Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professional Learning of School Leaders and Teachers

Engineering

PLE Day 2025 - 2026

CC BY NC

Meet the Team

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Declan Regan
Senior Leader

Kevin Grant
Professional Learning Leader

Francis O'Farrell
Associate

Fergal Murphy
Professional Learning Leader

James O'Rourke
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Ciarán Callaghan
Associate

Partners

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An Roinn Oideachais agus Óige
Department of Education and Youth

www.gov.ie/education

NCCA

www.ncca.ie

Coimisiún na Scrúduithe Stáit
State Examinations Commission

www.examinations.ie

Oide

www.oide.ie

Key Websites / Online information

Oide

www.curriculumonline.ie

www.ncca.ie

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Oide Mailing List

Oide Mailing List

Key Documents

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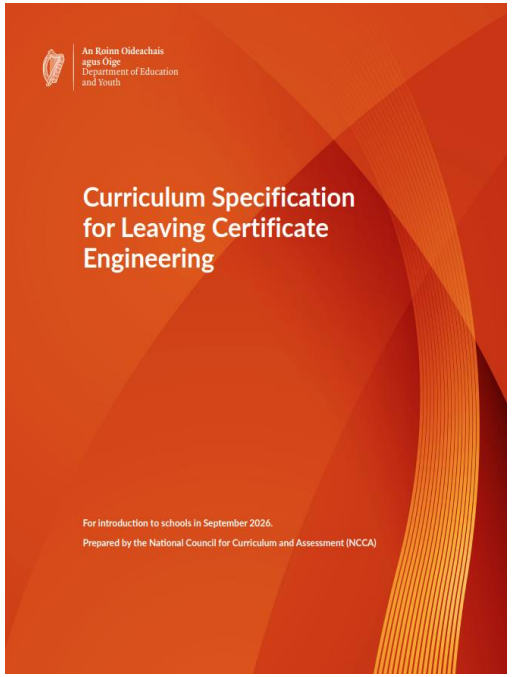
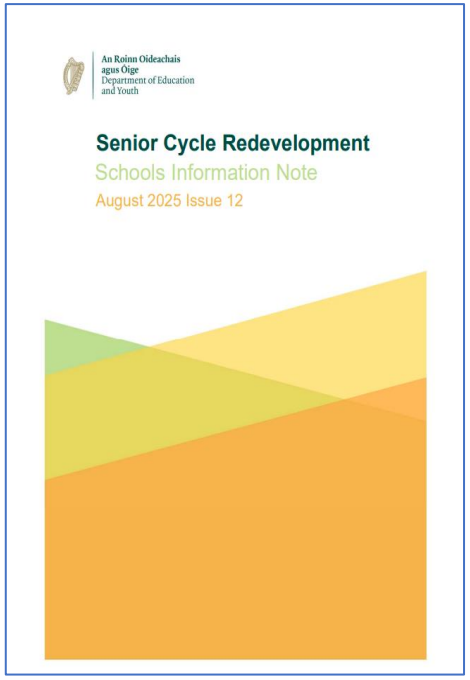
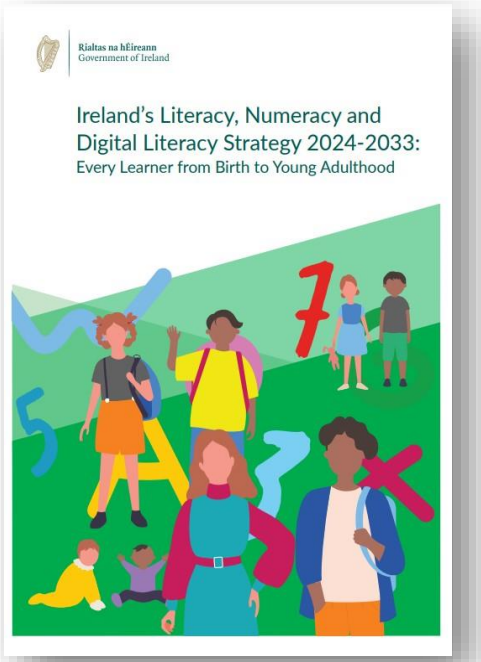


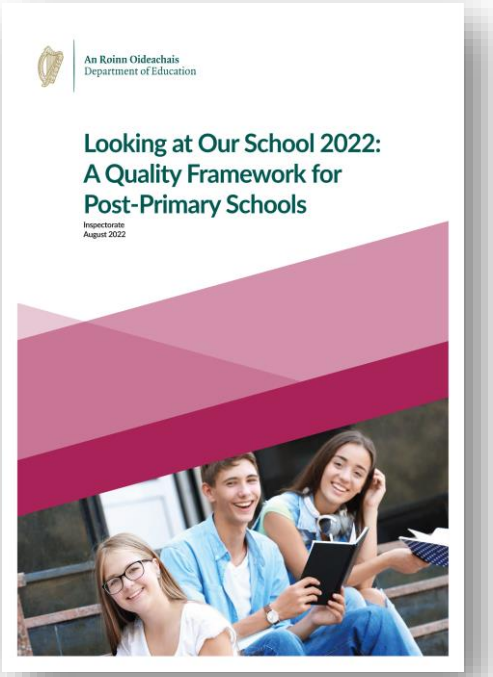
Subject Specification, NCCA



Senior Cycle Redevelopment Information Note



Irelands Literacy, Numeracy and Digital Literacy Policy Document



Looking at our schools 2022

Over today's three sessions - we will…

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Engage with the specification, examining the rationale, aims and the overall structure of the subject.

Examine the strands in detail. Engage with a learning experience that encourages an integrated approach to the practical and theoretical aspects of the specification.

Explore new elements of the Engineering specification, within the Automation and Control Systems strand through an applied learning experience.

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Supporting the Professional Learning of School Leaders and Teachers

Engineering

PLE 2025/2026

Session 1

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In this session, we will…

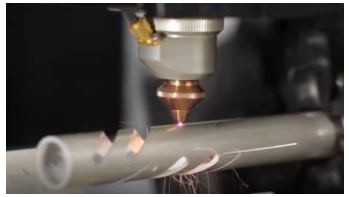
Engage with the specification, examining the rationale, aims and the overall structure of the subject.

Reflection Point

How has the world of engineering changed since the current syllabus was published in 1983?

What skills and knowledge will students need in the future?

Pause and Reflect



Read through the rationale and highlight how students will be prepared for the dynamic world they will live in.

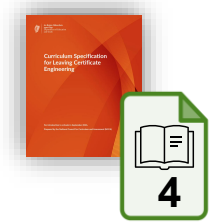
Link to the new Specification

Rationale

Engineering is a dynamic field focused on designing, realising, manufacturing, and testing solutions to practical problems. It plays a pivotal role in addressing contemporary challenges, fostering innovation, and promoting sustainable living within a circular economy. Engineering requires a blend of theoretical knowledge, practical skills, and a creative mindset. It promotes active learning while fostering effective problem-solving techniques through the application of scientific principles to real-world scenarios.

As part of the technology education suite of subjects, **Leaving Certificate Engineering** enables interdisciplinary learning, enriching students' overall experience. Engineering equips students with practical, cognitive, and technical skills for today's dynamic world, fostering teamwork, communication, and innovation. It helps them understand and address local, national, and global challenges, driving societal and economic progress.

Leaving Certificate Engineering emphasises the importance of ethical responsibility and the value of repair over replacement, which are essential values, helping students to understand the social and environmental consequences of business practices, cultivating a positive attitude toward enterprise and innovation. Leaving Certificate Engineering reflects the importance of engineering in society, inspiring STEM careers and enhancing technological literacy.



Pause and Reflect

Oide

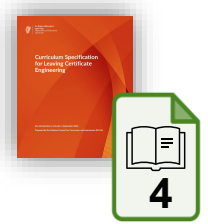
Interrogate the aims of the specification

Having read the aims, what capabilities should an engineering student have?

Aims

Leaving Certificate Engineering aims to develop a deep appreciation and understanding of the importance of sustainable and ethical engineering solutions for society. More specifically, Leaving Certificate Engineering aims to:

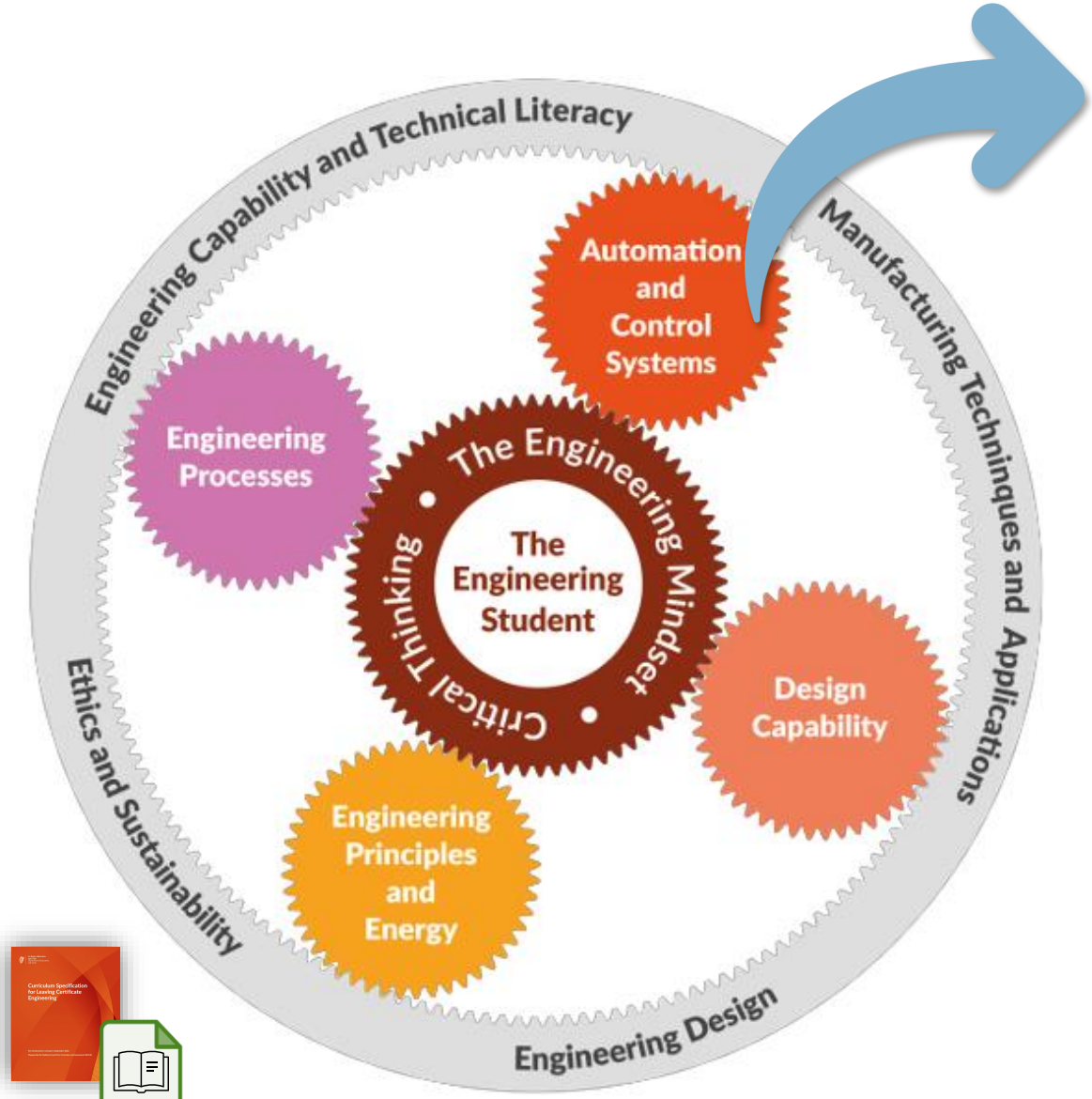
- foster an awareness of the environmental, social, and economic impacts of engineering decisions and promote sustainable practices and ethical responsibility.
- enable students to learn about the core concepts, processes and principles of engineering.
- develop the students' capability, accuracy and precision using resources and equipment available in the Engineering classroom in a safe and appropriate manner.
- foster an engineering mindset, by enhancing creativity, problem-solving skills and design thinking through practical applications to engineering problems.
- develop students' capacity to effectively articulate ideas, designs, and solutions through various media, enhancing collaboration and engagement.
- encourage the development and application of theoretical knowledge in a systematic way.
- provide a broad educational experience that prepares students for future studies and the workforce as well as developing awareness of future careers and opportunities.



Group Feedback & Discussion

What is your understanding of the Rationale and Aims?

Structure of the Subject



Four Strands

1. Engineering Processes
2. Automation and Control Systems
3. Design Capability
4. Engineering Principles and Energy

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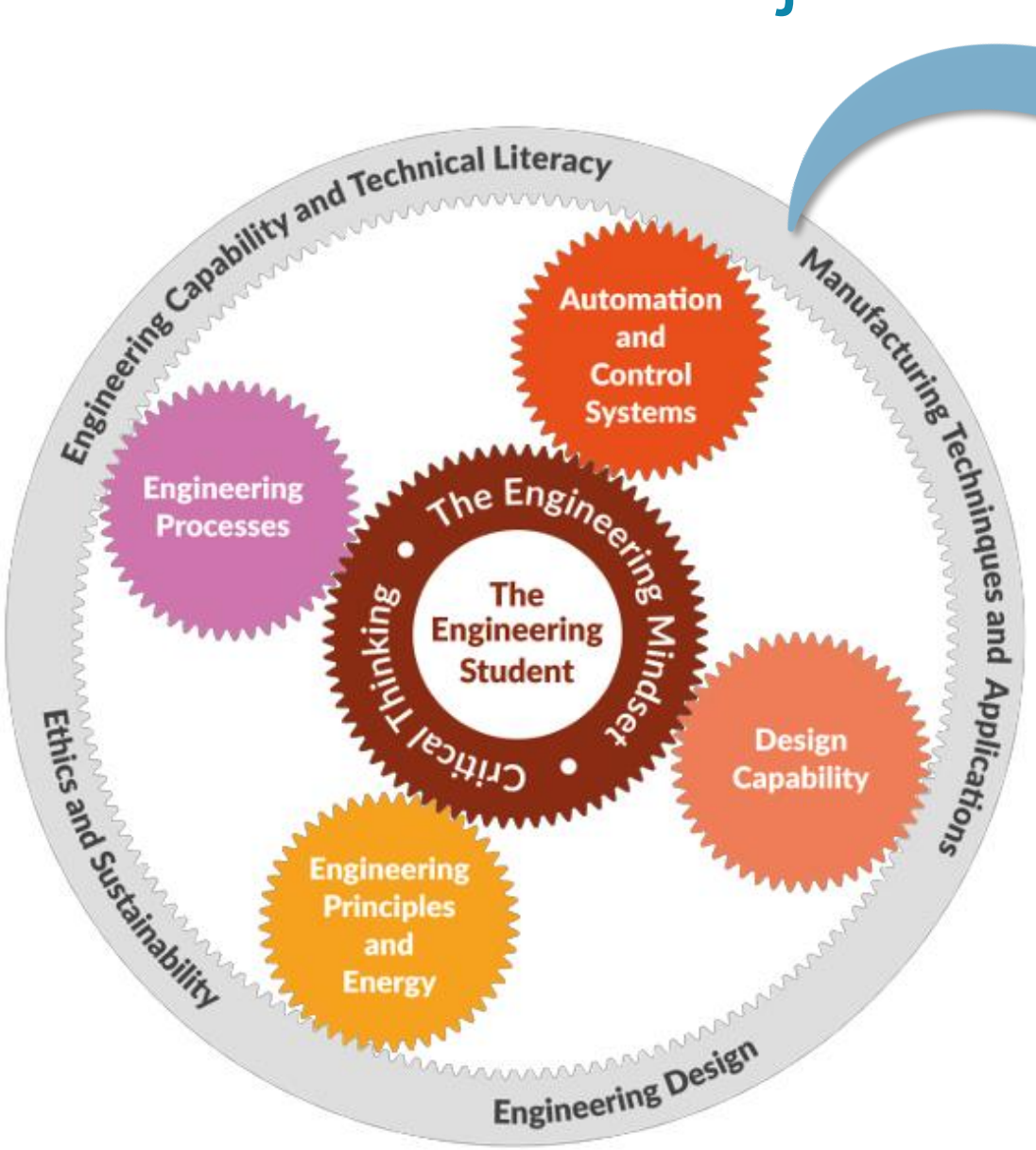
Supporting the Professional Learning of School Leaders and Teachers

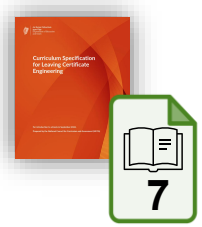
Structure of the Subject



Four Cross-cutting themes

- Engineering Capability and Technical Literacy
- Ethics and Sustainability
- Engineering Design
- Manufacturing Techniques and Applications

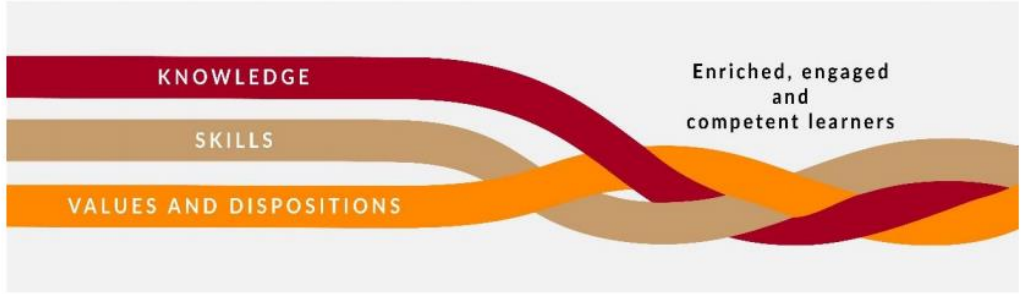
Key Competencies



Consider what are Key competencies?
How will the key competencies be lived out through the teaching and learning in your classroom?

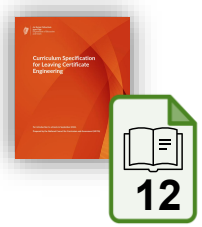
Key competencies

Key competencies is an umbrella term which refers to the knowledge, skills, values and dispositions students develop in an integrated way during senior cycle.



Structure of the Learning Outcomes

Students learn about	Students should be able to
Specific areas that students learn about	Learning outcomes which describe the knowledge, skills, values and dispositions students should be able to demonstrate after a period of learning.



Learning outcome structure

Students learn about	Students should be able to
• transferring measurements and details from a working drawing to a workpiece, ensuring precision and adherence to specifications.	**1.21 demonstrate** the correct use of simple and precision measuring tools and processes.

Action Verb

Demonstrate: prove or make clear by reasoning or evidence, illustrating with examples or practical application

Assessment of the subject

Assessment component	Weighting	Level
Design and manufacture project	50%	Common Brief
Written examination	50%	Higher and Ordinary Levels

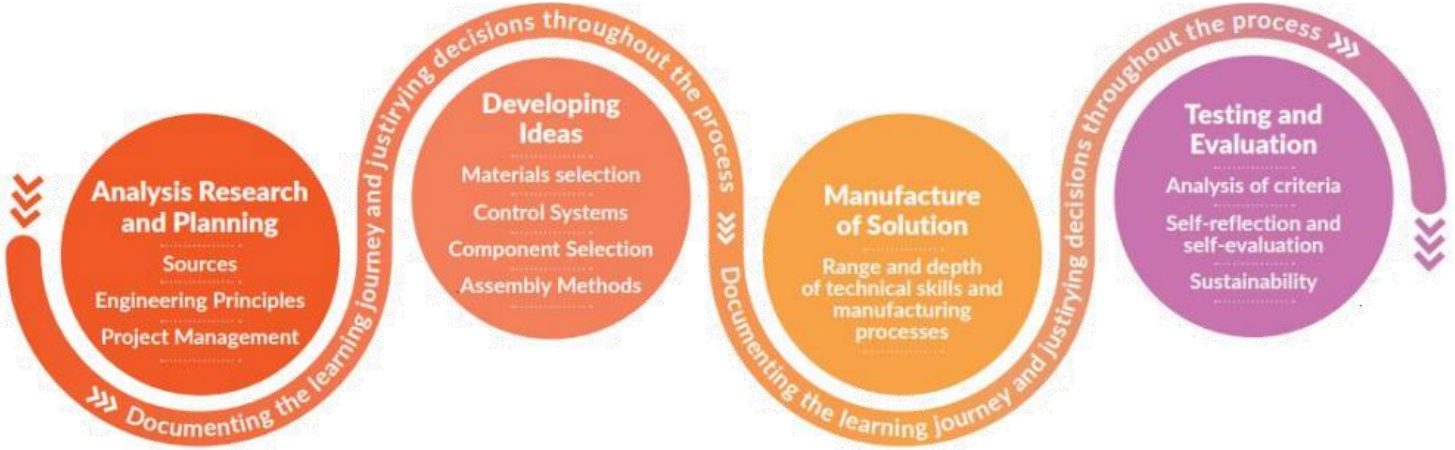
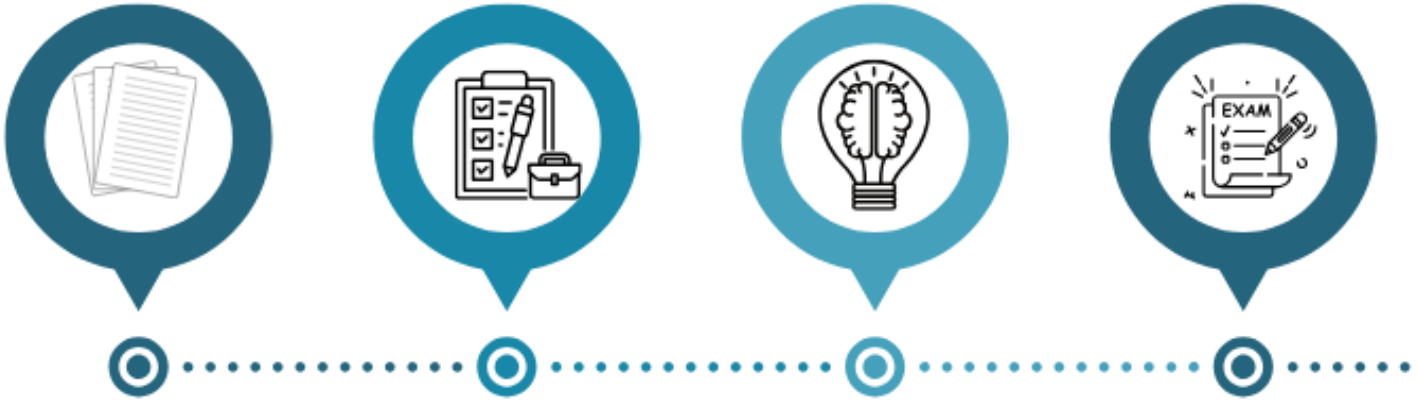


Figure 4 Additional Assessment Component (AAC)

Assessment in Engineering



SAMPLE PAPERS

two sample papers at higher and ordinary to be available in April 2026

SAMPLE ADDITIONAL ASSESSMENT COMPONENT BRIEF

A sample Additional Assessment Component brief will be made available in September 2026

ADDITIONAL ASSESSMENT COMPONENT

The Additional Assessment Component common brief will be issued by the SEC in October 2027

WRITTEN EXAM

The first written exam will be Assessed in June of 2028

Oide supports

PLE SUPPORT

One full-day PLE session per academic year

COLLABORATIVE SUPPORT

Oide will facilitate teachers of Engineering coming together to support each other in the implementation of the specification

OTHER PLE SUPPORTS

Oide will supply other supports through elective CPD in online or face-to-face formats

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Engineering

PLE 2025/2026

Session 2

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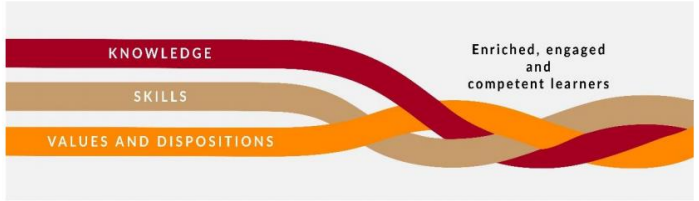
In session two, we will…

Examine the strands in detail. Engage with a learning experience that encourages an integrated approach to the practical and theoretical aspects of the specification.

Key Competencies



'Numeracy in the post primary school means being able to:

- *Use skills of investigation, reasoning and **problem-solving***
- ***Hypothesise** and make predictions through the examination of evidence*
- *Link numeracy learning to experiences across the curriculum, in the **real world** and outside of school'*

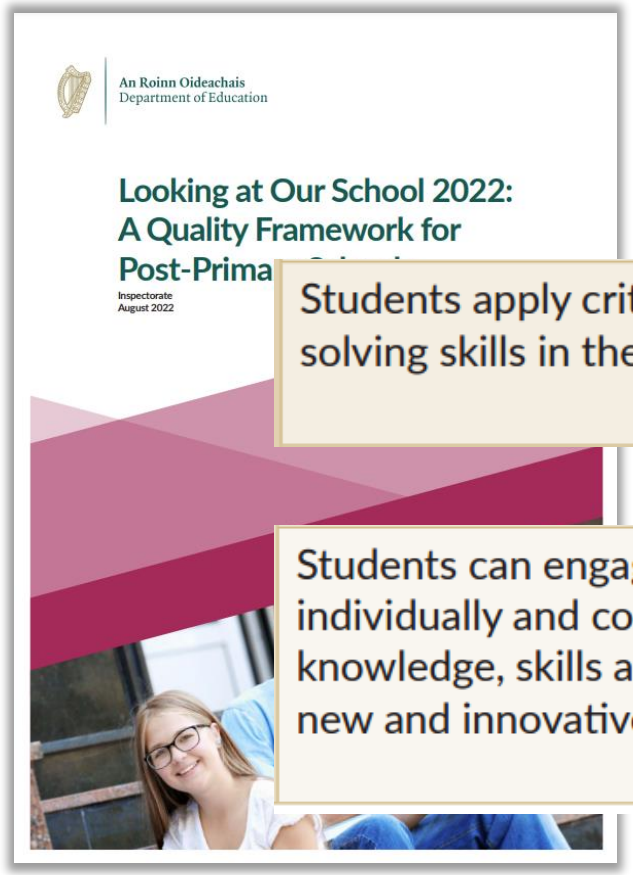
Ireland's Literacy, Numeracy and Digital Literacy Strategy 20242033, pg 32

*'Literacy encompasses an understanding of the **unique literacy practices** and needs of adolescent learners……*

*…Literacy encompasses both **cognitive and technical** skills'*

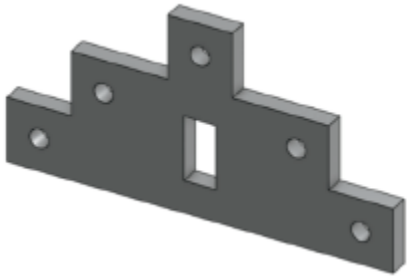
Ireland's Literacy, Numeracy and Digital Literacy Strategy 20242033,pg 28

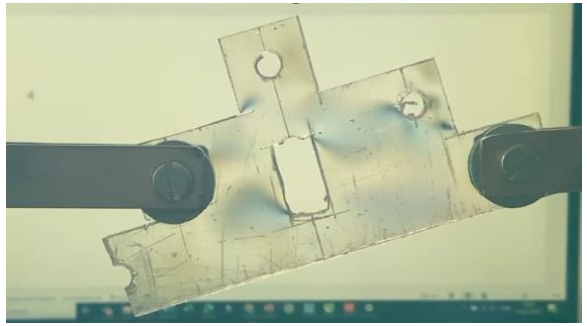
Looking at Our School 2022

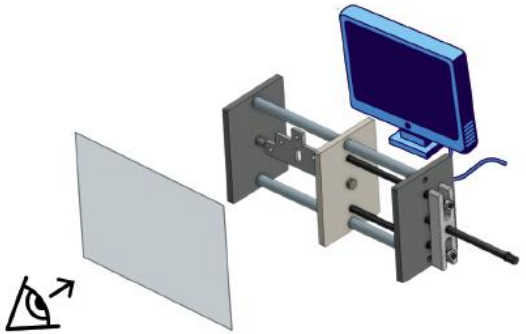


Dimension 1: Learning and Teaching
Domain 1: Learner outcomes

Students have the necessary	Students demonstrate a knowledge, appropriate to their stage of development, of their own	Students demonstrate a knowledge, appropriate to their stage of development, of their own behaviour
	Students apply critical thinking and problem-solving skills in their approach to their learning.	Students apply critical thinking and problem-solving skills in their approach to their learning **and develop as autonomous learners.**
relationships		**to do so themselves.**
	Students apply critical thinking and problem-	Students apply critical thinking and problem-
	Students can engage in creative processes individually and collaboratively that develop their knowledge, skills and understanding and result in new and innovative ideas and solutions.	Students can engage in creative processes individually and collaboratively that **transform** their knowledge, skills and understanding resulting in new and innovative ideas and solutions **that have value in real world applications.**







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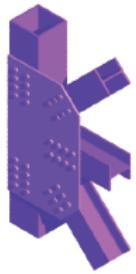
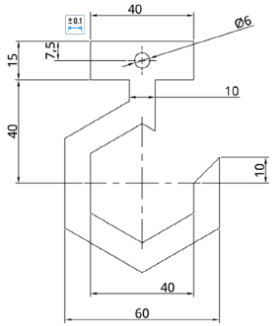
Engage with a learning experience that encourages an integrated approach to the practical and theoretical aspects of the specification.

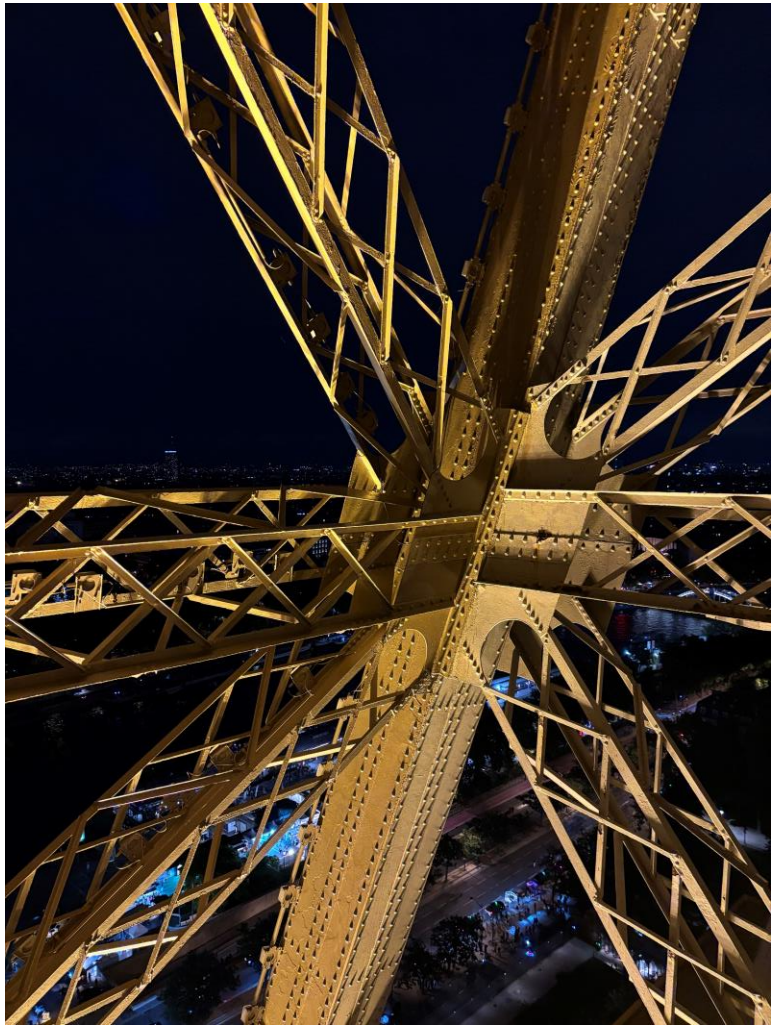


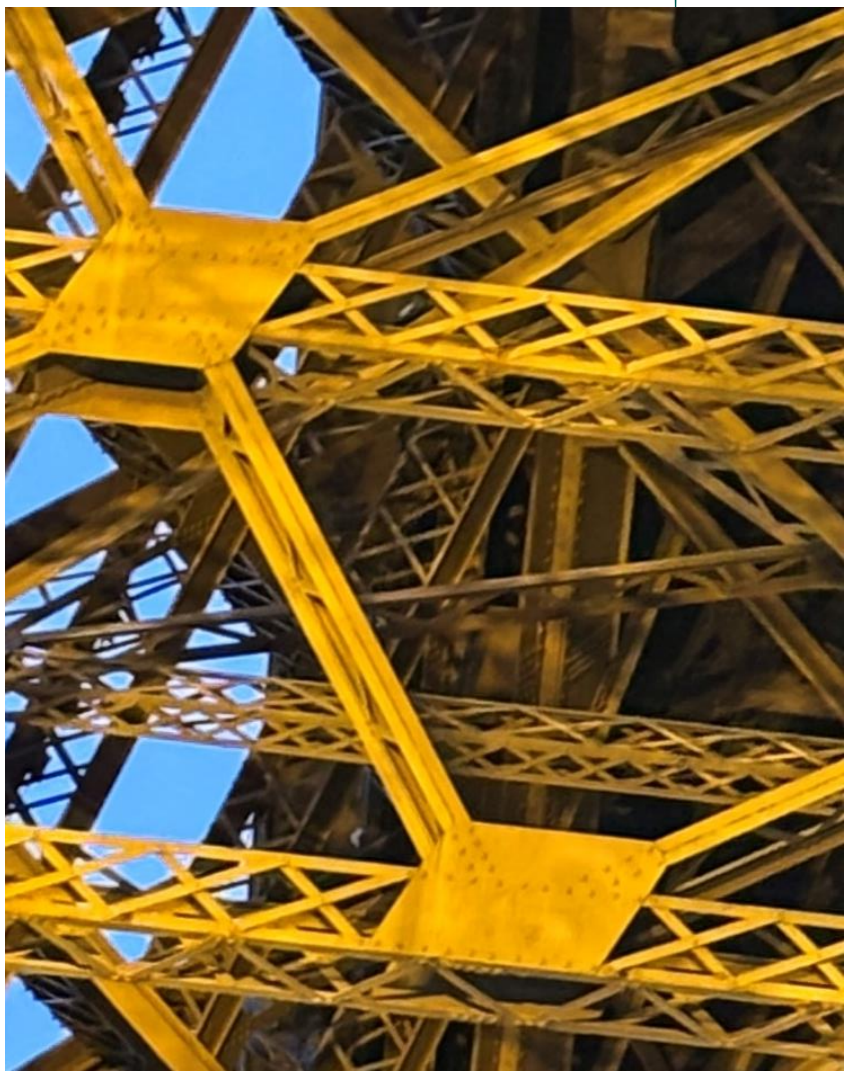


Real world example: gusset plates

Students learn about	Students should be able to
• how engineering contributes to the quality of daily life, ethics, sustainability and societal impact.	1.2 **describe** the impact that engineering developments have had on our world.

Eiffel Tower Video

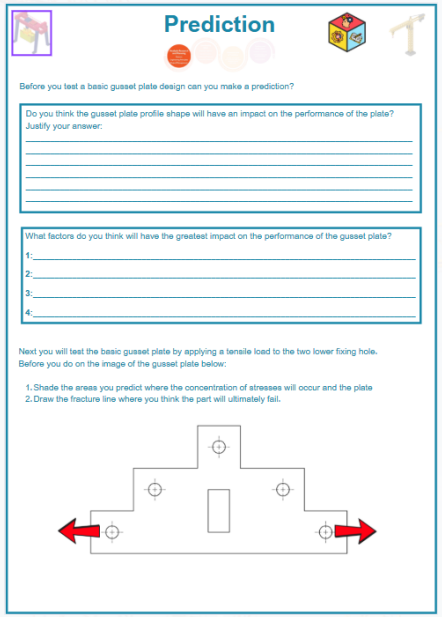


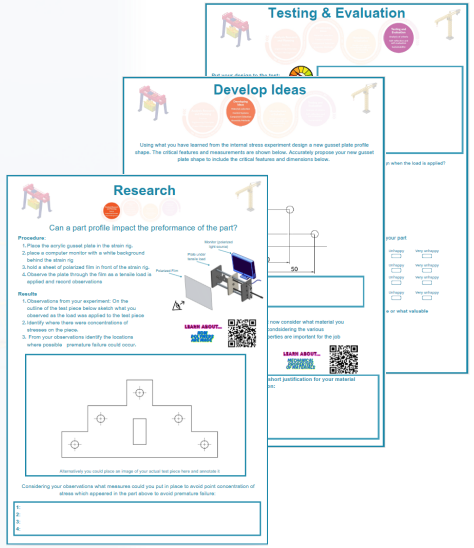


Informed Design Decisions

Scientific Approach

Before testing the gusset plate, develop your hypothesis by completing the prediction worksheet.





Informed Design Decisions

Informing your design decision through experimentation

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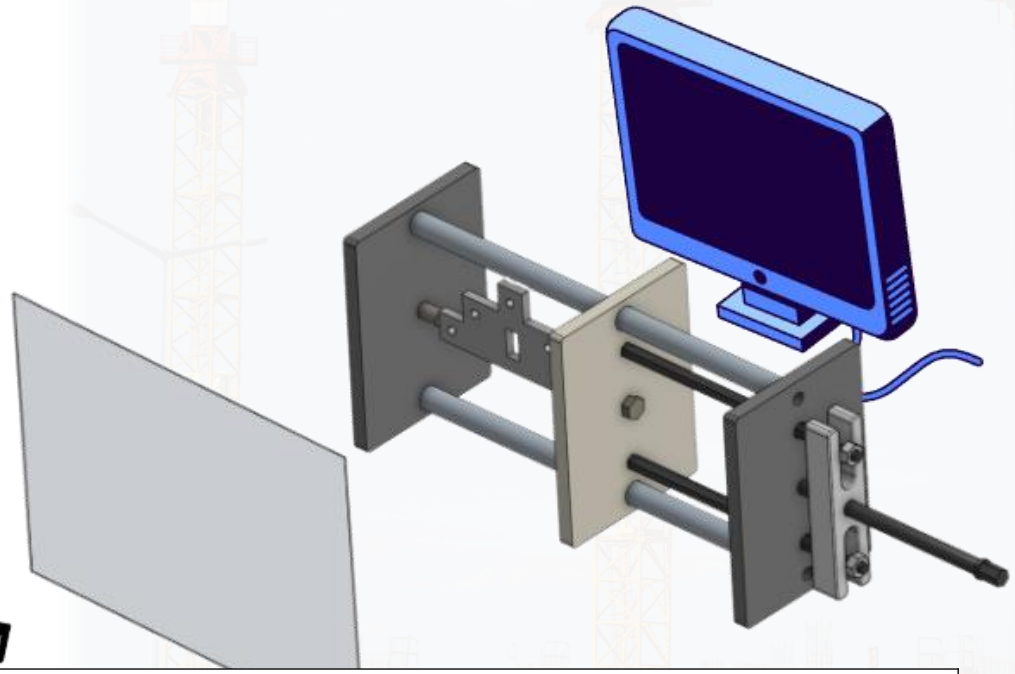
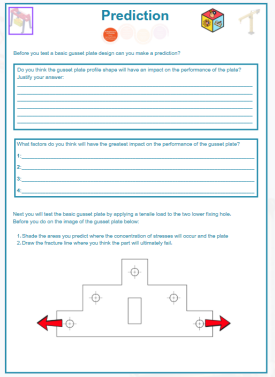
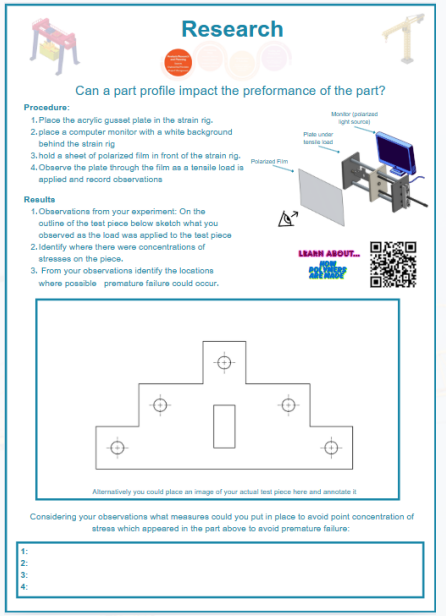
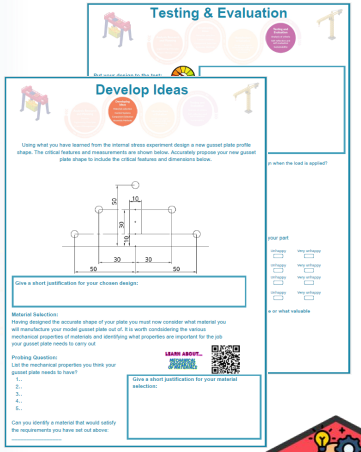
Basing design decisions on information









Use the polariscope to identify the point stresses (weak points) in the material as a load is applied, and identify factors that can cause premature failure

Students learn about	Students should be able to
• key testing concepts and terminology in engineering.	3.17 **appreciate** the importance of testing in the engineering design and product development process
• Material testing.	4.6 **interpret and communicate** test data from material tests to make informed material selection choices

19

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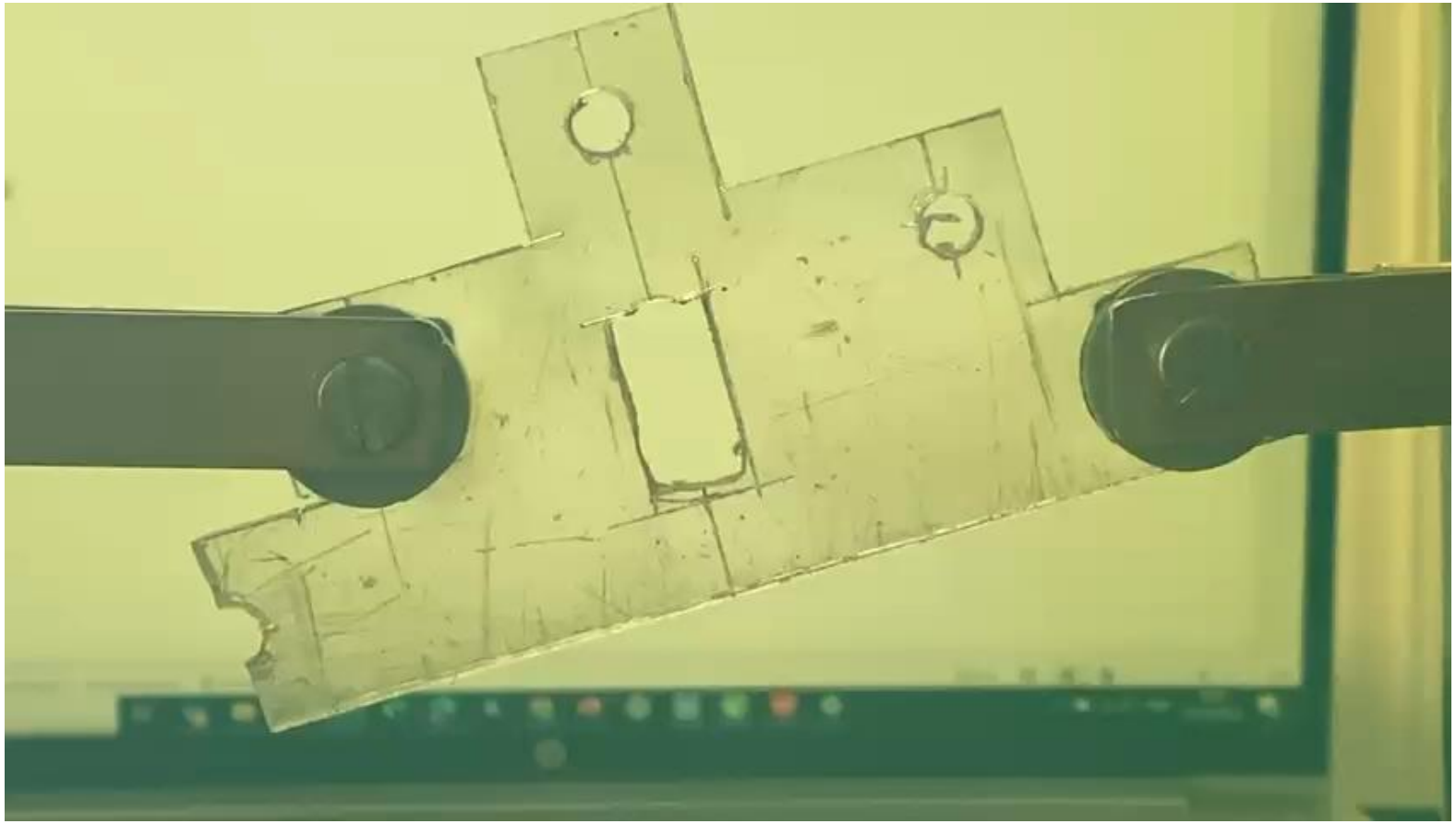
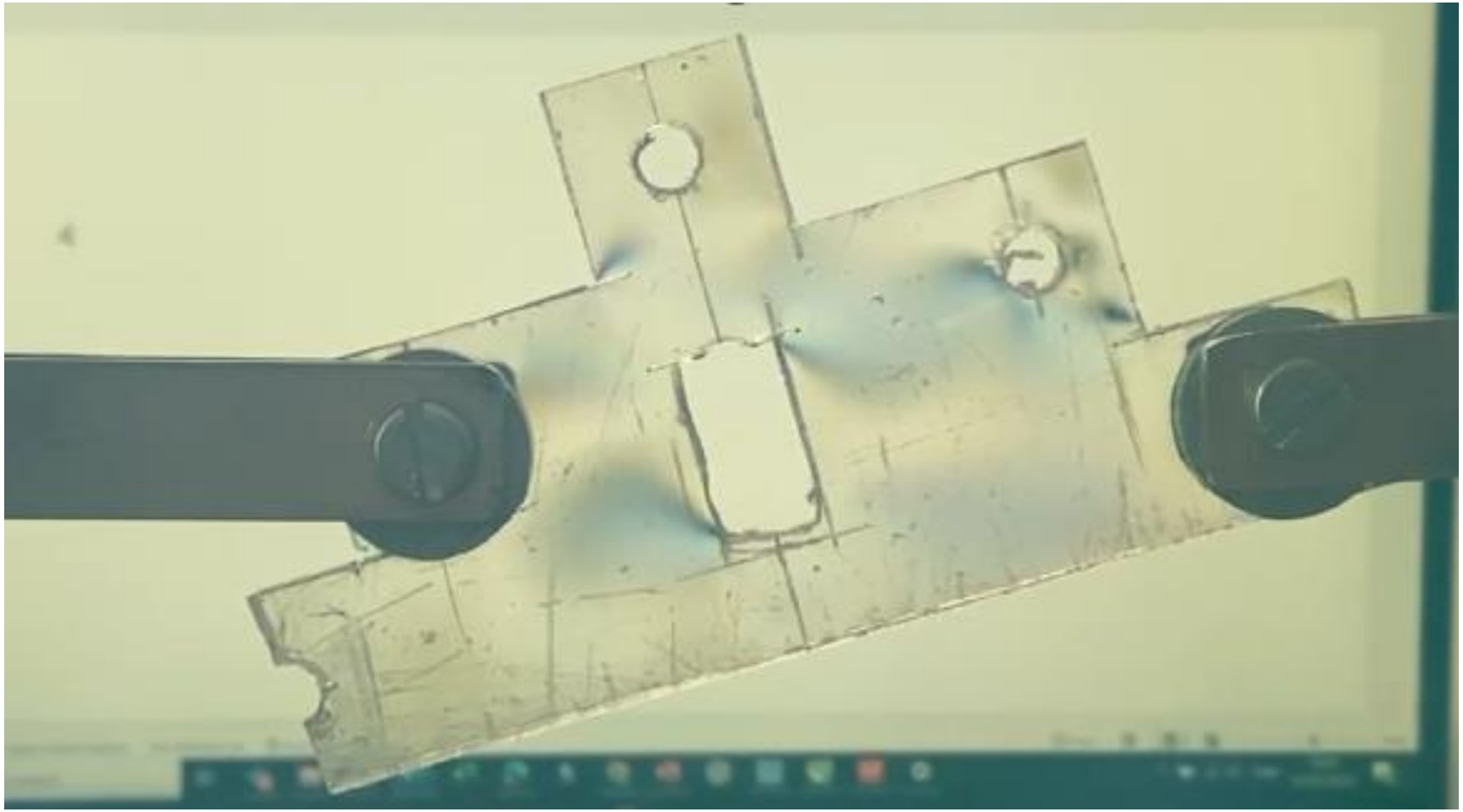
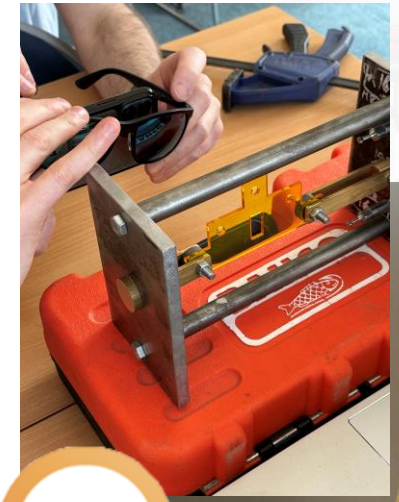
Sample Test Video

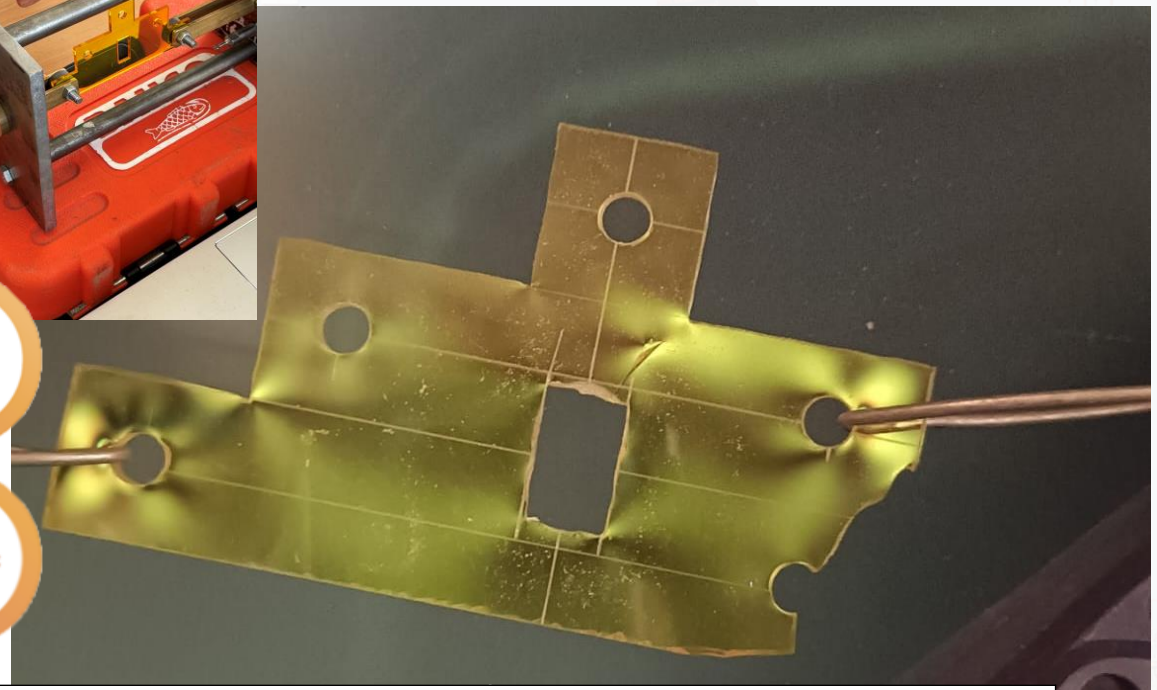


Sample Test Video Still prior to failure



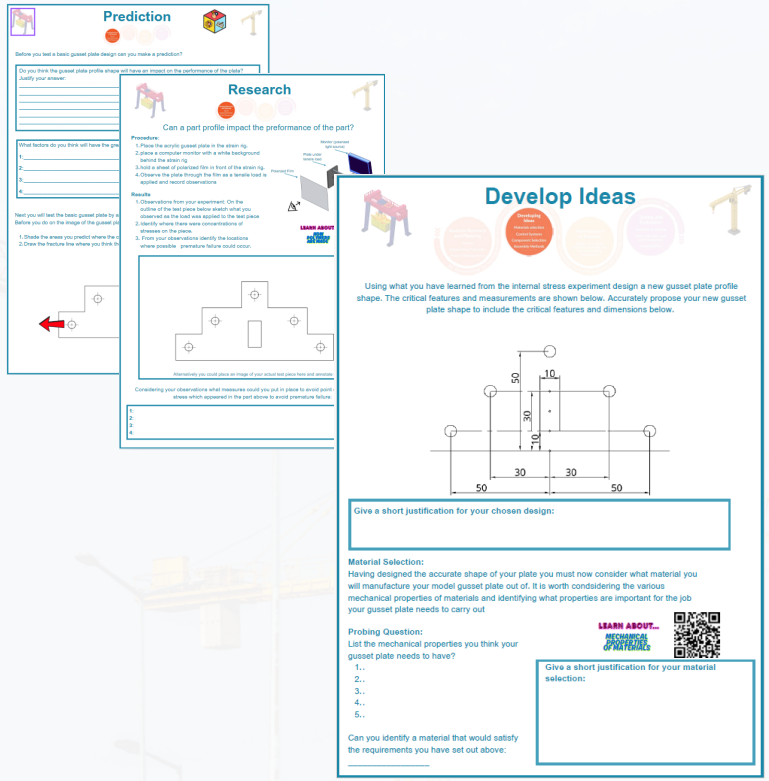
Activating the Learning

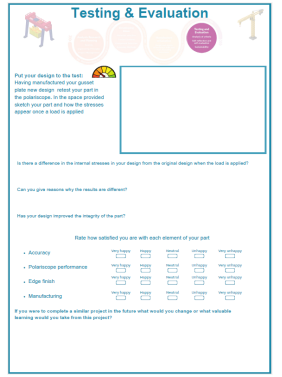




Being creative

Thinking and solving problems





Students learn about	Students should be able to
• interpreting and creating engineering drawings in compliance with drafting standards	3.5 **create** engineering working drawings that adhere to established drafting standards.
• prototyping and testing in design	3.16 **create** working prototypes to explore ideas, test functionality, and inform design decisions.

18

19

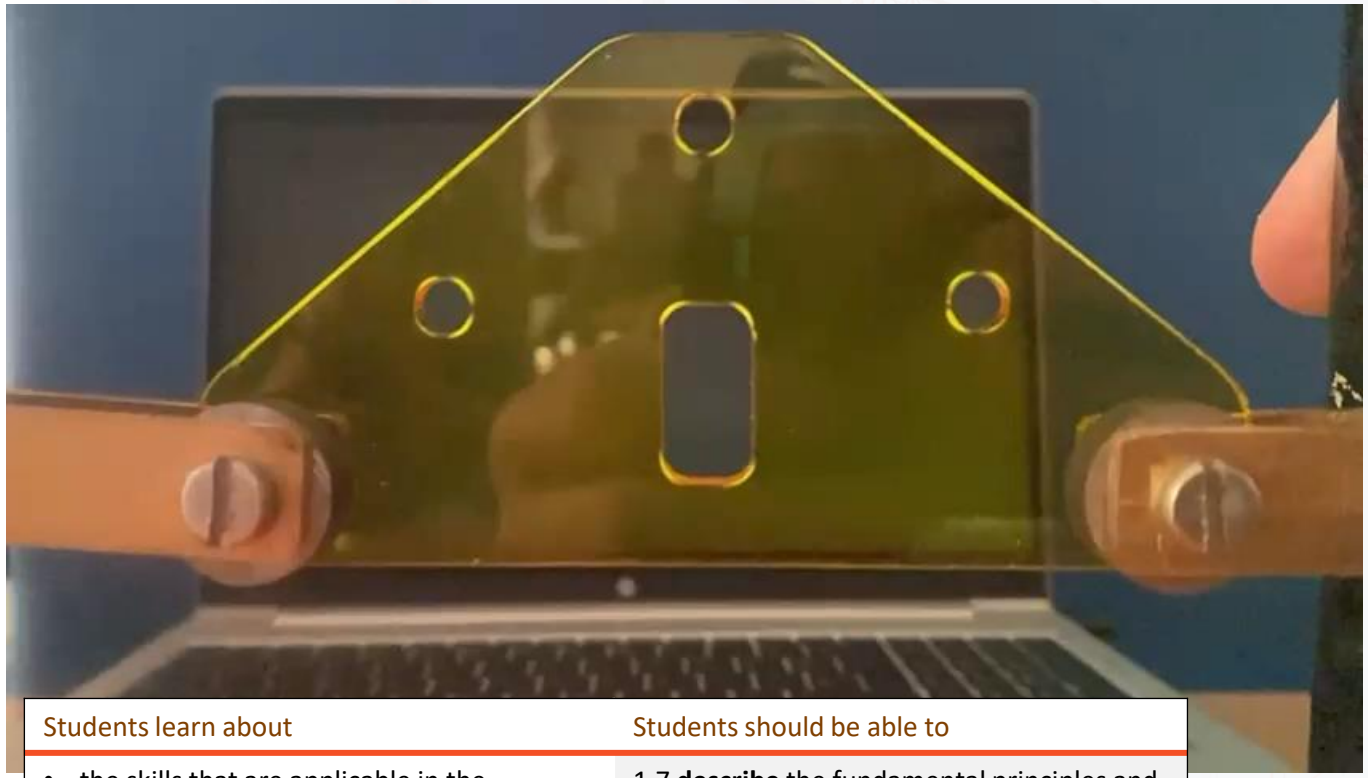
Using the knowledge developed from the polariscope design a new profile for the gusset plate

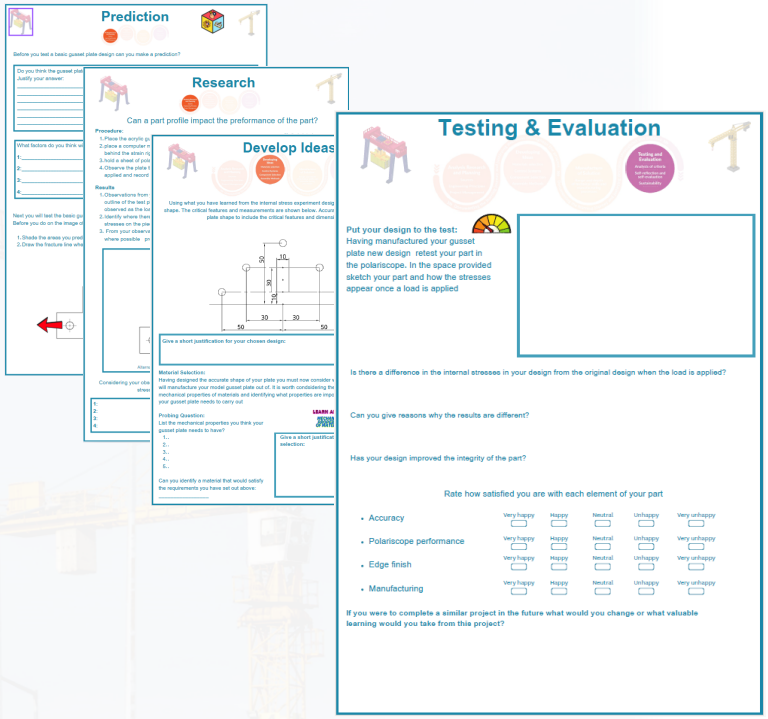
Group Discussion and Feedback

What are the benefits to the students in this activity?

How could you adapt this approach to aid your students in understanding the importance of design?

Putting our learning to the test



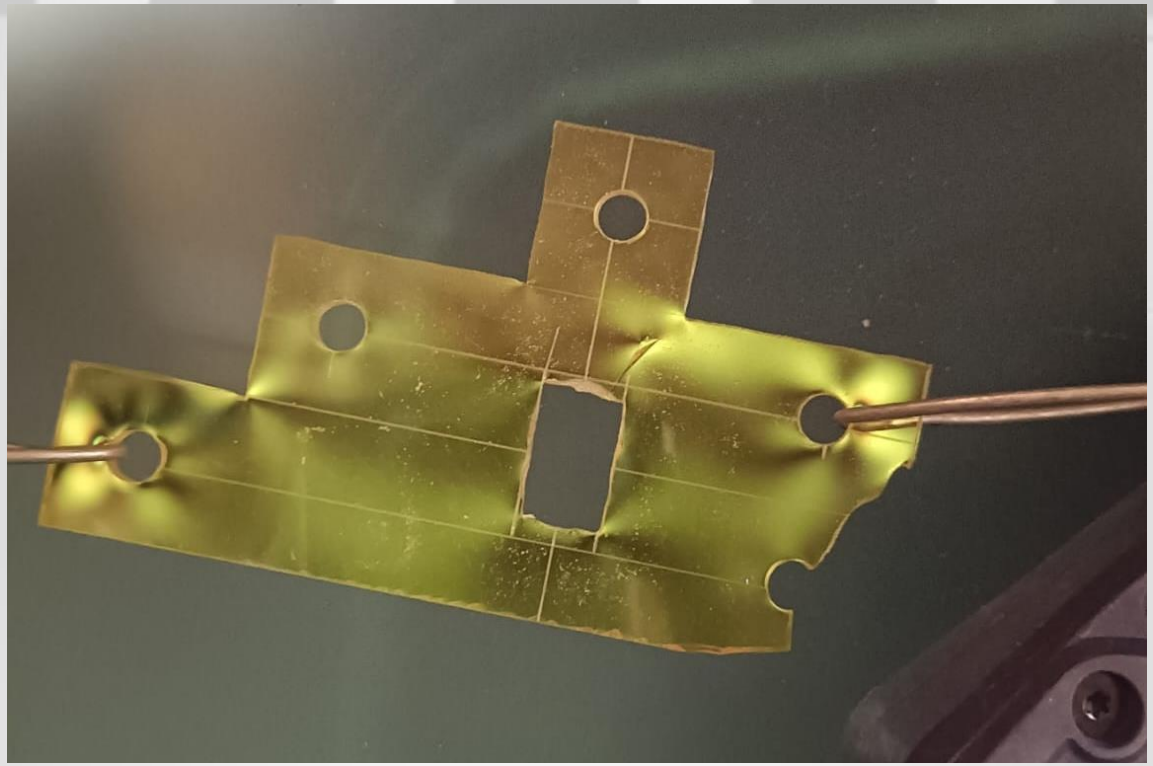


Managing learning and self

Students learn about	Students should be able to
• the skills that are applicable in the engineering classroom to include both manual and automated processes	1.7 **describe** the fundamental principles and theories of manufacturing processes and assembly techniques and apply appropriately to a range of contexts for required applications.
• transferring measurements and details from a working drawing to a workpiece, ensuring precision and adherence to specifications.	1.8 **demonstrate** proficiency in using hand and machine tools.

Having designed and manufactured your new gusset plate you must now put your knowledge to the test and re-test your design on the polariscope and record your observations

What are the opportunities for student learning to be developed through the activity?



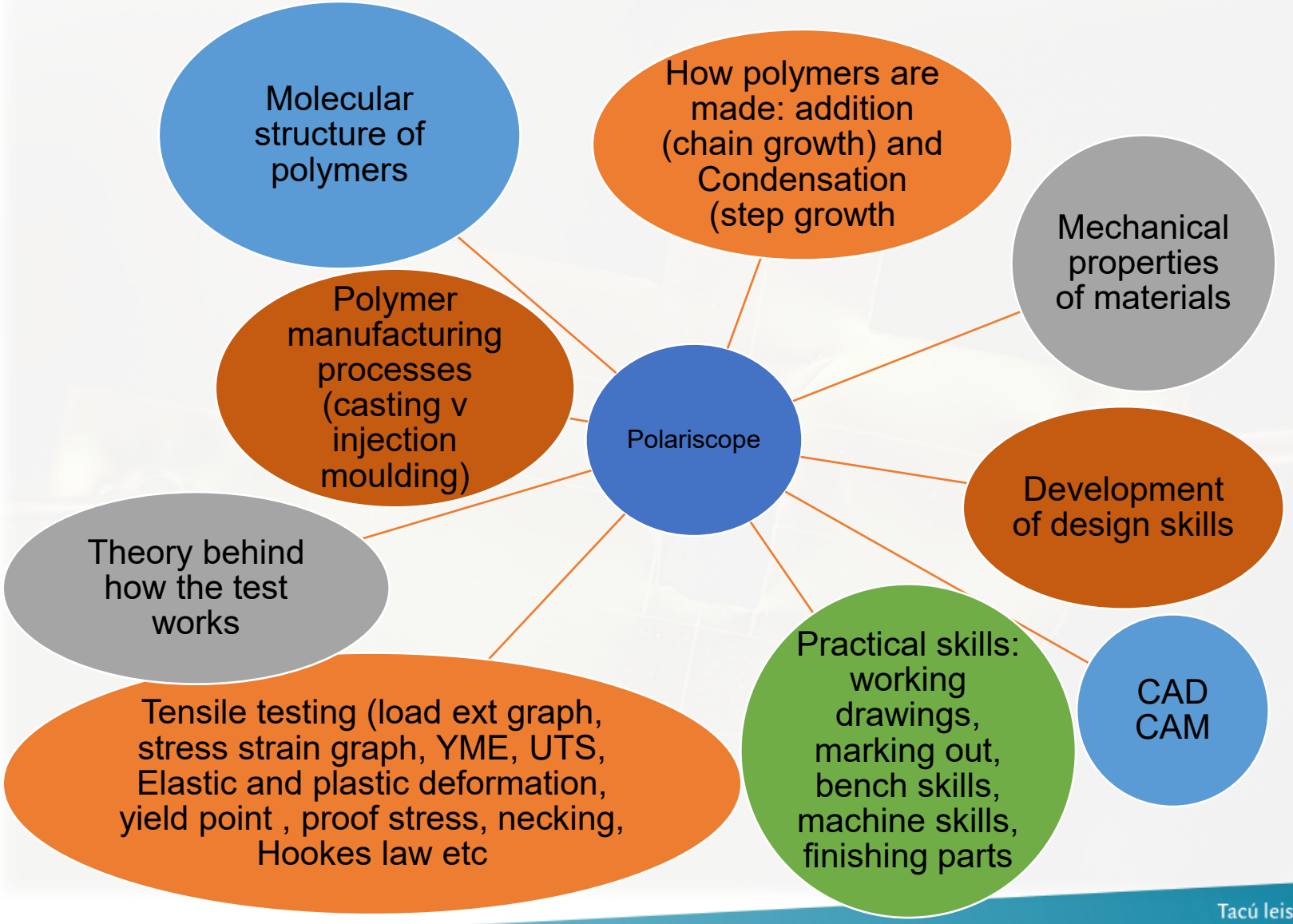
In pairs

10 minutes

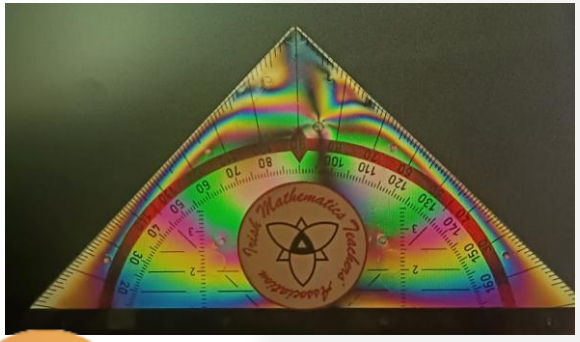
Share

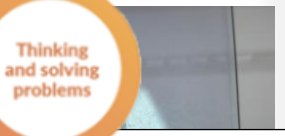
Highlight learning outcomes you could address through this activity

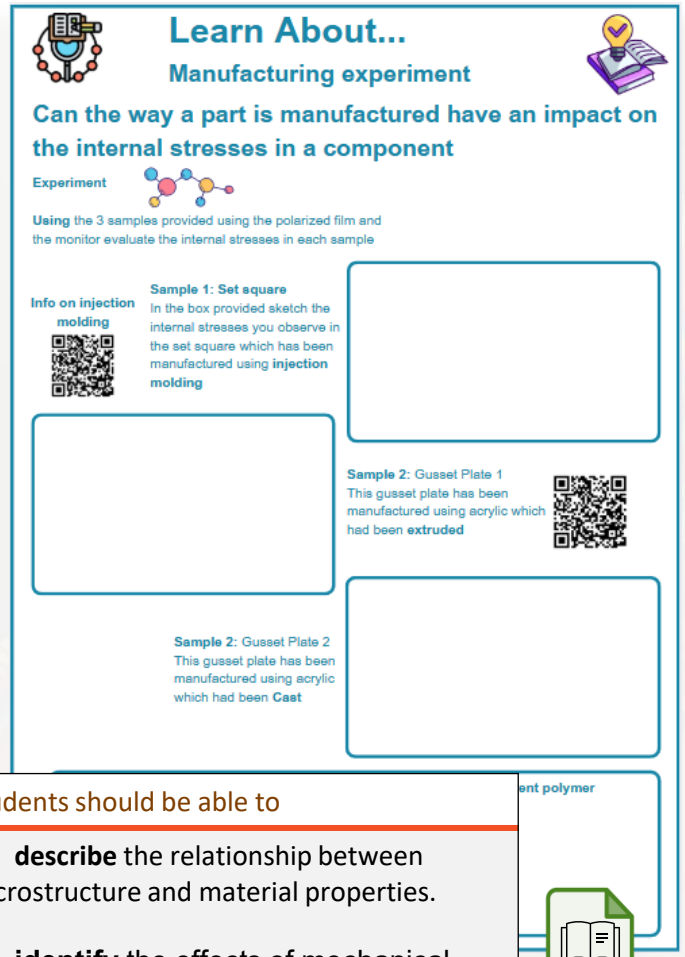
Areas for development: Expected responses



Sample: Documenting Learning







Thinking and solving problems

Students learn about	Students should be able to
• the relationship between the microstructure and macro properties of a range of engineering materials. • the relationship between the microstructure and macro properties of a range of engineering materials.	4.7 **describe** the relationship between microstructure and material properties. 4.9 **identify** the effects of mechanical working on material properties.

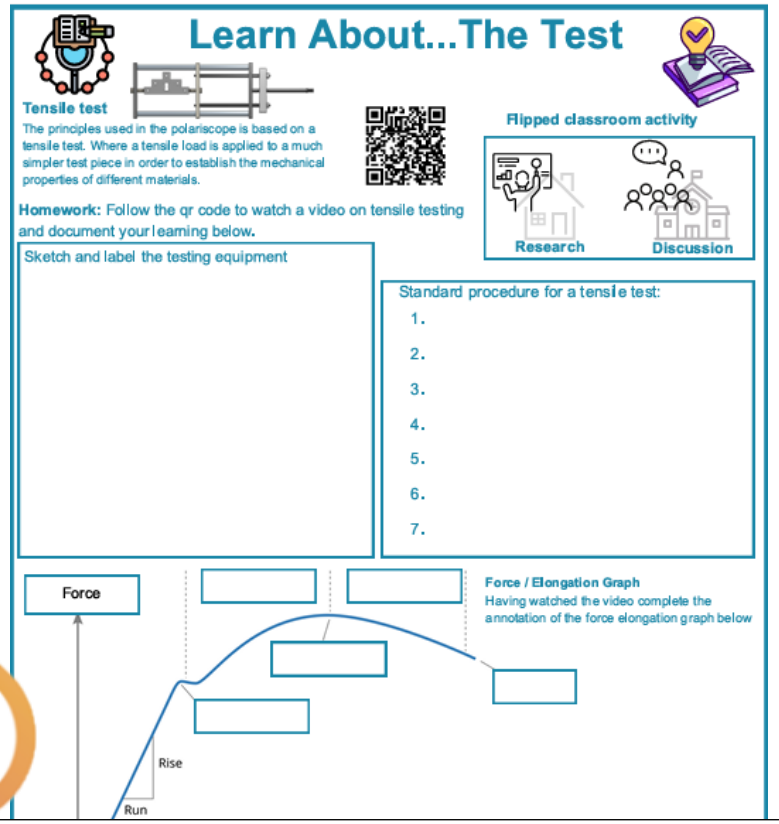
Learn about:

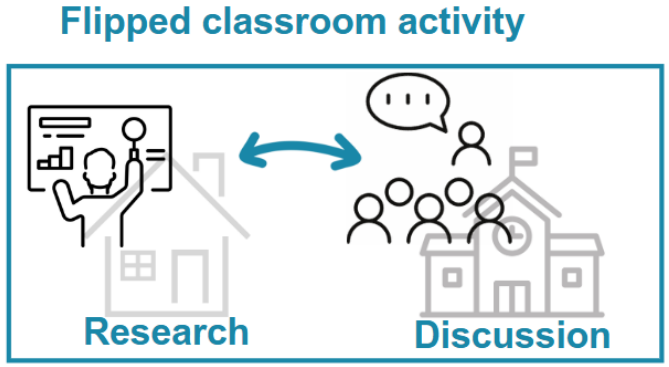
- Polymer manufacturing processes
- The impact internal stresses has on mechanical properties of a part

Using the polariscope test a range of components manufactured using different polymer manufacturing processes.

Record your observations and hypothesises the reason for each result and the impact this would have on that parts mechanical properties

Sample: Documenting Learning





Learn about:

- Tensile testing
- Mechanical properties of materials

Using the tensile rig to carry out tensile test on light material to gain an in-depth understanding of material properties and the full application of the tensile test.

Thinking and solving problems

Students learn about	Students should be able to
• material testing.	4.5 **describe** the various tests available to assess material properties.
• material testing.	4.6 **interpret** and communicate test data from material tests to make informed material selection choices.

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Reflect: Teaching for Student Learning

Read the Teaching for Student Learning section of the specification.

5 minutes

Highlight how this activity demonstrates desired classroom practices?

23

Oide

Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí

Supporting the Professional Learning of School Leaders and Teachers

Engineering

PLE 2025/2026

Session 3

CC BY NC

In this session, we will…

Explore new elements of the Engineering specification, within the Automation and Control Systems strand through an applied learning experience.

Oide

Consider your Current Practice

Development of Knowledge?

Development of practical skills?

Development of design capability?

What are you currently doing?

Preparation for current assessments?

How are you engaging the current syllabus?

Structure of teaching and learning across the 2-year programme?

Oide

Consider your Future Practice

Development of practical skills?

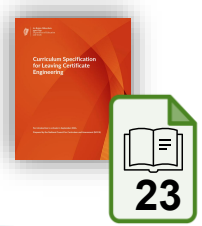
Development of Knowledge?

What will you need to change?

Development of design capability?

How will you engage the new Specification?

Structure of teaching and learning across the 2-year programme?



Continuity and Progression

‘The study of mechatronics creates a foundation for further study at Senior Cycle. Students develop proficiency in a range of processing skills and apply them in multiple contexts.’

What is your students current experience of Mechatronics?

Structure of the Subject

Strand 2: Automation and Control Systems

In this strand, students will study the principles of mechatronics and control, with a specific focus on smart manufacturing and digital technologies. The strand encourages learning by doing, where students are expected to design, build, and test control systems in the engineering classroom, gaining both theoretical knowledge and practical skills. Mechanical and electronic control systems are explored, integrating learning from Strand 4 and its applications in project realisation in Strand 1.

The learning outcomes in this strand begin with system analysis, inputs, and outputs, before advancing to local, remote, and autonomous control. Students will learn system analysis techniques, enabling them to capture the behaviour and communicate the functional requirements of systems involving automation and control. They will use a structured and systematic approach to map inputs, outputs, and their interactions, establishing a clear understanding and specification for system functionality. Additionally, they will learn to design and build circuits involving sensors and actuators and employ them in practical applications.

For local and remotely controlled systems, students will learn about the design and implementation of Human Machine Interfaces (HMI) and the hardware and software required to provide local and wireless communication technologies for monitoring and control. The strand culminates in a focus on autonomous control systems, where students will learn about closed-loop control systems, Artificial Intelligence, machine learning, and robotics. They will apply this knowledge to automated systems in a design, make, and test project.

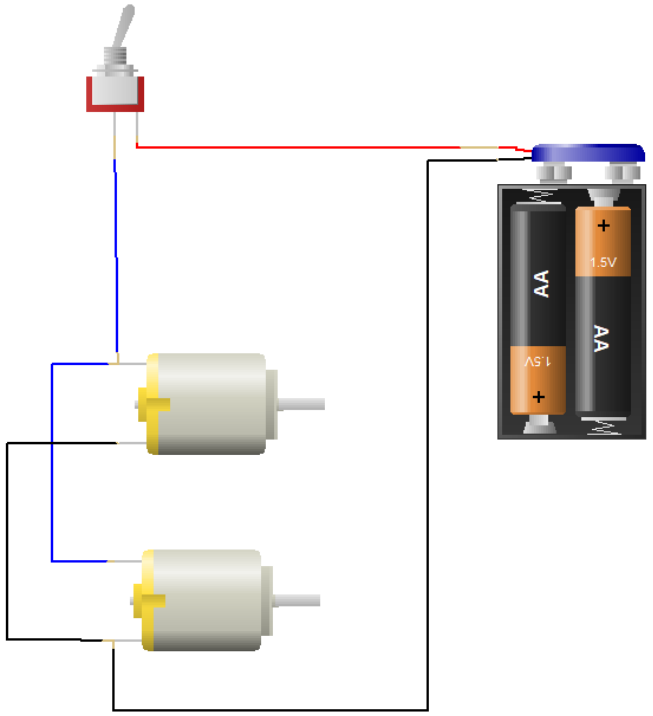
Through hands on experiences, students will identify and configure the hardware and software needed for automated systems and perform the analysis and testing required for their implementation. They will develop skills in building circuits, using test equipment, and debugging code and hardware systems.

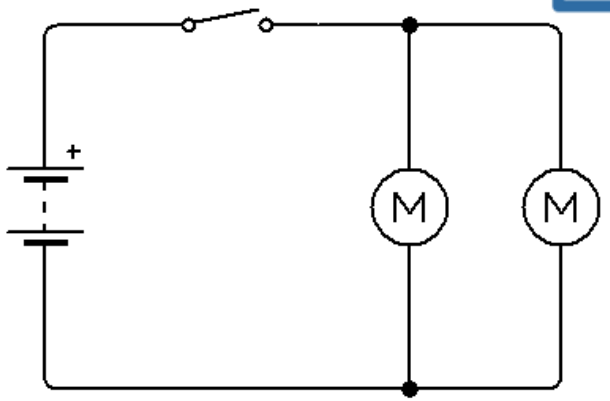
Developing a Learner Experience

Oide

How could you take an existing resource and expand the automation and control learning to senior cycle engineering level?

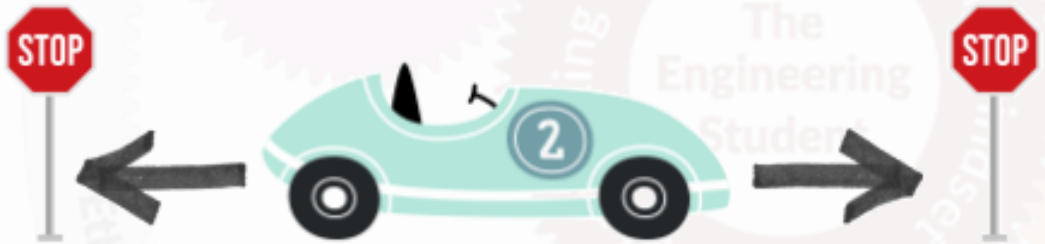
5 minutes





Sample learner experience

Using this existing resource, design a control system and HMI that has been informed by a state machine diagram.



Students learn about	Students should be able to
• System analysis techniques to capture and communicate the operation of control and monitoring systems. • approaches to designing Human Machine Interfaces (HMI) to provide a system with local control and monitoring capabilities.	2.2 **model** systems inputs, processes, outputs and the relationships between them using state machine diagrams. 2.11 **implement** hardware, software, local control and monitoring interfaces using system analysis specifications.

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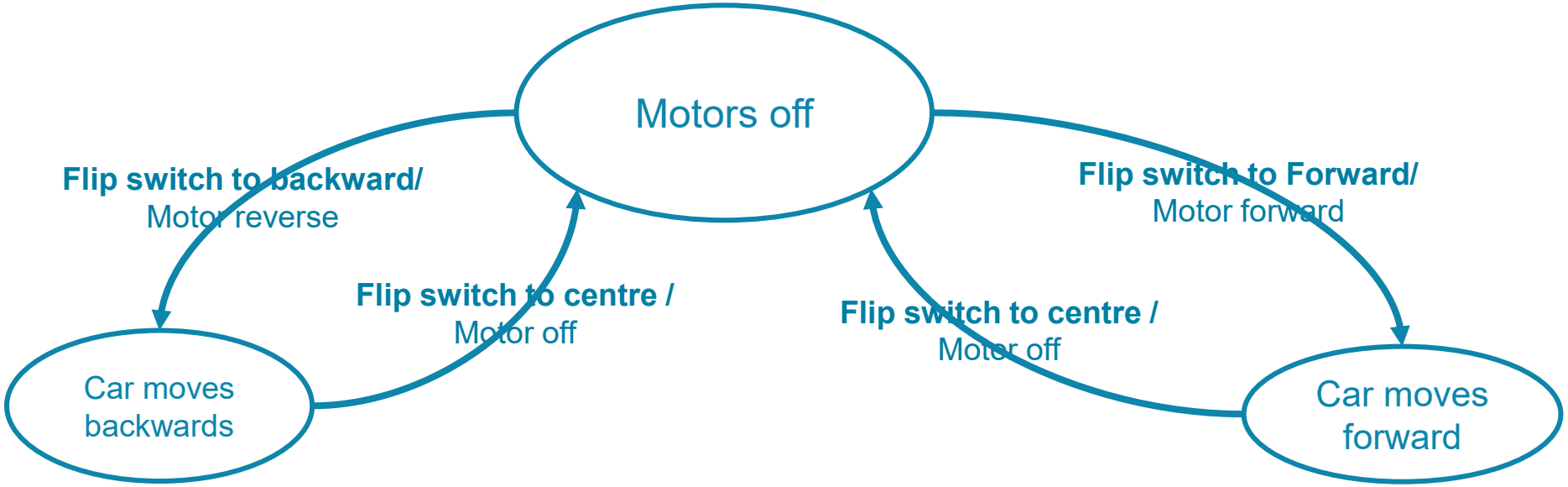
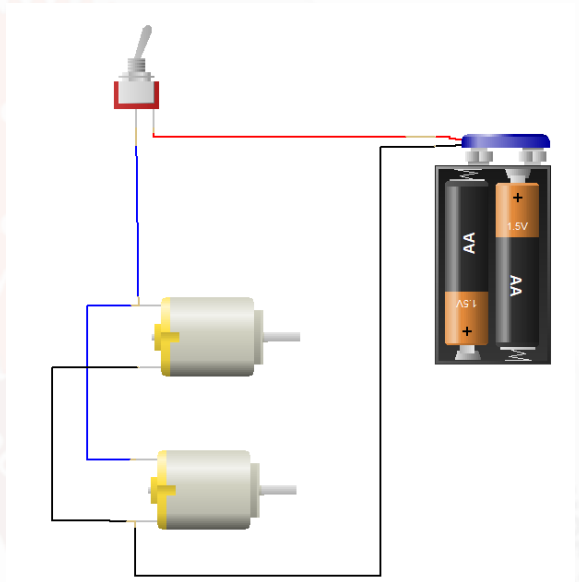
State machine diagram

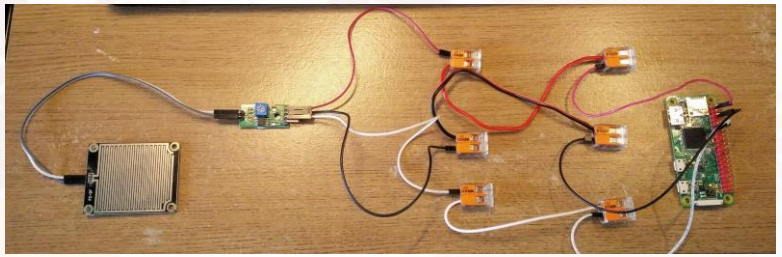


Now build your circuit

1. Using your state machine diagram sketch the circuit or wiring diagram for your control system.

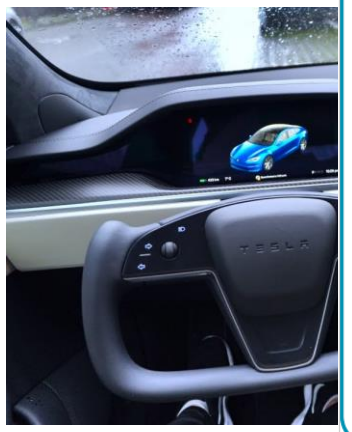


2. Now prototype your circuit.



Students learn about	Students should be able to
• hardware and software inputs and outputs required for control and monitoring of hydraulic, pneumatic, electronic, electrical and computer-based systems.	2.4 **identify** appropriate inputs and outputs for an automated system. 2.6 **describe** the design of a control system using an appropriate technical format.

The Human Machine Interface involves the software and hardware components used by humans to control and monitor machines and systems



What is a Human Machine Interface (HMI)?

A Human Machine Interface (HMI) is the point where a person interacts with a machine or system. It allows humans to give commands to machines and receive feedback. HMIs can be physical (like buttons or touchscreens) or digital (like apps or software controls). Good HMI design is important for safety, efficiency, and ease of use.

Task 1:

Using primary research only, insert an image of two HMIs for each of the categories below.

Setting	HMI 1 Identified	HMI 2 Identified
Kitchen		
Classroom Workshop		
Automotive		
Pastimes		

Task 2:

- Select one HMI from your list that you found interesting or important.
- Sketch the HMI below.
- Annotate the key parts, and explain how the user interacts with it.

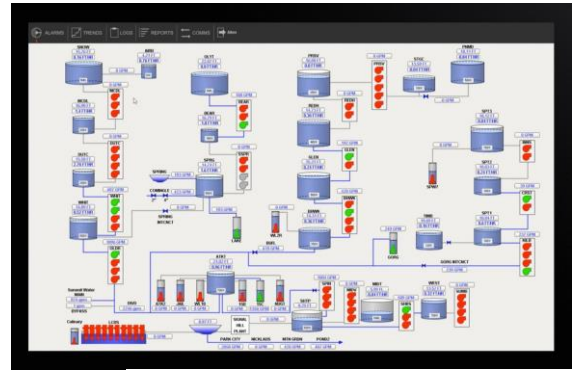
What is its purpose?

Who uses it?

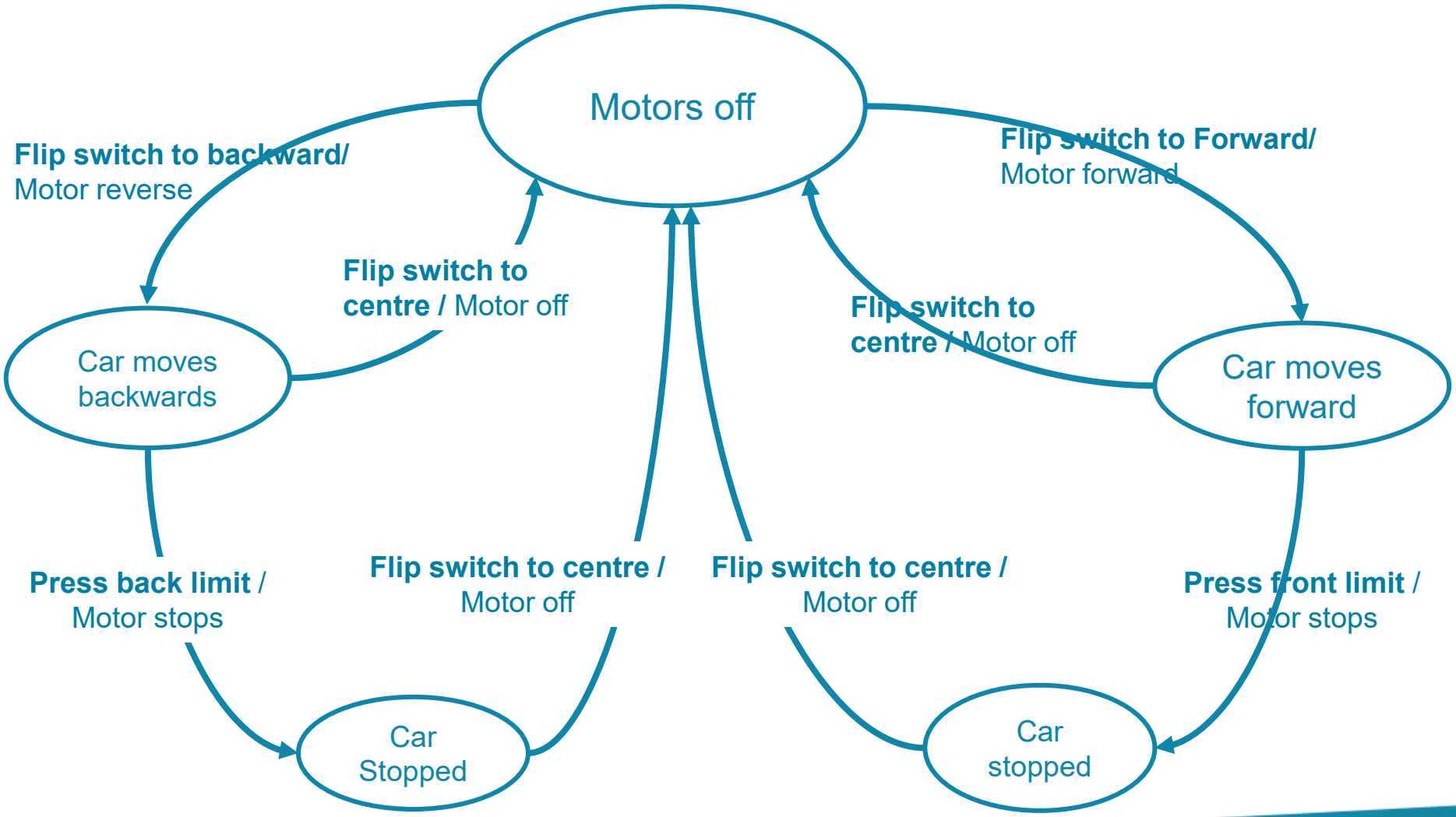
How easy or difficult is it to use?

What inputs does the user provide?

What feedback does the machine give?



State machine diagram



Group Feedback & Discussion

What are the benefits to the students learning from this approach?

What are the challenges for students in this task/activity?