Liverpool John Moores University

Title:	AEROSPACE PRODUCTION
Status:	Definitive
Code:	**6509ENGHAL** (106690)
Version Start Date:	01-08-2016
Owning School/Faculty:	Maritime and Mechanical Engineering
Teaching School/Faculty:	Riverside College

Team	Leader
Russell English	Y

Academic Level:	FHEQ6	**Credit Value:**	12	**Total Delivered Hours:**	26
Total Learning Hours:	120	**Private Study:**	94		

Delivery Options
Course typically offered: Semester 1

Component	Contact Hours
Lecture	16
Practical	8

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	AS1	Examination	70	2
Essay	AS2	Coursework	15	
Essay	AS3	Coursework	15	

Aims

To provide an understanding of aerospace production technologies and their implications on design, and gives the understanding and practical experience of the techniques used in conventional and non-conventional machining required by graduates employed in aerospace manufacturing industries.

Learning Outcomes

After completing the module the student should be able to:

1	Select suitable conventional machining processes and techniques for generating geometrical forms for a given component specification.
2	Describe the characteristics of a range of machine tools and select suitable machines and techniques for a given component specification.
3	Select suitable non-conventional machining techniques for a given component specification.

Learning Outcomes of Assessments

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

EXAM	1	2	3
CW	1		
CW	3		

Outline Syllabus

Conventional machining
Component manufacture: specify components for manufacture (eg criteria-tolerances, types of material, machining technique, surface texture, material removal rates, speeds and feeds, cutting times, cutter offsets, table angles)
Machining techniques: production of flat and cylindrical geometry (eg milling, surface grinding, lapping, planing, turning, cylindrical grinding, centreless grinding, honing, super-finishing, thread milling techniques, jig boring, horizontal boring, vertical boring, transfer machines)
Tooling requirements: multi-tooth cutting (eg milling, grinding, hobbing, drilling, reaming, and broaching); single-point cutting (eg turning, planing and slotting); appropriate cutting angles for given materials; types, advantages and disadvantages of coolants and cutting fluids used for various materials and processes (eg advantages — prolonging tool life, increased material removal rate, improved surface finish; disadvantages — fumes and possible irritations to operators)
Work-holding techniques: selection of appropriate work-holding devices (eg three and four jaw chucks, vices, jigs, fixtures, clamping arrangements, vee blocks, angle plates and magnetic chucks); health and safety issues and limitations of devices.

CNC machining
Machining techniques: Generation of CNC data for 3, 4 and 5-axis milling, 2 and multi-axis turning, and subsidiary operations such as EDM, punching/nibbling, laser, water jet, ultrasonic and robotics with the aid of CAD/CAM systems. High speed machining. Hard turning. Machining simulation.
CNC programming: Programming techniques for computer controlled machine tools. Manual and off-line programming, use of CAD/CAM systems. Use of post processors.

Non-conventional machining
Component manufacture: principle of operation of the non-conventional machining techniques (eg electro-discharge machining (EDM), wire erosion, ultrasonic machining, etching of electronic printed circuit boards (PCBs), laser-beam machining, plasma-jet machining); specification of components for non-conventional machining techniques (eg criteria-tolerances, types of material, suitable technique, surface texture, material removal rate, cost factors)
Tooling requirements: tooling and ancillary equipment needed to perform non-conventional machining techniques; work-holding techniques; health and safety issues.

Learning Activities

Combination of lectures and laboratory work

Notes

To provide an understanding of aerospace production technologies and their implications on design, and gives the understanding and practical experience of the techniques used in computer aided manufacture required by graduates employed in the aerospace manufacturing industries.