SQA Advanced Unit Specification

General information for centres

Unit title: Economics of Manufacture

Unit code: HT78 47

Unit purpose: This Unit is designed to provide candidates with opportunities to gain knowledge and understanding of the different categories of costs that operate in a manufacturing organisation. Candidates will also be involved in calculating these costs and in applying breakeven analysis within a manufacturing costing context. Candidates will also have an opportunity to evaluate the viability of a project using the financial appraisal techniques developed in the Unit. This Unit has been developed for candidates working towards being Manufacturing Technicians and Incorporated Engineers plus others who have an interest in the economics of manufacturing in organisations.

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

1 Identify categories of costs within a manufacturing organisation.
2 Calculate costs from given data.
3 Apply the principles of breakeven analysis.
4 Evaluate project viability using financial appraisal techniques.

Credit points and level: 1 SQA Credit at SCQF level 7: (8 SCQF credit points at SCQF level 7*)

**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 National 1 to Doctorates.*

Recommended prior knowledge and skills: Candidates should possess knowledge of manufacturing systems and the costs involved in running a manufacturing organisation.

This may be evidenced by possession of the following National Certificate Units: Engineering Manufacturing Processes 2, Manufacturing Systems 1, Manufacturing Systems 2 and Costing and Estimating for Manufacture.

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

Written Communication	SCQF level 6
Using Number	SCQF level 5
Using Graphical Information	SCQF level 5
Critical Evaluation	SCQF level 6

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.

Assessment: Outcome 1 should be assessed by means of a written paper lasting no more than 30 minutes on cost categories within a manufacturing organisation. This assessment should be conducted under supervised, controlled conditions. Assessments should be conducted under closed-book conditions and as such candidates must not be allowed to bring any textbooks, handouts or notes to the assessments.

The assessments for Outcomes 2 and 3 can either be treated as separate assignments (ie an assignment on manufacturing cost data and an assignment on breakeven analysis) or be combined together into one assignment where candidates are asked to interpret given cost data and apply breakeven analysis on their interpretation.

Outcome 4 should take the form of an assignment where the candidate is expected to evaluate project viability using varying financial appraisal techniques.

SQA Advanced Unit specification: statement of standards

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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

Identify categories of costs within a manufacturing organisation

Knowledge and/or skills

- Production costs
- Direct costs
- Indirect costs
- Fixed costs
- Variable costs
- Overhead costs

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 any assessment of this Outcome **five out of six** knowledge and/or skills items should be sampled.

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 six knowledge and/or skills items is required each time the Outcome is assessed. Candidates must provide a satisfactory response to all five items.

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:

- categorise production costs
- identify and explain direct costs
- identify and explain indirect costs
- identify and explain overhead costs

Evidence must be generated through candidates taking a short written assessment paper lasting no more than 30 minutes. The paper should be conducted under 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.

Assessment guidelines

Questions used to elicit candidate evidence should take the form of an appropriate balance of short answer and restricted response questions. Candidates could be given costs data for a given manufacturing operation and asked to identify as many cost categories as possible.

Outcome 2

Calculate costs from given data

Knowledge and/or skills

- Manufacturing cost calculation
- Overhead allocation
- Overhead absorption
- Depreciation

Evidence Requirements

All knowledge and/or skills items in this Outcome should be assessed. Candidate evidence for the knowledge and/or skills items in this Outcome must be provided by means of an assignment which includes the preparation of a report. The assignment must involve interpreting manufacturing cost data.

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:

- understand and interpret manufacturing costs
- evaluate and carry out calculations involving overhead allocation
- evaluate and carry out calculations involving overhead absorption
- evaluate and carry out calculations involving depreciation

The assignment, which should last no longer than one and a half hours, must be carried out under open-book conditions in which candidates should be allowed to take notes, handouts, textbooks etc into the assessment.

Assessment guidelines

Centres may choose to provide candidates with a structure for the report or leave it to the candidates to decide how they wish to structure their reports.

It is recommended that centres develop a checklist to assist in the assessment of candidates' responses against the knowledge and/or skills items in this Outcome.

The assessment of Outcomes 2 and 3 can be combined together into one assessment, details of which are given under the Assessment guidelines heading in Outcome 3.

Outcome 3

Apply the principles of breakeven analysis

Knowledge and/or skills

- Sales and purchases
- Set-up costs
- Production process costs
- Manufacturing and purchasing costs
- Make and buy costs
- Breakeven analysis: mathematical and graphical method

Evidence Requirements

All knowledge and/or skills items in this Outcome should be assessed. Candidate evidence for the knowledge and/or skills items in this Outcome must be provided by means of an assignment which includes the preparation of a report.

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:

- interpret and categorise sales in terms of cost, profit and volume
- identify set-up costs and use this data in a breakeven analysis
- identify production process costs and use this data in a breakeven analysis
- identify and distinguish between manufacturing costs and purchasing costs and use this data in a breakeven analysis
- carry out a breakeven analysis to determine whether to make or buy a product
- interpret given data to construct a breakeven chart
- understand the concept of breakeven analysis in terms of graphical and mathematical methods

The assignment, which should last no longer than one and a half hours, must be carried out under open-book conditions in which candidates should be allowed to take notes, handouts, textbooks etc into the assessment.

Assessment guidelines

Centres may choose to provide candidates with a structure for the report or leave it to the candidates to decide how they wish to structure their reports.

It is recommended that centres develop a checklist to assist in the assessment of candidates' responses against the knowledge and/or skills items in this Outcome.

The assessment of Outcomes 2 and 3 can be combined together into one open-book assessment, lasting three hours conducted under controlled, supervised conditions. Candidates could be given detailed manufacturing data involving processes, times, material and labour costs and all other costs associated with a manufacturing operation. From this, a detailed report should be submitted covering all assessment criteria for both Outcomes.

Outcome 4

Evaluate project viability using financial appraisal techniques

Knowledge and/or skills

- Criteria for project viability
- Payback period
- Internal rate of return
- Discounted cash flow techniques
- Net present value method

Evidence Requirements

All knowledge and/or skills items in this Outcome should be assessed. Candidate evidence for the knowledge and/or skills in this Outcome must be provided by means of an assignment which will include the preparation of a report. The assignment should involve interpreting manufacturing cost data.

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:

- evaluate and justify project viability for two given problems using three financial appraisal techniques
- interpret and carry out calculations using the payback period method
- interpret and carry out calculations using the internal rate of return method
- understand the various discounted cash flow techniques
- interpret and carry out calculations using the net present value method

The assessment, which should last no longer than two hours, must be carried out under open-book conditions in which candidates should be allowed to take notes, handouts, textbooks etc into the assessment.

Assessment guidelines

Centres may choose to provide candidates with a structure for the report or leave it to the candidates to decide how they wish to structure their reports. Candidates could be directed towards the use of spreadsheet software in order to provide the required evidence.

It is recommended that centres develop a checklist to assist in the assessment of candidates' responses against the knowledge and/or skills items in this Outcome.

Administrative Information

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Unit title: Economics of Manufacture

Superclass category: EB

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced qualifications.

FURTHER INFORMATION: Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000. Alternatively, complete our Centre Feedback Form.

SQA Advanced Unit specification: support notes

Unit title: Economics of Manufacture

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

The Unit has been written in order to allow candidates to develop knowledge, understanding and skills in the following areas:

1 The types of costs that exist within a manufacturing organisation.
2 The use of manufacturing cost data to solve problems involving overhead allocation, overhead absorption and depreciation.
3 The use of breakeven analysis to solve make or buy problems.
4 The use of financial appraisal techniques relating to payback, internal rate of return and net present value methods.

In designing this Unit, the Unit writers have identified the range of topics that they expect 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 to 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 recommended that they do so as the assessment exemplar pack for this Unit is based on the knowledge and/or skills items and list of topics in each of the Outcomes.

The list of topics for each Outcome is given below. Lecturers are advised to study this list in conjunction with the assessment exemplar pack so that they can get a clear indication of the standard of achievement expected of the candidates in this Unit.

1 Identify categories of costs within a manufacturing organisation (6 hours)

- Production Costs
- Direct Costs: direct material, direct labour, direct expenses
- Prime Costs
- Indirect Costs: indirect material, indirect labour, indirect expenses
- Fixed Costs: set-up costs, tooling costs
- Variable Costs: direct labour, direct materials, process consumables
- Overhead Costs: production overheads, administration overheads, distribution overheads, selling overheads

2 Calculate costs from given data (8 hours)

- Manufacturing Cost calculation
- Depreciation: straight line method, reducing balancing method:
  - purchase price
  - installation costs
  - delivery costs
  - estimated life of project
  - net scrap value
- Overhead Costs: cost centres, cost allocation, cost allocation
- Overhead Absorption Rate: direct labour hour rate, machine hour rate, cost unit rate
- Overhead Allocation: non-production overheads; rent and rates; heat and light; maintenance; insurance; indirect wages

3 Apply the principles of breakeven analysis (8 hours)

- Breakeven analysis
- Graphical method: cost versus quantity manufactured
- Mathematical method: straight line equation
- Costs, profit and volume of sales model
- Make and buy cost model

4 Evaluate project viability using financial appraisal techniques (12 hours)

- Financial appraisal techniques
- Internal Rate of Return method (IRR)
- Payback method
- Discounted cash flow techniques: Net Present Value method (NPV)
- Profit
- Depreciation
- Discounted cash flow: time value of money

Unit Assessment

Assessment time — 6 hours.

Guidance on the delivery and assessment of this Unit

The Unit is designed to introduce candidates to the various costs involved within a Manufacturing Organisation and develop an understanding of how to evaluate these costs.

The delivery of Outcome 1 is critical to the Unit as it equips candidates with the fundamental knowledge required to complete the remainder of the Unit. Therefore, it should be taught at the start of the Unit to ensure that candidates have the correct level of knowledge.

The delivery of Outcome 2 should focus on overheads and depreciation within a manufacturing organisation using the knowledge gained from Outcome 1.

The delivery of Outcome 3 should focus on breakeven analysis, using both graphical and mathematical methods.

The delivery of Outcome 4 should focus on three financial appraisal techniques namely, payback period, annual rate of return and net present value.

The written assessment paper should take place after Outcome 1 has been completed and the assignments for Outcomes 2, 3 and 4 (or Outcomes 2 and 3 combined and Outcome 4) would normally be completed in sequence following the written test.

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	SCQF level 6
Using Number	SCQF level 5
Using Graphical Information	SCQF level 5
Critical Evaluation	SCQF level 6

Open 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. Centres would have to ensure that the written assessment paper and assignments were carried out under controlled and supervised conditions.

Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website www.sqa.org.uk/assessmentarrangements.

General information for candidates

Unit title: Economics of Manufacture

This Unit has been designed to provide you with the knowledge and skills that will enable you to understand the types and nature of costs involved within a manufacturing organisation.

You will study the main costs involved in manufacturing and categorise them into direct, indirect, fixed, variable and overhead costs. This will allow you to progress onto carrying out calculations involving overhead allocation, overhead absorption and depreciation. You will also be introduced to breakeven analysis and be expected to determine the breakeven points for two given projects. The Unit will conclude with the fundamentals of financial appraisal techniques of payback period, internal rate of return and net present value.

Formal assessment of this Unit will consist of a short written test and three short assignments focusing on overheads, depreciation, breakeven analysis and financial appraisal techniques. These assessments will be carried out under open-book conditions in which you will be allowed to take notes, handouts, textbooks etc into the assessment. For the majority of assessments you will be actively encouraged to use spreadsheet software.