



COMAU

In conversation with... Comau
Wednesday 30 March, 9.30am (GMT)

Today's speakers



Massimo Ippolito



Phil Myers



Andrew Osborn

Next Manufacturing Skills

Train today's and tomorrow's
workforce

Massimo Ippolito | Comau Academy



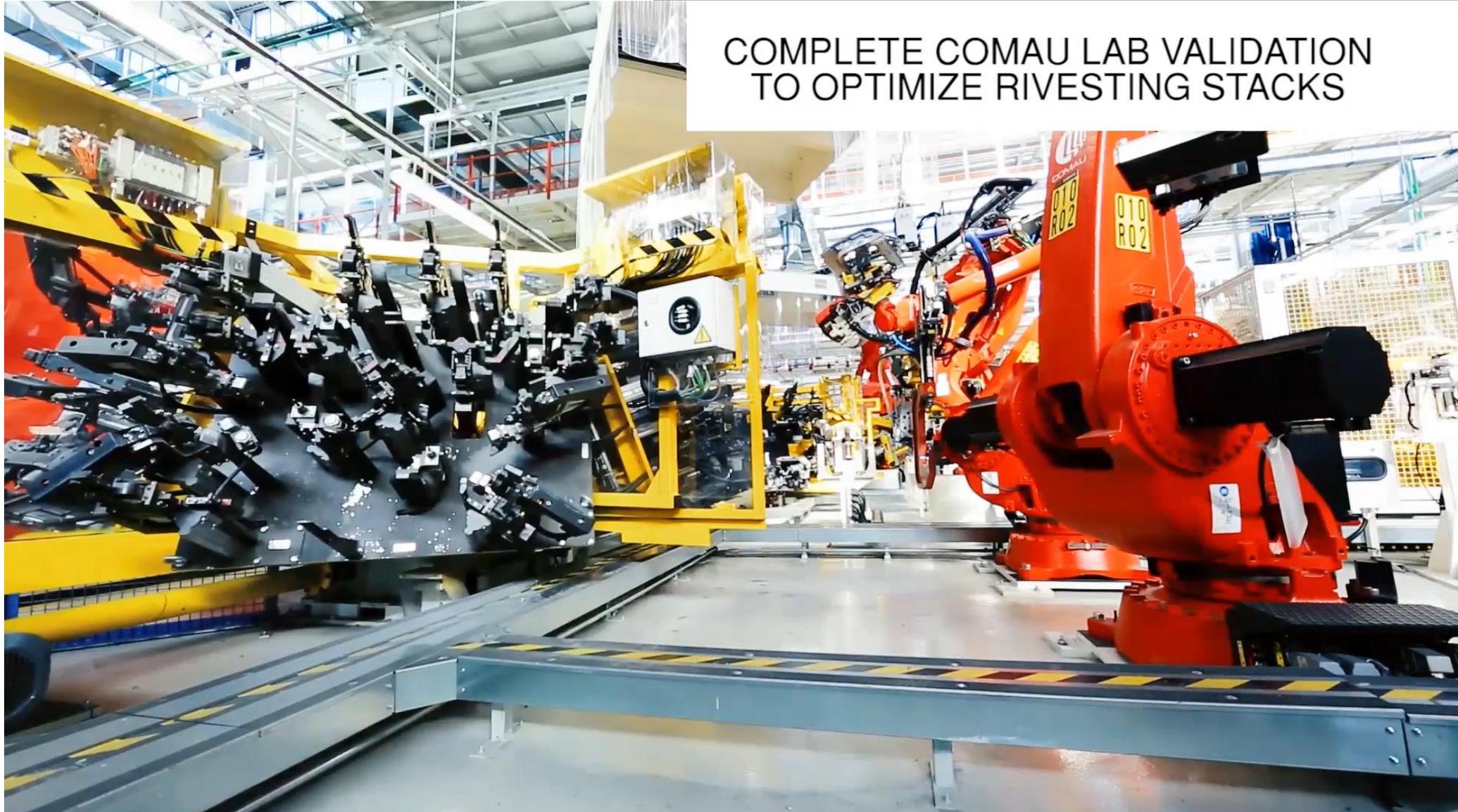
The rise of the robot

Robotics and automation are profoundly altering the face of manufacturing, creating promising new opportunities for employees at all skills levels.

Job profiles are changing rapidly, both within and outside of the traditional roles of production operator, technician, engineer and production manager.

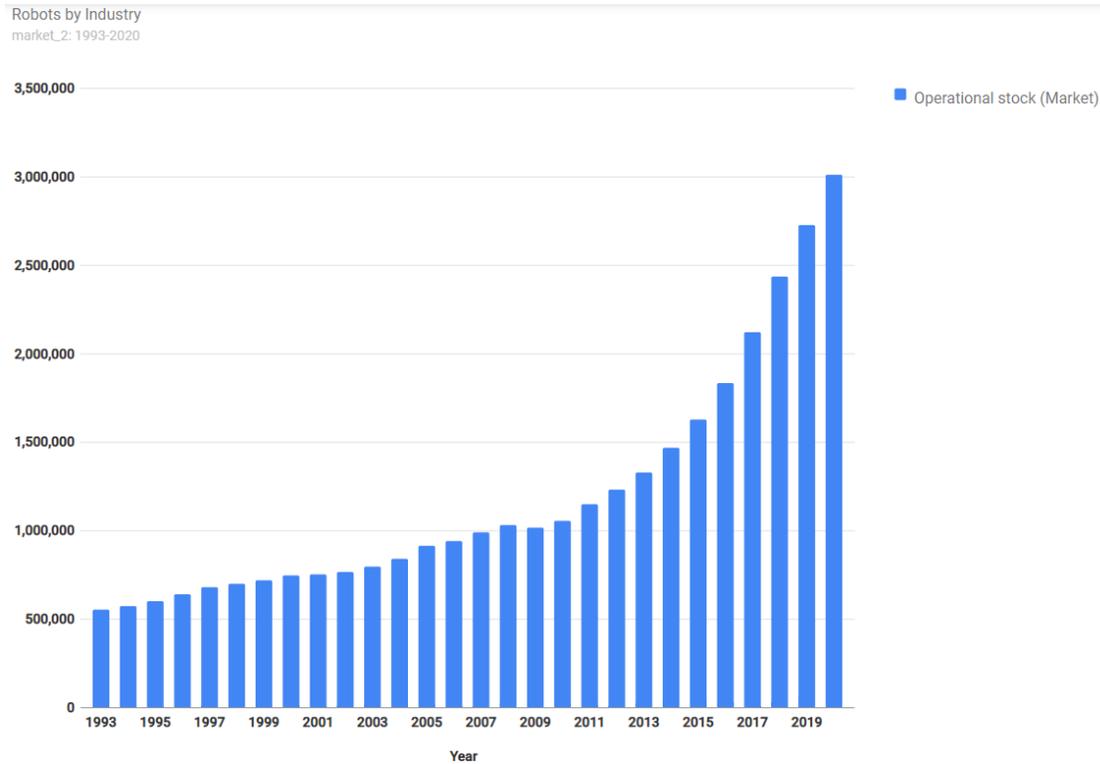


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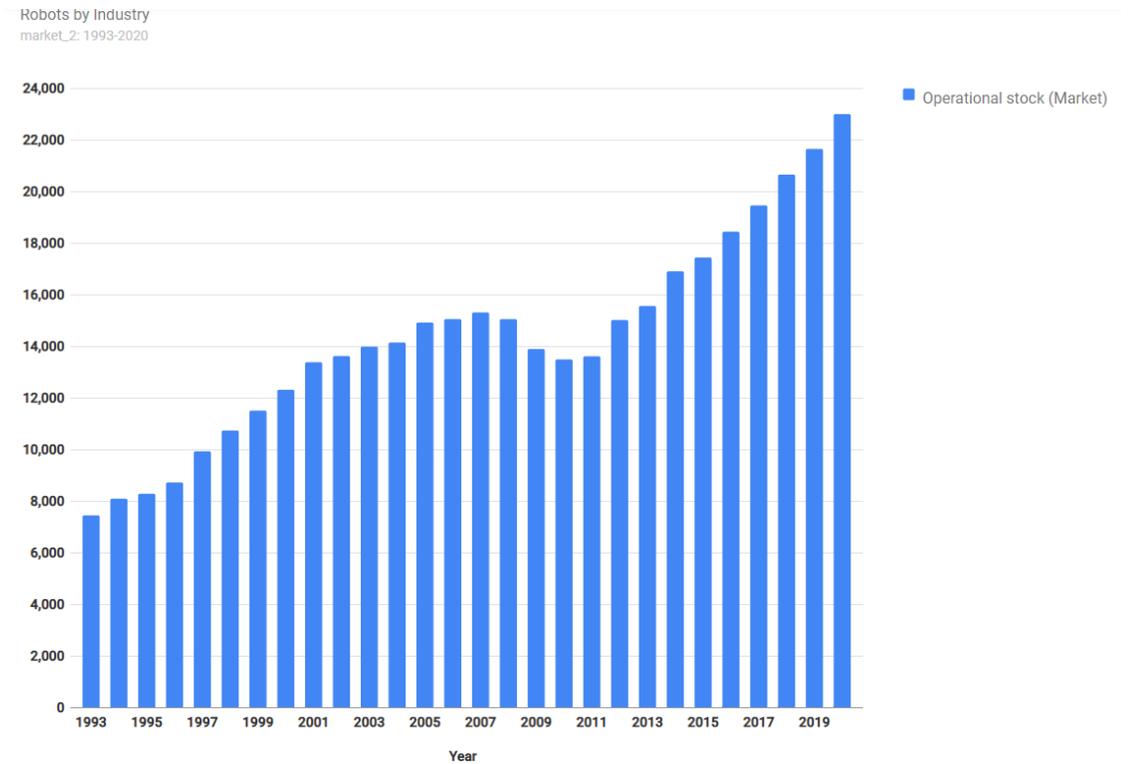


COMPLETE COMAU LAB VALIDATION
TO OPTIMIZE RIVESTING STACKS

The rise of the robot



World



UK

Robots and the future of manufacturing

- Manufacturers are shifting to advanced robotics and flexible automation in order to respond to cost-effective production.
- Robots and automation will not replace workers but are turning skills requirements to higher-skilled jobs.
- Increasing use of robotics and automation will significantly change manufacturing jobs and skills profiles over the next 10 years.
- Manufacturers increasing robot adoption are creating new roles in manufacturing.
- Manufacturers today struggle to hire workers. A shortage of qualified workers with robotics and automation skills levels is forecast to continue.



Skills requirements in manufacturing

- Four classic profiles such as production operator, maintenance technician, engineer and production manager will be impacted by the rise of robotics and automation will change over the next 10 years.
- While complex applications still require specialised knowledge, robots are increasingly easy to program and re-task from production operator for many applications.
- Production operators will be increasingly involved in training artificial intelligence algorithms used for robotic applications such as pick-and-place.
- Production operators will also be central to designing and adjusting processes to incorporate robots effectively as human assistants.
- IFR members believe that the role of the production operator will change most over the next 10 years with significant benefits for production workers.

Skills requirements in manufacturing

How some manufacturing roles will change over the next 10 years

Production Operators will

- Work with robots – IFR members estimate 50% will be working with robots in 10 years' time. Tasks include: programming of simple applications, monitoring robot performance, working collaboratively with a robot 'assistant' or robotic tool.
- Have the opportunity to learn new skills.
- Work across a range of production lines or cells.

Maintenance Technicians will

- Rely on data generated by machines, and analytic tools to assess when machines need maintenance.
- Need broad information technology skills to interpret digital representations of physical machines and search databases.
- Start to take a proactive role in process optimisation, exploring how processes could be altered to function more efficiently and avoid typical bottlenecks.

Engineers will

- Increasingly manage connected systems rather than discrete machines.
- Need expertise in electronics and software as well as traditional skills in mechanical engineering.
- Require an understanding of the interfaces and communications protocols between back-end order systems and machine controllers, as well as Internet of Things communications protocols.



Pearson BTEC and Comau Robotics Operations

Train today's and tomorrow's workforce

Phil Myers | Pearson



Design of the BTEC programme

- The qualification is designed to complement the Comau Robotics software, so the software covers the majority of content delivery.
- Four units align to the 4 Comau modules (55 hours duration).
- Qualification units are comprised of 'Learning Outcomes', all of which must be completed through a small number of linked assessment tasks, in order to achieve the qualification.
- All tasks must be completed to a minimum of Pass level to achieve the BTEC certification.



Design of the BTEC programme

- **Unit 1 - Robotics systems and basic procedures**
(Main components of the system, the teach pendant, operating procedures of the robot control unit)
- **Unit 2 - Fieldbus and reference systems**
(Robotised systems, key inputs and outputs; 3D reference systems; using robotics calculations)
- **Unit 3 - Motion programming**
(Develop robot programming, create structured programmes)
- **Unit 4 - Further robot programming**
(Solving problems using programming)



Supporting the wider curriculum

Specialist qualifications such as this are designed to complement the wider curriculum, i.e.

- for an apprentice or graduate trainee who may be developing knowledge in Electrical/Electronic Engineering but does not yet have specialist robotics knowledge;
- alongside an existing Level 3 Engineering course in schools or colleges, offering more specialist knowledge and skills to complement the broader qualification.



Learning Hub resources

Learning Hub is Pearson's online platform hosting all digital resources we have developed to aid students and teachers in studying subjects such as Robotics.

Our Robotics digital resource was built and written by Comau to support the interactive studying required in this subject.

It includes:

- Four modules that support the four BTEC units
- Quizzes
- Interactive support videos,
- RoboSIM software from Comau, plus support
- Support for use of a physical robotic arm (EDo)
- Scheme of work

Robotics Operations • Unit 3 of 6

Module 2 – Fieldbus and reference systems

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 Course Content

 Test

End of Unit

Module 2 - Fieldbus and reference systems

WELCOME!

Module 2 | Fieldbus and reference systems



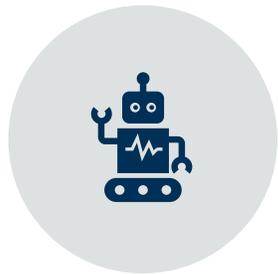
Supporting teacher delivery



This qualification is ideally suited to blended learning, due to a good mix of written, online and practical tasks.



Learners will complete parts of a module and then discuss in class as they prepare for the assignment. Our specially designed scheme of work available in Learning Hub will help structure the lesson.



Factory tours could provide good experience, allowing learners who may not have much robotics knowledge to see robots working in production environments.



Also available is the online RoboSIM for Robotic ARM simulation.

Assessment

The qualification comprises 4 units, each with its own Learning Outcomes.

Assessment Criteria allow for demonstration of learners' knowledge, understanding and skills in each area to achieve each Learning Outcome.

Learners complete an integrated assignment, which can be completed after each module or after the course.





Bringing Robotics to Life



Contemporary industry relevant digital resources



Robotics simulation (RoboSIM) or EDo Robotics Arm options



BTEC assessment and certification



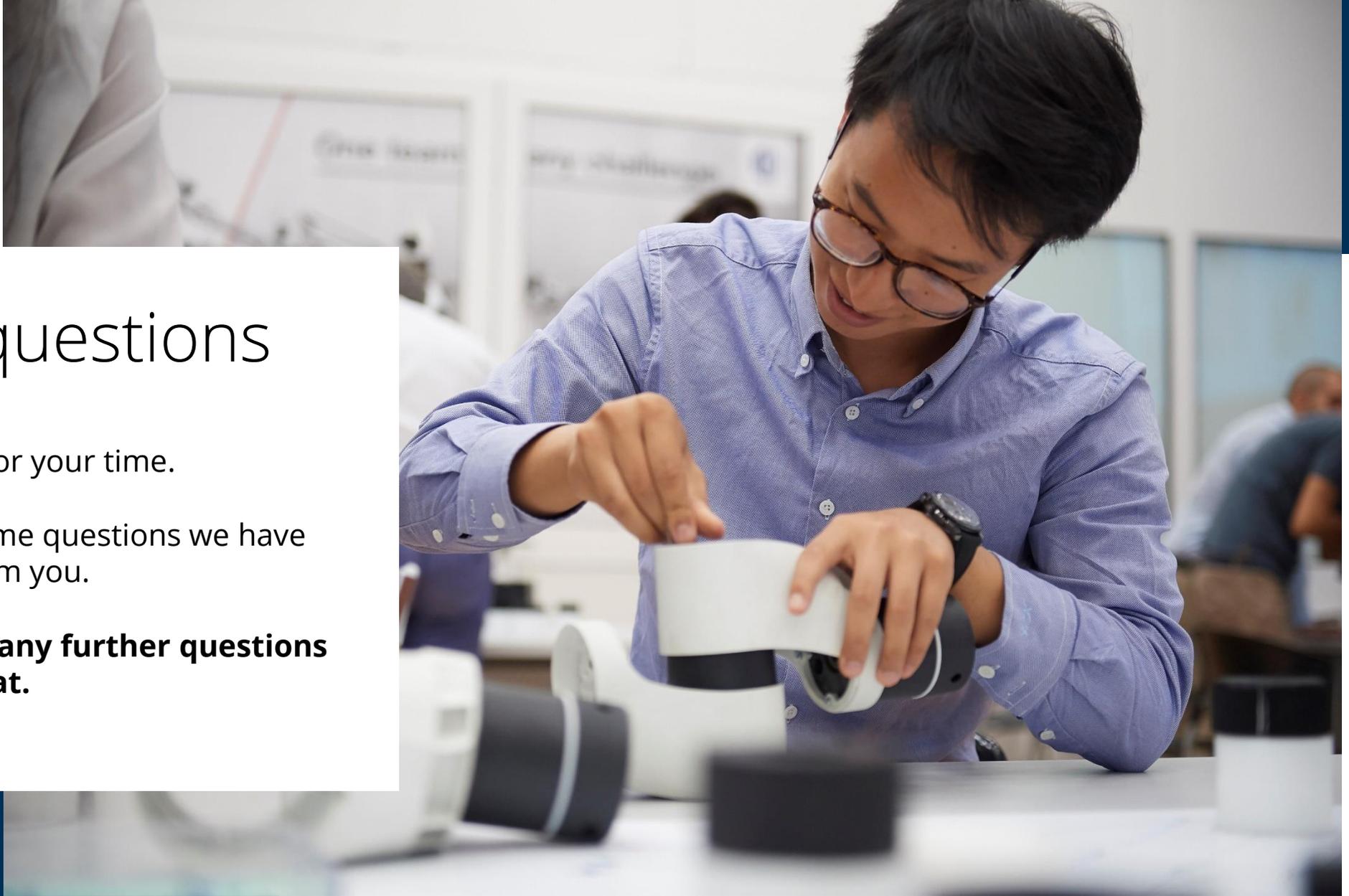
Teacher support including scheme of work and support for RoboSIM and hardware

Your questions

Thank you for your time.

Here are some questions we have received from you.

Please add any further questions into the chat.



Your questions

- How can I align the course and qualification with my current curriculum? For example, **BTEC Level 3 Engineering** or even academic subjects?

Health and Safety

Safe working with robotic arms

Levels of interaction (teach mode, run mode etc.)

Guarding & Safety Interlocks

Mathematics/ Mechanical Principles

Calculation of joint angles using trigonometry

Calculations of forces in each axis direction

Calculation of stopping distances

Electrical Principles

Voltage/ current/ power calculations

Electrical Motors – construction and application

Motor drive systems

Electronics

Electrical Actuators (e.g. electrical grippers)

Feedback systems

Rotary encoders and resolvers

PLCs and Automation

Use of PLCs to identify parts on a production line

Communications interfaces between PLCs and Robots

Use of PLCs to select robot programs

Pneumatics and Hydraulics

Suitability of pneumatic/ hydraulic end effectors for given tasks

Advantages and disadvantages

Selection and integration of pneumatic/ hydraulic end effectors

Business

Analysis of cost benefits of robotic automation

Advantages and disadvantages of robots in given production situations

Calculation of break-even scenarios for given production tasks

Welding Technology

Analysis of cost benefits of robotic welding

Advantages and disadvantages of automated welding for specific requirements

How to integrate the welding function into a robotic workcell

Maintenance Engineering

Requirements for electrical/ mechanical maintenance of robots and peripherals

Scheduling of maintenance activities into production schedules

Consideration of planned maintenance and reactive maintenance issues

Your questions

- How does the BTEC prepare learners to understand some of the fundamentals in Robotics arm operation?

Reference: Page 17 of the specification

Unit 1: Robotics Systems and Basic Procedures

Level: 3

Unit type: Mandatory

Guided learning hours: 10

Unit introduction

Robotic automation is at the forefront of the latest industry developments across a range of engineering sectors. Industrial robots are used within heavy production environments such as motor car assembly, as well as in light industry such as printed circuit board (pcb) assembly. Robots are also being introduced into ancillary operations such as product picking, packing, test and inspection.

This unit develops a learner's abilities in robot programming and engineering, allowing the learner to understand the specific terms and techniques associated with working on a robotic system. This in turn will prepare them for a trainee or apprentice role in this field, or for further study in this subject area.

Learning outcomes and assessment criteria

To pass this unit, the learner needs to meet all the learning outcomes for the unit. The assessment criteria determine the standard required to achieve the unit.

Learning outcomes		Assessment criteria	
A	Understand the main components of the robotic system and their function	A.1	Explain how and why the main components of the ARM function correctly
		A.2	Explain how and why the main components of the control unit function correctly
B	Be able to use the teach pendant (programming terminal)	B.1	Explain the main teach pendant commands and functions
		B.2	Correctly use the graphical user interface to safely move the ARM to a given specification
C	Safely use the correct operating procedures of a robot control unit	C.1	Discuss the need for degrees of protection in a robotic system in relation to given IP ratings
		C.2	Correctly and safely use the control unit to meet given objectives

Your questions

- Do I need to teach all this content in the classroom, or can learners access the modules at home?



