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Title: Embodiment Design
Status: Definitive
Code: **5164PDE** (121752)
Version Start Date: 01-08-2021

Owning School/Faculty: Engineering
Teaching School/Faculty: Engineering

Team	Leader
Adam Papworth	Y

Academic Level: FHEQ5 **Credit Value:** 20 **Total Delivered Hours:** 44
Total Learning Hours: 200 **Private Study:** 156

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	11
Tutorial	33

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Portfolio	Portfolio	CAD portfolio	100	

Aims

Introduces students to the skills and knowledge necessary to take a conceptual design, from design brief, through the embodiment phase of design, to the production of detailed design documents.

Learning Outcomes

After completing the module the student should be able to:

- 1 Generate an initial product design specification and select an optimal design from a range of design solutions.
- 2 Select appropriate standard items and select materials and their manufacturing processes to inform the final design.
- 3 Manage an embodiment design project to the completion of a set of design documents.

Learning Outcomes of Assessments

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

Portfolio of detail design doc 1 2 3

Outline Syllabus

Design process:

BS 7000 Series: Design Management System. BS7373: Design specifications.

Project management:

BS 6079 Series: Project Management. Developing and using work breakdown structure, network diagrams, critical analysis and Gantt charts to control a design project.

Design solution:

Design scheme evaluation and selection techniques; Elementary design calculations. Identification of areas of high technical risk and associated action plan.

Embodiment design:

Product configuration and architecture. Product testing and analysis. Optimising and completing the design form and definitive layout.

Material selection:

Materials selection charts and published data e.g. British Standards, ISO, product data sheets, IT sources, standard published data sources, manufacturers' literature.

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. Permanent and temporary fixing systems and the use of adhesives.

Design for manufacture:

Evaluate designs: in terms the design for manufacture. Design for economic production e.g. Batch size, geometry, features, material, dimensions, tolerances and surface finish.

Machine tools:

Machine tools: a range of machine tools and their applications (e.g. centre lathes, vertical and horizontal milling machines, cylindrical and surface grinders, centreless grinders, lapping, honing, planing and shaping machines, internal and external broaching machines, sawing machines, presses, sheet and tube bending machines); Work holding techniques: the six degrees of freedom of a rigid body with respect to work holding and jig and fixture design.

Design for assembly:

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.

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.