National Unit Specification: general information

UNIT Ship Construction Skills (SCQF level 5)

CODE F5F0 11

SUMMARY

This Unit can be delivered as part of a National Qualification Group Award in Engineering but can also be taken as a free-standing Unit by candidates who wish to enhance their skills in the shipbuilding industry and/or in a fabrication and welding environment. It is also suitable for those studying the subject for the first time.

The Unit will introduce candidates to the methods used in ship construction and to the equipment and machinery used for fabrication purposes through practical activities. Candidates will have the opportunity to learn how to use the fabrication workshop equipment safely and correctly. On completion of this Unit, candidates will be able to manufacture basic ship structures from given drawings to the required specification and to a suitable scale.

OUTCOMES

1 Carry out lining and marking off procedures.
2 Perform material removal procedures.
3 Carry out forming processes.
4 Assemble and join pre fabricated ship component parts.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates would normally be expected to have attained the following, or equivalent:

- introductory marking out procedures
- thermal cutting skills

Administrative Information

Superclass: XQ

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National Unit Specification: general information (cont)

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CREDIT VALUE

1 credit at Intermediate 2 (6 SCQF credit points at SCQF level 5*).

**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.*

CORE SKILLS

There are opportunities to develop the Core Skills of *Problem Solving*, *Numeracy* and *Working with Others* at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

National Unit Specification: statement of standards

UNIT Ship Construction Skills (SCQF level 5)

Acceptable performance in this Unit will be the satisfactory achievement of the standards set out in this part of the Unit Specification. All sections of the statement of standards are mandatory and cannot be altered without reference to SQA.

OUTCOME 1

Carry out lining and marking off procedures.

Performance Criteria

(a) Tools and equipment used for marking off plates and sections are correctly identified.
(b) The information from ships drawings is interpreted correctly.
(c) Ships' structures are correctly lined off and marked off accurately from given drawings.

OUTCOME 2

Perform material removal procedures.

Performance Criteria

(a) The tools used to remove material are correctly identified.
(b) Profiles are correctly produced to given specifications, using suitable shearing equipment.
(c) Profiles are correctly produced to given specifications, using suitable thermal cutting equipment.
(d) Material removal is carried out in a safe manner.

OUTCOME 3

Carry out forming processes.

Performance Criteria

(a) Curvatures and bends on plates and sections are correctly produced to given specifications using appropriate equipment.
(b) Section material is correctly hot-formed to given specifications using appropriate equipment.
(c) Material forming is carried out in a safe manner.

OUTCOME 4

Assemble and join pre-fabricated ship component parts.

Performance Criteria

(a) Ship sub-assemblies are accurately produced from pre-cut and formed components.
(b) Sections of a ship structure are correctly assembled to given specifications from previously produced sub assemblies.
(c) Completed assemblies are erected and levelled correctly to given specifications in situ.
(d) Assembly and joining is carried out in a safe manner.

National Unit Specification: statement of standards (cont)

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EVIDENCE REQUIREMENTS FOR THIS UNIT

Evidence is required to demonstrate that the candidates have achieved all of the Outcomes and Performance Criteria.

Performance evidence is required that demonstrates that the candidates have achieved Outcomes 1 to 3 to the standard specified within the allotted time scale. The component parts produced will be fabricated to normal industry tolerances and each individual component produced will be subject to continual assessment using observation checklists.

Performance evidence supported by assessor checklists is required to show that all Outcomes and Performance Criteria have been achieved. The evidence can be produced on one or more assessment occasions throughout the duration of the Unit but will take place under supervised conditions and last no more than two hours.

Once all items have been produced the final assembly will be subject to independent inspection and must conform to the given dimensional tolerances of ±3mm.

National Unit Specification: support notes

UNIT Ship Construction Skills (SCQF level 5)

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 is in the National Qualification Group Award (NQGA) in *Fabrication and Welding Engineering* but it may also be taken on a free-standing basis.

On completion of this Unit the candidates should be able to produce ship sub assemblies that conform to specifications as required by the shipbuilding industry.

A typical ship's structure containing items such as a tank top, bilge radius, bulkhead and auxiliary machine seats should be drawn up to a suitable scale and used as the artefacts to be produced by candidates.

The components can be used to allow candidates to produce items individually but can then be assembled together to complete the whole structure.

The components should be produced to a tolerance within ± 3 millimetres of the given dimensions.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

It is expected that this Unit will be delivered in a workshop equipped with the machinery, tooling and equipment necessary to produce fabricated steelwork components.

The standard sequence of mark, cut, form and assemble should be adhered to in order to give candidates experience of the situations they will encounter in industry.

Simple examples of components can be produced during the Unit's duration to give candidates experience of using the equipment necessary for the fabricated steelwork component to be produced.

For Outcome 1, samples of typical marked out components, common to all types of ships, could be used as practice exercises. In the first instance, practice exercises are produced on template paper in order to minimise waste and give candidates confidence in the use of the equipment. Typically, the equipment used would be plate squares, engineer's squares, rules, tapes straight edges, dividers and trammel heads.

For Outcome 2, practicing on scrap material is advised to allow candidates to become familiar with shearing machine and thermal cutting equipment.

Outcome 3 requires the use of the rolling machine to produce hull components and other components that require a curved surface. Angular work will be formed by the use of the press brake. As previously stated, practice exercises are advised during the Outcome.

Outcome 4 will require the candidates to use clamping devices and fairing aids during the assembly procedure. A suitable levelled table or workbench is necessary for the assembly of component parts.

Lecturer demonstration is advised on the more complex tasks of assembling of components in order to maintain level and form during construction.

This Unit should be delivered by a combination of teaching and learning approaches which could include:

- Lecturing
- Case studies
- Practical activities
- Group discussions
- Tutorials
- Site visits
- Audio visual
- Guest speakers

OPPORTUNITIES FOR CORE SKILL DEVELOPMENT

All elements of the Core Skill of *Problem Solving:* critical thinking, planning and organising, reviewing and evaluating, can be developed in the workshop environment as candidates work through the Unit. As they apply theory to practical tasks they have to consider a number of factors, selecting machinery, tooling and equipment to produce fabricated steelwork components. Practical exercises to support development of skills under guided supervision are undertaken as part of formative work across the award, with an emphasis on *Numeracy* as a tool to be used and applied efficiently and critically in working contexts. Candidates have to focus on practical calculation to mark out, cut, form and assemble in order to produce components safely and accurately. The ability to understand and interpret graphic and numerical data underpins competence and also develops skills in *Numeracy*.

Health and safety implications will be considered and observed throughout, and the importance of co operative working will be emphasised to support confidence and familiarity with procedures. Discussion of the contribution of each individual to group goals and responsibilities could be used in an evaluation of solutions and results.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Opportunities for the use of e-assessment

E-assessment may be appropriate for some assessments in this Unit. By e-assessment we mean assessment which is supported by information and communications technology (ICT), such as e-testing or the use of e-portfolios or e-checklists. Centres which wish to use e-assessment must ensure that the national standard is applied to all candidate evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. Further advice is available in *SQA Guidelines on Online Assessment for Further Education (AA1641, March 2003), SQA Guidelines on e-assessment for Schools (BD2625, June 2005).*

National Unit Specification: support notes (cont)

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The assessment for this Unit takes the form of a series of practical exercises which when completed will be constructed to form a single fabricated assembly. As each exercise is completed it as marked and recorded on an observation checklist. The criteria for achieving the Outcome require that the finished component must be produced within agreed tolerances. The final fabricated assembly will be assessed to within the agreed tolerances and the results recorded on an observation checklist.

CANDIDATES WITH DISABILITIES AND/OR ADDITIONAL SUPPORT NEEDS

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* **(www.sqa.org.uk)**.