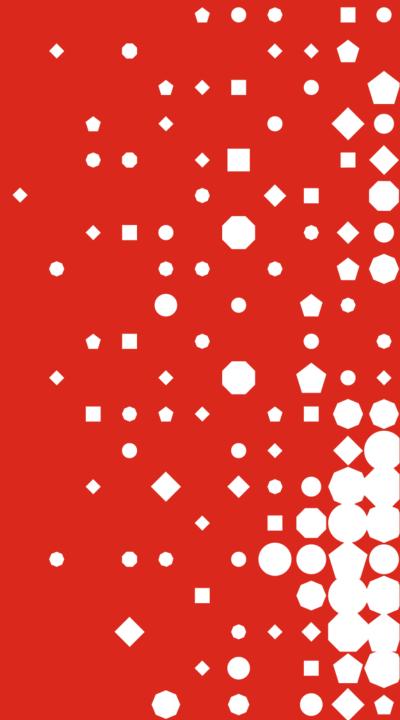
# Welcome to the T Level Engineering & Manufacturing

The webinar will begin shortly

July 2021





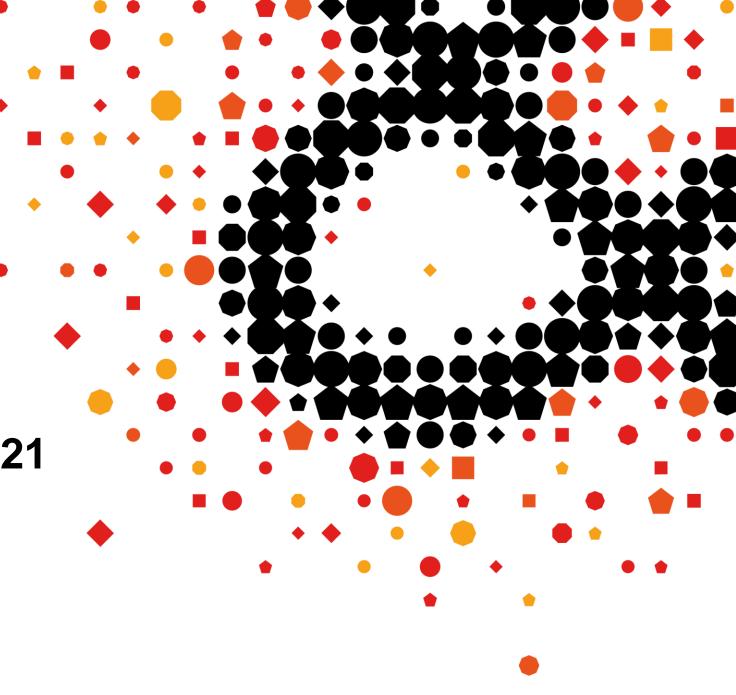


Welcome to the T Level Engineering & Manufacturing

**Provider Update - 7 July 21** 

Samantha Ashman - City & Guilds Technical Advisor





# Using the webinar platform



Send any questions in the question area throughout the webinar



All attendees will be set to mute



Webinar resources will be shared on our website shortly after







# **Agenda**

- 1. Welcome
- 2. Background and purpose of today's meeting
- 3. T Levels programme composition
- 4. Pathway breakdown
- 5. TQ development
- 6. Purpose and outcome of the session
- 7. TQ hours vs. T level hours Key date schedule and assessment hours
- 8. Curriculum Planning
- 9. Employer & Provider involvement (EIB & T Levels)
- 10. Useful resources for providers
- 11. AOC Industrial Placement
- 12. Questions





# Purpose and outcome



**Purpose:** To review TQ Development, GLHs and delivery content to ensure manageability for providers



**Outcome:** To gather feedback from the webinar delegates to support manageability of content. Review feedback and action accordingly before final submission.







# **Engineering and Manufacturing team**



**Scott Wilkins – Industry Manager Engineering and Manufacturing** Scott.wilkins@cityandguilds.com



**Robert Stott – Industry Manager Engineering and Manufacturing (T Levels)** 

Robert.stott@cityandquilds.com



Simon Yorke - Lead Technical **Advisor** Apprenticeships, EPA, Qualifications Simon.yorke@cityandguilds.com



Michael Scarrott Product Specialist-EAL Michael.Scarrott@eal.org.uk



Samantha Ashman - Technical Advisor **Engineering** 

T Levels

Samantha.ashman@cityandguilds.com







# T Level programme composition

1400-1800 GLH hours over two years. Achievement of T Level must include all components. UCAS points will be attached and will be equivalent to 3 A levels.



50% Total TQ time

Graded A\* - E

Paper 1 Maths & Science
Paper 2 Engineering Concepts
Employer Set Project (ESP)

#### Assessment:

External set and marked exams

#### **OCCUPATIONAL SPECIALISM**

50% Total TQ time

#### Graded Pass/merit/distinction

Based on occupational maps
No less than 50% of the total qualification
planned time

#### Assessment:

practical assignment(s)

WORK
PLACEMENT
315-420 hours
Min 45-60 days

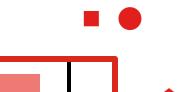
Maths, English and digital skills
GCSE or Functional Skills Level 2

Enrichment

– tutorial

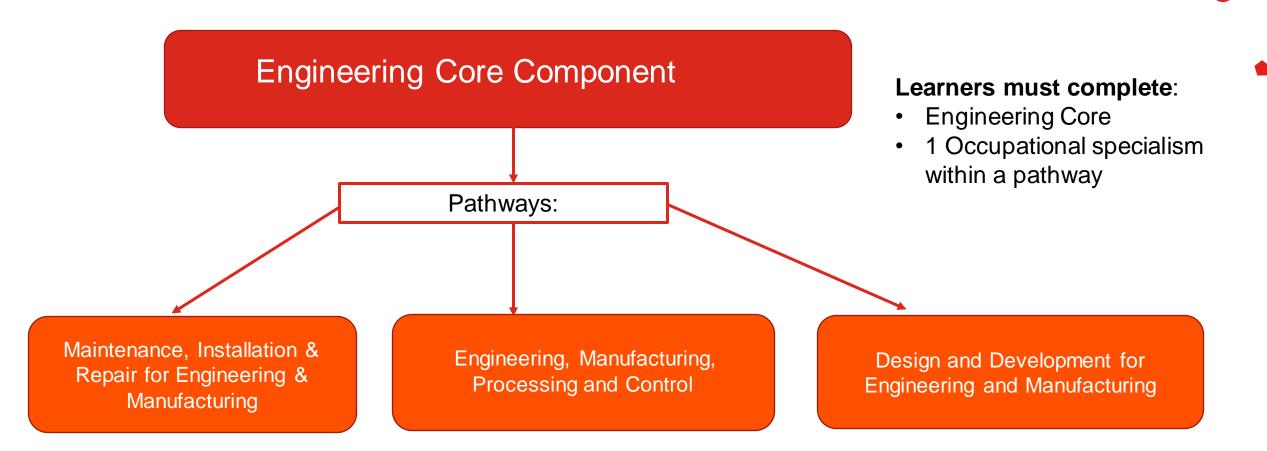








# **Engineering Technical Qualification: overview:**









# Route: Engineering and Manufacturing

# PATHWAY - Manufacturing, Processing and Control

Original Occupational specialisms









# **Proposed New Occupational Specialisms**

**Processing Technologies – Paused** 

Machining & Toolmaking Technologies

Fitting &
Assembly
Technologies

Composites
Manufacturing
Technologies

Fabrication & Welding Technologies



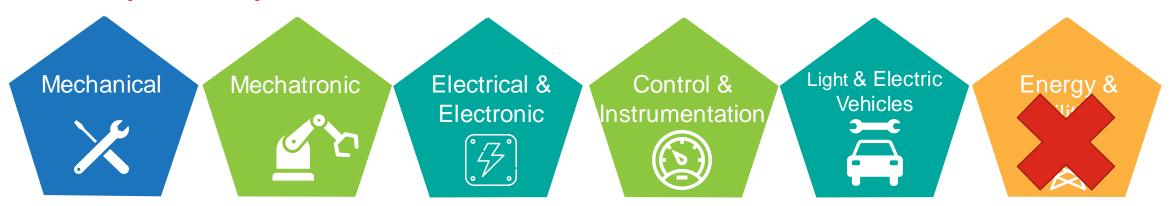




# Route: Engineering and Manufacturing

### **PATHWAY - Maintenance, Installation and Repair**

#### **Occupational Specialisms**





Energy and Utilities – Paused Vehicles – renamed and refocused

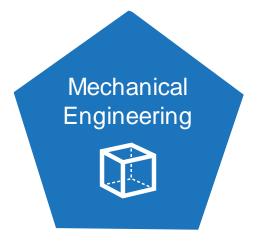


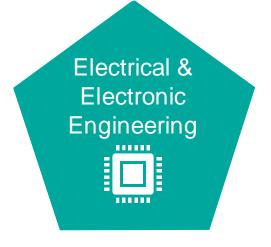


# Route: Engineering and Manufacturing

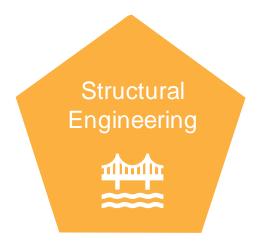
### **PATHWAY - Design and Development**

#### **Occupational Specialisms**













# **Core Content Examination**

**Paper 1** – Maths and Science Principles for Engineering (6 Elements) (2hrs 30mins)

Paper 2 – Engineering in Context (11 Elements) (2hrs 30mins)

#### 17 Elements in total to make up the core

Assessment	Overall contribution	
Core examination 1	35%	
Core examination 2	35%	
Employer-set project	30%	

	Flowart Penard
	Element – Paper 1
4	Essential mathematics for engineering and manufacturing
5	Essential science for engineering and manufacturing
6	Materials and their properties
7	Mechanical principles
8	Electrical and electronic principles
9	Mechatronics

	Element – Paper 2
1	Working within the engineering and manufacturing sectors
2	Engineering and manufacturing past, present, and future
3	Engineering representations
10	Engineering and manufacturing control systems
11	Quality management
12	Health and safety principles and coverage
13	Business, commercial and financial awareness
14	Professional responsibilities, attitudes, and behaviours
15	Stock and asset management
16	Continuous improvement
17	Project and programme management



# **Exemplar Core Examinations Paper 1**

Q1

The input into a gearbox is 300 revolutions per minute (rpm). The output from the gearbox is 2700 rpm. The gearbox contains two gears.

(a)	Calculate the ratio of the input speed to the output speed.	(1 mark)
(b)	The output gear has 18 teeth. How many teeth will the input gear have?	(1 mark)

Q1	Mark Scheme		
	(a) 1:9 [1] - Do not accept marks for 9:1 (b) 9 × 18 = 162 teeth [1]		
Total marks	2		
AO	AO2 = 1 + 1		
Qual spec reference	4.1		

Q8

Describe how galvanic protection can be used to prevent corrosion of a mild steel water tank. (4 marks)

Q8	Mark Scheme		
	Award one mark per relevant point, up to a maximum of 4 marks.		
	A metal coating or attachment forms an electrochemical circuit with the base metal [1] in the presence of an electrolyte [1]. The coating/attachment acts as the anode [1] and is sacrificial/corrodes in preference to the base metal [1].		
	Credit similar wording.		
Total marks	4		
AO	AO1b = 4		
Qual spec reference	5.5		





# **Exemplar Core Examinations Paper 2**

Q1

A company manufactures engines for cars on a production line. This involves a series of machining operations to produce a large component, followed by manual assembly of the finished engines.

(a) Explain **one** reason why the company may use condition-based monitoring rather than preventative maintenance for the machines on the production line. (2 marks)

Q1 (a)	Mark Scheme				
	One mark for the reason and one mark for the explanation of the reason, up to a maximum of two marks.				
	<ul> <li>Continuity of operation [AO1b] due to the reduced risk of unplanned downtime because of premature failure of parts between service intervals [AO1b].</li> <li>Reduced cost of parts [AO1b] as parts are only replaced when necessary rather than at fixed intervals [AO1b].</li> </ul> Credit other suitable responses.				
Total marks	2				
AO	AO1b = 2				
Qual spec reference	1.2				

(b) The company currently inspects every machined part to ensure that it meets the requirements. Explain three potential implications for the company changing from 100% inspection to statistical process control for every machined part. (6 marks)

Q1 (b)	Mark Scheme				
	One mark per implication and one mark per explanation of the implication to the company, up to a maximum of six marks.				
	<ul> <li>Statistical Process Control takes less time and money to carry out (AO2) this could increase the profitability of the production for the company (AO3)</li> <li>SPC could allow for immediate process adjustments to identified issues by operators (AO2) this would result in fewer parts being produced and scrapped for faults reducing the cost per machine part (AO3)</li> <li>There is a statistical risk that defects would not be detected without 100% inspection compounding quality issues through the manufacturing stages (AO2) this could result in reputational damage and reduce sales where quality is important (AO3)</li> </ul>				
Total marks	6				
AO	AO2 = 3	Q1 (c)	Mark Scheme		

(c) Describe **two** legal responsibilities for health and safety that apply to employees operating machining processes on a production line. (2 marks)

	<ul> <li>One mark per correct description of a legal responsibility up to a maximum of two marks.</li> <li>Employees must behave safely to ensure not to harm themselves or other working on the production line (AO1b)</li> <li>Employees must not undertake any tasks they are not authorised or properly trained to reduce risks operating the machining processes (AO1b)</li> <li>Employees are responsible to ensure that they use machinery appropriately to ensure safety devices are used correctly e.g. machine guards (AO1b)</li> </ul>
	Credit other suitable responses
Total marks	2
AO	AO1b = 2
Qual spec reference	12.3





AO3 = 3

Qual spec 11.1 reference

# **Exemplar Employer Set Project**

#### **Design specification**

#### Performance requirements for the bollard

Train Express Limited wish to develop a bespoke bollard to be sited in public realm spaces outside their stations across the UK (refer to Photograph 1). The company wish to 'reengineer' the standard self-righting internally illuminated bollard (refer to Photograph 2) used frequently in streetscapes across the UK. The new bollard is also required to monitor the number of people using a station and should be energy efficient. The specific performance requirements of the bollard are:

- The bollard shall have an overall height of 1000 mm and width of 300mm.
- Each bollard needs to be able to sustain an impact loading from a vehicle. The force applied to the barrier should be calculated in accordance with BS EN 1991-1-1:2002 (refer to Table 1).
- The bollard is to be manufactured from a recycled or sustainable material.
- The bollard is to be fitted with technology that is able to count human presence.
- The bollard is to be lit by a low energy lighting source.
- The bollard is to have an internal light source like the original, which ensures that it is highly conspicuous from all sides.
- The overall aesthetic design of the bollard is to be modern and reflect the intended siting outside a railway station.
- The bollard shell should be able to withstand a minor vehicle impact and be easily replaceable.
- Train Express Limited wish to limit or eliminate any mains power source to the bollard.
- The bollard should be designed as far as possible to be vandal proof.





#### Table 1: Loading applied to the bollard

The horizontal characteristic force F (in KN) should be equal to that delivered by the impact of a vehicle given by:

 $F = \frac{0.5 \, m \, v^2}{\partial c + \partial b}$ 

#### Where:

m is the gross mass of the vehicle in (kg)

v is the velocity of the vehicle (in m/s) normal to the barrier.

 $\partial c$  is the deformation of the vehicle (in mm)

∂b is the deformation of the bollard (in mm)

#### **Photographs**



Photograph 1: Typical area outside a Train Express Limited Station

(Source of image: Shuttersto

# **Exemplar Occupational Specialism Practical Assessment**

#### 2. Assignment brief

You are a mechanical engineer employed by an engineering company. The company have a large stores area for parts and materials.

You have been asked to design a <u>manually-powered</u> mechanical lifting device that will be used in the stores area. The aim of this device is to reduce the effort required from the workers in the stores area. Figure 1 shows an illustration of the lift required.

The device must be capable of lifting a cuboid box of maximum mass 25 kg. The maximum width, depth and height of the box are each 500 mm. The box arrives in the stores area on a roller table and is then pulled by a human worker onto the flat platform of the lifting device. The surface of the lifting platform should be 30 mm above ground level, so it is at the same height as the top of the rollers. The box must then be safely raised to a height of 1 m. It will then be pushed off onto another roller table by a human worker and the platform will be lowered to await the next box.

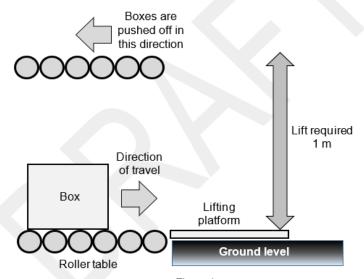


Figure 1





#### Time

The time allocated for the completion of the tasks and production of evidence for this assessment is 30 hours. Timings for completion of specific tasks are outlined below.

- Task 1 14 hours
- Task 2 12 hours
- Task 3 4 hours

#### Resources

Candidates must have access to a suitable range of resources to carry out the tasks and, where appropriate, to have the opportunity to choose materials demonstrating the ability to select from a range of appropriate materials.

Candidates should have access to a range of the following:

- tools and equipment
- PPE
- Manufacturer's manuals and handbooks for any processes required
- internet access for research for: costs, component data and production information.
- access to appropriate CAD drawing software.

# TQ Manageability







# **Proposed E&M GLH for Core Content**

Paper 1: Maths and Science Principles for Engineering

Element	Title	Revised GLH (current)	C&G July 21
4	Essential mathematics for engineering and manufacturing	75	90
5	Essential science for engineering and manufacturing	75	90
6	Materials and their properties	50	<b>60</b>
7	Mechanical principles	35	35
8	Electrical and electronic principles	35	35
9	Mechatronics	30	30
	Total Paper 1	300	340

**Paper 2: Engineering in Context** 

Element	Title	Revised GLH (current)	C&G July 21
1	Working within the engineering and manufacturing sectors	30	30
2	Engineering and manufacturing past, present, and future	30	30
3	Engineering representations	30	40
10	Engineering and manufacturing control systems	30	30
11	Quality management	25	30
12	Health and safety principles and coverage	50	60
13	Business, commercial and financial awareness	20	30
14	Professional responsibilities, attitudes, and behaviours	15	15
15	Stock and asset management	15	15
16	Continuous improvement	30	30
17	Project and programme management	25	30
	Total Paper 2 TOTAL COR		340 680

# **Summary of Proposed E&M TQ hours**

Core	GLH per	GLH inc. core to
	core/specialism	be delivered over
		two years
E&M Core (proposed)	<mark>680</mark>	N/A
Occupational Specialisms:		
Standalone		
Design and Development	<mark>680</mark> /specialism	1360
Maintenance Installation & Repair	<mark>680</mark> /specialism	1360
Manufacturing Processing & Control	680/specialism	1360



# **Funding bands**

#### **E&M – D&D, MPC and MIR TQs:**

These TQs will fall into band 8 large T Level @£11,168 which requires delivery hours to be planned on average at 1510Hrs.

1510 Hrs / 2 = 755 Hrs per year

755Hrs / 36 weeks delivery = Average 21 hrs per week delivery excluding any Maths and English\*\*.

#### Additional hours funding:

315 hours – Industry placement

150 hours – Employability, enrichment and pastoral hours

\*\*Maths & English a single £750 payment per subject over 2 years if applicable (current funding amount)





# **Proposed E&M D&D OS Content**

#### Technical qualification scheme of assessment overview

Core Component – Learners must complete all assessment components							
Assessment component	Method	Duration	Marks	Weighting	Marking	Grading	
Exam paper 1	Externally set exam	2.5 hours	102	35%	Externally marked	This component will	
Exam paper 2	Externally set exam	2.5 hours	102	35%	Externally marked	This component will be awarded on the	
Employer-set project	Externally set project	18.5 hours	90	30%	Externally marked	grade scale A* - E	
Occupational Specialism Co	mponent - Learners must d	omplete <b>one</b> asse	ssment compo	onent			
Assessment component	Method	Duration	Marks	Weighting	Marking	Grading	
Mechanical engineering	Externally set assignment	28 hours	90	100%	Externally moderated		
Electrical and electronic engineering	Externally set assignment	28 hours	90	100%	Externally moderated	All occupational specialism	
Control and instrumentation engineering	Externally set assignment	28 hours	90	100%	Externally moderated	components will be awarded on the grade scale P, M, D	
Structural engineering	Externally set assignment	28 hours	90	100%	Externally moderated		

# **Proposed E&M MIR OS Content**

Technical qualification scheme of assessment overview

Core Component – Learners	must complete all assessment	components					
Assessment component	Method	Duration	Marks	Weighting	Marking	Grading	
Exam paper 1	Externally set exam	2.5 hours	102	35%	Externally marked	This seems were "	
Exam paper 2	Externally set exam	2.5 hours	102	35%	Externally marked	This component will be awarded on the	
Employer-set project	Externally set project	21 hours	100	30%	Externally marked	grade scale A* - E	
Occupational Specialism Co	omponent - Learners must com	plete <b>one</b> asse	ssment comp	onent			
Assessment component	Method	Duration	Marks	Weighting	Marking	Grading	
Maintenance engineering technologies: Mechanical	Externally set assignment	20 hours	90	100%	Externally moderated		
Maintenance engineering technologies: Mechatronic	Externally set assignment	20 hours	90	100%	Externally moderated		
Maintenance engineering technologies: Electrical and Electronic	Externally set assignment	20 hours	90	100%	Externally moderated	All occupational specialism components will be awarded on the grade scale P, M, D	
Maintenance engineering technologies: Control and Instrumentation	Externally set assignment	20 hours	90	100%	Externally moderated		
Light & Electric Vehicles	Externally set assignment	20 hours	90	100%	Externally moderated		

# **Proposed E&M MPC OS Content**

Technical qualification scheme of assessment overview

Core Component – Learners must complete all assessment components							
Assessment component	Method	Duration	Marks	Weighting	Marking	Grading	
Exam paper 1	Externally set exam	2.5 hours	102	35%	Externally marked	This component will	
Exam paper 2	Externally set exam	2.5 hours	102	35%	Externally marked	This component will be awarded on the	
Employer-set project	Externally set project	24 hours	90	30%	Externally marked	grade scale A* - E	
Occupational Specialism Com	Occupational Specialism Component - Learners must complete one assessment component						
Assessment component	Method	Duration	Marks	Weighting	Marking	Grading	
Production fitting and assembly	Externally set assignment	25 hours (TBC)	90	100%	Externally moderated		
Composites manufacturing technologies	Externally set assignment	20 hours (TBC)	90	100%	Externally moderated	All occupational specialism	
Machining and toolmaking technologies	Externally set assignment	25 hours (TBC)	90	100%	Externally moderated	components will be derated awarded on the grade scale P, M, D	
Fabrication and welding technologies	Externally set assignment	25 hours (TBC)	90	100%	Externally moderated		

# **Quick Questions - Polls**

**Purpose:** To review GLHs and of delivery content to ensure manageability for providers

**Outcome:** To gather feedback from delegates to support manageability of content and Key date assessment schedule. Review feedback and action accordingly.

- 1. Considering a typical learner, do you agree with the proposed GLH for the 17 elements? Yes/No/Maybe?
- 2. Can you envisage any issues in terms of manageability of content Yes/No/Maybe?





# **Key date schedule - TBC**

Components	Series	Exam Type	Calendar Month/s	Assessment window/set date
Core Exam 1	First Series	Written exam	May/June 2023	Set date
	* Re-take series	Written exam	November 2023	Set date
Core Exam 2	First Series	Written exam	May/June 2023	Set date
	* Re-take series	Written exam	November 2023	Set date
Employer Set Project (ESP)	First Series	Project	April – May 2023	Set date within assessment window.
	* Re-take series	Project	October 2023	Set date within assessment window.
Occupational Specialisms	One Series Annually	Project	Feb – May 2024	Set date within assessment window.





# **Proposed Curriculum Planner**

YR1							
Term1	Sept	Oct	Nov	Dec			
Key Dates Schedule	Register Learners – From Sept – Dec						
Suggested deliver	Suggested delivery - Core						
Term 2	Jan Feb March April						
Key Dates Schedule	Bookings for Exam and ESP – From	ESP window opens					
Suggested delivery – Core, start industry placement and prepare for ESP.							
Term3	Мау	June	July	Aug			
Key Dates Schedule	ESP window closes	Core exam x2		Yr 1 results			
Suggested delivery - Preparation for exam.							

YR2						
Term1	Sept	Oct	Nov	Dec		
Key Dates Schedule	Bookings for OS assessments					
Suggested delive	Suggested delivery - OS & industry placement					
Term2	Jan	Feb	March	April		
Key Dates Schedule	Exam & ESP re-take	OS assessment window opens				
Suggested delivery - OS & industry placement						
Term3	Мау	June	July	Aug		
Key Dates Schedule	OS assessment window closes			Results		
Suggested delivery - OS & industry placement						





# **Quick Questions - Polls**

**Purpose:** To review GLHs and of delivery content to ensure manageability for providers

**Outcome:** To gather feedback from delegates to support manageability of content and Key date assessment schedule. Review feedback and action accordingly.

- Do you have any concerns around the delivery of the proposed GLH across 2 academic years for this TQ? – Yes/No/Maybe?
- 2. Can you envisage any issues around the timescales of exams and assessment preparation Yes/No/Maybe?
- 3. Can you see any issues with the proposed key date schedules Yes/No/Maybe?







# Get Involved - Make a difference Employer Industry Board (EIB)

Quarterly meeting with all panel members to discuss industry matters. Some of these can include; apprenticeships, FE, HE, T Levels, new developments (standards, qualifications), new technology and any other business. Get in touch with our Industry Manager if interested via email at <a href="mailto:Robert.Stott@cityandguilds.com">Robert.Stott@cityandguilds.com</a>

#### **Provider Advisory Board**

• Regular meetings (remote for now) to review key documentation for the TQs. These can include; specifications, exams, specialist content. Sessions are skill specific and generally for an hour. If interested in supporting with: writing of the content, developing assessment materials, reviewing and validation, please get in touch with our Technical Advisor via email at <a href="mailto:Samantha.ashman@cityandquilds.com">Samantha.ashman@cityandquilds.com</a>









# **Support and Guidance**

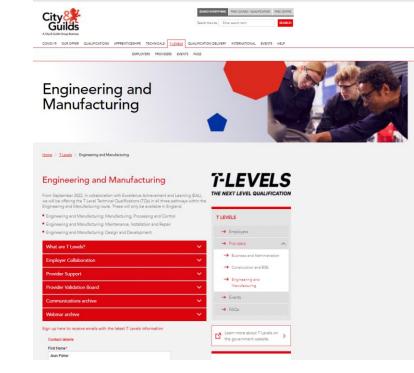
#### Ready to Support eligible providers and stakeholder engagement

- ➤ New Webpages for T Levels
- > Timelines
- Webinar for eligible providers
- > Provider focus groups
- Employer Industry Boards
- > E-bulletins
- Draft specification
- Dedicated technical advisors

City & Guilds: cityandguilds.com/tlevels/engineering

EAL: <a href="mailto:eal.org.uk/T-Levels">eal.org.uk/T-Levels</a>









# **Industry Placement support – AOC website**

https://www.aoc.co.uk/ip-guidance-resources

- For providers 'How to' guidance
  - Before placements
  - For students
  - During placements
- Tools and templates
  - Employer engagement
  - Before placements
  - During placement
  - Post placements
  - For employers









# **Websites to Support Providers**

T Level Industry Placement Delivery Guidance (updated 05/07/21)

T Level industry placements delivery guidance - GOV.UK (www.gov.uk)

#### T levels

T levels - GOV.UK (www.gov.uk)

**How T Levels are funded (updated 05/07/21)** 

How T Levels are funded - GOV.UK (www.gov.uk)

T Level transition programme framework for delivery 2020 to 2021

T Level transition programme framework for delivery 2020 to 2021 - GOV.UK (www.gov.uk)

Strategic Development Network | T Level and industry Placements

Strategic Development Network | T Level and industry placement support

#### **ETF Foundation – T Levels**

T Level Professional Development - Education & Training Foundation (et-foundation.co.uk)





# Thank YOU

