Embodiment Design

Module Information

2022.01, Approved

Summary Information

Module Code	5264PDE
Formal Module Title	Embodiment Design
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	11
Tutorial	33

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	Through a Reverse Engineering methodology this module develops 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.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Apply the Reverse Engineering methodology.
MLO2	2	Construct an initial product design specification and select an optimal design from a range of design solutions.
MLO3	3	Evaluate and select appropriate standard items and materials with their associated manufacturing processes to inform the final design.
MLO4	4	Manage a design related project to the completion of a set of design documents.

Module Content

Outline Syllabus	Design management:BS 7000 Series: Design Management System. BS7373: Design specifications. Product design specification (PDS).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.Quality management:Quality assurance issues in product design. Quality Functional Requirements (QFD) 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. Recognise other product design cost drivers.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, planning 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.Reverse Engineering:Reverse Engineering (RE) & how it is used in industry, its methodology & its key stages and understanding how RE feeds into design or redesign of products.
Module Overview	**Aims** **Through a Reverse Engineering methodology this module develops 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 Apply the Reverse Engineering methodology.** **2 Construct an initial product design specification and select an optimal design from a range of design solutions.** **3 Evaluate and select appropriate standard items and materials with their associated manufacturing processes to inform the final design.** **4 Manage a design related project to the completion of a set of design documents.**
Additional Information	UN Sustainable Development GoalsThis module includes content, which relates to the following UN Sustainable Development GoalsSDG15 – this module investigates re-design for the Circular Economy and the strategy to reduce waste generation through prevention, reduction, recycling and reuse.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Reverse Engineering Report	80	0	MLO1, MLO2, MLO3, MLO4
Test	Timed computer assessment DFMA	20	0	MLO3

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Adam Papworth	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings