

WM3H3-15 Materials Processing Technology

26/27

Department

WMG

Level

Undergraduate Level 3

Module leader

Muhammad Khan

Credit value

15

Module duration

14 weeks

Assessment

100% coursework

Study locations

University of Warwick main campus, Coventry Primary

Online

Description

Introductory description

The module covers a range of processing techniques which are used to manufacture components from metals, polymers, ceramics and composite materials at industrial scale. The module will consider conventional and advanced manufacturing processes. Some of these processes are only used for certain types of materials, while others are more universal. Students will develop a deeper understanding on the selection process of appropriate manufacturing techniques of engineering components suitable for particular applications. Understanding a wide range of manufacturing processes, their requirements and limitations, their production rates and volumes, and their costs and environmental impact is critical to optimise materials processing technology.

Relevant Apprenticeship Standard ST0025.

This module is linked with C1, C4, C7, C11, C16 and C17 of the AHEP 4 standards.

LO1 - C1, C4, C11, C16;

LO2 - C1, C4, C7;

LO3 - C1, C4, C11, C16, C17;

LO4 - C4, C7, C17.

Module aims

The aim of this module is to deepen the student's understanding of common manufacturing processes from earlier modules and reinforce the imperative to select a process that gives the correct balance between time constraints, component quality, sustainability, business and environmental impact. The module also provides a comprehensive knowledge and critical review of the role of the modern manufacturing techniques appropriate to the disciplines of Mechanical, Industrial and Manufacturing Engineering.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Theory of Metal Forming ; Specialised Metal Forming Techniques

Polymer and Composite manufacturing techniques

Powder and ceramic processing routes

Theory of metal machining and cutting tool technology; Non-conventional machining processes

Advanced ALM; Joining technologies

Surface finishing processes: coatings and surface treatments

Sustainable manufacturing and new process development

Process selection using Granta Edupack

Learning outcomes

By the end of the module, students should be able to:

- Critique the importance of materials processing technology as an individual and as a member or leader of a team for value based on time, cost, quality and environmental impact [AHEP:4-C1, C4, C11, C16].
- Evaluate the existing manufacturing techniques associated with products that are used in their own workplace or another advanced manufacturing organisation [AHEP:4-C1, C4, C7].
- Apply the advances in materials processing technology as an individual and as a member or leader of a team on selected component case study and assess the influence of component geometry, material, process efficiency and environmental impact of recycling at the end of the use life [AHEP:4-C1, C4, C11, C16, C17].
- Develop a systematic approach on the selection of new processes to achieve weight saving, accelerated time to market, quality improvements, sustainable production, cost reduction and minimise environmental impact [AHEP:4-C4, C7, C17].

Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

Subject specific skills

- Translate conceptual ideas or technical requirements into developmental outcomes or operational designs or specifications for systems or components to solve manufacturing challenges such as compliance, technology, technical or physical challenges (S1 from ST0025).
- Identify resources, such as digital tools or technologies, human, equipment, materials or data, to complete design and development projects or programmes of work (S9 from ST0025).
- Lead manufacturing engineering activities (S11 from ST0025).
- Identify and rectify faults, inaccuracies, discrepancies or unexpected results during the manufacturing engineering process, which may impact the quality and reliability of the system or component (S12 from ST0025).
- Identify areas for improvement and lead continuous improvement activities in the operation and performance of the system or component (S14 from ST0025).

Transferable skills

*Communication: Present arguments, knowledge and ideas, in a range of formats

*Problem-solving: Use rational and logical reasoning to deduce appropriate and well-reasoned conclusions; Retain an open mind, optimistic of finding solutions, thinking laterally and creatively to look beyond the obvious.

*Critical thinking: Recognise patterns, themes and key messages from sometimes confused and incomplete data; Make informed decisions on the value of a range of sources allowing an evidence based conclusion based on this analysis.

*Teamwork: Operate within, and contribute to, a respectful, supportive and cooperative group climate.

*Sustainability: Understands the climate emergency and committed to an active contribution to a sustainable world.

Study

Study time

Type	Required
Lectures	20 sessions of 1 hour (13%)
Total	150 hours

Type	Required
Seminars	4 sessions of 1 hour (3%)
Work-based learning	15 sessions of 1 hour (10%)
Online learning (scheduled sessions)	6 sessions of 1 hour (4%)
Other activity	2 hours (1%)
Private study	43 hours (29%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Completion of work-based or an engineering component case study and reading around the general subjects covered in the module to enhance understanding.

Other activity description

2 hours of online support for Q&A sessions on the individual written report (60%).

Work based learning details of 15 hours is as follows:

To select an engineering component/assembly to use in their Individual Written Report (60%) for review of in-house manufacturing process(es) in terms of its suitability, then proposing an alternative process route with justification. The student will collect appropriate information in their companies as per assignment brief to answer the questions and meet the relevant learning outcomes.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Group Written Report	40%	24 hours	No
Review of a manufacturing process for a common household object or an engineering component and associated component/assembly as a case study in terms of its suitability, then proposing an			

Weighting**Study time****Eligible for self-certification**

advanced alternative process route for improvements with justification. Group work of 5 or 6 students. Peer marking will be applied in accordance with WMG policy.

Reassessment component

Individual report

No

Critical review of materials processing technology for an engineering component case study (and associated assembly) in terms of its suitability, then proposing an advanced alternative process route with justification.

Assessment component

Individual Written Report

60%

36 hours

Yes (extension)

Identify to critically review an in-house manufacturing process and associated component/assembly with existing issues (or an equivalent process from outside) in terms of its suitability, then proposing an alternative process route suggesting any improvements with justification.

Reassessment component

Individual Written Report

No

Identify to critically review an in-house manufacturing process and associated component/assembly with existing issues (or an equivalent process from outside) in terms of its suitability, then proposing an alternative process route suggesting any improvements with justification.

Feedback on assessment**Formative Feedback:**

- Automated individual feedback on online revision quizzes
- Verbal formative feedback during seminar sessions

Summative Feedback:

- Written group feedback on Group Written Report
 - Written individual feedback for Individual Written Report
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Availability

Courses

This module is Core for:

- Year 3 of UWMS-H7C1 Undergraduate Applied Professional Engineering (Manufacturing Engineer)
- Year 3 of DWMS-H7C5 Undergraduate Applied Professional Engineering (Manufacturing Engineer) (Degree Apprenticeship)