Higher National Unit specification: general information

Unit title: Production Planning and Control

Unit code: H1KS 35

Superclass: VB

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Unit purpose

This Unit is designed to enable candidates to understand and apply the principles of planning and production control to improve production techniques and the efficient use of plant and traceability of items within a manufacturing facility. The Unit is aimed principally at those candidates who currently work at incorporated engineer level in a manufacturing environment (or who intend to work at this level in such an environment in the future). However, the Unit may also be studied by candidates who have an interest in the general field of manufacturing.

On completion of the Unit the candidate should be able to:

1 Explain and compare the principles of production planning and control.
2 Apply relevant elements of production planning and control philosophies and techniques.

Recommended prior knowledge and skills

It would be beneficial if candidates possessed an understanding of a range of manufacturing processes. This may be evidenced by possession of the following HN Units: *Engineering Skills* and *Process and Equipment Selection*.

Credit points and level

1 Higher National Unit credit at SCQF level 8: (8 SCQF credit points at SCQF level 8*)

**SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

General information (cont)

Core Skills

There may be opportunities to gather evidence towards the following listed Core Skills components in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Written Communication	Higher
Critical Thinking	Higher
Planning and Organisation	Higher

Context for delivery

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

Higher National Unit specification: statement of standards

Unit title: Production Planning and Control

Unit code: H1KS 35

The sections of the Unit stating the Outcomes, Knowledge and/or Skills, and Evidence Requirements are mandatory.

Where evidence for Outcomes is assessed on a sample basis, the whole of the content listed in the Knowledge and/or Skills section must be taught and available for assessment. Candidates should not know in advance the items on which they will be assessed and different items should be sampled on each assessment occasion.

Outcome 1

Explain and compare the principles of production planning and control.

Knowledge and/or Skills

- Reasons for applying production planning and control philosophies and techniques.
- Different levels of planning.
- Independent and dependent demand types and demand fluctuations.
- Inventory management (including inventory types and classification).
- Capacity planning (avoiding bottlenecks, loading, multi-cycling).
- Bill of Material (BOM).
- Concept of Just-in-time and Kanban.

Evidence Requirements

Evidence for the Knowledge and/or Skills items in this Outcome will be provided on a sample basis. The evidence may be presented in response to specific questions. Each candidate will need to demonstrate that she/he can answer questions based on a sample of the items shown above.

In order to ensure that candidates will not be able to foresee what items they will be questioned on, a different sample of five out of seven Knowledge and/or Skills items is required each time the Outcome is assessed.

Where sampling takes place, a candidate's response can be judged to be satisfactory where evidence provided is sufficient to meet the requirements for each item by showing that the candidate is able to:

- define production planning as an aid to the efficient use of available manufacturing resources to produce one or more items as opposed to not using a system where the results could be less efficient
- describe consequences of not using it
- describe the different approaches required for at least two levels of planning
- explain the difference between dependent and independent demand types
- describe a minimum of two types of inventory and state the disadvantages of holding inventory
- describe the principles of capacity planning and its importance
- describe the structure of a Bill of Material and the types of information it contains
- state the principles and objectives of Just-in-Time approach to production management.

Outcome 2

Apply relevant elements of production planning and control philosophies and techniques.

Knowledge and/or Skills

- Forecasting techniques.
- Planning techniques.
- Inventory management techniques.
- Capacity Planning techniques.
- Operations scheduling techniques.

Higher National Unit specification: statement of standards (cont)

Unit title: Production Planning and Control

Evidence Requirements

For Outcome 2 **all** of the Knowledge and/or Skills items should be assessed.

A candidate's response can be judged to be satisfactory where the evidence provided is sufficient to meet the requirements for each item by showing that the candidate is able to:

- Use and compare **at least two** forecasting techniques.
- Complete appropriate MRP tables for **at least three** Bill of Material levels to determine the planned order release requirements.
- Perform calculations to establish appropriate order quantities and batch sizes.
- Perform calculations for one method of capacity planning.
- Compare **at least two** operations scheduling sequencing rules and justify selection of appropriate method.

Higher National Unit specification: support notes

Unit title: Production Planning and Control

This part of the Unit specification is offered as guidance. The support notes are not mandatory.

While the exact time allocated to this Unit is at the discretion of the centre, the notional design length is 40 hours.

Guidance on the content and context for this Unit

This Unit has been designed to allow candidates to develop their knowledge and skills in the use of current techniques for product planning of manufactured items including the methods used to progress stages of completion.

Written Communication and Critical Thinking skills development should be achieved through decision making and writing the documentation required to communicate planning and control instructions to those engaged in making/assembling the items.

The particular skills developed are as follows:

- deciding a planning approach
- developing the plan
- deciding a control approach
- developing the schedule
- writing the documentation

The content of the Unit has been written in generic terms to allow candidates to use techniques specific to particular industrial applications.

Although it is usual to consider production planning and control as different or separate functions in the production of goods, the two Outcomes can be combined to allow a greater understanding of the overall picture. A combined approach would work well with candidates who already have some industrial experience in production or manufacture.

Guidance on the delivery of this Unit

A good introduction to the Unit would be to take one or two items (for example: a pie, a ball point pen, a lawnmower or a computer chip) and consider the whole planning and control sequence for manufacture.

When delivering each Outcome reference could be made back to the item(s) used in the introduction.

In designing this Unit, the Unit writer has identified the range of topics expected to be covered by lecturers. Recommendations are also given as to how much time should be spent on each Outcome. This has been done to help lecturers decide what depth of treatment should be given to the topics attached to each of the Outcomes. Whilst it is not mandatory for centres to use this list of topics it is strongly recommended that they do so to ensure continuity of teaching and learning, and because the assessment exemplar for this Unit is based on the Knowledge and/or Skills and list of topics in each of the Outcomes.

Higher National Unit specification: support notes (cont)

Unit title: Production Planning and Control

A list of topics is given below. Lecturers are advised to study this list of topics so that they can get a clear indication of the standard of achievement expected of candidates in this Unit.

Outcome 1 Explain and compare the principles of production planning and control **(18.5 hours)**

Deciding a planning approach considering:

- levels
- type of demand and demand fluctuations
- manufacturing requirements
- manufacturing techniques available

Inventory management:

- inventory types
- stock/no stock
- inventory classification
- inventory profiling
- safety stock (lead time usage distribution)
- inventory control

Capacity Planning:

- definition of capacity
- Rough Cut Capacity Planning (RCCP)
- capacity bills
- capacity measures (OEE)
- approaches to capacity issues (bottlenecks, loading, multi-cycling)

Bill Of Materials:

- structure (graphical and indented)
- levels (parent-component relationships)
- BOM information

Just-in-Time and Kanban:

- objectives
- aspects
  - product design
  - cellular layout
  - pull production
  - batch size
  - level loading
  - TQM
  - suppliers
  - people
  - benefits

Higher National Unit specification: support notes (cont)

Unit title: Production Planning and Control

Outcome 2 Apply relevant elements of production planning and control philosophies and techniques (18.5 hours)

Forecasting Techniques:

- apply and compare quantitative forecasting techniques
- assess accuracy of techniques

Planning techniques:

- apply planning techniques at different levels
  - Sales and Operations Planning
  - Master Production scheduling
  - Material Requirements Planning

Inventory management:

- economic order quantity calculations
- economic batch quantity calculations
- safety stock calculations

Performing Capacity planning:

- Rough Cut Capacity Planning calculations
- capacity bills
- OEE calculations

Producing a scheduling control sequence (ideally an electronic system should be used):

- prediction of problems (over capacity, under capacity, bottlenecks)
- comparisons of sequencing rules
- problem solutions (out-sourcing, multi-cycling, sub-contracting, alternative scheduling)

Higher National Unit specification: support notes (cont)

Unit title: Production Planning and Control

Guidance on the assessment of this Unit

Unit Assessment — 3 hours.

Outcome 1 should be assessed by means of one single assessment paper taken at a single assessment event that should last no more than 40 minutes. Evidence should be generated through assessment undertaken in controlled, supervised conditions. Assessment should be conducted under closed-book conditions and as such candidates must not be allowed to bring any textbooks, handouts or notes to the assessment.

Outcome 2 should be assessed using a scenario based assignment that requires the candidate to complete documentation relating to production planning and control and to compare techniques, justifying selection of appropriate methods.

The assignment portfolio should contain the use and comparison of at least two forecasting techniques, an appropriate method for batch/order quantity calculation, operational scheduling techniques using and comparing at least two appropriate sequencing rules, appropriate capacity planning calculations, and completion of appropriate MRP planning documentation for three levels of Bill of Materials

The completion of a portfolio associated with Outcome 2 should be done in no more than 2 hours and 20 minutes. Candidates should be supervised while completing the documentation and allowed access to extracts of information on approaches to production planning, improvement techniques and route planning and scheduling.

Candidates should attempt both assessments towards the end of the Unit delivery.

Assessment Guidelines

Outcome 1

The assessment paper could comprise a balance of short answer and restricted response questions.

Outcome 2

The candidates should have access to extracts of information on approaches to production planning and control and pro-formas should be provided by the assessment centre where required. Candidate may present their responses in paper form or electronically.

Higher National Unit specification: support notes (cont)

Unit title: Production Planning and Control

Online and Distance Learning

This Unit could be delivered by distance learning, which may incorporate some degree of on-line support. However, with regard to assessment, planning would be required by the centre concerned to ensure the sufficiency and authenticity of candidate evidence. Arrangements would be required to be put in place to ensure that the assessment, which is required to be sat at a single event, was conducted under controlled, supervised conditions.

For further information and advice please refer to *Assessment and Quality Assurance for Open and Distance Learning (SQA, February 2001 — publication code A1030).*

Opportunities for developing Core Skills

There may be opportunities to gather evidence towards the following listed Core Skills components in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

Written Communication	Higher
Critical Thinking	Higher
Planning and Organisation	Higher

Disabled candidates and/or those with additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website **www.sqa.org.uk/assessmentarrangements**

History of changes to Unit

Version	Description of change	Date

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General information for candidates

Unit title: Production Planning and Control

This Unit has been designed to develop your knowledge and skills in the use of techniques associated with planning the sequence of operations employed in the manufacture of simple items. These items could range from a single part made from one material produced by one process involving only a few operations to an assembly of several parts. The assembly could contain parts sourced from external suppliers fitted together with other parts, possibly made from different materials in-house. You will also learn about and use techniques associated with production control so that you can effectively plan the movement of parts through processes and operations in order that deadlines can be achieved and idle time kept to a minimum.

Initially the factors requiring consideration will be studied along with the current industrial techniques used to decide how to successfully allow manufacture and control to be achieved.

Several plans will then be critically reviewed to develop your overall understanding of how the techniques are applied. You will be given the opportunity to produce your own plan.

You will be assessed on your knowledge and use of the techniques. The assessment will take the form of one question paper and one portfolio, the question paper taking no more than 40 minutes and the portfolio production no more than 2 hours 20 minutes. The question paper will require that you answer questions involving knowledge and use of techniques. The portfolio will be based on a scenario and will require that you produce all the documentation for production planning and control of manufactured, assembled and procured items within an organisation.

If you do not already have a reasonable knowledge of manufacturing processes and operations used in the field you are interested in ask your tutor for information on these subjects.