



Materials and Manufacturing

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**Swansea
College of Art**
Founded 1853

*Trawsnewid Addysg; Trawsnewid Bywydau
Transforming Education; Transforming Lives*

Module content

Overview.

These module will introduce students to fundamental knowledge and practical skills in relation to understanding manufacturing processes, material selection, 3D CAD, 3D printing and capturing digital data.

Course summary:

- Module covers semesters 2
- Lectures -manufacturing processes and material selection
- Demo Practical – Product Breakdowns
- Short Design for manufacturing tasks
- Tutorials - Assignment
- Material testing visit – IQ building

Module content

- Design for Manufacture – (Manufacturing choice)
- Assemblies and production lines
- Manufacturing Drawings
- Low volume high volume
- Batch manufacturing
- Material choices
- Material selection
- Tooling Design
- Surface finishes
- Post processes
- Smart materials – photochromic, graphene etc..

In-house facilities

- Vacuum forming
- CNC Roland MDX 540 3 axis machining with 4th axis bolt on
- CNC router 2 ½ axis
- Glass casting
- Slip casting
- Additive machines – Fortus 250mc
- Traditional fibreglass lay-up area
- Material testing equipment
- Material selection software
- Autoclave for carbon fibre lay up
- Vacuum casting
- Laser cutting
- Waterjet cutting
- CNC cutting table

Manufacturing processes

Moulding

Injection/reaction injection/compression moulding

Blow moulding

Rotational moulding

Vacuum forming

Pressing

Extrusion

(Surface finishes colours post processes)



Manufacturing processes

Cutting

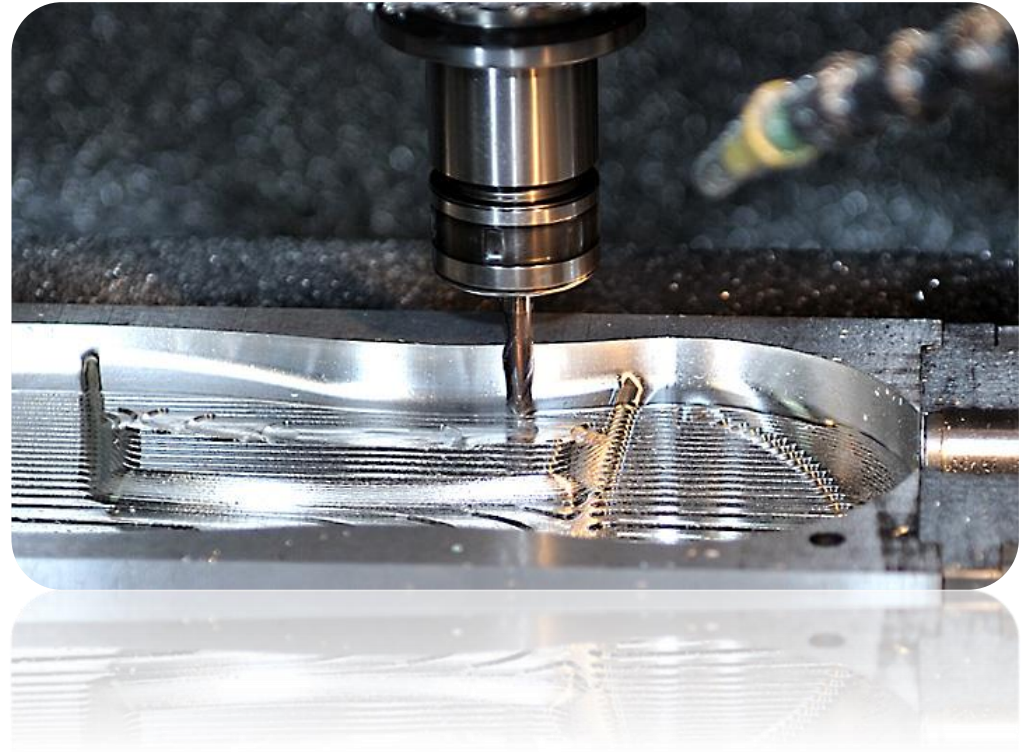
Laser cutting

Waterjet cutting

Plasma cutting

CNC machining – Subtractive manufacturing

Welding, Fabrication



Manufacturing processes

Casting

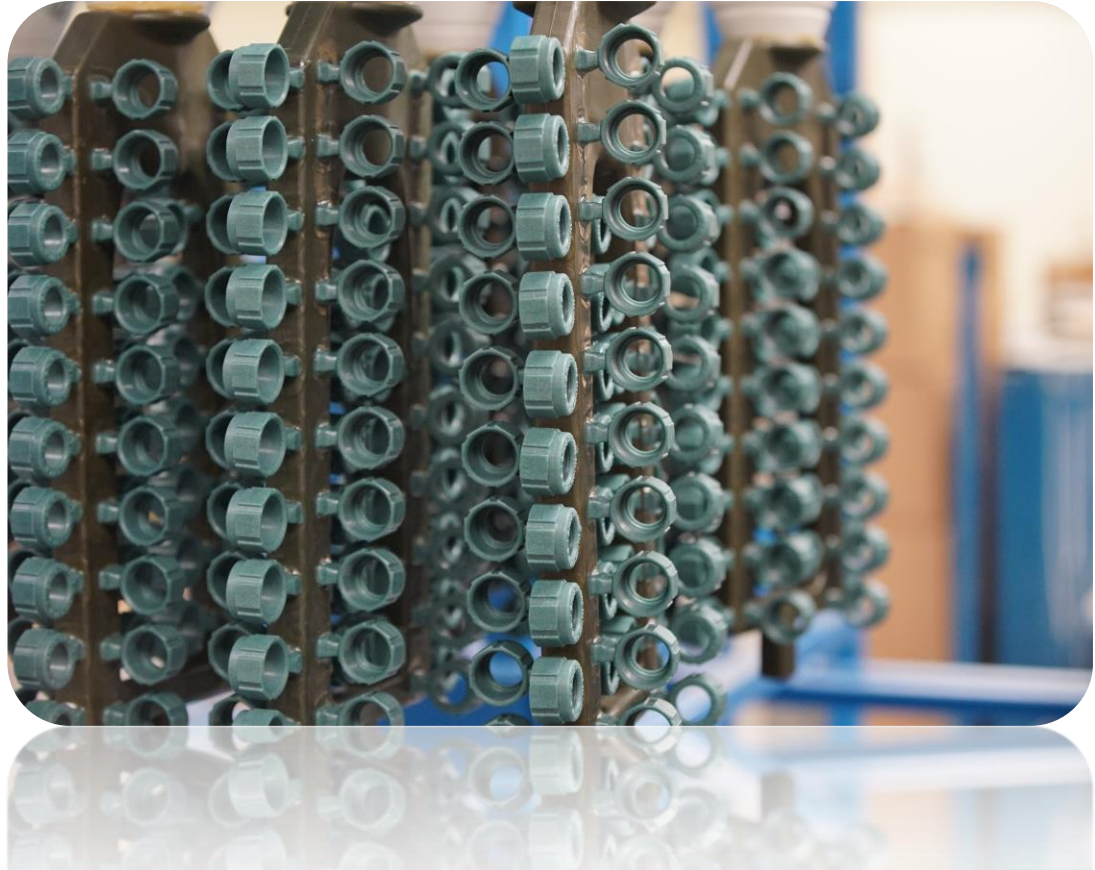
Vacuum casting

Slip casting

Investment casting

Lost wax casting

Die casting



Manufacturing processes

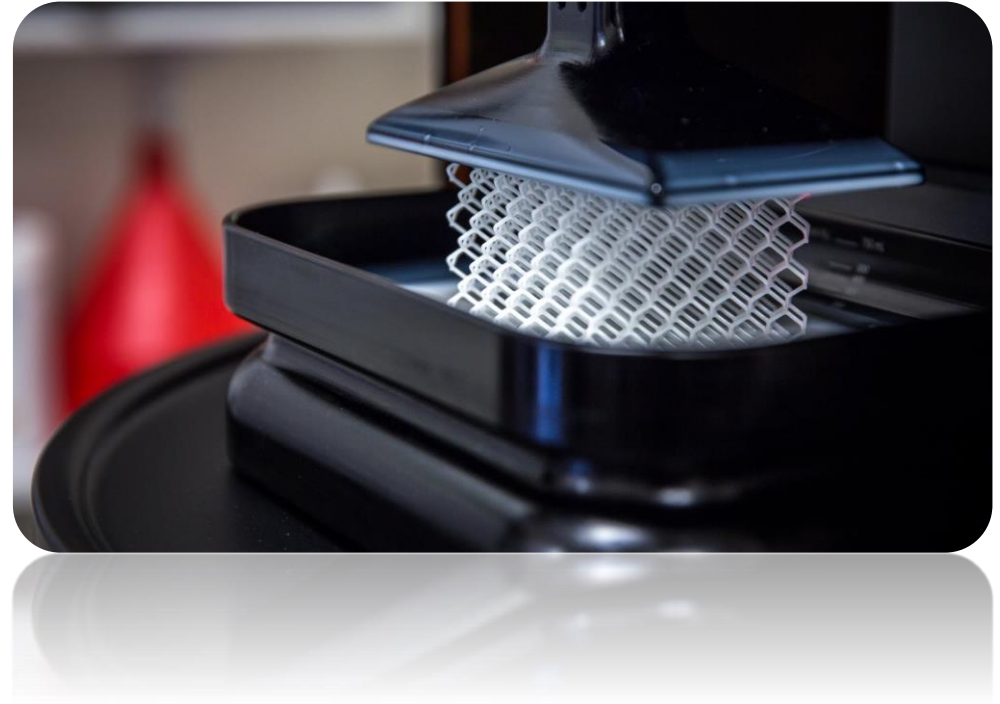
Additive Manufacturing

Technology overview

3D farming

Fabrication

Other processes for Fabrics, composites
and PCB manufacture



Reading

Essential

Thompson, R. & Kim, YY. (2011) Product and Furniture Design (The Manufacturing Guides). Thames & Hudson.

Thompson, R. (2011) Prototyping and Low-volume Production (The Manufacturing Guides). Thames & Hudson.

Thompson, R. & Thompson, M. (2011) Sustainable Materials, Processes and Production (The Manufacturing Guides). Thames & Hudson.

Recommended

Lefteri, C. (2011) Making It: Manufacturing Techniques for Product Design (2nd edition). Laurence King Publishing Ltd.

Thompson, R. (2007) Manufacturing Processes for Design Professionals. Thames & Hudson.

Callister, W. (2002) Materials and Design: The Art and Science of Materials Selection in Product Design. Butterworth-Heinemann.

Background

Hudson, J. (2011) Process: 50 Product Designs from Concept to Manufacture. (2nd edition). Laurence King Publishing Ltd.

Bramston, D. (2009) Basics Product Design 02: Material Thoughts. AVA Publishing.

ASSIGNMENT 1

This coursework task will challenge your understanding and fundamental knowledge of manufacturing processes and materials.

You are to identify a product or furniture (of your choice), deconstruct and analyse all its individual components from a materials and manufacturing perspective. That's means everything that is manufactured independently of another component. The product of choice must have at least 10 components (Electronic sub-assemblies count as one component).

You are to document this 'Product Post Mortem' on the Template provided on Moodle. You must photograph each component and specify the material and manufacturing methodology used to produce it. From these deconstructed parts, produce an exploded view of the component assembly (digital/free hand).



Thank You



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Y Drindod Dewi Sant
University of Wales
Trinity Saint David

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