

BACHELORS DEGREE ASSIGNMENT SPECIFICATION

Student name:		Student P number:	
Programme:	BEng (Hons) Mechanical & Manufacturing Engineering (Part-Time) BEng (Hons) Manufacturing Systems Engineering (Part-Time)		
Module:	Manufacturing Design & Technology	Module Level (4, 5, 6):	Level 5
Module code:	M5X02070	Contribution to Overall Module Assessment (%):	100%
Lecturers:	Richard Morgan & Rachel Alexander	Internal Verifier:	Graham Howe
Assignment Title:	Design Development – Polymer Processing Plant	Assignment No (x of x):	1 of 1
Hand Out Date:	25/01/18	Submission deadline:	23/04/18

Referencing:	In the main body of your submission you must give credit to authors on whose research your work is based. Append to your submission a reference list that indicates the books, articles, etc. that you have read or quoted in order to complete this assignment (e.g. for books: surname of author and initials, year of publication, <u>title of book</u> , edition, publisher: place of publication).			
Disclosure:	I declare that this assignment is all my own work and that I have acknowledged all materials used from the published or unpublished works of other people. All references have been duly cited.			
Student's Signature:	Assignments will not be accepted without a signature here	Date:		
Turnitin: Lecturer to tick to indicate if an electronic version of the assignment must be submitted to Turnitin. Note: the Turnitin version is the primary submission and acts as a receipt for the student. Both electronic and paper versions MUST be submitted by the same deadline. No marks will be released until both submissions are received. Late submission of the electronic version will result in a late penalty mark. Penalties for late submission: Up to one week late, maximum mark of 40%. Over one week late, Refer.			YES	✓
			NO	

Learning Outcomes tested (from module syllabus)	Assessment Criteria To achieve each outcome a student must demonstrate the ability to:
An awareness and understanding of the limitations of manufacturing processes in respect to their effects on both operating conditions and material performance.	Select appropriate manufacturing processes for the circumstances outlined in the task descriptors.
Cognitive skills in the application of physical principles of manufacturing processes with a view to improve the selection and optimisation of existing processes.	Make recommendations and amendments to designs in line with design for manufacture considerations.
Understanding and practical knowledge of the use appropriate design methods in conjunction with advanced features of a 3D CAD system in engineering design.	Implement design changes using SolidWorks solid modelling software.

DO NOT put this form into Turnitin or it will match many similarities with other students' submissions.

TASK DESCRIPTION

Introduction

Precious Plastic is a global community of people who are working together towards a solution to plastic pollution. This has been achieved by developing and sharing open source designs for basic polymer processing machinery. It is intended that individuals or small groups can use these designs, along with readily available components and materials to facilitate their own, miniaturised polymer processing and manufacturing plant capable of transforming waste plastic into useful, salable products.

Designs for the following items of polymer processing equipment are readily available via the Precious Plastics web resource:

- Shredder machine

Plastic waste is shredded into flakes which can be used in the other machines to create new products or components. The output size of these flakes can be altered by changing the sieve inside the machine to create different patterns and processes.

- Extrusion machine

Extrusion is a continuous process where plastic flakes are inserted into the hopper and extruded into a line of plastic with a uniform cross section. These lines can be used to make new raw materials such as 3d printing filament, make granulated plastic, spun around a mould, or used to create new components/products.

- Injection machine

Plastic flakes are heated and injected into a mould. The process is well suited to creating small, thin walled objects repeatedly. The part moulds can be made using manual/CNC mills or lathes.

- Compression machine

Plastic is heated inside the oven and slowly pressed into a mould. Well suited for making large and more solid objects, the oven itself is also a useful machine for prototyping and carrying out tests on new materials.

The machines have been designed and specified in such a way as to allow the entire recycling, processing and manufacturing process to fit within a large (40ft x 8ft x 8.5ft) shipping container.

You are required to select one of the process elements and, liaising with other members of the group develop new machine designs which optimize some or all of the following factors:

- Process Productivity (throughput)
- Process capability
- Health and Safety (machine operators / end users / observers)
- Social Engagement and Education
- Energy usage
- Reliability

All design developments must also pay due regard to design for manufacture factors and cost of manufacture. Life-in-service factors such as reliability and running costs should also be considered. You are required to thoroughly document the design and development process according to the tasks outlined in this coursework specification.

GUIDANCE FOR STUDENTS IN THE COMPLETION OF TASKS

Task 1

Research and critically appraise the existing, open source design and critique this against the commercial/industrial process. (2000 words)

Task 2

Develop a design specification. Outline the factors which you will seek to optimise and generate concept design solutions. (500 words)

Deadline ~~05/03/18~~ 09/03/18 (extension due to campus closure)

Task 3

Appraise your concept design solutions.

Carryout your design and development work outlining your engineering solutions and any underpinning principles. (2000 words)

Deadline ~~12/03/18~~ 14/03/18 (extension due to campus closure)

Task 4

Fully document your final design solution. Your submission should include the following:

- Solid Models and Technical Drawings of your design.
- Detailed specification of any components or systems use.
- Operating principles

(1000 words)

Deadline 26/03/18

Task 5

Conclusion and appraisal of the final design along with any further work carried out.

(1000 words)

For this, final submission, you should compile tasks 1 to 5 into one cohesive report. If you wish to make amendments to any of the previous tasks, in the interest of continuity/fluency, you may do this for the final submission.

The grades for each task will be determined from the work documented in the final submission.

Deadline 23/04/18

MARKING CRITERIA AND STUDENT FEEDBACK

This section details the assessment criteria. The *extent* to which these are demonstrated by you determines your mark. The marks available for each criterion are shown. Lecturers will use the space provided to comment on the achievement of the task(s), including those areas in which you have performed well and areas that would benefit from development/improvement.

Common Assessment Criteria Applied	Marks available	Marks awarded
1. Research-informed Literature Extent of research and/or own reading, selection of credible sources, application of appropriate referencing conventions.		
The marks for 'Research informed literature' will be determined by the range and credibility/suitability of citations used to support your work. The referencing conventions used throughout your work will also be evaluated.	10	
2. Knowledge and Understanding of Subject Extent of knowledge and understanding of concepts and underlying principles associated with the discipline.		
The marks for 'Knowledge and Understanding of Subject' will be determined by evaluating the explanation and justification for your design decisions. This includes the extent to which you are able to identify and explain the underlying scientific, engineering, economic, social or environmental principles which inform or influence your decisions and solutions.	20	
3. Analysis Analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence		
The marks for 'Analysis' will be determined by evaluating the analytical tools or methods which you apply in your work. Analytical methods include, calculations, FMEA, QFD, FEA or Life Cycle Analysis.	20	
4. Practical Application and Deployment Deployment of methods, materials, tools and techniques; application of concepts; formulation of innovative and creative solutions to solve problems.		
The marks for Practical Application and Deployment will be determined by evaluating how effectively and thoroughly, you've integrated the subject knowledge and the analysis into an effective machine or facility design. Primarily, this will be established through your Solid Models, Technical Drawings and your supporting design documentation.	30	
5. Skills for Professional Practice Attributes in professional practice: individual and collaborative working; deployment of appropriate media; presentation and organisation.		
The marks for 'Skills for Professional Practice' will be determined by evaluating the way in which you communicate your work. You are expected to use appropriate media (written work, tables, charts, solid models, engineering/technical drawings) in your report. The standard and extent of use of these media will determine the marks allocated for this section.	20	

Assignment Mark (Assessment marks are subject to ratification at the Exam Board. These comments and marks are to give feedback on module work and are for guidance only until they are confirmed.)	Late Submission Penalties (tick if appropriate)		
	Up to one-week late		
	Over one week late		
			%

COMMON ASSESSMENT AND MARKING CRITERIA

	OUTRIGHT FAIL	UNSATISFACTORY	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT	EXCEPTIONAL
Assessment Criteria	0-29%	30-39%*	40-49%	50-59%	60-69%	70-79%	80-100%
1. Research-informed Literature Extent of research and/or own reading, selection of credible sources, application of appropriate referencing conventions	Little or no evidence of reading. Views and findings unsupported and non-authoritative. Referencing conventions largely ignored.	Poor evidence of reading and/or of reliance on inappropriate sources, and/or indiscriminate use of sources. Referencing conventions used inconsistently.	References to a limited range of mostly relevant sources. Some omissions and minor errors. Referencing conventions evident though not always applied consistently.	Inclusion of a range of research-informed literature, including sources retrieved independently. Referencing conventions mostly consistently applied.	Inclusion of a wide range of research-informed literature, including sources retrieved independently. Selection of relevant and credible sources. Very good use of referencing conventions, consistently applied.	A comprehensive range of research informed literature embedded in the work. Excellent selection of relevant and credible sources. High-level referencing skills, consistently applied.	Outstanding knowledge of research-informed literature embedded in the work. Outstanding selection of relevant and credible sources. High-level referencing skills consistently and professionally applied.
2. Knowledge and Understanding of Subject Extent of knowledge and understanding of concepts and underlying principles associated with the discipline.	Major gaps in knowledge and understanding of material at this level. Substantial inaccuracies.	Gaps in knowledge, with only superficial understanding. Some significant inaccuracies.	Evidence of basic knowledge and understanding of the relevant concepts and underlying principles.	Knowledge is accurate with a good understanding of the field of study.	Knowledge is extensive. Exhibits understanding of the breadth and depth of established views.	Excellent knowledge and understanding of the main concepts and key theories. Clear awareness of challenges to established views and the limitations of the knowledge base.	Highly detailed knowledge and understanding of the main theories/concepts, and a critical awareness of the ambiguities and limitations of knowledge.
3. Analysis Analysis, evaluation and synthesis; logic, argument and judgement; analytical reflection; organisation of ideas and evidence	Unsubstantiated generalisations, made without use of any credible evidence. Lack of logic, leading to unsupportable/missing conclusions. Lack of any attempt to analyse, synthesise or evaluate.	Some evidence of analytical intellectual skills, but for the most part descriptive. Ideas/findings sometimes illogical and contradictory. Generalised statements made with scant evidence. Conclusions lack relevance.	Evidence of some logical, analytical thinking and some attempts to synthesise, albeit with some weaknesses. Some evidence to support findings/views, but evidence not consistently interpreted. Some relevant conclusions and recommendations, where relevant	Evidence of some logical, analytical thinking and synthesis. Can analyse new and/or abstract data and situations without guidance. An emerging awareness of different stances and ability to use evidence to support the argument. Valid conclusions and recommendations, where relevant	Sound, logical, analytical thinking; synthesis and evaluation. Ability to devise and sustain persuasive arguments, and to review the reliability, validity & significance of evidence. Ability to communicate ideas and evidence accurately and convincingly. Sound, convincing conclusions / recommendations.	Thoroughly logical work, supported by evaluated evidence. High quality analysis, developed independently or through effective collaboration. Ability to investigate contradictory information and identify reasons for contradictions. Strong, persuasive, conclusions, justifiable recommendations.	Exceptional work; judiciously selected and evaluated evidence. Very high quality analysis, developed independently or through effective collaboration. Ability to investigate contradictory information and identify reasons for contradictions. Highly persuasive conclusions
4. Practical Application and Deployment Effective deployment of appropriate methods, materials, tools and techniques; extent of skill demonstrated in the application of concepts to a variety of processes and/or contexts; formulation of innovative and creative solutions to solve problems.	Limited or no use of methods, materials, tools and/or techniques. Little or no appreciation of the context of the application.	Rudimentary application of methods, materials, tools and/or techniques but without consideration and competence. Flawed appreciation of the context of the application.	An adequate awareness and mostly appropriate application of well established methods, materials, tools and/or techniques. Basic appreciation of the context of the application.	A good and appropriate application of standard methods, materials, tools and/or techniques. Good appreciation of the context of the application, with some use of examples, where relevant.	A very good application of a range of methods, materials, tools and/or techniques. Very good consideration of the context of the application, with perceptive use of examples, where relevant. Evidence of some innovation and creativity.	An advanced application of a range of methods, materials, tools and/or techniques. The context of the application is well considered, with extensive use of relevant examples. Application and deployment extend beyond established conventions. Innovation and creativity evident throughout.	Outstanding levels of application and deployment skills. Assimilation and development of cutting edge processes and techniques.
5. Skills for Professional Practice Demonstrates attributes expected in professional practice including: individual initiative and collaborative working; deployment of appropriate media to communicate (including written and oral); clarity and effectiveness in presentation and organisation.	Communication media is inappropriate or misapplied. Little or no evidence of autonomy in the completion of tasks. Work is poorly structured and/or largely incoherent.	Media is poorly designed and/or not suitable for the audience. Poor independent or collaborative initiative. Work lacks structure, organisation, and/or coherence	Can communicate in a suitable format but with some room for improvement. Can work as part of a team, but with limited involvement in group activities. Work lacks coherence in places and could be better structured.	Can communicate effectively in a suitable format, but may have minor errors. Can work effectively as part of a team, with clear contribution to group activities. Mostly coherent work and is in a suitable structure.	Can communicate well, confidently and consistently in a suitable format. Can work very well as part of a team, with very good contribution to group activities. Work is coherent and fluent and is well structured and organised.	Can communicate professionally and, confidently in a suitable format. Can work professionally within a team, showing leadership skills as appropriate, managing conflict and meeting obligations. Work is coherent, very fluent and is presented professionally.	Can communicate with an exceptionally high level of professionalism. Can work exceptionally well and professionally within a team, showing advanced leadership skills. Work is exceptionally coherent, very fluent and is presented professionally.

Student Self Evaluation Form

Student name:		Student P number:	
Programme:		Year of programme	
Assignment Title:			

This section repeats in brief the common assessment criteria detailed on previous pages. The *extent* to which these are demonstrated by you determines your mark. Using these criteria, tick the box that best indicates the level of achievement you feel you have achieved with regard to each of them.

Common Assessment Criteria Applied	Level of Achievement						
	REFER		3 rd	2:2	2:1	1 st	1 st
	OUTRIGHT FAIL	UNSATISFACTORY	SATISFACTORY	GOOD	VERY GOOD	EXCELLENT	EXCEPTIONAL
1. Research-informed Literature	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
	☐	☐	☐	☐	☐	☐	☐
2. Knowledge and Understanding of Subject	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
	☐	☐	☐	☐	☐	☐	☐
3. Analysis	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
	☐	☐	☐	☐	☐	☐	☐
4. Practical Application and Deployment	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
	☐	☐	☐	☐	☐	☐	☐
5. Skills for Professional Practice	0-29%	30-39%	40-49%	50-59%	60-69%	70-79%	80-100%
	☐	☐	☐	☐	☐	☐	☐

PLEASE COMMENT ON AREAS IN WHICH YOU FEEL THAT YOU HAVE PERFORMED WELL	PLEASE COMMENT ON AREAS YOU FEEL THAT YOU NEED TO DEVELOP

Student's Name		Date	
Student's Signature			