Cranfield
Manufacturing

Postgraduate
master's courses in

Manufacturing and materials

Academic year 2022/23 entry

Cranfield University

We are the UK's only specialist postgraduate university in technology and management, with longstanding relationships with some of the most prestigious global companies. Our close collaboration with industry, and passion for the areas we operate in, will help your career.

Specialist postgraduate
A research-focused professional community

81%
of our research is **world-leading or internationally excellent**
Research Excellence Framework (REF) 2014

Over £150 million
of investment in new facilities over the past five years

Six-time winner of
the Queen's Anniversary Prize for Higher and Further Education
The Queen's Anniversary Prizes For Higher and Further Education 2019

A professional network of **70,000+** alumni, from 177 countries

5,000+
postgraduate students from 100+ countries

UK Top 5
for Engineering (Mechanical, Aeronautical and Manufacturing)
QS World University Rankings by subject, 2021

As we are postgraduate only, we are not listed in league tables that help compare undergraduate universities, such as *The Times World Rankings* and *The Complete University Guide*.

"As an engineer, I was looking for a course that could strengthen my management skills so I have a combination of technical and managerial abilities. I think learning from people in industry is going to directly support my future career. I would highly recommend this course to anyone interested in manufacturing, aspiring to be in a managerial role. You will learn things at Cranfield that you can't learn anywhere else."

Sadeq AlMeaibed, Field Engineer, Halliburton (Engineering and Management of Manufacturing Systems MSc 2019)

Reasons to study **manufacturing and materials** with us

1 Industry links

Our students benefit from extensive contact with industry including guest lectures from BAE Systems, Rolls-Royce and industrial sponsorship of many group and individual projects. Courses are regularly reviewed by an advisory panel of leading industry professionals to ensure the content is relevant and meets the expectations of employers.

2 Learning from the best academics

You will meet high-quality staff from around the world who have diverse backgrounds and experiences to create a rich teaching and research environment.

3 Teaching informed by industry

We design our courses with employers and combine high-calibre teaching with case studies and practical work experience.

4 Work on real-world projects

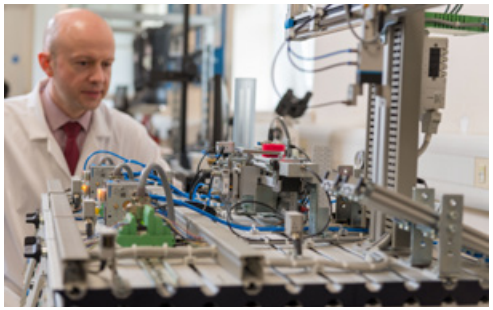
Almost two-thirds of your study is on projects to find solutions to real-world problems, working on developments initiated by industry.

5 Outstanding facilities

We have exceptional facilities, many of which are unique in the university sector. These include clean rooms, high-temperature coating facilities, a virtual reality suite with a Samsung SUR40 touch table, an impressively equipped composites laboratory and impact testing facilities including FIA-approved (Federation Internationale del'Automobile) Cranfield Impact Centre. We have a wide range of software for modelling and simulation of manufacturing processes and an unparalleled welding laboratory with robotic, automated and advanced arc welding equipment. Cranfield has recently invested £1.6 million in renewal of the electron microscopy suite, part of our materials characterisation facilities.

6 Networking opportunities

Our industrial advisory panel members are regular visitors to Cranfield and, for example, attend student thesis presentations and many internal events. This provides an excellent opportunity for students to meet employers and forge valuable links and contacts for career development purposes.



Manufacturing technology and materials courses

Taught modules form 40% of the course content, with group and individual research projects contributing to the remaining 60%.

This table shows the compulsory and (where applicable) some elective modules offered in the 2021-2022 academic year, to give you an idea of course content. To keep our courses relevant and up-to-date, modules are subject to change so please check the latest information on our website. All courses are available full- or part-time.

Advanced Materials

MSc/PgDip/PgCert

www.cranfield.ac.uk/advancedmaterials • Accredited (see page 11)

This course provides a fundamental understanding of materials' properties, their processing and computer-based design procedures, which are essential for product commercialisation. It also includes the development of new materials and the improvement and application of current materials in new and novel structures.

Aerospace Materials

MSc/PgDip/PgCert

www.cranfield.ac.uk/aerospacematerials • Accredited (see page 11)

The 2050 climate change agenda for sustainable aviation and 'race to space' requires engineering graduates with specialist skills to adapt and develop materials for next-generation aircraft and spacecraft including functional materials for clean energy and energy storage. This course will develop knowledge-based skills to open innovation and entrepreneurship opportunities pivotal for long-term career development.

Manufacturing Technology and Management

MSc/PgDip/PgCert

www.cranfield.ac.uk/mtm • Accredited (see page 11)

Manufacturing is at the heart of all the products we use in our everyday lives. This course addresses the specialist skills required by high-tech industries, giving you the competence in problem solving, commercial awareness and the leadership skills required for the 21st-century workforce. Technical pathways with elective modules enable you to create a personalised package of learning.

Metal Additive Manufacturing

MSc/PgDip/PgCert

www.cranfield.ac.uk/mam

This course provides students with the latest knowledge and skills for this manufacturing technique, providing a great foundation for a future career in manufacturing engineering and science. The course focuses on different metal additive manufacturing processes and their capabilities, designing systems, qualification of processes, modelling and the microstructural response of different metallic alloys during additive manufacture, based on their unique physical metallurgy.

Welding Engineering

MSc/PgDip/PgCert

www.cranfield.ac.uk/welding • Accredited (see page 11)

Welding is integral to the manufacture of a wide range of products. This course provides you with the practical and theoretical knowledge required to become a welding engineer and a materials and joining specialist. It covers modern welding processes and techniques, metallurgy and materials science, welding automation and application of robots in welding, design of structural welds and management of weld quality.

✓ = compulsory module

Modules:	Advanced Materials	Aerospace Materials	Manufacturing Technology & Management (Choose four electives)	Metal Additive Manufacturing	Welding Engineering
Advanced Welding Processes			Elective		✓
Additive and Subtractive Manufacturing Technologies	✓		Elective		
Sustainable Aerospace Materials		✓			
Composites Manufacturing for High Performance Structures	✓	✓	Elective		
Failure of Materials and Structures	✓	✓			
Finite Element Analysis	✓	✓	Elective		
Functional Materials		✓			
General Management	✓		✓	✓	
Introduction to Materials Engineering	✓	✓	Elective		
Material Selection	✓	✓			
Operations Analysis			Elective		
Surface Science and Engineering	✓	✓	Elective		
Composites Joining, Repair and Serviceability			Elective		
Introduction to Manufacturing, Materials and Research Techniques			✓		
Lean Product Development			✓		
Manufacturing			Elective		
Nanomaterials and Advanced Composites			Elective		
Operations Management			Elective		
Design of Welded Structures					✓
Introduction to Materials for Welding Engineering					✓
Management of Weld Quality					✓
Welding Metallurgy					✓
Welding Processes and Equipment					✓
Welding Systems and Research Methods					✓
Additive Manufacturing System Design				✓	
Management of Manufacturing Quality				✓	
Metal Additive Manufacturing Metallurgy				✓	
Metal Additive Manufacturing Processes				✓	
Post-processing for Additive Manufacturing				✓	
Finite Element Analysis for Additive Manufacturing				✓	

Manufacturing systems and management courses

Modules form 40% of the course content, with the group and individual projects making up the remaining 60%.

This table shows the compulsory and (where applicable) some elective modules offered in the 2021-2022 academic year, to give you an idea of course content. To keep our courses relevant and up-to-date, modules are subject to change. Please see the website for the latest information. All courses are available full- or part-time.

Aerospace Manufacturing

MSc, PgDip, PgCert

www.cranfield.ac.uk/aerospacemanufacturing • Accredited (see page 11)

The specialist skills of aerospace production systems are vital to drive productivity improvements. You will gain the capabilities to manage major improvement programmes in the aerospace manufacturing industry and instigate interventions that enhance business performance.

Engineering and Management of Manufacturing Systems

MSc, PgDip, PgCert

www.cranfield.ac.uk/emmsystems • Accredited (see page 11)

This course develops suitably trained and qualified individuals by providing them with the knowledge and skills necessary to make an immediate contribution to a company's manufacturing performance and operations.

Global Product Development and Management

MSc, PgDip, PgCert

www.cranfield.ac.uk/gpdm • Accredited (see page 11)

Manufacturing and service industries require individuals who can tackle the challenges that come with operating in a complex, global environment. You will acquire advanced techniques for integrating product development at multiple levels, and designing and manufacturing intelligent, sustainable and internationally-competitive products.

Maintenance Engineering and Asset Management

MSc

www.cranfield.ac.uk/meam

This course develops suitably trained and qualified individuals by providing them with the knowledge and skills necessary to make an immediate contribution to a company's manufacturing performance and operations.

Management and Information Systems

MSc, PgDip, PgCert

www.cranfield.ac.uk/mis • Accredited (see page 11)

By developing an understanding of the interaction between organisations, their IT and their people, you can play a crucial role in integrating the language and practice of management and technology in business operations.

✔ = compulsory module

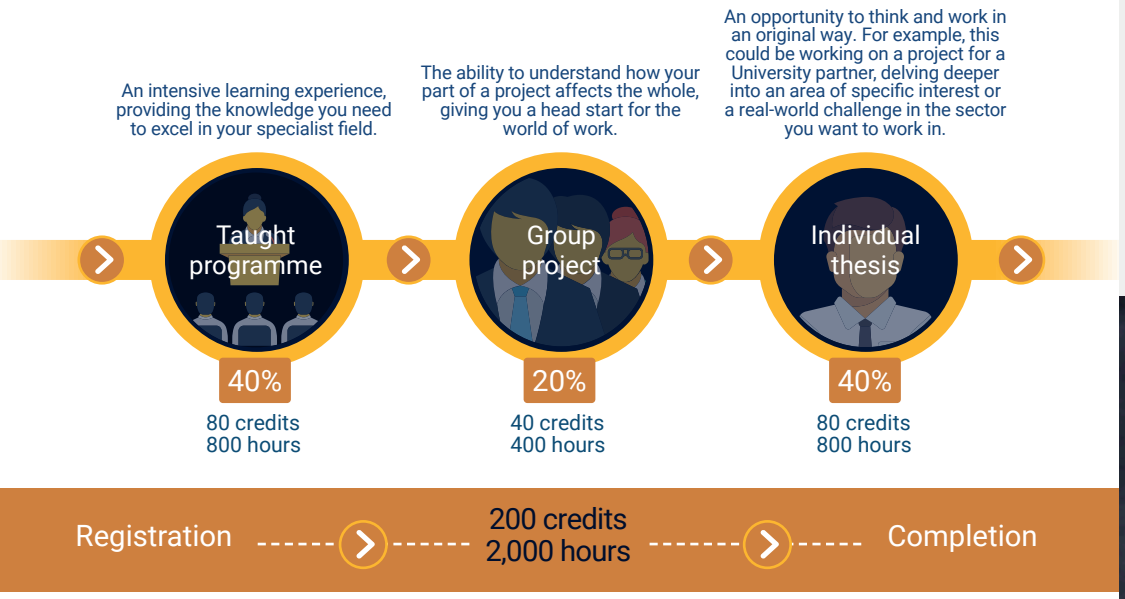
Modules:

	Aerospace Manufacturing (Choose three electives)	Engineering and Management of Manufacturing Systems	Global Product Development and Management	Maintenance Engineering and Asset Management	Management and Information Systems
Aircraft Assembly	✔				
Enterprise Modelling			✔		✔
Manufacturing Strategy	✔	✔			
Manufacturing Systems Engineering	✔	✔			
Operations Management	✔	✔	✔		✔
Supply Chain Management	✔	✔	✔		✔
Additive and Subtractive Manufacturing Technologies	Elective				
Advanced Welding Processes	Elective				
Composites Manufacturing for High Performance Structures	Elective				
Failure of Materials and Structures	Elective				
Operations Analysis	Elective	✔			
Design Driven Innovation Processes			✔		
Design, Technology and Prototyping			✔		
Digital Engineering			✔		
Enterprise Systems		✔			✔
General Management		✔	✔		✔
Internet of Things		✔			
Lean Product Development			✔		
Business Change Management					✔
Data Analytics					✔
Business Process Analysis and Engineering					✔
Asset Management				✔	
Diagnostics and Prognostics				✔	
Failure of Materials and Structures				✔	
Industrial Maintenance				✔	
Maintenance Planning and Control				✔	
Probability & Statistics in Risk & Reliability Engineering				✔	
Condition Based Maintenance				✔	
System Availability and Maintainability				✔	

Course structure

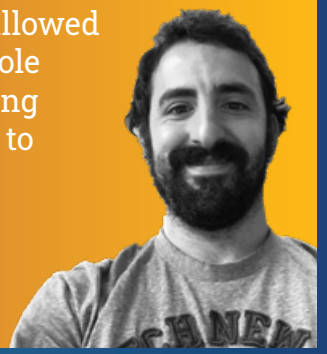
Our specialist, sector-facing master's courses are set up and developed in close collaboration with industry partners, ensuring the content of our courses remain industry-relevant and employers remain impressed with your business-readiness.

This diagram illustrates the course structure of many of our full-time master's courses, it is not indicative of all courses. Please check your course structure online for more detailed information, including the weight of each phase and part-time course structure variations.



"The knowledge acquired during my MSc allowed me to pick up the technical content of the role quickly, which helped to ease the challenging learning curve faced when initially having to work in an industrial environment with multi-functional teams of individuals."

Koldo Almandoz Forcén, Manufacturing Capability Acquisition Engineer – Coatings, Rolls-Royce (Aerospace Materials 2017)



Industry links

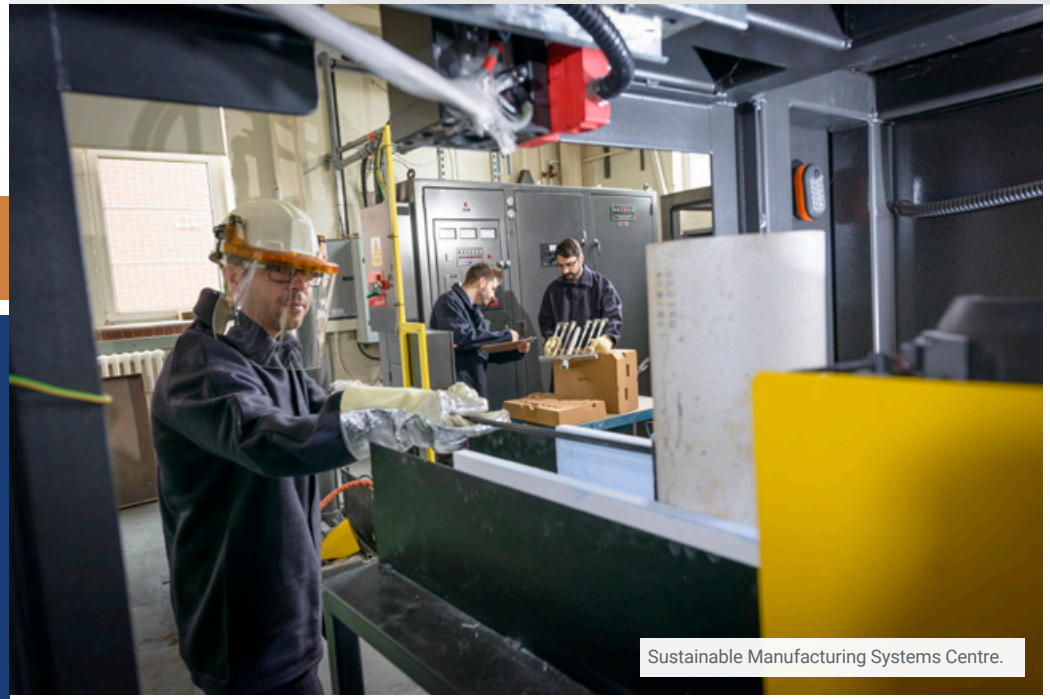
Cranfield has unrivalled links with industry. Our students benefit from our extensive contacts and track record of close collaboration with Government and the manufacturing sector. These links include an industrial advisory panel and project sponsors.

Industrial advisory panels

Our courses are reviewed each year by panels of industry advisors from leading companies and institutions in the sector. This ensures that the skills you acquire are up-to-date and what employers want. Some of the companies represented on our manufacturing courses industrial advisory panels include:

BAE SYSTEMS

SAFRAN



Sustainable Manufacturing Systems Centre.

Academic staff

You will be taught by a wide range of subject specialists at Cranfield and industry professionals who draw on their research and industrial expertise to provide stimulating and informed input to your learning experience. Here are some of the staff you will be taught by:

Dr Samir Khan, Senior Lecturer in Internet of Things and Programme Director

Samir is a senior lecturer in Internet of Things and course director for the Management and Information Systems MSc. He was the leading researcher on the No Fault Found research project between 2011-2015, at the Through-life Engineering Services Centre within Cranfeld University. Dr Khan's current research work is focused on intelligent monitoring, prognostics and system health monitoring and related machine learning applications.

Dr Konstantinos Salonitis, Professor of Manufacturing Systems and Programme Director

Kostas works in the area of simulation and modelling of manufacturing processes and systems, including energy efficiency, environmental impact assessment, abrasive machining and rapid manufacturing. He is interested in and lectures on lean management of manufacturing systems.

Dr Ahmed Al-Ashaab, Reader in Lean Product Development

Ahmed is an active researcher in the areas of collaborative product development, concurrent engineering, knowledge-based engineering and lean product development. His research projects have a strong focus on industrial applications. He has taught in Mexico, Colombia, France and the UK.

Dr Jeff Rao, Senior Research Fellow – Coatings Technology

Jeff's interests lie in coating technologies, biomimicry and how nature can influence coating designs. He has over 10 years' experience in coatings depositions relating to the automobile, aerospace and white-good industries. Jeff was awarded a fellowship by The Royal Society and worked at the Superconductivity Research Laboratory in Tokyo after completing his PhD from Surrey University.

Dr Sue Impey, Senior Lecturer and Programme Director

Sue has over 30 years' experience and expertise in surface science and engineering with current research in aqueous corrosion and corrosion control to extend the service life of materials. She co-ordinates the design and delivery of the manufacturing technology and materials programme. Sue also provides technical support to the University and external clients in materials characterisation and surface analysis.

Key facts and statistics

Course information

Full-time
One year

Part-time
Up to three years
See the course page for more information about part-time study.

Start date
October

MSc/PgDip/PgCert
Not all courses offer all awards, see course information pages for details of awards offered.

Fees
Please see the individual course pages on our website for full fee information and full-time or part-time options. Terms and conditions apply.

See www.cranfield.ac.uk/fee-information

Cohort profile*

Geographic spread
39% UK
14% EU
47% Rest of world

Average cohort age
19-29 years

Average cohort size
21

17% Female
83% Male

*These figures give an indication of the course make-up at registration across Manufacturing for the entry year 2020-2021.

Accreditations

Many of our manufacturing and materials courses are accredited by one or more Professional Engineering Institutions (PEIs) on behalf of the Engineering Council as meeting the requirements for further learning for registration as a Chartered Engineer. Candidates must hold a CEng accredited BEng/BSc (Hons) undergraduate first degree to comply with full CEng registration requirements. You can check the accreditation status of this or any other degree programme at **www.engc.org.uk/acad** or visit the course webpage for further details.

Careers

Our alumni can be found around the world implementing manufacturing innovation for business success.

Here are some examples of the type of roles our graduates have gone on to, and the organisations they work for:

Roles

- Air Systems Engineer,
- Applications Engineer,
- Business Analyst,
- Capability Acquisition Engineer,
- Composites Engineer,
- Development Engineering Manager,
- Graduate Engineer,
- Strategic Planner,
- Systems Developer,
- Technical Analyst.

Organisations

- Bombardier,
- British Airways,
- Coca-Cola,
- Liebherr Aerospace and Transportation Systems,
- PwC,
- Ricardo plc,
- Rolls-Royce,
- Safran.

Project sponsors

The group and individual projects that you will undertake as part of your course are often run in collaboration with our industrial partners.

More information about group projects can be seen below and some of our partners are shown on the back cover of this brochure.

Industry sponsored group projects

Cranfield's group project experience provides you with the opportunity to take responsibility for a consultancy-type project while working under academic supervision.

Some recent projects include:

- Augmented Reality (AR) to improve data usage in manufacturing settings – **Unilever,**
- Developing the next generation of training for Network Rail – **Network Rail,**
- Digital twin representation of a modified mobile asset in aerospace maintenance – **Babcock,**
- Quantifying sintering behaviour of thermal barrier coatings at high temperature – **Rolls-Royce.**

Welding Engineering and Laser Processing Centre.

Financing your studies

If you need advice on funding your course, we can provide information and a range of online tools to help you put together the funding package you need for your course and living costs.

There is more information on our website:
www.cranfield.ac.uk/funding

How to apply

Read more about our entry requirements and how to apply.

www.cranfield.ac.uk/apply

Life at Cranfield

A welcoming, professional campus community.

Located just over an hour from London in the English countryside, Cranfield's campus environment supports close, working relationships between our multinational postgraduate students and academic and industry experts.

www.cranfield.ac.uk/visit

Take a virtual tour to see inside some of our facilities:

virtualtour.cranfield.ac.uk

Cranfield University works with over

1,500 businesses and governments based in over 40 countries

These organisations include:

AIRBUS · BAE SYSTEMS · BOMBARDIER · Ford · Rolls-Royce · SAFRAN

Other courses you may also be interested in:

Advanced Lightweight and Composite Structures MSc
Applied Artificial Intelligence MSc
Computational Software Techniques in Engineering MSc
Design Thinking MDes
Robotics MSc

For a full list of Cranfield courses, please see our prospectus and website.

www.cranfield.ac.uk/manufacturing

T: +44 (0)1234 758083
E: studymanufacturing@cranfield.ac.uk

Cranfield University
Cranfield
MK43 0AL, UK

Every effort is made to ensure that the information in this brochure is correct at the time it is printed. Please check our website for the latest information. Photographs in this publication were taken prior to and during the coronavirus pandemic. We continue to monitor the pandemic and take all the necessary steps to ensure the health, safety and wellbeing of our Cranfield community.
See **www.cranfield.ac.uk/coronavirus** SATM-MM-September 2021.

@cranfielduni · **Cranfield University**
@cranfielduni · **/cranfielduni**
/cranfielduni · **blogs.cranfield.ac.uk**