and maintain the equipment and tooling. Ensure that your workforce is adequately trained or can be trained easily.



Supplier Reputation:

Choose reputable suppliers and manufacturers with a track record of delivering quality equipment and tooling. Customer reviews and references can be valuable in this regard.

Cost Analysis:

Perform a cost-benefit analysis that includes not only the initial purchase cost but also long-term operating costs, including maintenance, energy consumption, and potential productivity gains. Cost analysis of tooling in the manufacturing process involves a comprehensive assessment of both direct and indirect expenses. Direct costs include the initial purchase price of the tools, maintenance, and replacement costs. Indirect costs encompass the impact of tooling on production efficiency, labor, and energy consumption. Calculate the total cost of ownership (TCO) by factoring in tool lifespan and depreciation. Compare TCO with potential productivity gains, reduced downtime, and improved quality to determine cost-effectiveness. Regularly monitor and update cost analyses to adapt to changing production requirements and technological advancements, ensuring that tooling investments align with budgetary constraints and long-term manufacturing goals.

Testing and Prototyping:

Whenever possible, conduct tests and prototypes with the selected equipment and tooling to ensure they meet your production requirements and quality standards.

Decision and Implementation:

Finally, make an informed decision based on the above considerations and implement the selected equipment and tooling into your manufacturing process. Monitor their performance and make adjustments as necessary.

In conclusion, selecting the right production equipment and tooling is a strategic decision that requires careful analysis and consideration of various factors to ensure that your manufacturing process operates efficiently, produces high-quality products, and remains cost-effective.