

# SAMPLE ASSIGNMENT BRIEF AND COMMENTARY

## UNIT 6 - PRODUCTION AND MANUFACTURING



## **Engineering**

### **Level 3 Unit 6: Production and manufacturing (ENG3U6)**

#### **Sample Assignment Brief and Commentary (Approximately ten hours under controlled conditions)**

#### **Assignment Overview**

A production plan is important not only because it ensures that a product is made correctly, but also because it can be used to create a production schedule. This allows you to plan make sure that key machines and processes are fully used and to forecast the lead time to manufacture a product. In this assignment you will develop a production plan and schedule for the manufacture of a batch of remote controls, using a video case study.

This assignment has been designed as a stand alone task for this unit.

This assignment will be taken under controlled conditions. This means that you will work under the supervision of your teacher. Where this is not possible for a task or part of a task, you will need to submit evidence from others to prove that the work is your own.

#### **Outcomes**

##### **You will produce:**

- 1 A Production Plan for the manufacture of a large batch of remote controls
- 2 A schedule for the production of the large batch
- 3 An analysis of the changes needed in production to manufacture a small batch of samples

#### **Assignment brief**

A company that manufactures remote controls has been approached by a possible new customer, who will give them a very large order if they can deliver it within the customers required time. The company have asked you to record a production plan for their existing product and use it to create a schedule for producing the first batch of 2,000 products for the new customer.

The customer has also asked if the company can supply a one-off batch of 100 prototype products of a new design, so that they can test and evaluate them for a new application. You have been asked to prepare a report for the Sales Director, explaining how this batch will need to be different from normal manufacture in terms of the processes used, cost and the time needed to complete production.

The total time allowed for assignments in this unit is approximately 10 hours. Marking of this assignment is determined by completion of the assessment grid.

You must complete the following tasks:

### **Task 1**

(estimated time allowed: 3-5 hours)

Watch the case study. Develop a production plan for the manufacture of the remote control. This should include:

- The task carried out (e.g. making the circuit board, putting the components on the circuit board)
- The materials used during that task (e.g. PCB, electrical components, casing)
- The equipment used (e.g. the CNC pick and place machine)
- Any quality assurance that has been used (e.g. use of sensors to check position, dedicated jigs and fixtures etc.)
- Any quality control checks that are carried out (e.g. the machine that checks the circuits, the man who tests that a sample of the final products work as intended, etc.). This should indicate whether testing is carried out on every product or on a statistically-selected sample

### **Task 2**

(estimated time allowed: 2-3 hours)

Create a Gant chart/timing plan for use as the schedule for the batch. This should include separate line entries for:

- The time needed for major items of materials to be ordered and arrive.
- All of the tasks carried out, including quality checks (e.g. making the circuit board, the machine that checks the circuits).

You should estimate the time required for the batch at each process based on the information in the case study. You must also take into account that other products are also being made, so there will be typically up to one day's work in a queue before each process.

### **Task 3**

(estimated time allowed: 3-5 hours)

Write a report for the Sales Director explaining how the one-off sample batch will need to be different from normal manufacture. This should include:

- An explanation of how the scale of manufacture affects the manufacturing system and processes used
- The benefits that CAD, CAM and CAE currently bring to the manufacturing system when making large quantities of products
- The alternative processes that could be used at each step in the production plan to make the one-off batch of samples
- The benefits and drawbacks of these alternative process options, including how these may affect the time needed to complete the batch and the cost of making the sample products

## **Additional Information for Teachers**

This assignment has been based on a video case study at Matric Remote Controls. This can be found online at <http://www.youtube.com/watch?v=gMZNRzCDunc>. This assignment could easily be adjusted for other appropriate video case studies, such as 'How it's made' or 'How do they do it'.

During the video the interviewee refers to ERP. This stands for Enterprise Resource Planning, where materials supply, production planning and scheduling are all carried out by an integrated piece of software.

Tasks 1 & 2 – it may be helpful to provide standard formats for these activities.

Task 3 – as most of the available case studies identify good practice, it can be difficult for pupils to understand why automated processes should be used as they may be perceived as the 'norm'. By focussing on the implications of making a small batch, in effect this is being done in reverse, and pupils have to consider the implications on making an automated process manual. This will develop the same understanding of the possible benefits and drawbacks of CAD, CAM and CAE.

Compliance to the Assessment Criteria:

- Criteria topic 1 is evidenced by Task 3
- Criteria topic 2 is evidenced by Task 1
- Criteria topic 3 is evidenced by Tasks 1, 2 and the analysis in Task 3

## Commentary on Sample Assignment Brief

- Accessibility:
  - length of assignment about right
  - not always clear exactly what the learner has to do
  - some concern about the amount that has to be done in 10 hours
  
- Suitability of task:
  - tasks could be more explicit
  
- Opportunity to cover Assessment Criteria
  - Assessment Criteria should be cross-checked against tasks: are all covered as fully as they could be?
  - 40 % of Assessment Criteria is for production planning – this is needs to be reflected in the assignment and will need to be discussed with the consortia
  
- Balance of time:
  - 13 hours maximum time: could be closer 'approximate time' in specification (10 hours)
  - time allocation could reflect the mark weighting a little more clearly
  
- Evidence Requirements:
  - contrast differences tasks cover ERS 2 very well

# Assessment grid

Please note that the descriptions in this marking grid relate to the top of each band. Further guidance on using marking grids is available in the Assessment section of the specification.

Assessment criteria topic	Band 1	Band 2	Band 3	Mark and Comments
	The learner has:			
1 Engineering manufacturing systems	<p>0 – 7 marks</p> <p>Gathered, recorded and analysed information about manufacturing systems from a limited range of sources.</p> <p>Briefly described the suitability of the product for manufacture by different types of processes or applications.</p> <p>Described the operation of CAD or CAM as part of a manufacturing system.</p> <p>Explained in general terms how CAE operates.</p> <p>Described the characteristics of different engineering production systems.</p>	<p>8 – 14 marks</p> <p>Gathered, recorded and analysed information from a wide range of sources; described and analysed different types of manufacturing systems.</p> <p>Assessed the suitability of the product for various types of processes or applications.</p> <p>Explained how CAD or CAM could be used in forming part of the manufacturing system.</p> <p>Explained how CAE could integrate various aspects of manufacturing systems and what benefits might result.</p> <p>Described the effectiveness of different engineering production systems.</p>	<p>15 – 21 marks</p> <p>Gathered, analysed and evaluated relevant information about different manufacturing systems and recorded well-reasoned judgements about their effectiveness in a variety of complex engineering contexts.</p> <p>Analysed the comparative merits of differing types of processes or applications for producing the product.</p> <p>Fully explained the part CAD or CAM plays in an integrated manufacturing system.</p> <p>Clearly explained how CAE would operate, in reducing time taken for operations and increasing flexibility. Shown in detail the contribution CAD and CAM would make.</p> <p>Evaluated and assessed the merits of a variety of engineering production systems.</p>	
2 Quality control and quality assurance within the engineering sector	<p>0 – 5 marks</p> <p>Produced a summary list of quality control points.</p> <p>Shown an understanding of quality assurance in context.</p> <p>Applied simple statistical methods.</p>	<p>6 – 10 marks</p> <p>Produced a detailed and accurate list of quality control points.</p> <p>Clearly documented a quality assurance procedure for the product's production; demonstrated how quality assurance procedures will be applied.</p> <p>Used statistical and analytical methods.</p>	<p>11 – 15 marks</p> <p>Produced a detailed quality control programme and specified any associated parameters related to accuracy and precision.</p> <p>Assessed all relevant quality assurance issues and produced a detailed quality assurance procedure which should prove effective.</p> <p>Evaluated using statistical and analytical methods.</p>	
3 Engineering production planning	<p>0 – 8 marks</p> <p>Produced a production plan for a simple product or, alternatively, produced a production plan for a complex product which contains omissions.</p> <p>Included some aspects of production and supply scheduling.</p> <p>Produced costings and schedules which are based on the obvious aspects of manufacturing the product.</p> <p>Adequately researched some production requirements.</p>	<p>9 – 16 marks</p> <p>Produced an adequate production plan for a moderately complex product.</p> <p>Included most aspects of production and supply scheduling.</p> <p>Produced costings and schedules which reflected the significant parts of the manufacturing process.</p> <p>Analysed most production requirements to ensure efficient manufacturing.</p>	<p>17 – 24 marks</p> <p>Produced an effective and detailed production plan for a complex product.</p> <p>Scheduled production and supply requirements effectively, using accurate data gained from research.</p> <p>Produced detailed and accurate costings and schedules for most aspects of the production process.</p> <p>Analysed production requirements to optimise manufacturing capacity.</p>	
<b>Any further comments</b>				