Liverpool John Moores University

Title:	Design for Manufacture II
Status:	Definitive
Code:	**6001PDE** (120088)
Version Start Date:	01-08-2018
Owning School/Faculty:	Electronics and Electrical Engineering
Teaching School/Faculty:	Maritime and Mechanical Engineering

Team	Leader
Tahsin Opoz	Y
Xun Chen	

Academic Level:	FHEQ6	**Credit Value:**	20	**Total Delivered Hours:**	72
Total Learning Hours:	200	**Private Study:**	128		

Delivery Options
Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	48
Tutorial	24

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	Report	Coursework report	30	
Portfolio	Portfolio	Analysis Portfolio	70	

Aims

Introduce the processes involved in analysing a product design in terms of its manufacturability and preparing for its mass manufacture.

Learning Outcomes

After completing the module the student should be able to:

1 Analyse a product design for its economic mass manufacture.
2 Evaluate and select product design features and techniques that facilitate economic assembly.
3 Apply the principles of geometrical tolerancing and produce detail design documentation.
4 Select and use appropriate advanced manufacturing technology.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Report	1	2
Portfolio	3	4

Outline Syllabus

Module introduction
Module guide; aims; learning outcomes; assessment and marking schemes. Outline syllabus; module timetable and student feedback.

Understand how to analyse a product design for its economic manufacture

Manufacturing methods:
Key design factors e.g. design form, material type and properties, quality requirements, manufacturing equipment, processing capability, costs, skills of labour force, impact on environment; analytical review of manufacturing methods e.g. alternatives, most suitable, least waste, use of design criteria; decision-making e.g. which, why, alternatives, suitability.

Total cost:
Breakdown of the three major costs e.g. material, labour and overheads; fixed and variable costs; relationship between manufacturing method and complexity of design e.g. form, finish and relative costs; break-even analysis.

Standardisation:
Standards relevant to design form and materials e.g. BS, ISO, industry-specific; use of standard components, parts and fittings; application of preferred number methods for detection and standardisation; advantages of using standard parts e.g. design, development, tooling, planning, choice, labour, ease of replacement; inter-changeability, cost; conformity with relevant health and safety standards.

Process requirements:
Factors affecting material requirements e.g. form, size, weight, quality, processing method, quantity, availability, service life, and mechanical, electrical and chemical characteristics
Implementation: timescale, ease of implementation, lifespan/upgradeability

Design for manufacture and assembly:
The embodiment design stage covering design architecture, configuration, spatial constraints, and parametrics. Application of analytical DFMA techniques that evaluate design validity of the product; cost saving techniques e.g. variations between similar components, sequencing of assembly stages, symmetrical and asymmetrical parts, number of components. Design for injection moulding.

Economic manufacture:
Automated methods e.g. ability to feed and assemble components automatically, unidirectional component location, ease of handling, positioning, stacking and accessibility within assemblies; significant features of good design e.g. location of spigots, flanges, tenons, locating faces, accessibility, alignment, families of parts or groupings.

Principles of geometric tolerancing:
Applications of dimensional tolerance and the dimensioning of components, sub-assemblies and assemblies, using relevant BS and ISO standards; effects of tolerance build-up and assess its application on an assembled product; dimensional data for the manufacture and inspection of a component.

Advanced Manufacturing Technology:
Selection and use of AMT for product manufacturing; selection and use of computer-aided manufacturing (CAM) for product assembly and material selection/handling.

Learning Activities

This module will be delivered through an integrated series of lectures, tutorials, practical sessions, guided design activities and case studies. The learning activities are to be student focused and develop the students design knowledge through experiential learning.

Notes

This module is delivered using a variety methods including lectures, seminars, tutorials and practical sessions. The module will be delivered from a engineering and product design perspective.