Higher Nationals

Assignment Brief – BTEC (RQF)

Qualification	Pearson BTEC Higher National Diploma in Mechanical Engineering
Student Name /ID Number	
Unit Number and Title	Unit 01: Design Engineering
Academic Year and Batch	
Unit Assessor	Geethal Siriwardana
Assignment Title	Product Design Engineering
Issue Date	05/12/2021
Formative Assessment Date	07/01/2022
Submission Date	14/01/2022
IV Name and Date	Asiri Manchanayaka

Submission Format:
The submission is in the form of calculations supported by written responses and simulation files. All work must be supported with research and referenced appropriately. Also, the Simulation files needs to be submitted with this assignment.

Unit Learning Outcomes:
LO1 Plan a design solution and prepare an engineering design specification in response to a stakeholder's design brief and requirements. **LO2** Formulate possible technical solutions to address the student-prepared design specification **LO3** Prepare an industry-standard engineering technical design report. **LO4** Present to an audience a design solution based on the design report and evaluate the solution/presentation

Assignment Brief and Guidance:

Scenario

Design engineers are problem solvers who bridge the gap between traditional engineering and design. It's a discipline which draws on knowledge of manufacturing techniques, product development, technical design, and rapid prototyping to bring new innovations to market. It also focuses on improving existing products and the processes used for making them.

Assignment Briefing

ABC Company hires you as a design engineer to develop a selected product (product that you have already selected). Imagine that you need to develop the product from the beginning. The design team of your company needs you to prepare a state of art document to convince its management to fund the design product.

Task 01

Define your design in terms of engineering. You may refer following points as a guide.

- Produce a design specification from a given design brief.
- Explain the impact of the stakeholder's design letter and the requirements in preparing the design specification
- Create a design project schedule with a graphical illustration of planned activities
- Explore industry-standard evaluation and analytical tools in the development of possible technical solutions
- Create a possible design solution using appropriate design techniques.
- Prepare a technical design report for industry standards
- Explain the role of design specifications and standards in the report on technical design

Task 02

Define your methodology of developing the product. You may address the following to develop your methodology

- Evaluate potential planning techniques and present a case for the chosen method
- Demonstrate critical path analysis techniques in planning/ planning design projects and explain its use
- Use appropriate software to apply modelling, simulation, and/or prototyping principles to develop the right design solution
- Concept Selection (You may need at least 3 Concept for the selection)
- Reflect on effectiveness Morphological analysis
- Explain the use of CPA (Critical Path Analysis) for your product
- Assess all issues related to compliance, security and risk management specific to the technical design report
- Think about the effectiveness of the chosen communication strategy in the presentation of the design solution and reflect
- Compare and compare the completed design specification with the relevant specification of

the industry standard
- Evaluate potential technical solutions, presenting a case for the final choice of solution.
- Evaluate the effectiveness of the industry's standard technical design report to produce a fully compliant finished product

Task 03

Develop a CAD model of your product using SolidWorks. During the developing stage, as a design engineer you need to address the following consideration in your report.

- Initial hand sketching
- Explore how you have embedded the ergonomics into your product.
- Evaluate potential selection material
- Apply Industry-standard specifications
- Assess any compliance with the standards you have considered?
- Present the recommended test procedure for your product practically and physically?
- Clarify the role of BOM (Bill of Materials)
- Present methods and operations in bulk manufacturing
- Prepare cost analysis
- Reflect the effectiveness

Task 04

Students will get three minutes to pitch the developed product following with a Q&A Session. The maximum possible number of slides will be five including the title slide. Date of the pitching will be advised later. Students should address following aspect when design the presentation.

- Present the recommended design solution to the identified audience
- Explain possible communication strategies and presentation methods that could be used to inform the stakeholders of the recommended solution
- Reflect on the effectiveness of the chosen communication strategy in presenting the design solution
- Justify potential improvements to the design solution and/or presentation based on reflection and/or feedback

Note:

Students must generate a one single report with all the assumptions and design justification (Do not separate according to the given tasks). Student has full control over the topic selection and topic breakdown. Students are required to attach the FEA/FEM Files along with submitting report. Also, in text citation and referencing are required to avoid the plagiarism in the report along with paraphrasing.

Once the report is finalised, students are required to submit as a PDF file. All the other files can be submitted as a one single compressed file. Please note that other file types will be rejected without any notice.

Word Count: Between 4500 and 5500 excluding general report sections.

Method of Submission:

Student are required to compile a compressed folder (zip file) including all the SolidWorks files and the report.

Report needs to submit separately. (Separate submission portal will be provided via LMS)

Rename the file as follows:

- Report File: (CINEC Student id) _Report (ex. M19990123456_Report)
- SolidWorks Zip File Files: TaskNo_## (ex. TaskNo01)
- Compressed File: UNIT01_Assign01_(CINEC Student id)

(ex. UNIT01_Assign01_M19990123456

Useful Links:

- **CAD/CAM Tutorial:** https://www.youtube.com/c/CADCAMTUTORIAL/videos
- **Morphological Analysis Explained:** https://www.youtube.com/watch?v=i3njT_ujDuE
- **Ten Basic Steps to Free Hand Sketching for Engineering Drawing:** https://www.youtube.com/watch?v=Ess0dmJB2lo
- **Engineering ToolBox:** https://www.engineeringtoolbox.com/

Learning Outcomes and Assessment Criteria			
Learning Outcome	**Pass**	**Merit**	**Distinction**
LO1 Plan a design solution and prepare an engineering design specification in response to a stakeholder's design brief and requirements	P1 Produce a design specification from a given design brief P2 Explain the influence of the stakeholder's design brief and requirements in the preparation of the design specification P3 Produce a design project schedule with a graphical illustration of the planned activities	M1 Evaluate potential planning techniques, presenting a case for the method chosen M2 Demonstrate critical path analysis techniques in design project scheduling/planning and explain its use	D1 Compare and contrast the completed design specification against the relevant industry standard specification
LO2 Formulate possible technical solutions to address the student-prepared design specification	P4 Explore industry standard evaluation and analytical tools in formulating possible technical solutions P5 Use appropriate design techniques to produce a possible design solution	M3 Apply the principles of modelling, simulation and/or prototyping, using appropriate software, to develop an appropriate design solution	D2 Evaluate potential technical solutions, presenting a case for the final choice of solution
LO3 Prepare an industry-standard engineering technical design report.	P6 Prepare an industry standard engineering technical design report P7 Explain the role of design specifications and standards in the technical design report	M4 Assess any compliance, safety, and risk management issues specific to the technical design report	D3 Evaluate the effectiveness of the industry standard engineering technical design report for producing a fully compliant finished product

LO4 Present to an audience a design solution based on the design report and evaluate the solution/presentation	P8 Present the recommended design solution to the identified audience P9 Explain possible communication strategies and presentation methods that could be used to inform the stakeholders of the recommended solution	M5 Reflect on the effectiveness of the chosen communication strategy in presenting the design solution	D4 Justify potential improvements to the design solution and/or presentation based on reflection and/or feedback

STUDENT ASSESSMENT SUBMISSION AND DECLARATION

When submitting evidence for assessment, each student must sign a declaration confirming that the work is their own.

Student name:	Assessor name:	
Issue date:	Submission date:	Submitted on:
Programme:		
Unit:		
Assignment number and title:		

Plagiarism

Plagiarism is a particular form of cheating. Plagiarism must be avoided at all costs and students who break the rules, however innocently, may be penalised. It is your responsibility to ensure that you understand correct referencing practices. As a university level student, you are expected to use appropriate references throughout and keep carefully detailed notes of all your sources of materials for material you have used in your work, including any material downloaded from the Internet. Please consult the relevant unit lecturer or your course tutor if you need any further advice.

Student Declaration

Student declaration

I certify that the assignment submission is entirely my own work and I fully understand the consequences of plagiarism. I understand that making a false declaration is a form of malpractice.

Student signature: Date:

Higher Nationals - Summative Assignment Feedback Form

Student Name/ID	
Unit Title	

Assignment Number		Assessor	
Submission Date		Date Received 1st submission	
Re-submission Date		Date Received 2nd submission	
Formative Comments:			
Assessor Signature:			Date:
Assessor Feedback			
Grade:	Assessor Signature:		Date:
Student Signature & Date:			

* Please note that grade decisions are provisional. They are only confirmed once internal and external moderation has taken place and grades decisions have been agreed at the assessment board.