

Higher National Unit Specification

General information for centres

Unit title: Human Factors for Aircraft Engineering

Unit code: DR08 34

Unit purpose: This Unit is designed to allow candidates 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 requirement to meet EASA IR Part 66 Aircraft Maintenance License (Module 9) Human Factors.

On completion of the Unit the candidate should 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 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 HN 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 Access 1 to Doctorates.*

Recommended prior knowledge and skills: Access to this Unit will be at the discretion of the centre. The Unit has no mandatory prerequisites.

Core skills: There are opportunities to develop the Core Skill of communications and problem solving at Higher Level in this Unit, although there is no automatic certification of Core Skills or Core Skills components.

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: This Unit is assessed by two assessment examinations covering all of the individual Outcomes. The assessments will be carried out on a sampled basis and be composed of a number of appropriate structured short answer restricted response questions, each of approximate 75 words. The first assessment will cover Outcomes 1 and 2, and the second will cover Outcomes 3 and 4. The assessments are to be based upon a case study or workplace scenario and are to be carried out under supervised, controlled conditions.

General information for centres (cont)

Unit title: Human Factors for Aircraft Engineering

In order to achieve this Unit, candidates are required to pass both assessments by presenting sufficient evidence that they have met the minimum evidence requirements, giving satisfactory response to the sample questions.

The assessment instruments used should follow the general guidelines offered by the Scottish Qualification Authority (SQA) assessment model and an integrative approach to assessment is encouraged.

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 candidates' achievements should be kept. These records will be available for external verification.

Higher National Unit specification: statement of standards

Unit title: Human Factors for Aircraft Engineering

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

Since the Outcomes for this Unit are assessed on a sampling basis, the whole of the contents listed in the knowledge and/or skill sections must be taught and available for assessment. Candidates will be to see the case study or work-based scenario that they will be assessed upon before the assessment event but should not know in advance the items on which they will be assessed and different case studies/scenarios or items should be sampled on each assessment occasion.

Assessment events for this Unit are to be carried out under closed-book supervised conditions and any notes made by the candidates before and during assessment should be handed in at the end.

The evidence requirements and assessment guidelines for the assessments of this Unit are given at the end of the statements of standards.

Outcome 1

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

Knowledge and/or skills

- ◆ human factors
- ◆ incidents attributable to human factors/human error
- ◆ affect that visual and hearing limitations has on human performance
- ◆ factors affecting memory, information processing, attention and perception
- ◆ affects of claustrophobia and physical access has on human

Evidence requirements

Candidates will need to provide evidence to demonstrate their knowledge and/or skills by showing that they can:

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
- ◆ affect fitness/health, workload and shift work has on human performance
- ◆ affect alcohol, medication and drug abuse has on safety in the workplace
- ◆ physical environment effects that influence human performance

Higher National Unit specification: statement of standards (cont)

Unit title: Human Factors for Aircraft Engineering

Outcome 3

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

Knowledge and/or skills

- ◆ affect of physical and repetitive tasks has on individual
- ◆ 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

Evidence for this Unit will be generated through sampling of the knowledge and/or skills requirements of the individual Outcomes by two assessment events, the first covering Outcomes 1 and 2, the second Outcomes 3 and 4.

In generating the evidence required for this Unit, candidates will need to respond to a set number of sampled questions based upon a case study or workplace scenario by structured short answer, restricted response questions. For each of the assessment the sampling basis is to be four, for the first assessment it is to be two from each of the knowledge and/or skills requirements of the Outcomes 1 and 2, and for the second assessment two from each out of the knowledge and/or skills requirements of Outcomes 3 and 4.

All assessment must be carried out under closed-book supervised conditions and the candidates' response to each question should be approximately 75 words. Assessment events should last for one and a half hours and in order to gain an assessment pass, candidates will need to demonstrate that they have met the minimum evidence requirements, giving satisfactory response to the sample questions.

Higher National Unit specification: statement of standards (cont)

Unit title: Human Factors for Aircraft Engineering

For the first assessment, a candidate's response can be judged satisfactory if the evidence generated shows that depending upon the sampled questions, the candidate can explain:

- ◆ why human factors need to be taken into account in a working environment
- ◆ how incidence occur due to human errors or factors
- ◆ Murphy's law and how it is used to prevent error
- ◆ why incidence/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
- ◆ 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 effects 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
- ◆ how the physical working environment can effect human performance in the workplace

For the second event, a candidate's response can be judged satisfactory if the evidence generated shows that depending upon the sampled questions, the candidate can explain:

- ◆ 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
- ◆ 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

Assessment Guidelines

The assessment of this Unit should be carried out by two assessment events based upon a case study or work case scenario and cover all four Outcomes of the Unit, the first assessment covering Outcomes 1 and 2, the second assessment covering Outcomes 3 and 4. The candidates should have access to the case study or workplace scenario that each assessment is to be based upon a week before the each assessment and all assessments should be carried out under supervised control conditions and last one and a half hours each. The sampled questions used to elicit candidates' evidence should take the form of structured, restricted response questions.

Higher National Unit specification: statement of standards (cont)

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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 candidates awarded marks for key points and presentation of answers. Candidates can supplement written answer with sketches and diagrams to clarify points and be allowed to use scientific calculators to carry out any calculation.

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

Administrative Information

Unit code:	DR08 34
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Superclass category:	PK
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Higher National Unit specification: support notes

Unit title: Human Factors for Aircraft Engineering

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 is an optional Unit devised for the principals and technology section of the HNC/HND Aircraft Engineering Group Award. The Unit is intended to provide candidate 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 requirement to meet EASA IR Part 66 Aircraft Maintenance License (Module 9) Human Factors, so it would be possible for candidates to sit an additional multi-choice examination in an EASA 147 organisation to gain an exemption to the EASA aircraft engineering licensing requirements.

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 inhibits 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. The effects that physical working environment such as noise, climate illumination can have on an individuals performance.
- 3 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.
- 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.

Higher National Unit specification: support notes (cont)

Unit title: Human Factors for Aircraft Engineering

Guidance on the delivery and assessment of this Unit

This Unit is designed to provide candidates 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.

Assessment of this Unit is to be carried out by centres using the assessment instruments they consider most appropriate, although assessment instruments used should follow the general guidelines offered by the Scottish Qualification Authority (SQA). All assessments should be carried out under controlled condition and candidates should not be allowed to bring in textbooks or handouts but should be permitted to bring in prepared material from the case study although this should be handed in at the end of the assessment.

Opportunities for developing Core Skills

There are no opportunities to develop Core Skills in this Unit.

Open learning

The Unit would be suitable for open and distance learning. The mode of delivery would be the same as other distance-learning Units by a range of self-study and tutor based assignments. Candidates would need to attend an approved study centre to sit the assessment events.

Candidates with additional support needs

This Unit specification is intended to ensure that there are no artificial barriers to learning or assessment. 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. For information on these, please refer to the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs*, which is available on the SQA website **www.sqa.org.uk**.

General information for candidates

Unit title: Human Factors for Aircraft Engineering

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 candidates who are interested in aircraft engineering and is offered as an optional Unit in the HNC/HND Aircraft Engineering Group Award, although it may be of interest to candidates of other disciplines.

The Unit may be of particular interest to candidates who are interested in pursuing a career in aircraft maintenance engineering as it covers the knowledge requirements for Module 9 (Human Factors) of EASA IR Part 66 Aircraft Licensing Requirements for both mechanical and avionics engineers.

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, psychology and physical conditions that affect human performance.
- 3 Explain how 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 of the Unit will be by two examination papers based upon case studies or workplace scenarios, the first paper covering Outcomes 1 and 2, the second covering Outcomes 3 and 4.

All examinations for this Unit are carried out under closed-book conditions. You will not therefore be permitted to bring textbooks or handouts into the assessment, but would be permitted to bring in prepared material from the case study but this will have to be handed in at the end.