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## UNIT C: MANUFACTURING PRODUCTS (6295)

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### About This Unit

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Teamwork skills are very important in manufacturing. It is not possible for an individual to do everything when making a large number of products. In this unit, you will develop the basic teamwork skills that will help you in all future employment.

You will work as part of a team. You will be given a production plan and will be asked to develop a schedule for manufacture so you can produce products in quantity. You must follow your schedule for manufacture and carry out appropriate quality control techniques.

Throughout the manufacturing process you will need to be aware of health and safety requirements. You will develop the skills needed to use equipment and machinery safely.

You will have the chance to develop your application of number and communication Key Skills while working towards this unit.

This unit links well with Intermediate Unit A: *Application of new technology in manufacturing* and Unit B: *Working with a design brief* as you will be able to put what you have learnt about design into practice, and may provide opportunities to use new materials and production methods. It will also help you prepare for VCE units in production.

This unit is assessed through your portfolio work and an external assessment.

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### What You Need To Learn

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#### Production Plan and Schedule for Manufacture

You will need to work from a production plan, which you will be given. The plan will tell you about the type of product you must manufacture and how many to make. You will need to use the plan to develop a schedule for manufacture.

This schedule must include:

- all processing and assembly stages;
- sequence and timing of stages;
- critical control points;
- critical control procedures;
- team allocation of critical control procedures.

## **Teamwork**

You will need to know what makes an effective team. To develop an effective team you must:

- identify individual strengths and weaknesses;
- ensure good communication between team members;
- identify roles for each team member, which should be assigned according to strengths and weaknesses;
- set targets and common goals;
- ensure that team members are motivated.

## **Preparing Materials, Components, Equipment and Machinery**

You must know how to prepare materials and components according to the production plan and manufacturing schedule. You will need to learn about the processing methods for given materials and their working properties.

You must be aware of other forms of preparation such as trimming, cleaning or degreasing, preparing blanks and initial processing such as annealing or freezing.

You must be able to prepare the equipment and machinery needed for the manufacture of a product. This includes cleaning and setting up, for example checking cutting edges, tensioning sewing machines.

You must be able to carry out health and safety checks on equipment and machinery, for example checking guards are in position.

## **Processing Materials and Components**

You must learn how to use appropriate equipment and machinery safely and use manufacturers' instructions to produce a given product. To do this you must be able to:

- control and adjust appropriate equipment and machinery correctly to process materials and components to specification and quality standards;
- maintain levels of materials;
- understand the principles that determine the correct use of tools and equipment.

## **Assembling and Finishing Materials and Components**

You will need to be able to assemble materials and components to a production plan and manufacturing schedule. You will also need to finish the product according to a production plan and manufacturing schedule.

## **Applying Quality Control Techniques during Manufacture**

You will need to know about quality indicators given in the production plan and be able to apply these during manufacture. You must be able to:

- test and compare samples at the critical control points specified in your manufacturing schedule;
- record data in appropriate formats, such as on paper, in computer packages, as graphics or in tables;
- identify defects and suggest possible causes and the changes needed to prevent them from happening again.

## **Health and Safety**

When manufacturing a product, you must always be aware of health and safety issues relating to the use of materials, components, tools and equipment. You must be able to:

- care for yourself and others in a manufacturing environment;
- follow safety procedures and instructions;
- keep a safe place of work;
- check that safety equipment, health and safety procedures and systems are operational;
- use safety equipment and health and safety procedures and systems correctly during assembly and finishing.

Safety systems include guards or stop buttons, as well as procedures to ensure hygiene standards are met.

Safety equipment includes emergency equipment, first-aid equipment and personal safety clothing.

## Assessment Evidence

<p><b>You need to answer test questions</b> to show how well you understand the production process.</p> <p><b>In addition, in your portfolio, you need to produce</b> a batch of a product manufactured as part of a team and the schedule for manufacture of the product. The product must be composed of three main components made from different materials.</p>		
<p><b>To achieve a portfolio Pass you must show you can:</b></p> <p>P1 agree the roles for team members by matching tasks to the strengths and weaknesses of the members</p> <p>P2 develop a realistic schedule for manufacture by identifying the main stages and critical points of manufacture</p> <p>P3 select and prepare appropriate materials, components, equipment and machinery to make your batch of product</p> <p>P4 use appropriate processes and skills to make and finish your batch of product</p> <p>P5 follow safety procedures correctly and use correctly safety equipment for the processes, equipment and machinery used</p> <p>P6 apply appropriate quality control as you manufacture the batch of product.</p>	<p><b>To achieve a portfolio Merit you must also show you can:</b></p> <p>M1 ensure the team follows the schedule for manufacture by revising the schedule during the manufacturing process if necessary</p> <p>M2 carry out quality control techniques consistently to achieve the required quality standards for the batch of product.</p>	<p><b>To achieve a Distinction you must also show you can:</b></p> <p>D1 identify alternative processes and techniques that could have been used to manufacture your batch of product</p> <p>D2 explain how the schedule for manufacture could be improved if you had to repeat the exercise</p> <p>D3 evaluate the quality of your finished batch of product and the performance of the manufacturing team.</p>



### **Teaching Strategies**

The product needs to be carefully considered and should usually have the following features:

- three components made from different materials;
- be non-sophisticated (more sophisticated for intermediate students than foundation students);
- be relatively easy to manufacture involving a limited number of stages (more stages for intermediate);
- be low cost and use available materials.

The specification should be clear and meaningful. It is appropriate to decide on a product that will stimulate students. For example, something they may be able to use or wear, or sell as part of an enterprise activity.

### **Production Plan**

The production plan given to students should be appropriate for the facilities and working areas available to them. It is important to make the production plan as detailed, clear and unambiguous as possible. Where possible it needs to be related to industrial practice.

Remember that several production teams may be working at once (if working in nested groups).

After receiving the product specification and production plan it is suggested that students are given clear health and safety instructions on the use of equipment and machinery. Manuals and codes of practice should be available for reference.

Equipment and machinery should exclude machinery defined as ‘dangerous’ in health and safety statutes and regulations.

### **Scientific Principles**

Students should be given instructions on the correct use of tools and equipment. This should be underpinned by general scientific principles, for example it is more efficient to use a saw vertically than horizontally because it is aided by the force of gravity.

### **Assessment Strategies**

All GNVQ students produce portfolio work as part of teaching and learning. The portfolio provides the evidence for internal assessment for most units. This unit is common to the six-unit and the Part One awards. Please note that the assessment requirements for these two qualifications are different.

Each unit in the Part One award combines portfolio evidence with a test to arrive at Pass, Merit and Distinction grades. All three compulsory units have this combination.

When grading student evidence you should consider the following general qualities that distinguish between the three grades:

- increasing depth and breadth of understanding;
- increasing coherence, evaluation and analysis;
- increasing independence and originality.

For this unit you should also consider the following qualities that help distinguish between grades:

- increasing understanding of the manufacturing process;
- increasing skill and confidence in manufacturing processes and using a production plan and manufacturing schedule.

There is usually a variety of evidence equivalent to that stated in the assessment evidence that will show these qualities.



## Key Skills Guidance

This guidance is specific to this unit, but for planning and delivery purposes, it should be read in the context of the whole GNVQ. Please refer to the introduction to the whole qualification for further information.

The section on signposts indicates opportunities to achieve aspects of key skills that can be incorporated naturally into candidates' learning programmes. Candidates should be encouraged both to develop and to produce evidence for these aspects of the key skills, but they may need to develop additional evidence elsewhere to ensure that the requirements of the key skills units are fully met.

<b>Signposts</b>	
<i>When candidates are:</i>	<i>There may be opportunities for them to develop the following key skills evidence:</i>
<ul style="list-style-type: none"><li>developing a realistic schedule for manufacture by identifying the main stages and critical control points of manufacture</li></ul>	<p>N2.1 Interpret information from two different sources, including material containing a graph</p> <p>N2.2 Carry out calculations to do with:</p> <ul style="list-style-type: none"><li>a) amounts and sizes</li><li>b) scales and proportions</li><li>c) handling statistics</li><li>d) using formulae</li></ul> <p>N2.3 Interpret the results of calculations and present findings. Use at least one graph, one chart and one diagram</p>
<ul style="list-style-type: none"><li>carrying out quality control techniques consistently to achieve the required quality standards, for example by testing at critical control points specified in the manufacturing schedule</li></ul>	<p>N2.1 Interpret information from two different sources, including material containing a graph</p> <p>N2.2 Carry out calculations to do with:</p> <ul style="list-style-type: none"><li>a) amounts and sizes</li><li>b) scales and proportions</li><li>c) handling statistics</li><li>d) using formulae</li></ul> <p>N2.3 Interpret the results of calculations and present findings. Use at least one graph, one chart and one diagram</p>

<ul style="list-style-type: none"> <li>• finding out about safety procedures and safety equipment for the processes, equipment and machinery used, for example using health and safety manuals, codes of practice, information from the Health and Safety Executive and trade unions</li> </ul>	<p>C2.2 Read and summarise information from two extended documents about a straightforward subject. One of the documents should include at least one image</p>
<ul style="list-style-type: none"> <li>• working as part of a team</li> </ul>	<p>C2.1a Contribute to a discussion about a straightforward subject</p>
<ul style="list-style-type: none"> <li>• developing a realistic schedule for manufacture by identifying the main stages and critical points of manufacture</li> <li>• selecting and preparing appropriate materials, components, equipment and machinery to make their batch of product</li> <li>• using appropriate processes and skills to make and finish their batch of product</li> </ul>	<p>LP2.1 Help set short-term targets with an appropriate person and plan how these will be met</p> <p>PS2.2 Plan and try out at least one option for solving the problem, obtaining support and making changes to your plan when needed</p> <p>WO2.1 Plan straightforward work with others, identifying objectives and clarifying responsibilities, and confirm working arrangements</p> <p>WO2.2 Work cooperatively with others towards achieving identified objectives, organising tasks to meet your responsibilities</p>
<ul style="list-style-type: none"> <li>• evaluating the quality of their finished batch of product and the performance of the manufacturing team</li> </ul>	<p>PS2.3 Check if the problem has been solved by applying given methods, describe results and explain your approach to problem solving</p> <p>LP2.3 Review progress with an appropriate person and provide evidence of your achievements, including how you have used learning from one task to meet the demands of a new task</p> <p>WO2.3 Exchange information on progress and agree ways of improving work with others to help achieve objectives</p>