

Pearson BTEC Levels 4 Higher Nationals in Engineering (RQF)

Unit 14: Production Engineering for Manufacture

Unit Workbook 1

in a series of 4 for this unit

Learning Outcome 1

Production Engineering Activities

1.1 Production Engineering Activities:

1.1.1 The Modern Manufacturing Process

Theory

The modern manufacturing process is not just on the factory floor, but rather a closely-knit web of different teams all working together to produce a high-quality product, shown by Fig.1.1. The system always feeds back to better develop the current manufacturing systems and improve the overall quality of the product and increase the overall output of the system.

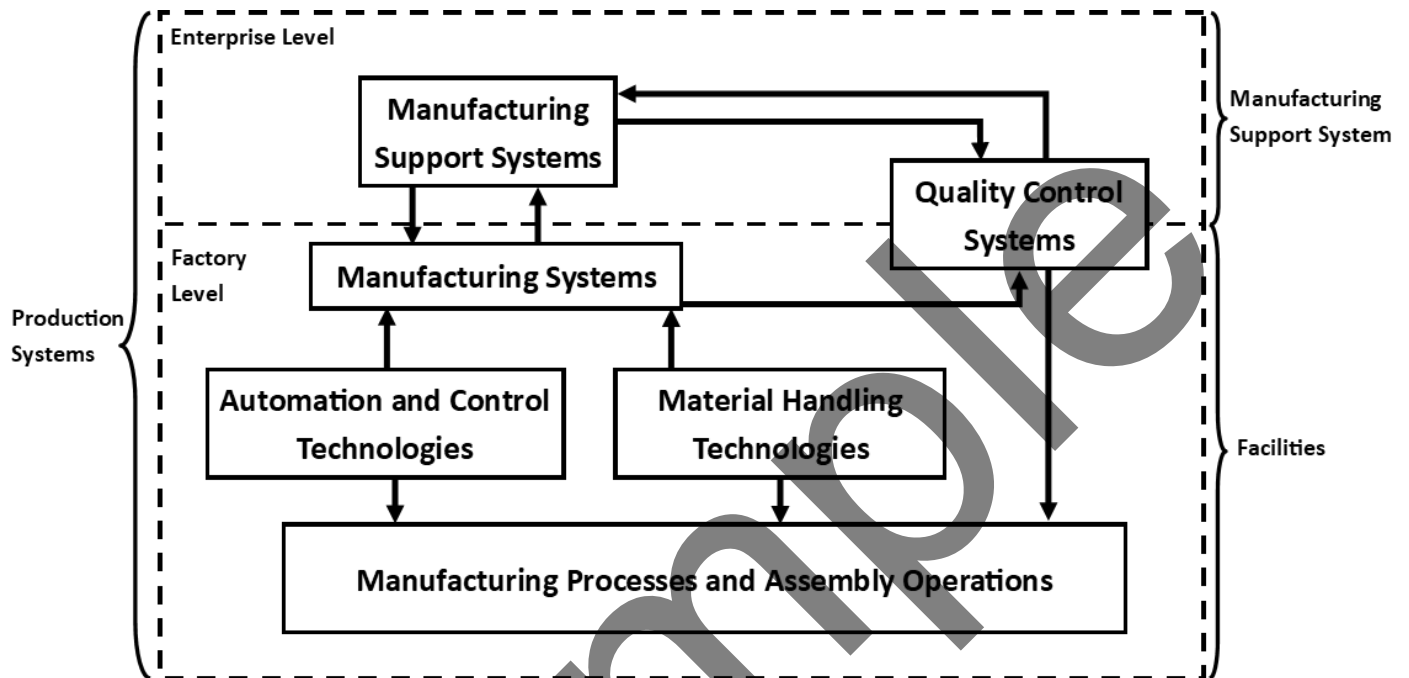


Fig.1.1: A modern manufacturing process diagram.

The modern manufacturing process will always have a support system that will constantly be under improvement, no process will be perfect and will always have room for improvement, whether this is to reduce waste, or make the best use of the floorspace, or the storage.

1.1.2 The Role of a Production Engineer

Theory

The role of a production engineer is a wide one, and incorporates manufacturing technology, engineering sciences and management science. A production engineer will have a broader range of engineering and will also understand the management difficulties that a production line faces.

A production engineer is responsible for the implementation of production processes and procedures. They will lead productivity improvements with project based activities, including new product introduction and refining the manufacturing process to reduce waste, rejects and operating costs, while trying to improve quality and safety.

The key responsibilities for a production engineer are vast, some of which are listed below.

- General:
 - Identifying manufacturing needs for new products in development

- Design new systems and processes and provide facilities and methods to ensure the cost-effective integration of new products or for the improvement of existing ones into manufacturing operations
- Design fixtures and tooling for assembly tasks
- Ensure product and process quality meets specifications required
- Task Management:
 - Maintain financial and statistical records
 - Plan and organise maintenance
 - Carry out Failure Mode Effects Analysis (FMEA), process documentation and implement improvements
- People Management:
 - Lead and support technicians and trainee engineers
 - Train people within own work group
 - Supervise any sub-contractors
- Relationship Management:
 - Liaise and communicate with other departments, customers, suppliers and any other service providers
 - Work with supervisors and colleagues to ensure workflow and output are at their most effective

1.1.3 Improving a Production Line

Theory

When developing new manufacturing techniques for a production line, it's important to look at the process in the production line that needs improvement. Consider the following production line in Fig.1.1, it shows the cost of running the system, and also the rate at which the process can complete its task.



Fig.2.1: A production line including the rate of process and the cost.

If the company wants to increase the overall output rate of the system, the production engineer needs to research and develop improvements to **Process 3**, the overall rate of the production line is only as fast as its slowest process. This production line will produce 20 products per hour, until **Process 3** is improved. If **Process 2** is continued at full rate, there will also be a tremendous backlog, and this will cost the company more in terms of storage.

With regards to reducing the cost of the system, it is difficult to pinpoint an exact process to tackle straight away. You would expect it to be **Process 1**, since it is the most expensive, however, there is no guarantee that this is the process you can cut the most cost out of. The production engineer must first research all the processes to see which has the best opportunity to reduce the cost by the largest amount, before beginning the development of the cheaper manufacturing process.

1.1.5 Designing, Implementing and Refining Systems

Video

To improve the production line, there are several ways to approach it. You can refine the design of the product, or you can refine the processes and systems themselves.