



**NEW**

**TECHNICAL QUALIFICATIONS  
IN ENGINEERING**

**NOVEMBER 2016**

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# CHALLENGES AND OPPORTUNITIES

## IN ENGINEERING

**2014** - the engineering sector contributed an estimated **£455.6 billion (27%)** of the UK's total GDP despite engineering businesses employing only **19.3%** of the UK workforce.

**257,000  
ENGINEERING  
VACANCIES  
BY 2022**

**From 2022** - engineering businesses have the potential to contribute an extra **£27 billion** to the UK economy every year.

**Between 2012 and 2022** - engineering businesses will need to recruit **2.56 million** people, **257,000** of whom will be new vacancies.

Overall, **1.82 million** of these workers will need engineering skills meaning **182,000** people per year will be required to meet demand.

**Currently** only **108,000** people enter engineering occupations at Levels 3/4+ per year.

# MEETING THE CHALLENGE

## WITH THE CITY & GUILDS TECHBAC

TechBac is a unique combination of:

### TECHNICAL SKILLS



### WORKPLACE SKILLS

New employer recognised City & Guilds Technical Qualifications;

- Designed to meet the latest education reforms
- Relevant to industry needs
- Rigorous, high quality practical learning with outcomes in mind
- Supporting progress to Further Education, University or employment

City & Guilds Workplace Skills is a blended approach to developing transferable and social skills;

- Develop, accredit and showcase workplace skills, to enrich learners' CVs
- Help learners to feel confident and ready for work
- Track learner engagement and progress to optimise performance
- Aligned to changes in policy and digital delivery
- Support to embed in delivery

To create, recognise and award these attributes and behaviours, we have developed the **Skills Zone**, our gateway to Workplace Skills.

**ROUNDED INDIVIDUAL WHO IS:**

**CONFIDENT, TALENTED, MOTIVATED AND READY TO WORK**

# THE TECHBAC EXPERIENCE

## A HOLISTIC PROGRAMME DESIGNED FOR SUCCESS

### KNOWLEDGE & UNDERSTANDING



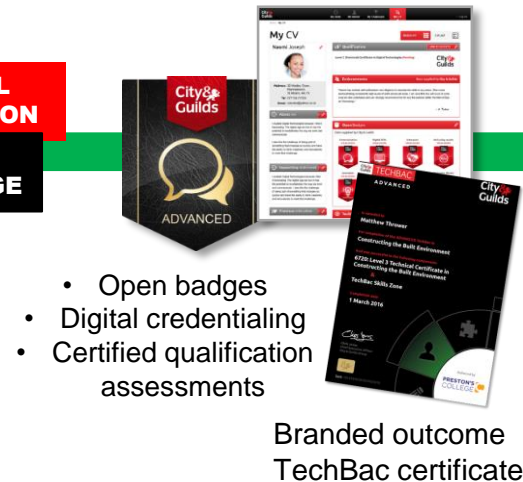
**Technical Skills**  
Practical learning  
(Technical Qualifications)

### HANDS-ON EXPERIENCES



**Professional Skills**  
Blended social learning  
(Workplace Skills)

### ASSESSMENT & CREDENTIALING



**Online CV**  
Share and showcase

### OUTCOME



**Targeted skills**  
Opening doors  
to university,  
apprenticeships  
or into a job

**Work ready**  
With the skills  
employers need

**A holistic and experiential approach making young people more employable.**

**NEW TECHNICAL  
QUALIFICATIONS  
IN ENGINEERING**

**Built to meet industry needs.**

# EMPLOYER SUPPORT

## DESIGNED WITH LEADING EMPLOYERS

The following employers have provided letters of support for our new technical qualifications in engineering:



# **KS4 WHAT'S AVAILABLE AND WHEN?**

## **KEY STAGE 4: AVAILABLE FOR SEPT 2016 DELIVERY**

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### **Key Stage 4 (KS4) - Level 2**

#### **Level 2 Technical Award in Engineering (1145-20)**

Accreditation No: 601/4535/3

Guided Learning Hours: 120

**Now approved to appear on 2018 DfE Performance Tables.**



### KEY STAGE 4 (14–16) (LEVEL 2) TECHNICAL AWARDS

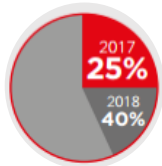


120 GLH (1 x GCSE)  
Made up of 30, 60 GLH units

**Progression:** Provide the foundation for learners to progress to a broad range of academic and vocational qualifications post-16

**GRADING: P/M/D/D\***

**Content:** Breadth and depth of study; must not focus on particular occupation



**Assessment:** 40% of the qualification content will be assessed externally. Must include synoptic assessment.

## **KS4 WHAT'S AVAILABLE AND WHEN?**



**KEY STAGE 5, LEVEL 2 - AVAILABLE FOR SEPT 2016 DELIVERY**

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**Key Stage 5 (KS5) - Level 2**

600/0881/7 City & Guilds Level 2 Diploma in Engineering (QCF)

**Now approved to appear on 2018 DfE Performance Tables.**

# KS5 LEVEL 2 DESIGN PRINCIPLES

EFFECTIVE FROM SEPTEMBER 2017

## KEY STAGE 5 (16 - 18) (L2) TECHNICAL CERTIFICATES

360 GLH, 450 GLH  
Made up of 30, 60 GLH units

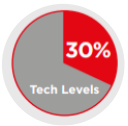
**Progression:** Enable entry to an apprenticeship, employment or progression to a Level 3 Technical Level Qualification.

**GRADING: P/M/D/D\***

**UCAS points:** n/a

**Mandatory content** and the contribution to overall grade must make up **at least 40%** of the qualification. Where qualifications have one or more pathway, the mandatory content (%) should apply equally to these.

**Assessment:** A proportion of the qualification content will be assessed externally (**minimum 25% for TCs and 30% Tech Level**). Must also include synoptic assessment.



**Employer involvement:** in design, recognition, delivery and or assessment, which raises the credibility of the qualification in the eyes of employers, parents and learners

## **KS5 WHAT'S AVAILABLE AND WHEN?**

### **KEY STAGE 5, LEVEL 3 AVAILABLE FOR SEPT 2016 DELIVERY**

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#### **Key Stage 5 - Level 3**

##### **Level 3 Advanced Technical Certificate in Engineering (1145-30)**

Accreditation No: 601/4535/3

Guided Learning Hours: 360

##### **Level 3 Advanced Technical Diploma in Engineering (1145-31)**

Accreditation No: 601/4507/9

Guided Learning Hours: 540

##### **Level 3 Advanced Technical Extended Diploma in Engineering (1145-32)**

Accreditation No: 601/4506/7

Guided Learning Hours: 720

**Now approved to appear on 2018 DfE Performance Tables.**

# KS5 LEVEL 3 DESIGN PRINCIPLES

IN LINE WITH DFE QUALIFICATION CHANGES IN ENGLAND

## KEY STAGE 5 (16 - 18) (L3) TECH LEVELS

360 GLH, 450 GLH, 540 GLH, 720 GLH, 1080 GLH  
Made up of 30, 60, 90 GLH units

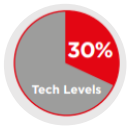
**Progression:** Enable entry to an apprenticeship or other employment, or progression to a related higher education course.

**GRADING: P/M/D/D\***

**UCAS points:** 16 min – 168 max

**Mandatory content** and the contribution to overall grade must make up **at least 40%** of the qualification. Where qualifications have one or more pathway, the mandatory content (%) should apply equally to these.

**Assessment:** A proportion of the qualification content will be assessed externally (**minimum 25% for TCs and 30% Tech Level**). Must also include synoptic assessment.



**Employer involvement:** in design, recognition, delivery and or assessment, which raises the credibility of the qualification in the eyes of employers, parents and learners

# UCAS POINTS

## ENABLING PROGRESSION TO UNIVERSITY

Grade	Level 3 Advanced Technical Certificate (360)	Level 3 Advanced Technical Diploma (540)	Level 3 Advanced Extended Technical Diploma (720)
Distinction*	56	84	112
Distinction	48	72	96
Merit	32	48	64
Pass	16	24	32

### OTHER QUALIFICATIONS

Grade	Level 3 Advanced Extended Project Qualifications	Using And Applying Mathematics (Core Maths)
A*	28	
A	24	20
B	20	16
C	16	12
D	12	10
E	8	6

### A Level equivalent points

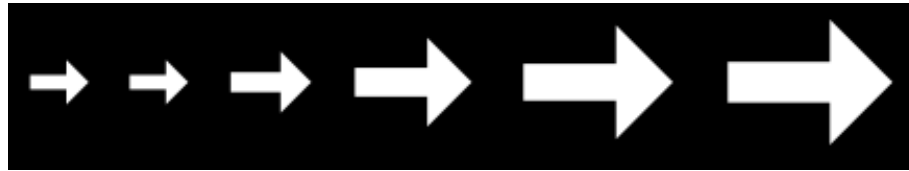
UCAS points	A Level
56	A*
48	A
40	B
32	C
24	D
16	E

- ✓ Adding Core Maths at Level 3 makes TechBac compliant with the Government's new technical baccalaureate measure.
- ✓ Funding uplift may apply

# UPCOMING TECHNICAL DEVELOPMENTS

**COMING SOON**

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We are also developing Key Stage 5 Level 2 Technical Certificates in Engineering in the following areas for September 2017 delivery:

- Manufacturing Technologies
- Welding and Fabrication
- Engineering Maintenance
- Electrical and Electronic Engineering

# **NEW TECHNICAL QUALIFICATIONS ASSESSMENT**

**Timeframes, support and examples.**



# CURRENT TIMELINE AND ASSESSMENT DATES

## KS4/KS5 LEVEL 2 TECHNICAL AWARDS / CERTIFICATES

DATE	END EXTERNAL EXAM	SYNOPTIC ASSIGNMENT
<b>FEBRUARY: WK OF:1<sup>st</sup> FEB</b>		SYNOPTIC ASSIGNMENTS RELEASED TO CENTRES
<b>APRIL L2-25<sup>th</sup></b>	EXTERNAL END EXAM	
<b>MAY: EXAM-WK OF: L2-30<sup>th</sup>  SYN- WK of: 23 MAY</b>	RESULTS OF 1 <sup>st</sup> EXTERNAL EXAM	SUBMISSIONS OF MARKS FOR SYNOPTIC ASSIGNMENT & OPTIONAL UNIT EVIDENCE
<b>JUNE L2- 27<sup>th</sup></b>	2 <sup>ND</sup> EXTERNAL END EXAM WINDOW	
<b>JULY L2- 4<sup>th</sup></b>		SYNOPTIC ASSIGNMENT MARKS CONFIRMED AND GRADES AWARDED
<b>JULY/AUG L2 – 1<sup>st</sup> AUG</b>	RESULTS OF 2 <sup>ND</sup> EXTERNAL EXAM	

# CURRENT TIMELINE AND ASSESSMENT DATES

## LEVEL 3 TECHNICAL LEVEL QUALIFICATIONS

DATE	END EXTERNAL EXAM	SYNOPTIC ASSIGNMENT
<b>FEBRUARY:</b> <b>WK OF: 1<sup>st</sup> FEB</b>		SYNOPTIC ASSIGNMENTS RELEASED TO CENTRES
<b>APRIL</b>  <b>L3-18<sup>th</sup></b>	EXTERNAL END EXAM	
<b>MAY:</b> <b>EXAM-WK OF:</b>  <b>L3-23<sup>th</sup></b> <b>SYN- WK of:</b> <b>23 MAY</b>	RESULTS OF 1 <sup>st</sup> EXTERNAL EXAM	SUBMISSIONS OF MARKS FOR SYNOPTIC ASSIGNMENT & OPTIONAL UNIT EVIDENCE
<b>JUNE</b> <b>L3 20<sup>th</sup></b>	2 <sup>ND</sup> EXTERNAL END EXAM WINDOW	
<b>JULY</b> <b>L3 – 4<sup>th</sup></b>		SYNOPTIC ASSIGNMENT MARKS CONFIRMED AND GRADES AWARDED
<b>JULY/AUG</b> <b>L3 – 25<sup>th</sup> JULY</b>	RESULTS OF 2 <sup>ND</sup> EXTERNAL EXAM	

# SUPPORT RESOURCES

## WHAT'S AVAILABLE AND WHERE?

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### DOCUMENTATION AVAILABLE NOW

- Qualification Handbooks
- Sample synoptic assessments
- Sample external end tests

All available on qualification pages at [cityandguilds.com](http://cityandguilds.com)

### QUALIFICATION SUPPORT RESOURCES

- Schemes of work for all units at Level 3

## LEVEL 2 TECHNICAL AWARD

Building Energy Management Systems (BEMS) are computer-based systems that help to manage, control and monitor modern building services such as air conditioning, heating and lighting. They also manage the energy consumption of devices used by the building.

Light level sensors are a key part of BEMS and are designed to control light levels of artificial lighting in order to achieve energy efficiency.

A local company manufactures BEMS components but doesn't manufacture the light level sensor unit. They are planning to bring production of these in-house. An outline design and specification has been produced for this light level sensor. These are in Appendix A.

You have been asked to:

- Interpret the outline design and specification for the light level sensor unit
- Develop it through its prototyping stage to prove the design works before it is approved for manufacture.

# ASSESSMENT EXAMPLE - EXTERNAL TEST

## L3 ADVANCED TECHNICAL CERTIFICATE/DIPLOMA/EXTENDED DIPLOMA

### Question 1

a) Define **each** of the following:

i. Toughness

(1 mark)

ii. Brittleness

(1 mark)

b) The Izod and Charpy methods of testing the impact resistance of a material are similar and use the same basic principles. Explain either method using an illustrated drawing covering:

- Specimen preparation
- The test method
- Visual and measurable results (in general terms)

(6 marks)

### Question 2

a) Explain in general terms what is meant by a **composite material**

(2 marks)

b) Briefly describe **two** types of sandwich core materials and their structures

(4 marks)

### Question 3

State **two** different types of resistive materials, giving their properties and uses. Complete the table below with your responses.

## STAY IN TOUCH

### TALK TO US

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**1 TALK TO YOUR BUSINESS MANAGER**

**2 JOIN THE LINKEDIN COMMUNITY: TECHBAC DEVELOPMENT & DISCUSSION**

**3 REGISTER FOR AN EVENT (WE RUN SECTOR EVENTS, ADVANCE EVENTS AND CONSULTATIONS)**

**REGISTER FOR UPDATES AT**

**[CITYANDGUILDS.COM/TECHBAC](https://www.cityandguilds.com/techbac)**