

Model Assignment

Issued September 2008

OCR Level 3 Principal Learning in Engineering

Unit F557: Applications of computer aided designing

Please note:

This OCR model assignment may be used to provide evidence for the unit above. Alternatively, centres may 'tailor' the assignment within permitted parameters (see 'Notes for Tutors'). It is the centre's responsibility to ensure that any adaptations made to this assignment allow learners to meet all the assessment objectives and provide sufficient opportunity for learners to demonstrate achievement across the full range of marks.

The scheme codes for these qualifications are:

OCR Principal Learning in Engineering Level 3 500/2400/0

The QCA Accreditation Number for this unit is:

Unit F557: Applications of computer aided designing K/501/1898

This OCR model assignment remains live for the life of these qualifications.

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Model Assignment: Learner Information

OCR Level 3 Principal Learning in Engineering

Unit F557: Applications of computer aided designing

Model Assignment

Description of Model Assignment.

OCR Engineering Ltd. is a specialist engineering company that produces high quality engineering products and components for its customers. The company has been asked to design an aluminium stand for an LCD flat screen monitor. As one of the design team you will be responsible for the development, testing and production of the final design drawings and appropriate testing, simulation and modification of design ideas.

You will use CAD applications to create, model, evaluate and communicate the design. You will need to use both 2D and 3D CAD applications. In addition, you will consider design for the manufacture of the aluminium stand. You will select appropriate materials and processes, testing the suitability of these through either physical or computer based testing and simulation.

You have been asked by the directors to undertake research into the range of applications for CAD/CAM within design and manufacturing systems. They have also asked that you research and identify opportunities for the application of concurrent engineering practice within design development process. You will need to present a short written report to the directors explaining the opportunities for the use of CAD/CAM and concurrent engineering.

Read through all of the following tasks carefully, so that you know what you will need to do to complete this assignment.

Tasks

Task 1: Using 2D and 3D software

Assessment Criteria 1.1, 2.1, 3.1

Your task is to:

- Use 2D and 3D software packages to design and model the aluminium stand for the LCD monitor

You will need to:

- draw all parts of the product and assemble parts to model construction and assembly processes
- incorporate standard components in assemblies of parts such as fastenings, nuts, bolts, screws
- produce drawings to British and International standards including:
 - create orthographic and pictorial views of parts and assemblies
 - dimensions and appropriate tolerances
 - create parts lists
 - appropriate cross-sectional views
- produce, modify and store presentation drawings for the product, communicating design through the possible use of:
 - coloured, rendered, textured, exploded, sectioned, annotated views
 - the creation of temporary cross sections or translucency to view interior details
 - additions and modifications to lighting, shadows and reflections
 - allocation of densities to parts to reflect real materials
 - the addition of appropriate backgrounds to rendered views
 - photorealistic material rendering
 - background images and additional graphics

Task 2: Designing for manufacture

Assessment Criteria 4.1

Having completed your initial design work you need to consider 'designing for manufacture'.

Your task is to:

- identify appropriate materials and manufacturing processes for your design
- test and simulate these processes using the outcomes of this testing to make and apply any necessary modifications to the design

You will need to:

- ensure designs are feasible and practical and that manufacturing set up is correct
- make visual checks of CAD models to ensure conformity with design specifications
- make checks on assemblies for interference between parts
- use physical tests or computer generated tests to:
 - examine load bearing characteristics of a part with a number of different modifications such as:
 - sharp/radiused edges
 - square/round holes
 - with/without stiffening ribs
- where appropriate, manufacture a prototype in foam or wax to evaluate ergonomics

If the design has moving parts you may need to:

- simulate motion in parts, assemblies and use animation to explain how mechanisms work

The results of testing should be recorded in the form of a report with fully annotated screen shots, digital photographs, animations or video sequences.

Task 3: CAD/CAM applications

Assessment Criteria 5.1, 6.1

Your task is to:

- plan and carry out research to identify and evaluate the applications of CAD/CAM within combined design/manufacturing systems
- plan and carry out research to identify and evaluate the applications of concurrent engineering systems.

You will present your findings in the form of a report to the directors of the company.

Model Assignment: Tutor Information

OCR Level 3 Principal Learning in Engineering

Unit F557: Applications of computer aided designing

Guidance for Centres

General

1 1.1 OCR model assignments are issued free to participating centres and are also available to download from our website: www.ocr.org.uk.

1.2 Centres may choose to:

- use OCR model assignments for formal summative assessment of learners
- tailor OCR model assignments for formal summative assessment of learners

It is intended that this model assignment can be used by centres without modification. However, in order to provide appropriate contextualisation, improve access or increase local relevance, centres may 'tailor' the model assignments within set parameters. Details of the scope of adaptation are provided in the 'Notes for Tutors' section of this document.

1.3 This assignment has been designed to meet the full assessment requirements of the unit. Learners will need to take part in a planned learning programme that covers the underpinning knowledge and skills of the unit.

2 Before carrying out the assignment

2.1 Learners should be provided with a copy of the *Learner Information* section of this assignment or the centre adapted model assignment.

2.2 Learners may carry out preparations prior to undertaking the tasks; there is no time limit for this.

3 When completing the assignment

3.1 All assessment evidence must be produced under **controlled conditions** so that the overall level of permit control secures validity and reliability, provides good manageability for all involved and allows teachers to authenticate the work confidently. Further guidance on **controlled conditions** is provided within the OCR Principal Learning Handbook.

3.2 Learners should be allowed 20 guided learning hours (glh) to complete all of the tasks. The amount of time may vary depending on the nature of the tasks and the ability of individual learners. It is suggested that evidence is produced in several sessions.

3.3 Each learner must produce individual and authentic evidence for each task within the assignment.

3.4 Centre staff may give support and guidance to learners. This support and guidance should focus on checking that learners understand what is expected of them. It is not acceptable for presenters to provide model answers or to work through answers in detail.

- 3.5 Learners may use information from any relevant source to help them with producing evidence for the tasks.
- 3.6 Learners must be guided on the use of information from other sources to ensure that confidentiality is maintained at all times.

4 After completing the assignment

- 4.1 Learners' evidence is assessed by the centre's assessor against the qualification specification contained in the Principal Learning Handbook. When marking learners' work, centres **must** use the descriptors provided within the unit. For further information about assessment please refer to the section on Assessment and Moderation in the Principal Learning Handbook.
- 4.2 Assessors' decisions should be quality assured across the centre through internal moderation. For further information about internal moderation please refer to the section on Assessment and Moderation in the Principal Learning Handbook.

5 Presentation of work

- 5.1 Centres may wish to discourage learners from excessive use of plastic wallets for presentation of their evidence as this may hinder the assessment process. Instead centres may wish to encourage learners to present their work so that it is easily accessible, e.g. spiral bound, stapled booklet, CD-ROM.

6 Acceptable evidence

- 6.1 For guidance on generation and collection of evidence please refer to the section on Assessment and Moderation in the Principal Learning Handbook.

7 Plagiarism and unauthorised collaboration

- 7.1 Centres should have adequate procedures in place to ensure that plagiarism and unauthorised collaboration are identified and responded to.
- 7.2 When supervising tasks, teachers are expected to:
- offer learners advice about how best to approach such tasks
 - inform learners of the ramifications of unfair practise
 - exercise continuing supervision of work in order to monitor progress and to prevent plagiarism
 - ensure all copied materials is suitably acknowledged
 - ensure copied material is not given credit in the assessment process
- 7.3 As with all controlled assessments, the teacher/tutor presenter must be satisfied that the work submitted for assessment is the learner's own work.

Notes for Tutors

Introduction to the Tasks

The tasks have been designed to enable learners to demonstrate their knowledge and understanding of applications of computer aided designing.

The model assignment has been designed so that all of the assessment criteria in Unit F557 are addressed.

These guidance notes should be used in conjunction with the unit specification and Principal Learning Handbook.

Scope of permitted Model Assignment modification

The model assignment is self-contained in its present form. The set of tasks form a coherent whole addressing all the assessment criteria. No changes to the assessment criteria are permitted.

The model assignments can be changed in terms of:

- the context for the model assignment that will reflect the project undertaken
- the computer applications which are used by learners
- the end user/client

Guidance should be given by the presenter to ensure learners undertake a task of appropriate demand to ensure learners have access to all the assessment criteria.

When completing this model assignment it may be possible to generate evidence for completing a task in a variety of formats. This list is not exhaustive and will depend on the approach taken to complete the task or model assignment. In some cases the task or model assignment will require a specific format for the outcome and this will be clearly marked in the table.

Depending on the approach taken to the model assignments it may also be possible to demonstrate additional PLTS coverage and some additional opportunities have been listed below.

Task activity	Nature of evidence generated	Potential Assessment Criteria coverage
<p>Task 1</p> <p>Using 2D and 3D software</p>	<p>Confidently and consistently design and model using 2D and 3D software. Evidence may include:</p> <ul style="list-style-type: none"> • modelling of simple engineered products • parts and components shown • parts and components assembled • incorporation of standard components • collaboration with other learners to design concurrently <p>Produce drawings to specified British and International standards. Evidence may include:</p> <ul style="list-style-type: none"> • cross-referencing of standards available on software packages; • creation of orthographic and pictorial views of parts and assemblies to pp 8888 and • parts lists, dimensions and appropriate tolerances. <p>Produce, modify and store presentation drawings. Evidence may include:</p> <p>use of appropriate software to present and communicate designs through drawings, which may include:</p> <p style="padding-left: 40px;">coloured, rendered, exploded, annotated textured, rotated, sectioned</p> <ul style="list-style-type: none"> • temporary cross sections or translucency to view interior details 	<p>Assessment Criteria</p> <ul style="list-style-type: none"> • 1.1 • 2.1 • 3.1 <p>PLTS</p> <ul style="list-style-type: none"> • CT1 • CT5

	<ul style="list-style-type: none"> • appropriate backgrounds to rendered views • additions and modifications to lighting, shadows and reflections. • allocation of densities to parts to reflect real materials. • views of parts enhanced by photorealistic material rendering • background images and additional graphics relevant to the designed product which could be: <ul style="list-style-type: none"> ○ logos ○ user interface instructions ○ photographic images. 	
<p>Task 2</p> <p>Designing for manufacture.</p>	<p>Select appropriate materials and processes when designing for manufacture. Test and simulate design ideas. Make and apply any necessary modifications. Evidence may include:</p> <ul style="list-style-type: none"> • details of how designs are regarded as feasible and practical and that manufacturing set up is correct • details of visual checks of CAD models to ensure conformity with design specifications • results of checks on assemblies for interference between parts • details and results of testing, using physical tests or computer generated such as Finite Element Analysis, to compare load bearing characteristics taking into account such things as: <ul style="list-style-type: none"> ○ sharp/radiused edges ○ square/round holes ○ with/without stiffening ribs • a manufactured prototype in foam or wax to evaluate ergonomics • simulating motion in parts and assemblies and use of animation to explain how mechanisms work. 	<p>Assessment Criterion</p> <ul style="list-style-type: none"> • 4.1 <p>PLTS</p> <ul style="list-style-type: none"> • CT5 • CT6
<p>Task 3</p> <p>CAD/CAM applications</p>	<p>Plan and carry out research to:</p> <ul style="list-style-type: none"> • identify a range of applications of CAD/CAM within design and manufacturing systems • undertake a formative evaluation of the research • plan and carry out research to identify applications of concurrent engineering within design and manufacturing systems • undertake a formative evaluation of the research. 	<p>Assessment Criterion</p> <ul style="list-style-type: none"> • 5.1 • 6.1 <p>PLTS</p> <ul style="list-style-type: none"> • IE2