Higher National Unit specification

General information

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

Unit code: H94J 34

Superclass: PK

Publication date: May 2015

Source: Scottish Qualifications Authority

Version: 01

Unit purpose

This Unit is designed to allow learners to acquire a knowledge and understanding of human factors and how they affect an individual's performance in the workplace. In particular the Unit will look at how human factors apply to an aircraft engineering maintenance environment. The Unit will also provide the knowledge element aligned to EASA guidance to human factors in the aircraft maintenance environment.

This Unit is primarily intended for learners who are interested in aircraft engineering and is part of the HNC/HND Aircraft Engineering qualifications, although it may be of interest to learners of other disciplines.

Outcomes

On successful completion of the Unit the learner will be able to:

1 Explain the need to take human factors into account and identify the limits of human performance.
2 Explain the social, psychological and physical conditions that affect human performance.
3 Explain how the workplace environment, types of work tasks and communications affect human performance in the workplace.
4 Explain how human error and hazards in the workplace lead to accidents and how these can be avoided.

Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Higher National Unit specification: General information (cont)

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

Recommended entry to the Unit

Access to this Unit will be at the discretion of the centre. The Unit has no mandatory prerequisites.

Core Skills

Opportunities to develop aspects of Core Skills are highlighted in the Support Notes for this Unit specification.

There is no automatic certification of Core Skills or Core Skill components in this Unit.

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.

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**.

Higher National Unit specification: Statement of standards

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

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.

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. Learners 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 the need to take human factors into account and identify the limits of human performance.

Knowledge and/or Skills

- Human factors principles
- Incidents attributable to human factors/human error
- Effect that visual and hearing limitations has on human performance
- Factors affecting memory, information processing, attention and perception
- Effects of claustrophobia and physical access has on human

Outcome 2

Explain the social, psychological and physical conditions that affect human performance.

Knowledge and/or Skills

- Individual, groups and managers responsibility in the workplace
- Peer pressure, motivation and culture issues that impact in the workplace
- Effect fitness/health, workload and shift work has on human performance
- Effect alcohol, medication and drug abuse has on safety in the workplace

Higher National Unit specification: Statement of standards (cont)

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

Outcome 3

Explain how the workplace environment, types of work tasks and communications affect human performance in the workplace.

Knowledge and/or Skills

- Effect of physical and repetitive tasks has on individual
- Physical environment effects that influence human performance
- Limitations of visual inspection
- Limitations of individual working on complex systems
- Communication within and between teams
- Work logging and recording
- Individual development
- Dissemination of information

Outcome 4

Explain how human error and hazards in the workplace lead to accidents and how these can be avoided.

Knowledge and/or Skills

- Error models and theories
- Types of error in maintenance tasks
- Implications of errors
- Avoiding and managing errors
- Recognising and avoiding hazards in the workplace
- Dealing with emergencies

Evidence Requirements for this Unit

The assessment for this Unit can be done on an Outcome by Outcome basis or as part of a combined assessment event. Learners are required to provide written and/or oral recorded evidence, generated under closed-book supervised conditions.

Evidence for the Knowledge and/or Skills in this Unit will be generated through sampling. Any sampling process must be 'unseen' by the learner before the assessment. That is, learners are expected to fully prepare the range of Knowledge and Skills and not be able to predict a chosen sample.

Higher National Unit specification: Statement of standards (cont)

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

Outcome 1

Learners will need to provide written and/or oral recorded evidence to demonstrate they can examine three of the five Knowledge and/or Skills items by showing that they can explain:

- why human factors need to be taken into account in an aircraft maintenance environment.
- how incidences occur due to human errors or factors.
- Murphy's law and how it is used to prevent error.
- why incidences/accidents happen due to visual and hearing impairment.
- why human performance is limited by an individuals ability to process information, their memory, attention and perception.
- why claustrophobia and physical access have a detrimental effect on human performance.

Outcome 2

Learners will need to provide written and/or oral recorded evidence to demonstrate they can examine two of the four Knowledge and/or Skills items by showing that they can explain:

- the responsibility of individuals and groups in the workplace.
- how motivation/de-motivation and culture issue effect an individual performance.
- how peer pressure, team working and managerial decision influence an individual.
- how fitness/health and stress can effect an individuals performance.
- how shift work/workload bring about fatigue and limit human performance.
- the effect that alcohol, medication and drug abuse has on individuals.

Outcome 3

Learners will need to provide written and/or oral recorded evidence to demonstrate they can examine four of the eight Knowledge and/or Skills items by showing that they can explain:

- how the physical working environment can effect human performance in the workplace.
- how physical and repetitive tasks restrict or effect human performance.
- how individuals can limit effectiveness of visual inspection and its limitation.
- the limitations of individuals working on complex systems.
- why communication within and between teams is important in the workplace.
- the importance of work logging and recording to safe working practices.
- the importance of individual development and the need to keep up to date the importance of dissemination information correctly in the workforce.

Higher National Unit specification: Statement of standards (cont)

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

Outcome 4

Learners will need to provide written and/or oral recorded evidence to demonstrate they can examine three of the six Knowledge and/or Skills items by showing that they can explain:

- different types of error model and theories and explain how they are used.
- different types of errors and explain how they arise in maintenance tasks.
- the implication of errors to both individuals and companies.
- how errors can be avoided and managed.
- the methods used to recognise hazards and how the steps taken to avoid them the recognised methods and procedures used to deal with emergencies.

Higher National Unit Support Notes

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

Unit Support Notes are offered as guidance and 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 is an optional Unit in the HNC/HND Aircraft Engineering qualifications. The Unit is intended to provide learner with an in-depth knowledge of human factors and how these factors can affect an individual's performance in the workplace, particularly within the civil aviation industry.

The Unit will also provide the knowledge element aligned to published EASA guidance addressing human factors in the aircraft maintenance environment.

Content/context corresponding to Outcomes

1 The need to take human factors into account and the incidence attributable to human error. Murphy's law and how to avoid it. How vision, hearing can affect an individuals performance. How an individual's perception, attention and memory play an important role in their overall performance and how claustrophobia and physical access can inhibit some individual's work.

2 The responsibility of individuals and groups in the workplace. How peer pressure, managerial decisions and team working can affect an individual's performance. The culture, motivation/de-motivation issues that can influence an individual or groups attitude to work. The role that workload, time, pressure and shift work effects stress on an individual or how their fitness/health suffers due to fatigue and change of sleep patterns.

3 The effects that physical working environment such as noise, climate illumination can have on an individual's performance. The type of physical work that a person can be asked to undertake and the effect that repetitive tasks has on their performance. The limitation of people when asked to carry out visual inspections and the limitations that can be expected of them when carrying out complex tasks. The importance of communication in the workplace between individuals and groups and the communication between groups that occurs when accurately logging and recording work. The need for personal development and keeping individuals up to date with practices and the importance of dissemination of information to the correct people.

Higher National Unit Support Notes (cont)

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

4 The types of human error models and theories along with the types of human errors that can occur in maintenance tasks. The implication of these human errors (accidents) in the workplace and how they can be avoided and managed. How hazards in the workplace that can lead to accidents are identified and avoided and how if and when an emergency occurred the type of systems and methods used to manage them.

Guidance on approaches to delivery of this Unit

This Unit is designed to provide learners with professional knowledge and skills for the specific occupational area of aircraft engineering. It is logical to deliver this Unit sequentially by Outcome, with a mixture of assignments, exercises and case studies. Having access to relevant publications is recommended and course work and assignment reports must be the work of individuals.

Guidance on approaches to assessment of this Unit

Evidence can be generated using different types of assessment. The following are suggestions only. There may be other methods that would be more suitable to learners.

Centres are reminded that prior verification of centre-devised assessments would help to ensure that the national standard is being met. Where learners experience a range of assessment methods, this helps them to develop different skills that should be transferable to work or further and higher education.

Assessment for this Unit could be done on an Outcome by Outcome basis or as part of a combined assessment event. As an example, a combined assessment could take place covering Outcomes 1, 2 and 3 with a separate assessment covering Outcome 4. In this example, the combined assessment could be based upon a case study or workplace scenario, issued to the learner in advance of the assessment event. In this case the learner should be allowed sufficient time to familiarise themselves with the key aspects of the study, as a recommendation issued seven days in advance of the assessment. Learners should not be allowed to bring in textbooks or handouts but should be permitted to bring in up to two sides of A4 notes they have prepared. The notes should only extract specific human factors related events documented in the case study and should be handed in at the end of the assessment.

Irrespective of which assessment strategy is adopted, assessments should contain a sample of the Knowledge and/or Skills requirements for each Outcome.

In order to achieve this Unit, learners are required to pass all assessments by presenting sufficient evidence that they have met the minimum Evidence Requirements, giving satisfactory response to the sample questions.

Accurate records should be made of the assessment instruments used showing how evidence is generated for each assessment/examination, giving marking schemes and/or checklists, etc. Records of learners' achievements should be kept. These records will be available for external verification.

Higher National Unit Support Notes (cont)

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

The assessment instruments used for assessing this Unit should follow the general guidelines offered by the Scottish Qualification Authority (SQA) assessment model. Each centre should make a model answer as a marking guide for each sampled question asked and learners awarded marks for key points and presentation of answers. Learners can supplement written answer with sketches and diagrams to clarify points and be allowed to use scientific calculators to carry out any calculation.

For learners who do not achieve the minimum Evidence Requirement for each assessment, centres may allow learners to re-sit the assessments at an appropriate time using different sampled questions based upon the same or another case study.

Opportunities for 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 Communication Technology (ICT), such as e-testing or the use of e-portfolios or social software. Centres which wish to use e-assessment must ensure that the national standard is applied to all learner evidence and that conditions of assessment as specified in the Evidence Requirements are met, regardless of the mode of gathering evidence. The most up-to-date guidance on the use of e-assessment to support SQA's qualifications is available at **www.sqa.org.uk/e-assessment**.

Opportunities for developing Core and other essential skills

Learners will have opportunities to develop the Core Skills component of *Communication* (Written) at SCQF level 5 in this Unit throughout all Outcomes, although there is no automatic certification of Core Skills or Core Skill components. This could be achieved through accurate written answers to formative and summative questions.

History of changes to Unit

Version	Description of change	Date

General information for learners

Unit title: Human Factors for Aircraft Engineering (SCQF level 7)

This section will help you decide whether this is the Unit for you by explaining what the Unit is about, what you should know or be able to do before you start, what you will need to do during the Unit and opportunities for further learning and employment.

This Unit is designed to enable you to acquire a knowledge and understanding of human factors and how they affect an individual's performance in the workplace. In particular the Unit will look at how human factors apply to an aircraft engineering maintenance environment.

The Unit is primarily intended for learners who are interested in aircraft engineering and is part of the HNC/HND Aircraft Engineering qualifications, although it may be of interest to learners of other disciplines.

The Unit has four main areas, each area covered by a separate Outcome. The four main areas the Unit covers are:

1 Explain the need to take human factors into account and identify the limits of human performance.
2 Explain the social, psychological and physical conditions that affect human performance.
3 Explain how the workplace environment, types of work tasks and communications affect human performance in the workplace.
4 Explain how human error and hazards in the workplace lead to accidents and how these can be avoided.

Assessment for all four Outcomes in this Unit will be carried out under closed-book supervised conditions. To complete the Unit successfully you will have to achieve a satisfactory level of performance in the assessment event/s.

You will have opportunities to develop the Core Skills component *Communication* (Written) at SCQF level 5 in this Unit, although there is no automatic certification of Core Skills or Core Skill components.