WorldSkills UK

Centre of Excellence-Network for Innovation

International Skills Summit

Future Skills: Meeting the Demand!

23 May 2024

Funded by UK Government

worldskillsuk
excellence at work

Cerian Ayres
Innovation Lead, WorldSkills UK

NCFE ENDORSED PROGRAMME

Skills & Education Group

AUTODESK

CREATE Education

mtc | Training

Funded by UK Government

Skills for jobs: Lifelong learning opportunities for growth

‘I can say without any hesitation that the future is Further Education.’

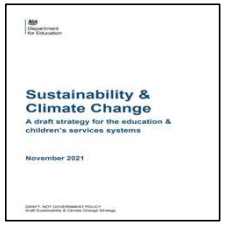
(Secretary of State for Education)

“A good education is the closest thing we have to a silver bullet when it comes to making people’s lives better”

(Prime Minister Rishi Sunak)

Further and Higher Technical Education transforms lives and empowers people and communities.

Technical (STEM) skills will lie at the heart of the job opportunities in the UK’s recovery plan, to enable the UK’s future economic, social and environmental prosperity.

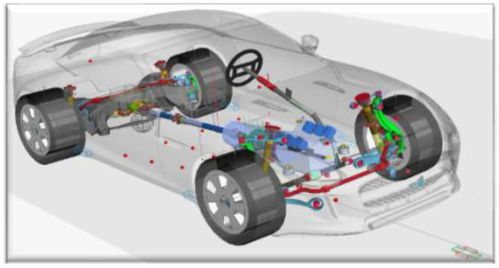


https://www.et-foundation.co.uk/supporting/education-for-sustainable-development/

12 Disruptive technologies: Shaping the future

1. Robotics

2. Autonomous Vehicle



3. Internet of Things

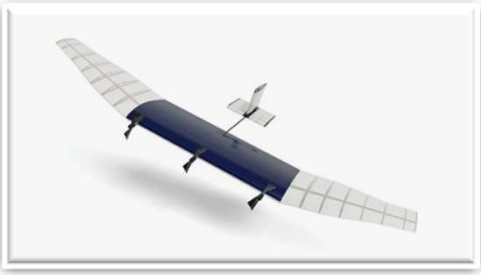
4. Cloud Technologies

5. Genomics

6. Energy Storage

7. Renewable Energy

8. Mobile Internet

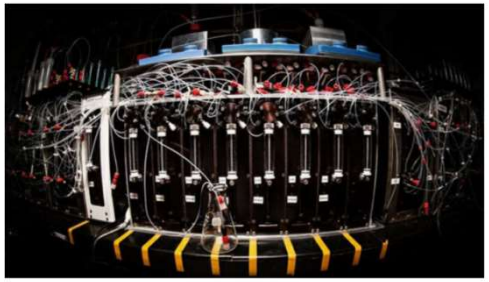


9. Exploration & Recovery

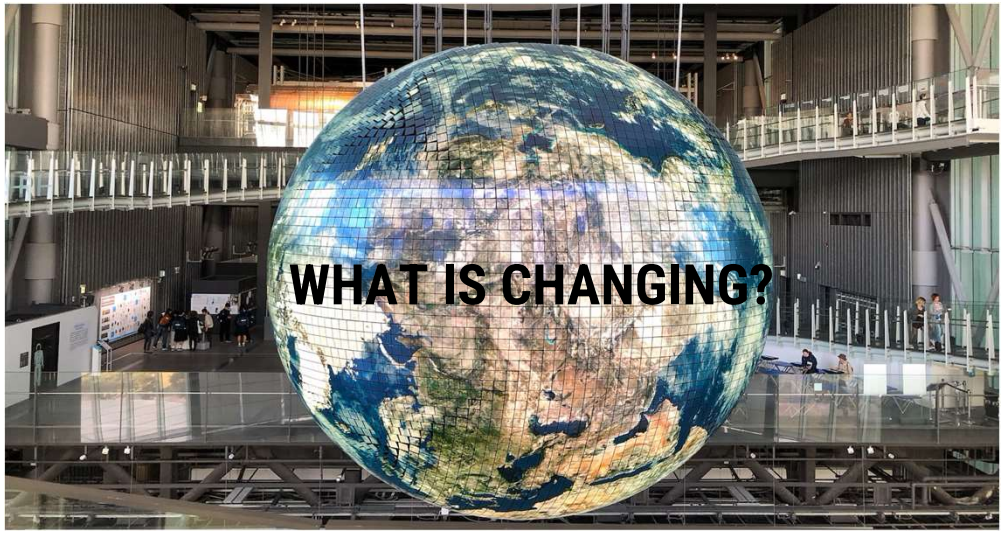
10. Smart Materials

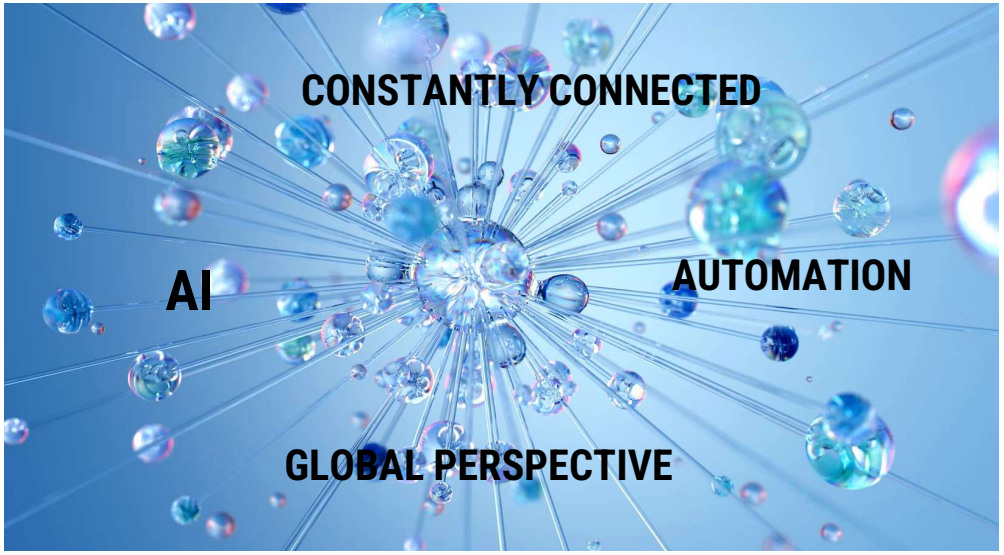
11. Three D Printing

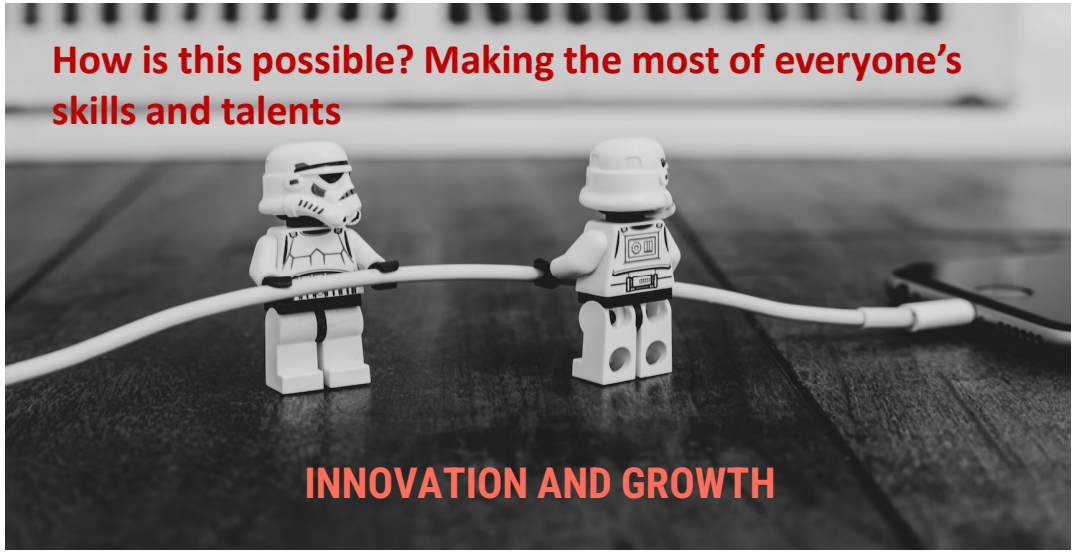
12. Knowledge Automation



Technology shaping work, learning, and life

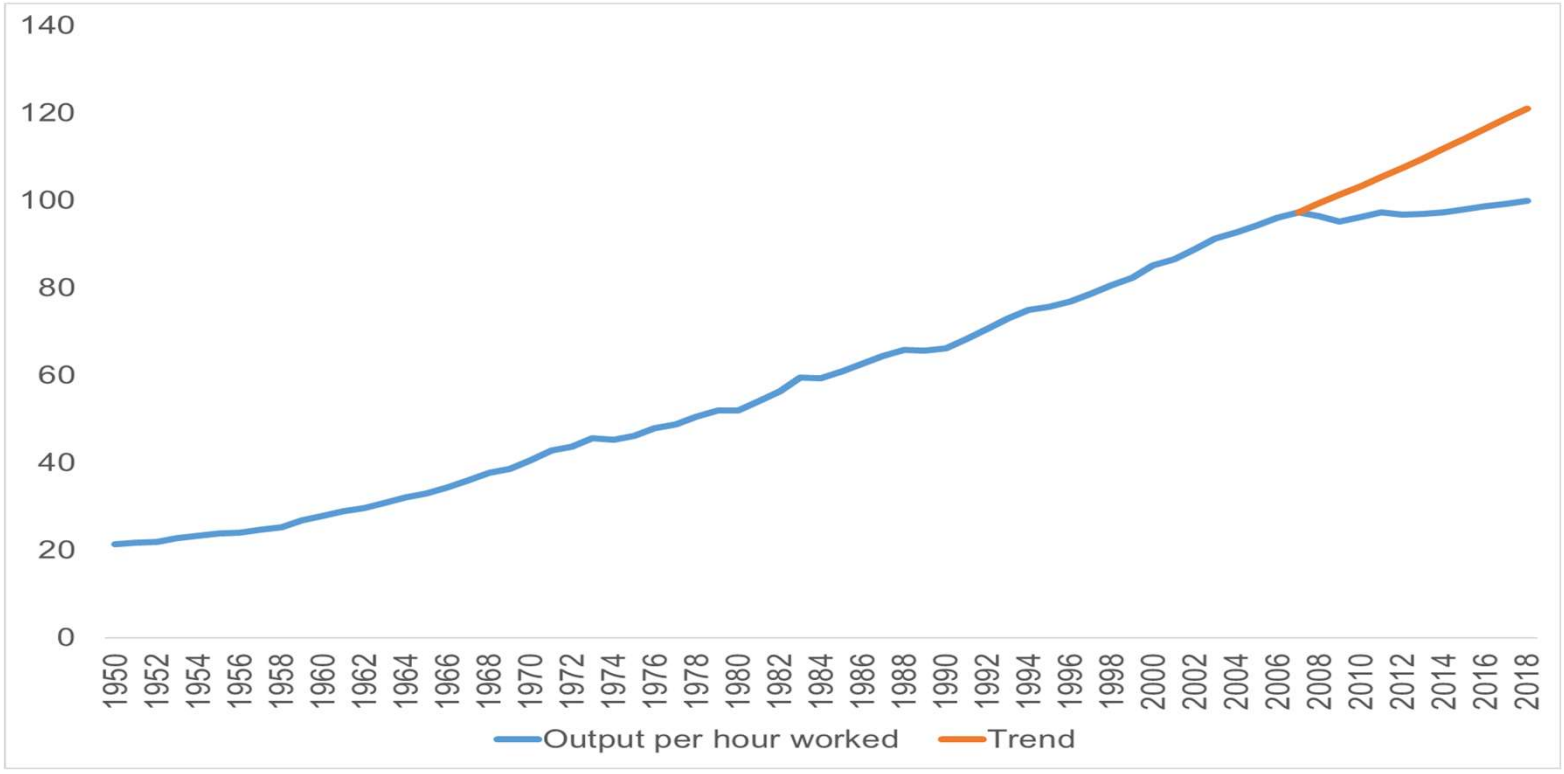






Why the need for technical education reforms?

UK output per hour worked, 1950 – 2018 (2018 = 100)



The UK's productivity puzzle

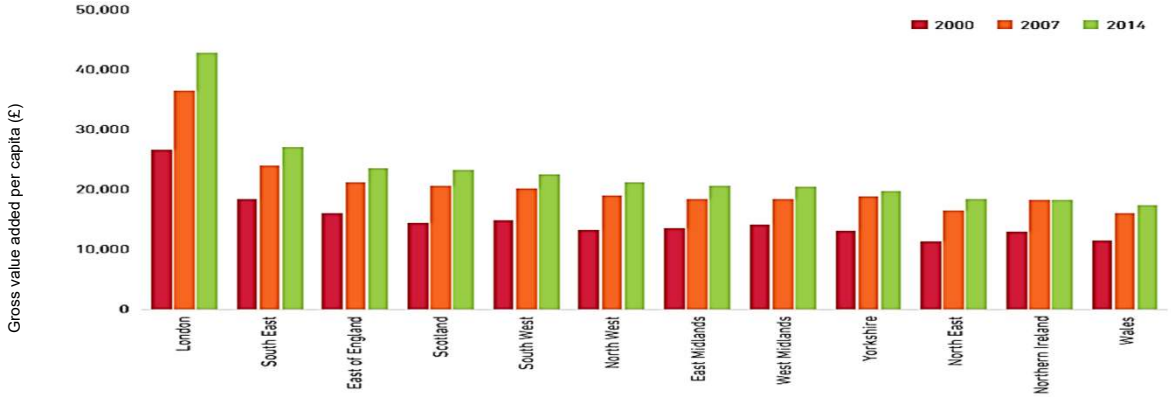
22% of the productivity gap with Germany, and 18% of the gap with France, is due to skills, with the majority of the remaining gap due to investment per worker.

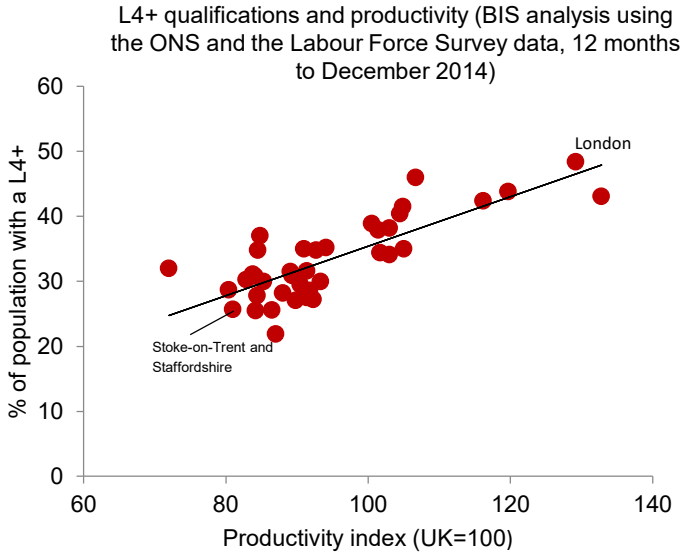
Estimates suggest that matching Germany in terms of skill levels at Level 3, could result in an additional **£4.6b** per year.

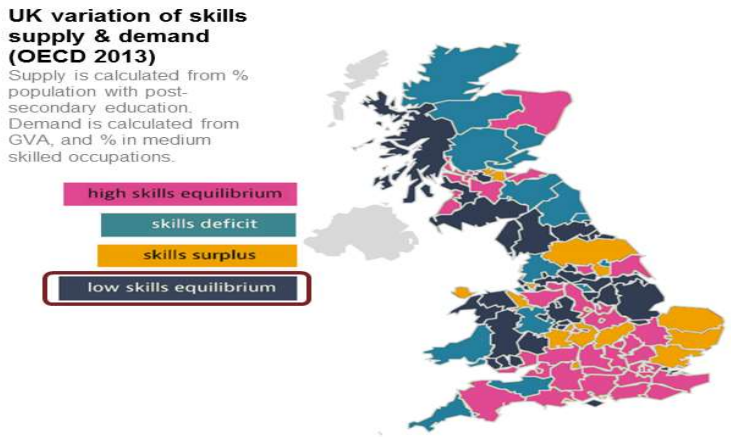
The benefit to individual young people from achieving a Level 3 rather than a Level 2 qualification, is estimated at **£2,270** per year, and would affect **86,000** each year.

Productivity and skills vary across the UK

The UK has some of the biggest variations in regional productivity among major developed nations, which not only holds back our national economy but is also at the root cause of the lower earnings power in left behind areas (the trap of low skills equilibria).







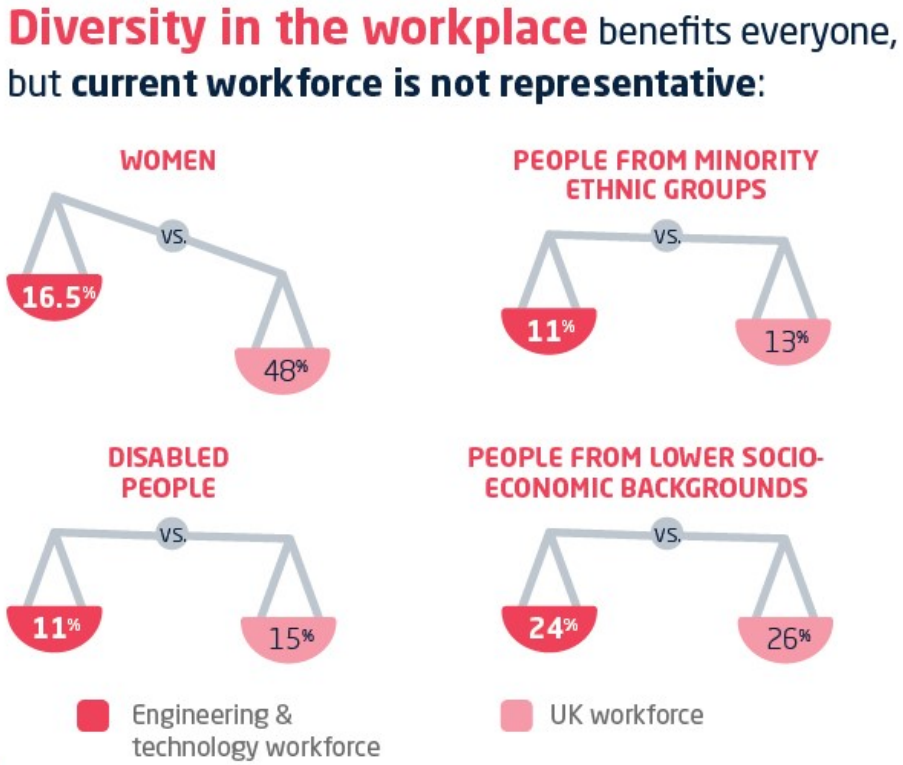
Education and skills outcomes also vary significantly between regions and are strongly correlated with regional productivity. **Employers cite education and skills as the strongest determinant of regional skills imbalances**.

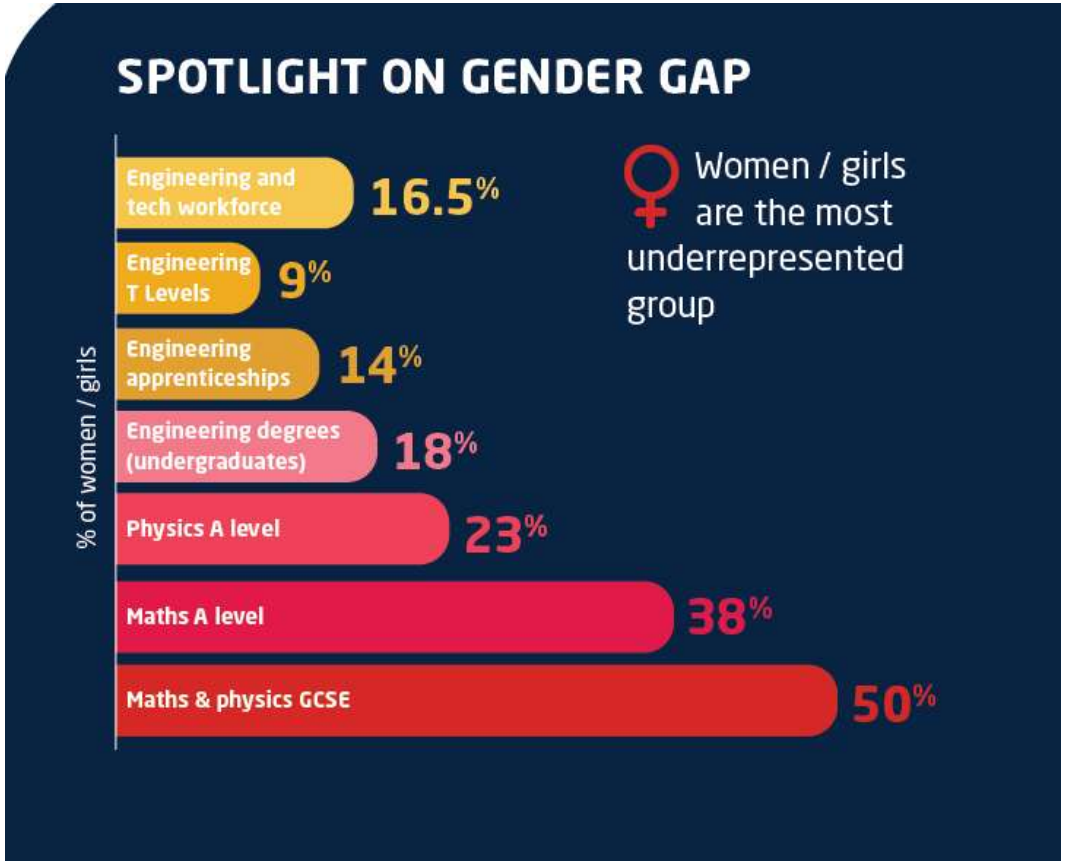
Opportunity Areas

Those from disadvantaged areas are significantly less likely to have achieved Level 3 or above by age 25.

There are significant increases in average earnings depending on the highest level of education.

Regional Inequality in STEM Skills?





[Engineering UK Annual Report]

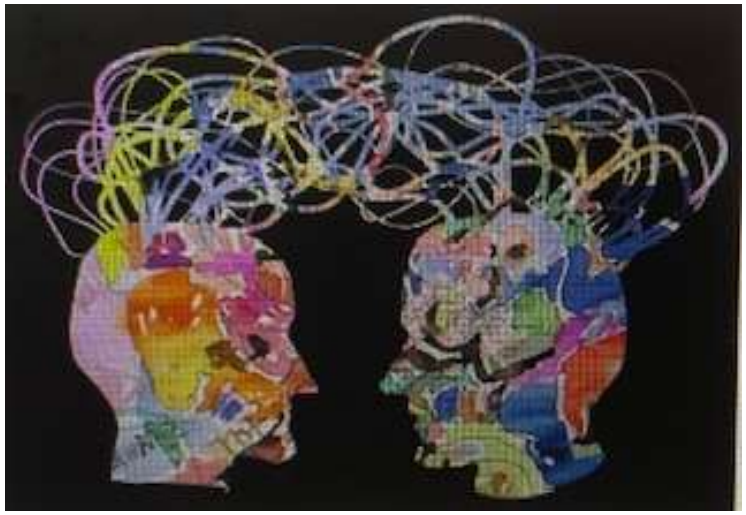
Cementing the UK's position as a global science and technology superpower by 2030

- The Science and Technology Framework sets out the approach to making the UK a Science and Technology Superpower by 2030

- The Department for Science, Innovation and Technology was established with a focus on **growing the economy**. Bringing the best minds together around a system mission- Becoming the most innovative economy in the world.

- In an increasingly competitive world, it is recognised that there are new challenges, such as keeping nature secure, the UK's people prosperous, and the planet healthy.

- Britain has a strong history of leadership and innovation, from the steam engine to the world wide web, that has brought strength and prosperity to our nation and the world.



UK Punching High

- Despite our relative size, Britain outperforms many of our closest competitors.
- We have 4 of the worlds top 10 universities and a technology sector worth over a trillion dollars.
- Put together just 8 of our university towns, they are home to more billion-dollar unicorn start ups, more than the whole of France and Germany combined.
- However, when other countries move fast, we need to do the same.
- We have therefore seen investment in science and technology to maintain our global competitiveness.
- It is not just about challenging rankings, its about the benefits of that position into material benefits for people.

Spring Budget 2024

Science and Technology Superpower Agenda

Science and technology will be the major driver of prosperity of power and history making events this century.

All delivery is overseen by the National Science and Technology Council

Fifty technologies assessed against eight criteria:

1. Sustainable environment
2. Health and Life Sciences
3. **Digital Economy**
4. National Security and Defence
5. International Competition
6. Foundational
7. Market potential
8. Threats and Resilience

Five Critical Technologies identified

- **AI**
- **Engineering Biology**
- **Future Telecommunications**
- **Semiconductors**
- **Quantum Technologies**

The critical technologies are to be reviewed annually to ensure the UK keeps up-to-date with global competitors

The Science and Technology Framework sets out 9 levers to support ambitions

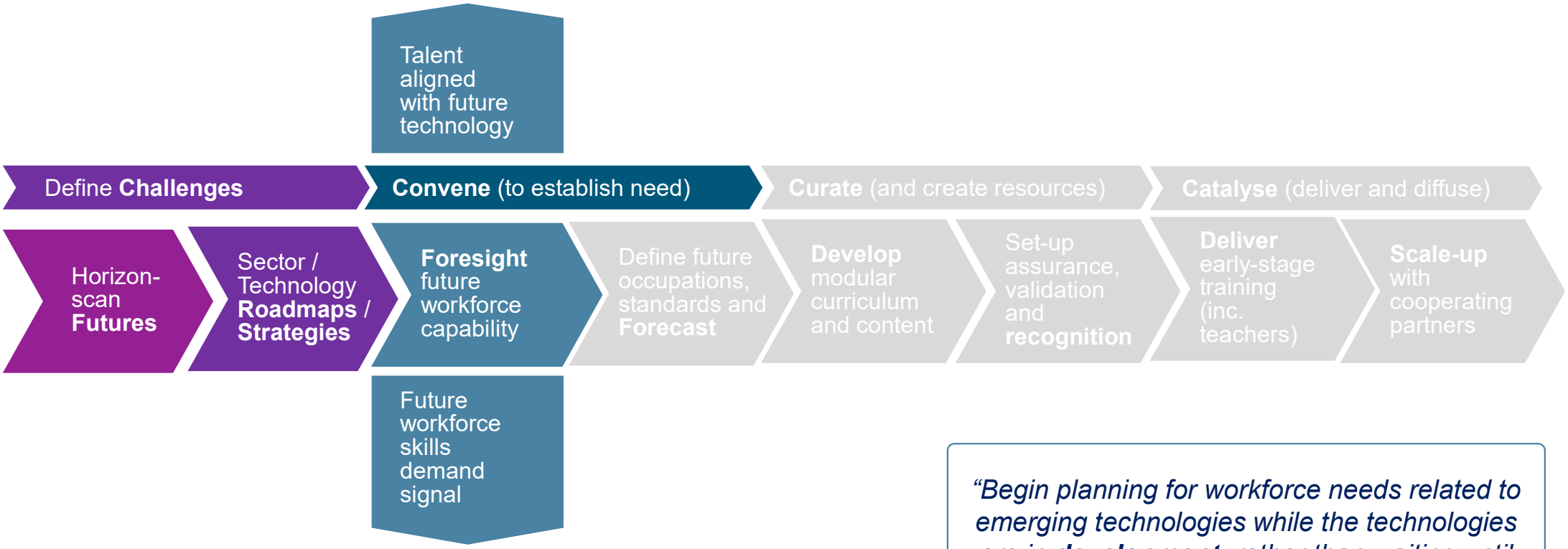
One lever is :- **Talent and Skills**

Talent and Skills Lever

1. Create an agile and responsive skills system which develops the skills needed to support worldclass workforce in STEM industry sectors and to drive economic growth
2. Recruit and retain high-quality FE and School teachers for STEM related subjects
3. Explore opportunities for STEM participants and a more diverse range of people to enter the science workforce.
4. Establish a competitive advantage in attracting international talent to the UK
5. Give people the opportunity to train, retrain and upskill through their lives to respond to changing workforce needs

80% of the 2030 workforce is already in work hence the importance of the Lifelong Loan Entitlement

Inspiring Innovation and Inclusion: Workforce and Skills Foresighting



*"Begin planning for workforce needs related to emerging technologies while the technologies are in **development**, rather than waiting until technologies are fully developed and deployed"*
Manufacturing USA

WorldSkills UK strategic priorities

About Us: WorldSkills UK is a four nations partnership between education, industry and UK governments. It is a world-class skills network acting as a catalyst for:

Raising Standards	Championing future skills	Empowering young people from all backgrounds
through international benchmarking and professional development.	through analysis of rapidly changing economic demand. Research and thought leadership	through competitions-based training and careers advocacy.

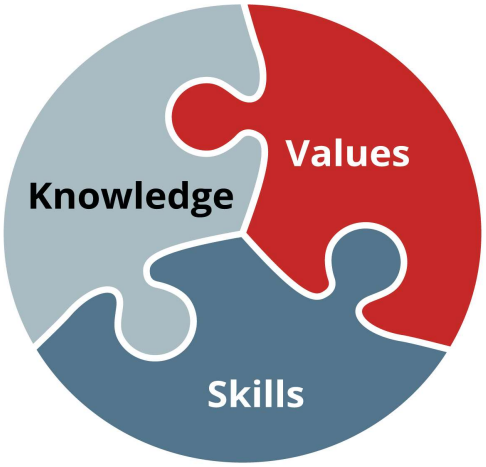
We are working to help the UK become a “skills economy”: boosting the prestige of technical and professional education by embedding world-class training standards across the UK’s Four Nations to help drive investment, job creation and economic growth.

WorldSkills UK – Centre of Excellence and Network for Innovation

WorldSkills UK

We are an independent charity and a partnership between employers, education and governments.

Together, we are using international best practice to raise standards in apprenticeships and technical education so more young people and employers succeed.

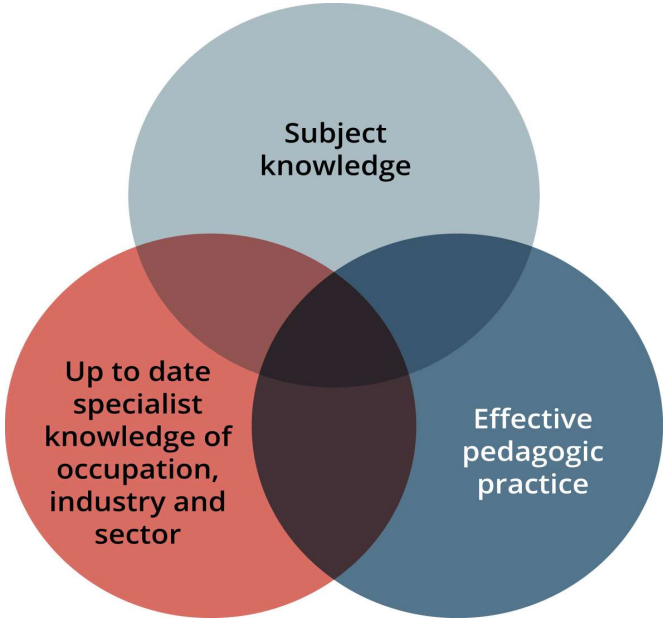


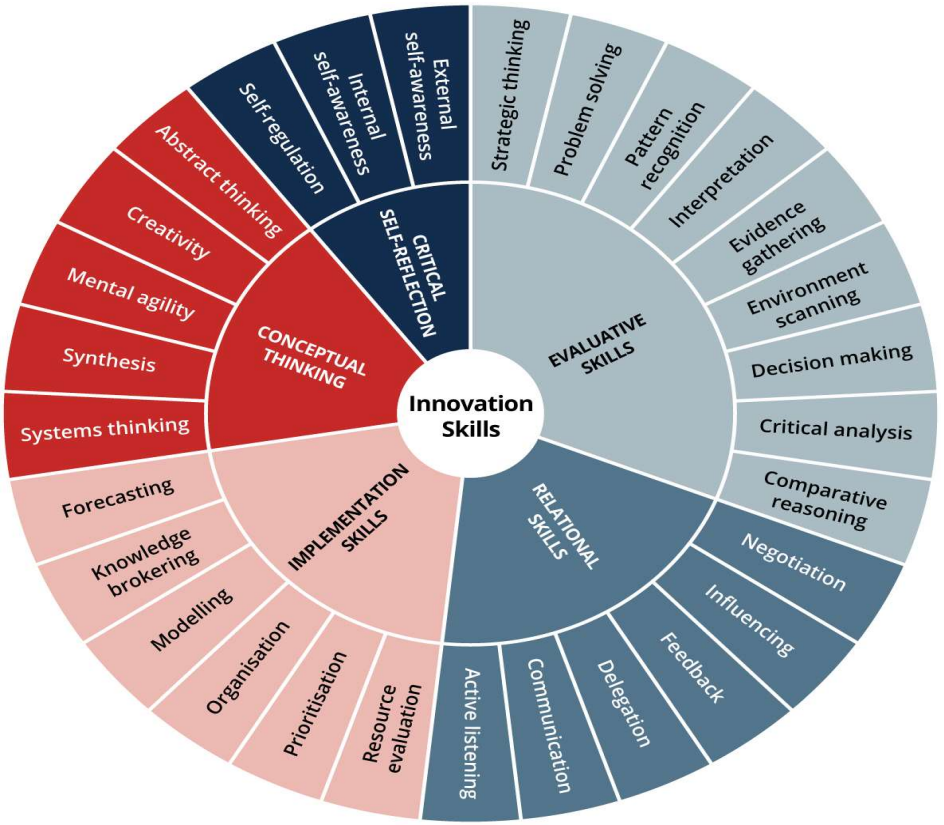
WorldSkills UK • Mainstreaming international best practice

Network for Innovation

A high-value third space for education leaders and educators to network, collaborate and exchange, to foster innovation and development in teaching excellence.

Supporting Dual Professionalism





Innovate UK Framework

- Partnership working inc. IfATE, IoT Network , WorldSkills UK+
- Focused on learning outcomes
- Embedding within technical education
- Realising the innovation mindset needed by businesses

Mainstreaming international best practice

worldskillsuk excellence at work

In partnership with NCFE

Leading innovation through the WorldSkills UK Centre of Excellence

The WorldSkills UK Centre of Excellence 2.0 is a comprehensive programme of world-class teacher training, interactive networks, and communities of practice to boost standards of teaching, learning and assessment.

World-class Teacher Training				Network for Innovation		Communities of Practice	
Competence to excellence	Competition pedagogy	Mindset development	Technical masterclasses in digital, engineering & manufacturing skills	In person events / forums each year and if demand is high, delivered and tailored to regions/ nations	Virtual lightening talks and webinars from education and sector organisations	Digital, Advanced manufacturing, Engineering, Net zero communities	Global community for Thought Leadership and roundtables

Powered by international best practice

SWINDON AND WILTSHIRE

INSTITUTE OF TECHNOLOGY

Darran Marks
Managing Director, Swindon and Wiltshire IOT

Skills Improvement

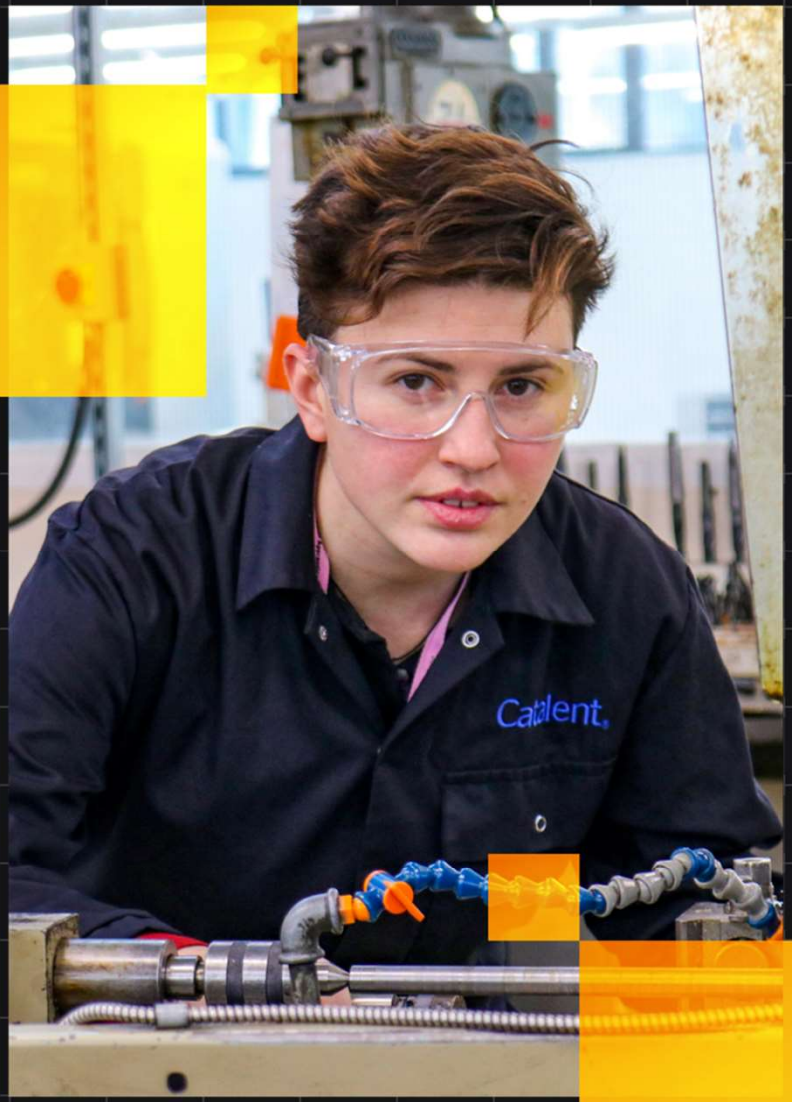
Link

People

Place

Opportunities

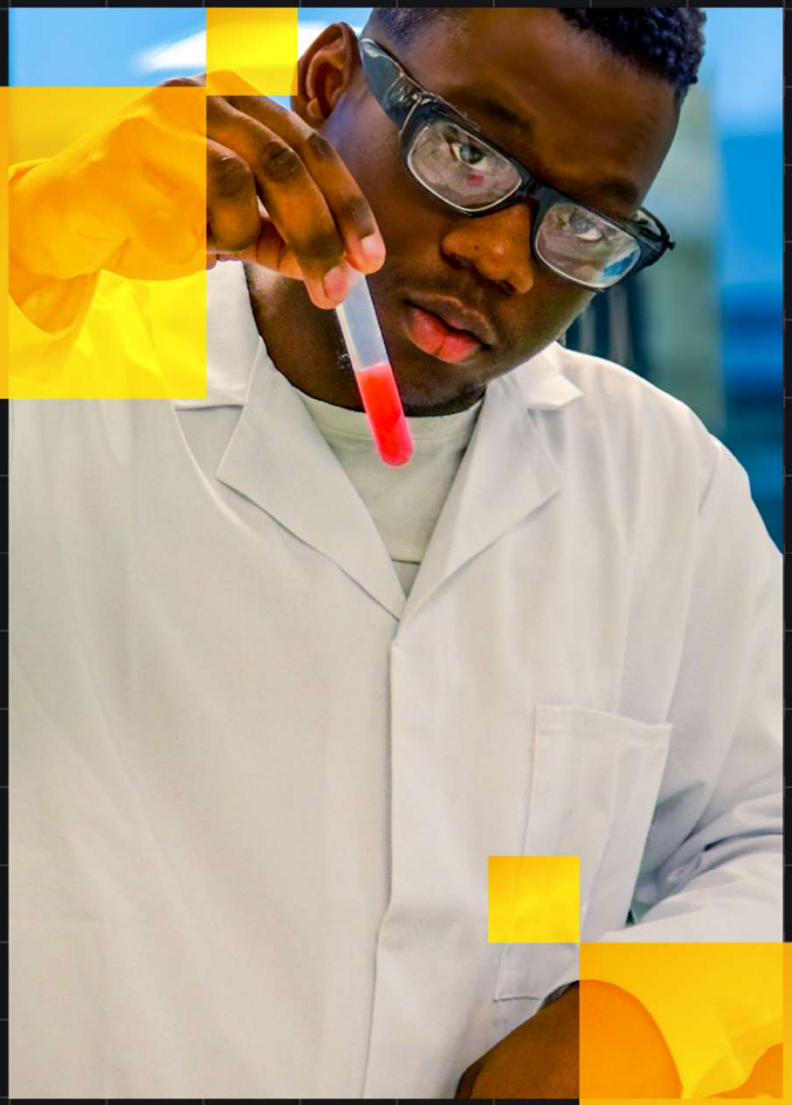
SWINDON AND WILTSHIRE
INSTITUTE OF TECHNOLOGY



LSIP Priorities

- Advanced Manufacturing and Engineering
- Agriculture, Agri-Tech and Land Management
- Automotive, Transport and Logistics

SWINDON AND WILTSHIRE INSTITUTE OF TECHNOLOGY



Local

Regional

GDP up 5%
Manufacturing

Supply chain

Research -
Innovate, Resilience

LSIPs – Devolved Govt.

Employers Forum

SWINDON AND WILTSHIRE
INSTITUTE OF
TECHNOLOGY

Additive Manufacturing, Digitisation, and Sector Opportunities

CREATE Education and 3DGBIRE

- 3DGBIRE work with some of the largest manufacturers across the UK and Ireland.
- We get the benefit of seeing the sectors build themselves.
- We can then provide the skills to the learners that will be working in these sectors.

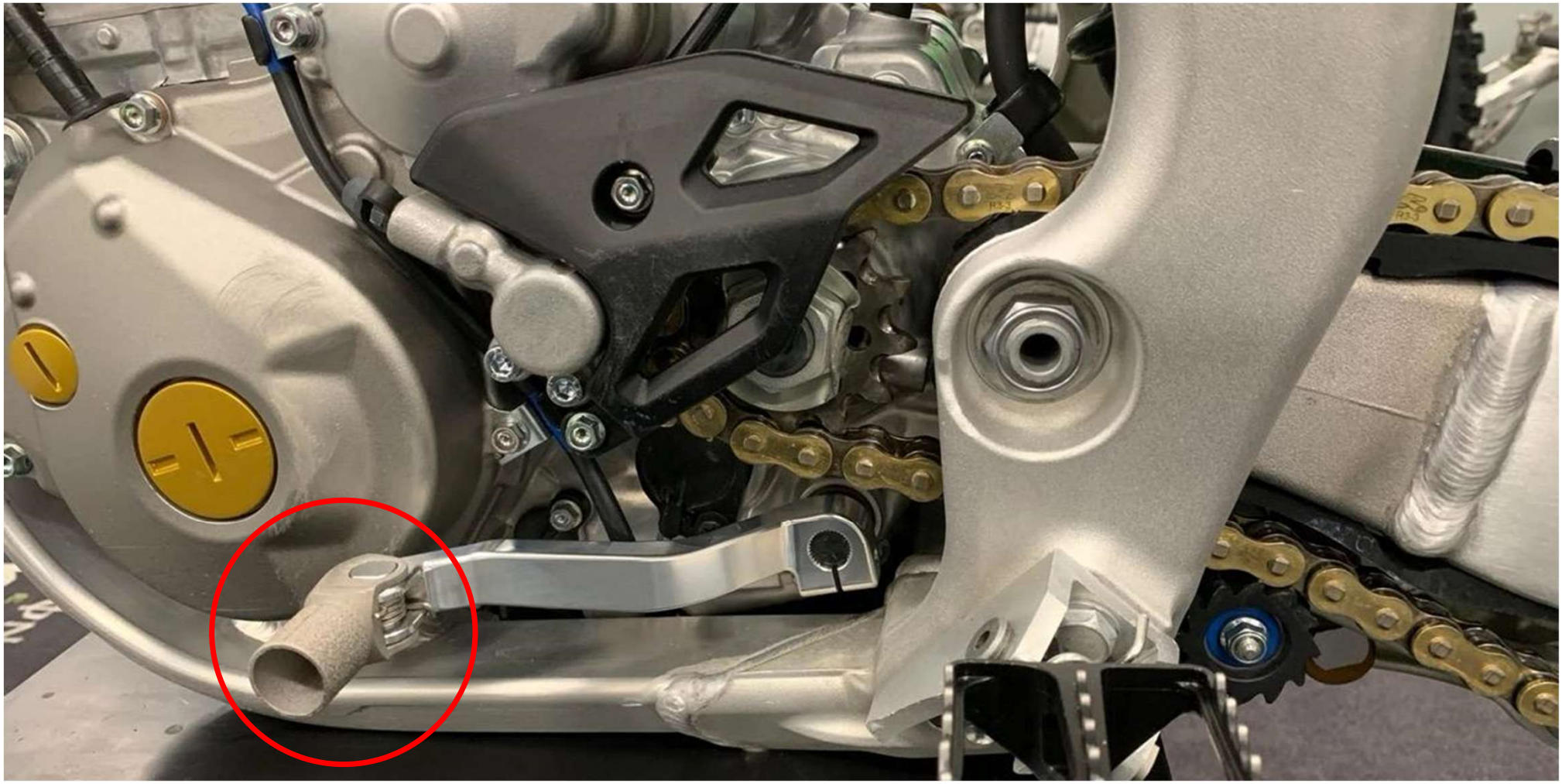
Future Gazing – Industry 4.0

3D Printing

Future Gazing - The Future (was) is Now

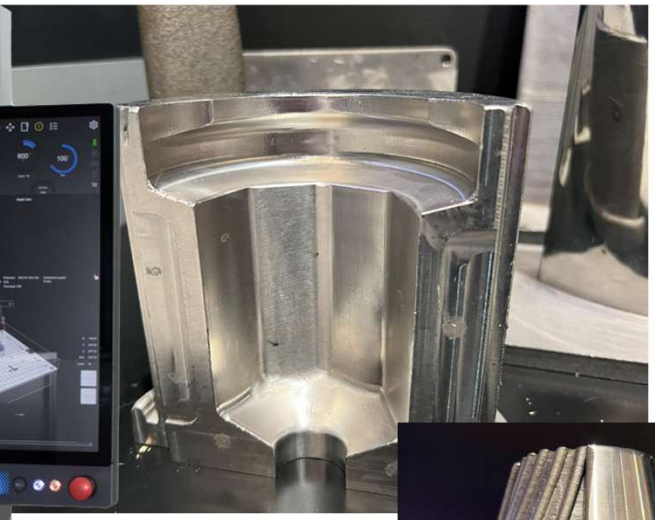
Filament-based Printing

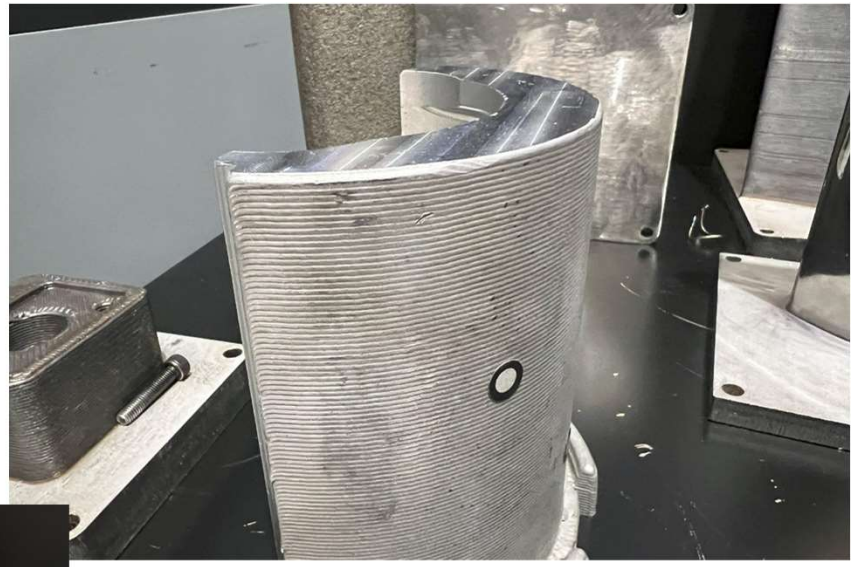
- FDM, FFF, etc – filament-based printing, is the most used printing method in education.
- 90% of all printing is PLA – PolyLactic Acid, which is a starch-based biopolymer. It prints easily, has a decent strength, and is industrially biodegradable.
- These machines can do so much more!

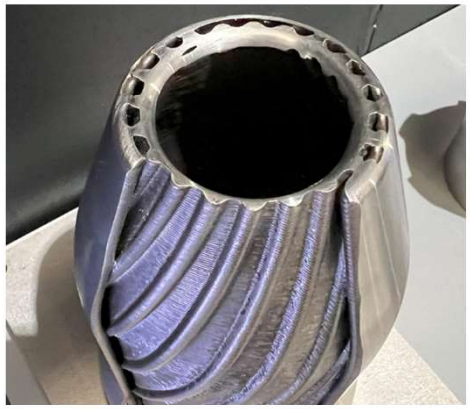


- High Temperature Printers
- Medical devices
- Rail and aerospace certified parts
- Process monitoring - one of the biggest elements that challenges use of AM parts in industrial uses - CERTIFICATION

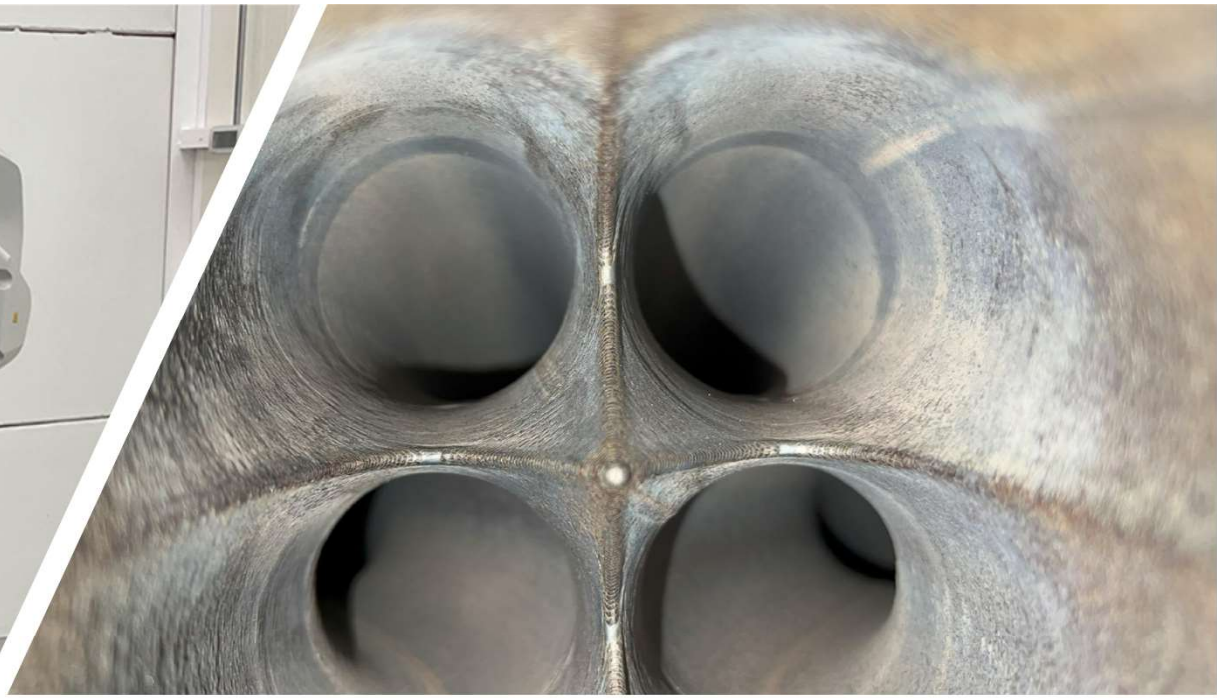
Plastic material comes on spools, and so does welding wire…

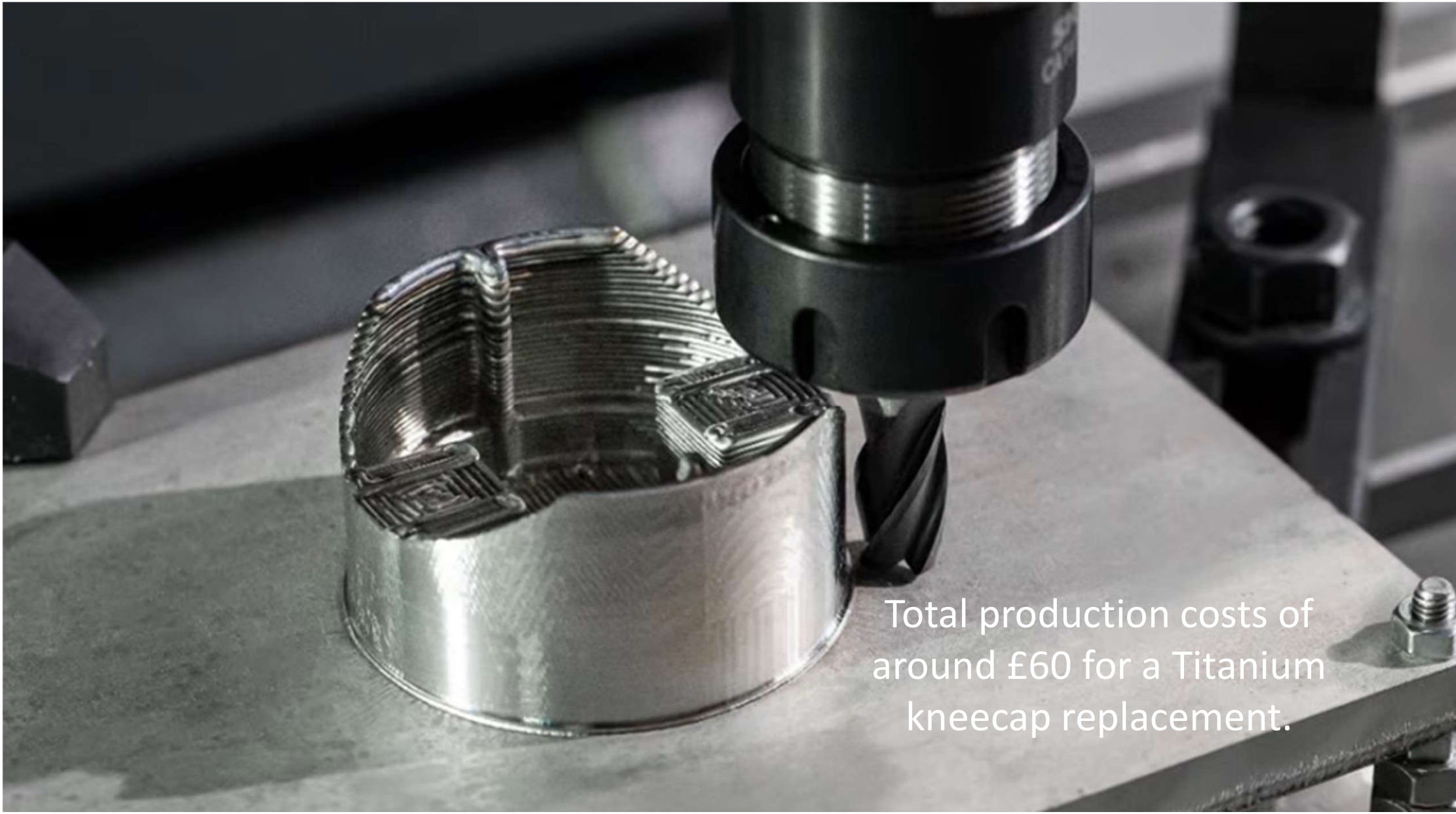




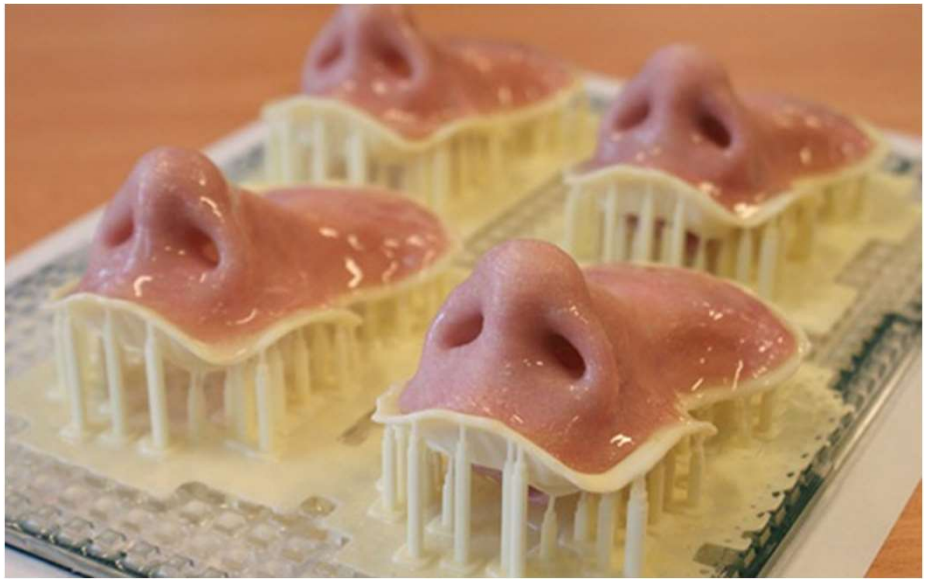


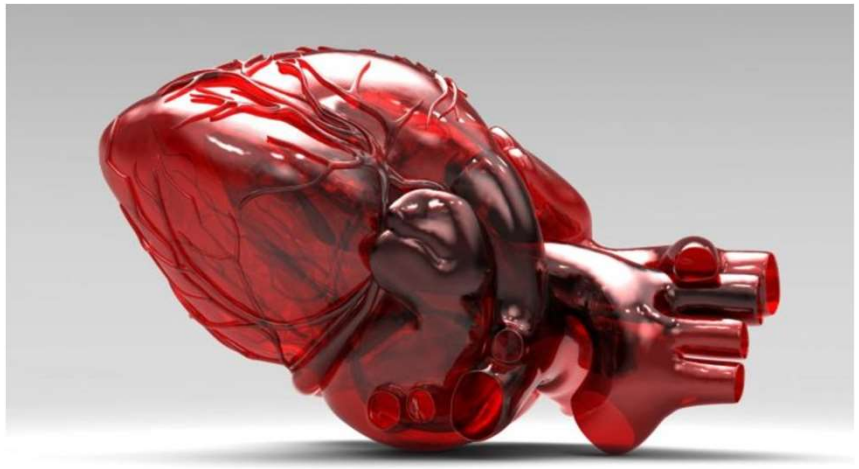

ABB




Total production costs of
around £60 for a Titanium
kneecap replacement.

Resin-based 3D printing:





Resin-based printing has advantages and disadvantages:

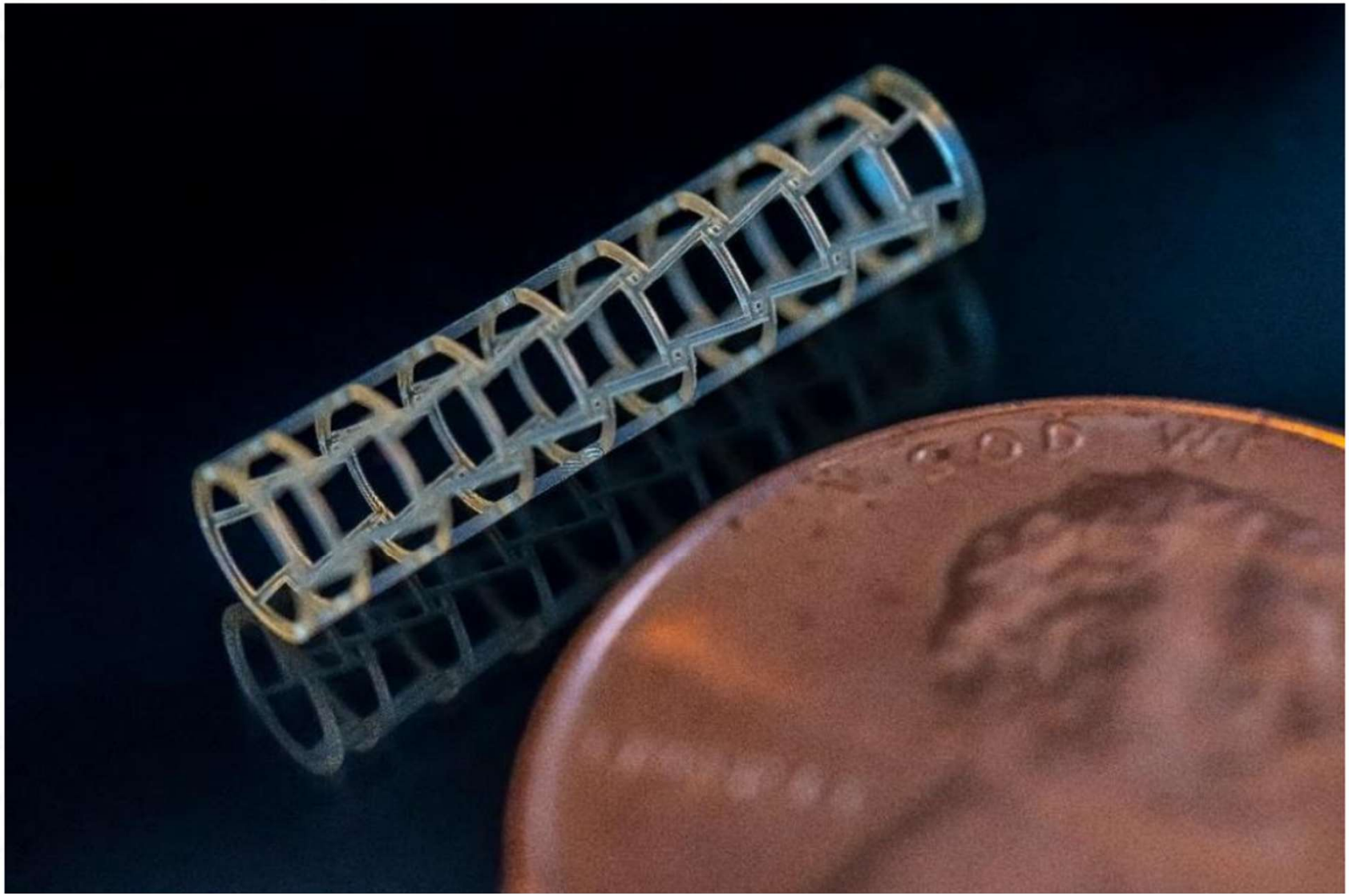
+ High Detail
+ Speed (especially for multiple models)
+ Material Properties
- Can be messy
- Single colours
- Biocompatibility restrictions

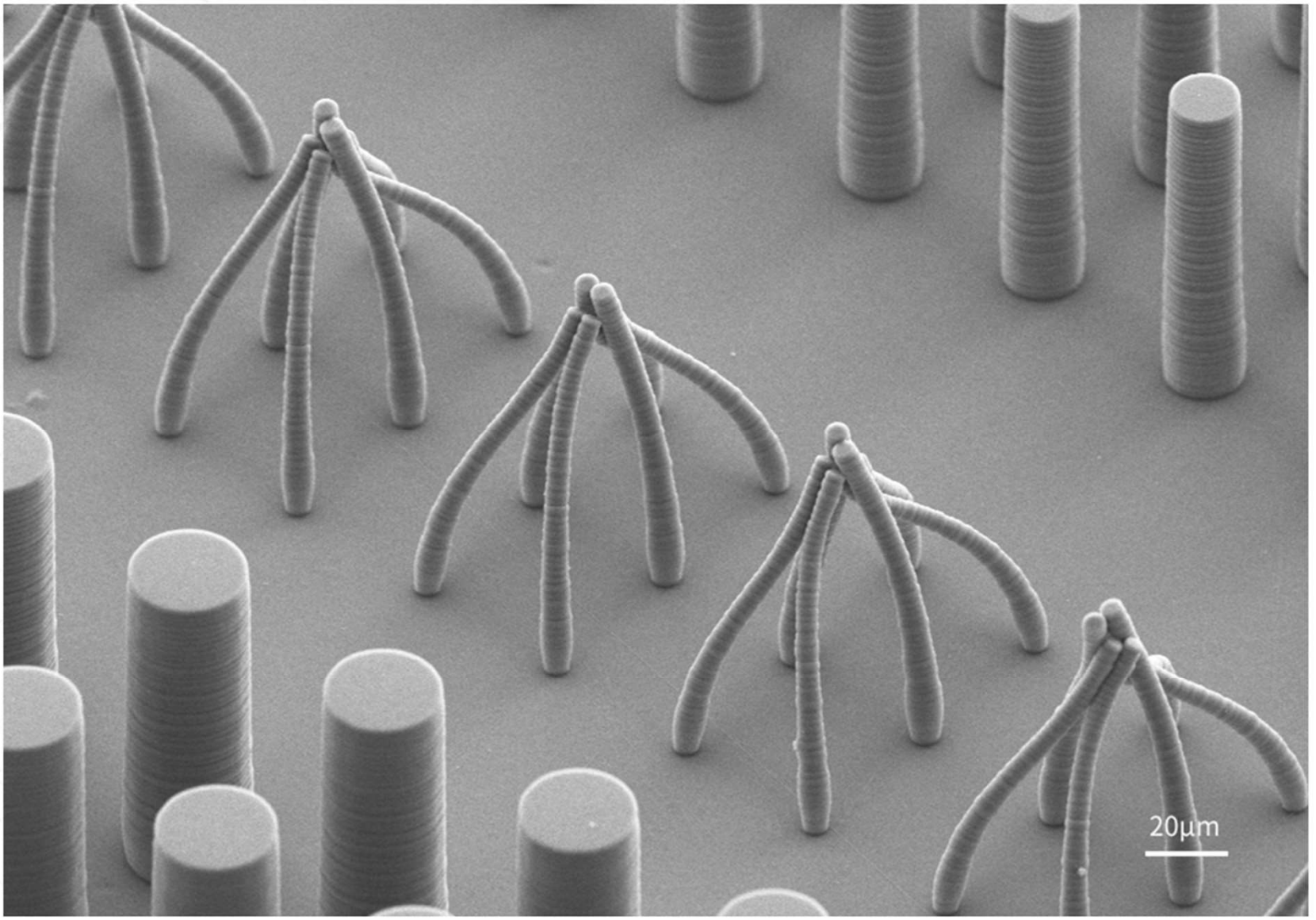
ideaMaker Raise3D DF2 Solution Resins

But if you can get the right resins and the right technologies…

- Part details down to 2-microns, even on parts as large as 50mm per side
- Biocompatible resins - implantable and bioresorbable
- Each part can be customised to the patient, or to a specific mechanical task or fit

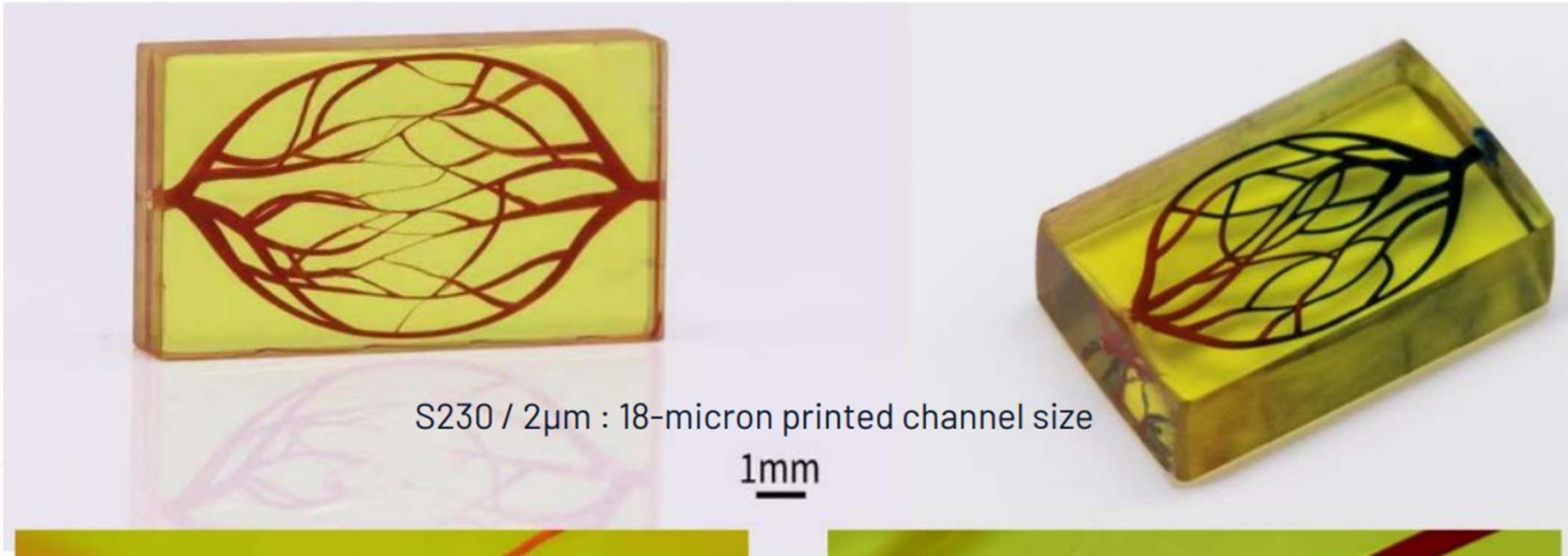
Higher Res. Image : **Micro Vascular Stents**




20µm

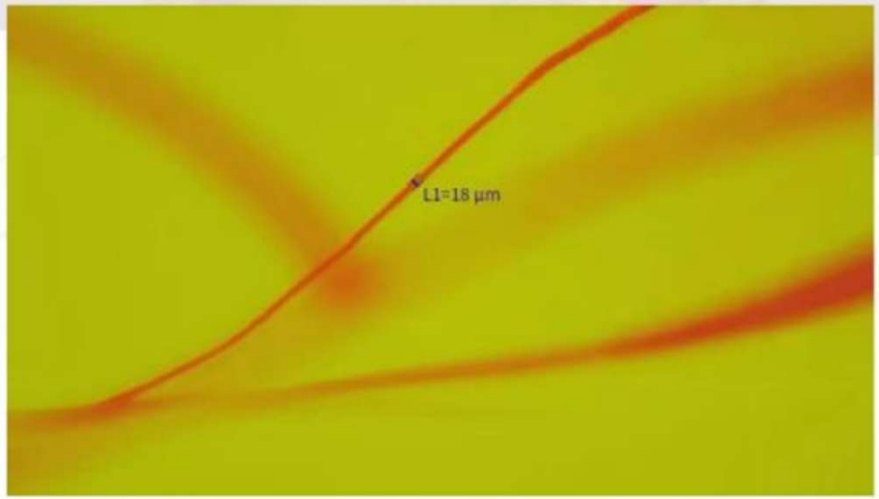
BMF

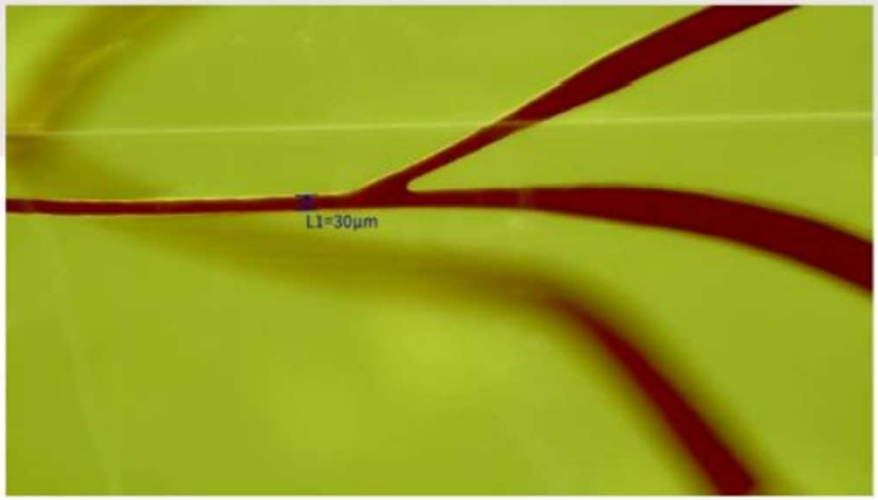
Higher Res. Image : **Blood Vessel Model**



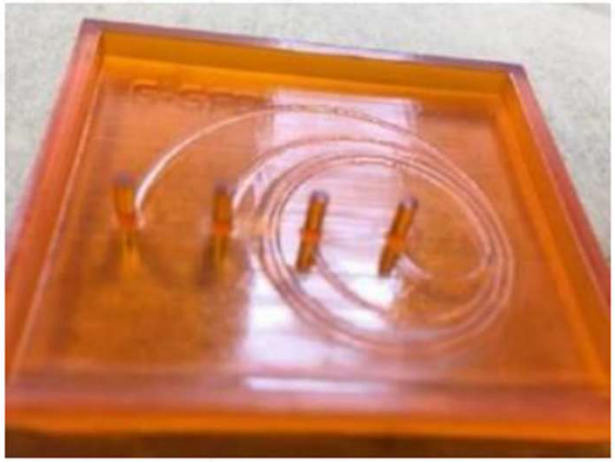
S230 / 2µm : 18-micron printed channel size

1mm

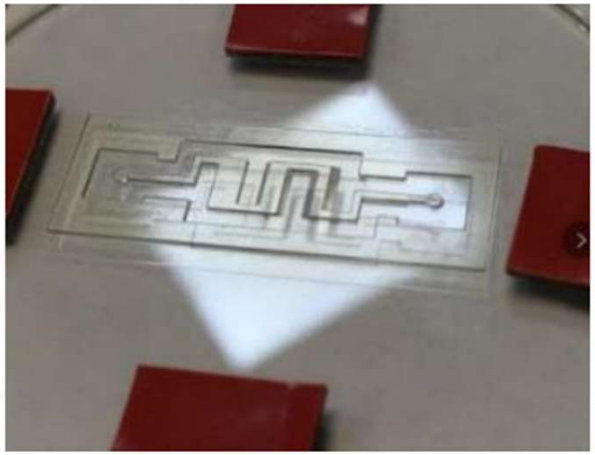




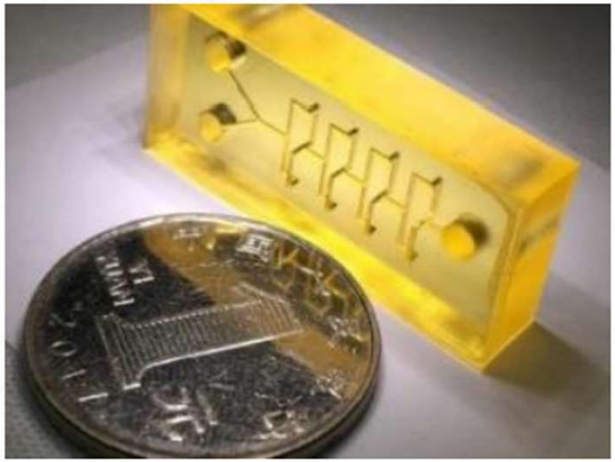
Application Examples: Microfluidics & Pharma

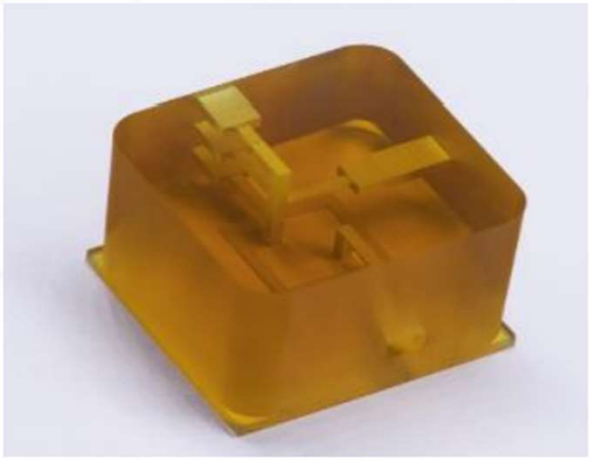


Internal spiral channel

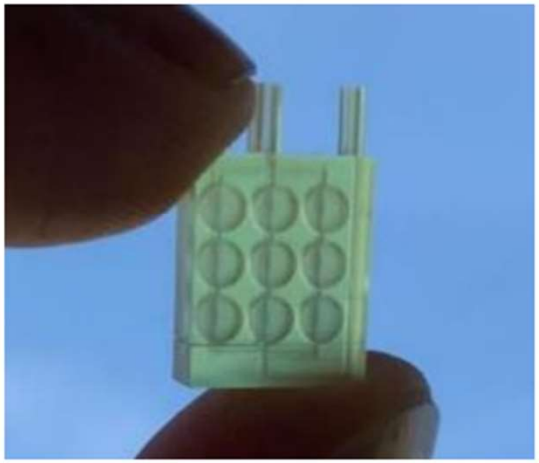


Clival and chamfered channels





3-Dimensional channels



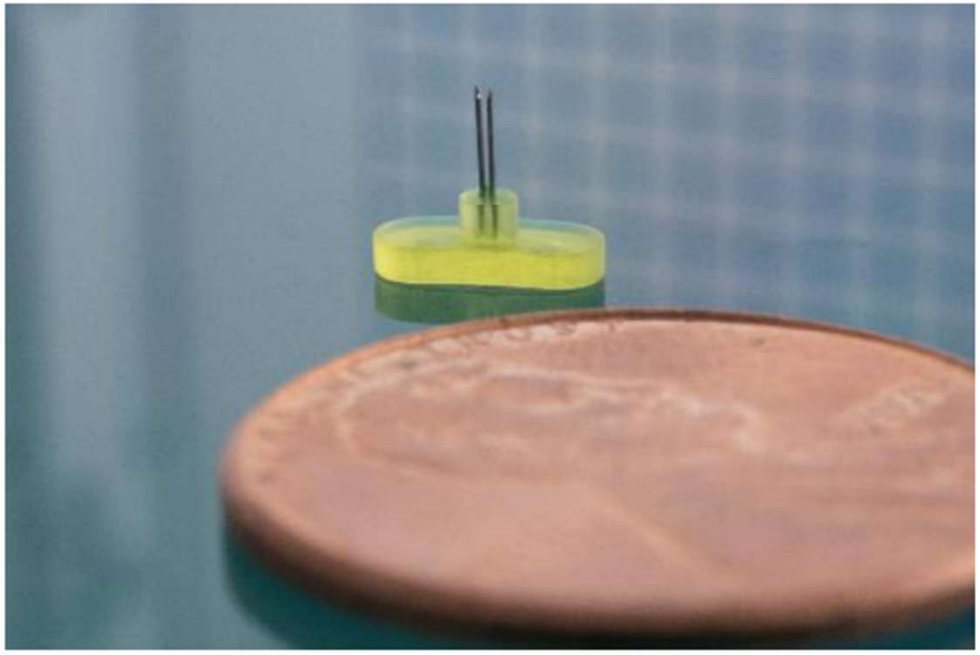
Case Study - IMcoMET M-Duo Technology®

Key Results:

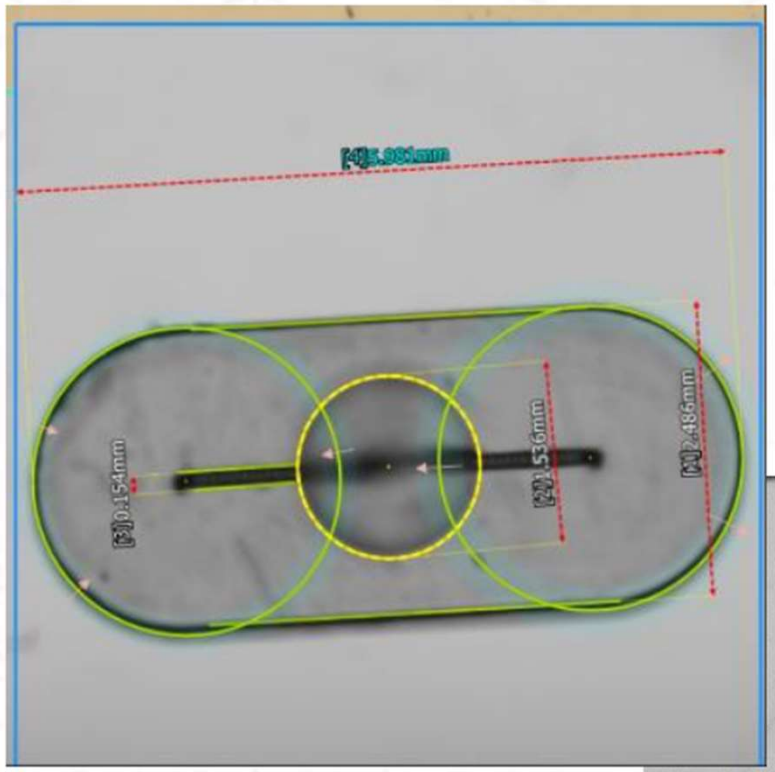
- Printed small features with accuracy and repeatability
- Able to use the design for end-use parts

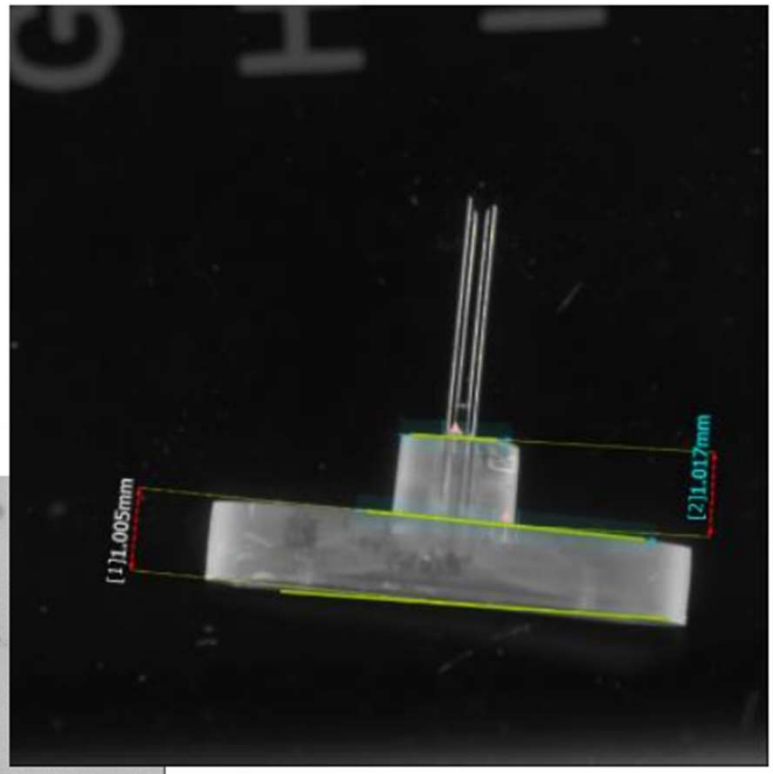
Challenge: Needed a bio-compatible cap with two 100 µm channels spaced 20-40 µm apart to house micro-needles for a cancer treatment device.

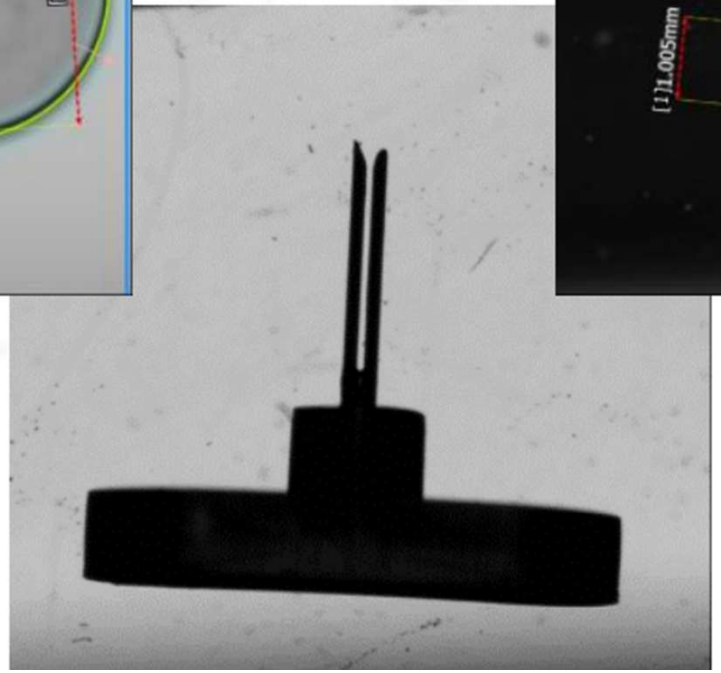
Solution: The parts were printed on an S240 which provided the precision and repeatability needed. Using BMFs bio-compatible material, the parts could be considered for end-use in patients.



IMcoMET Higher Res. Images

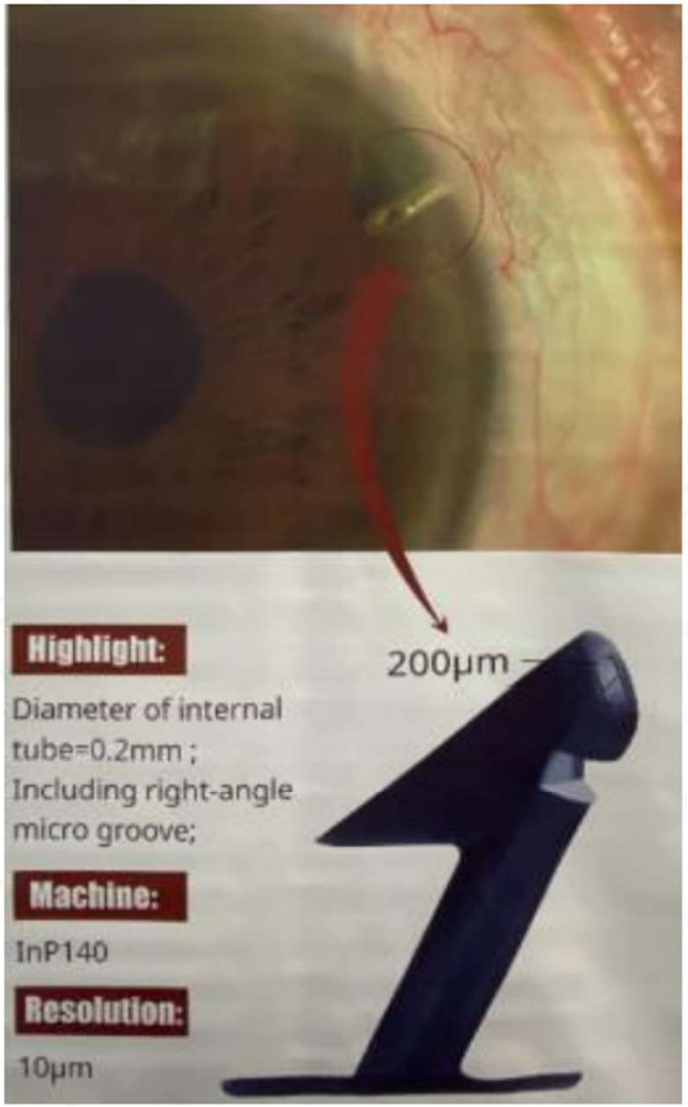






- Two 100-micron channels
- 20-40 micron spacing

Application Example :



Glaucoma Stent

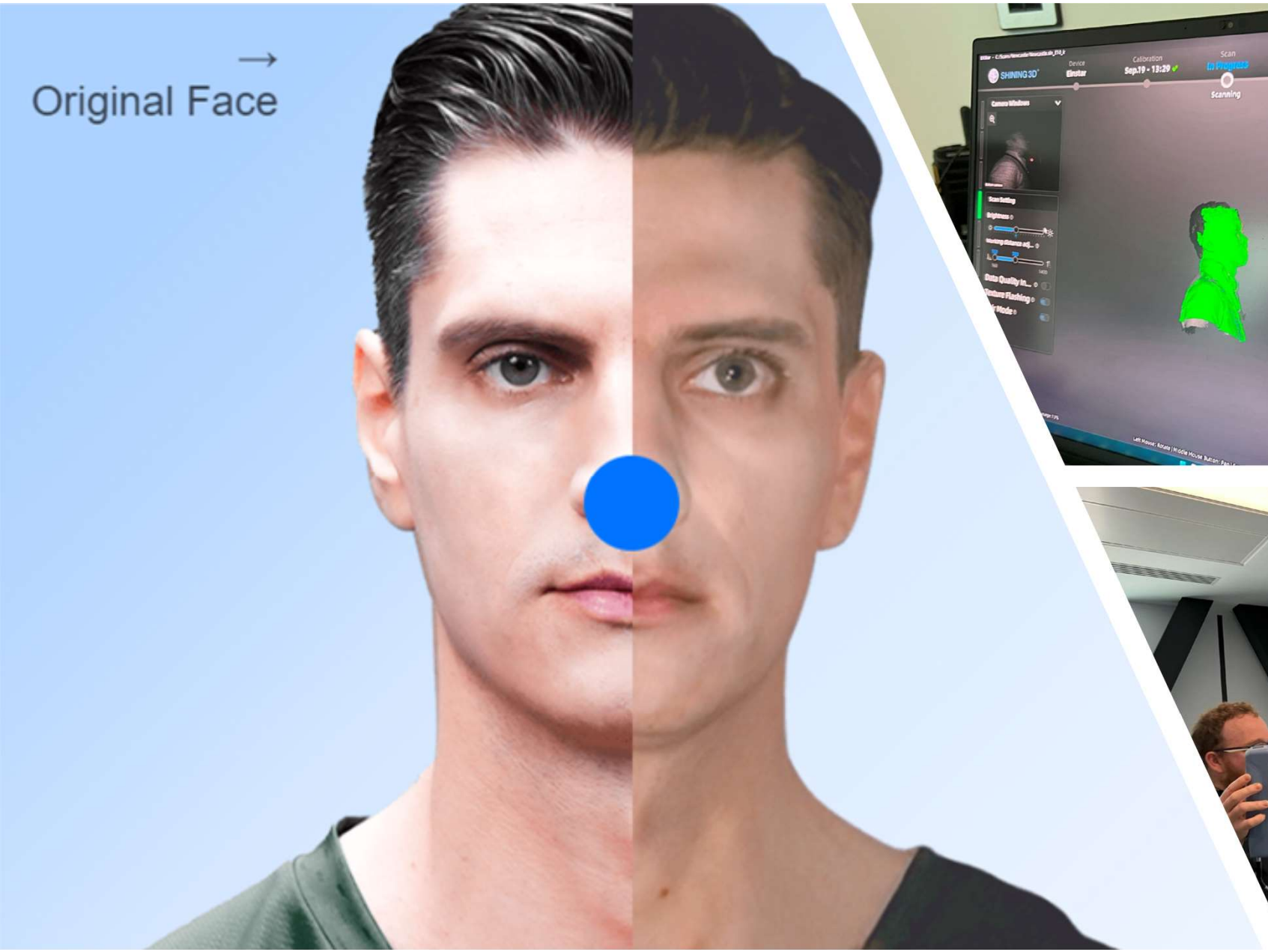
DIMENSIONS 1.8mm x 0.8mm x 2.17mm

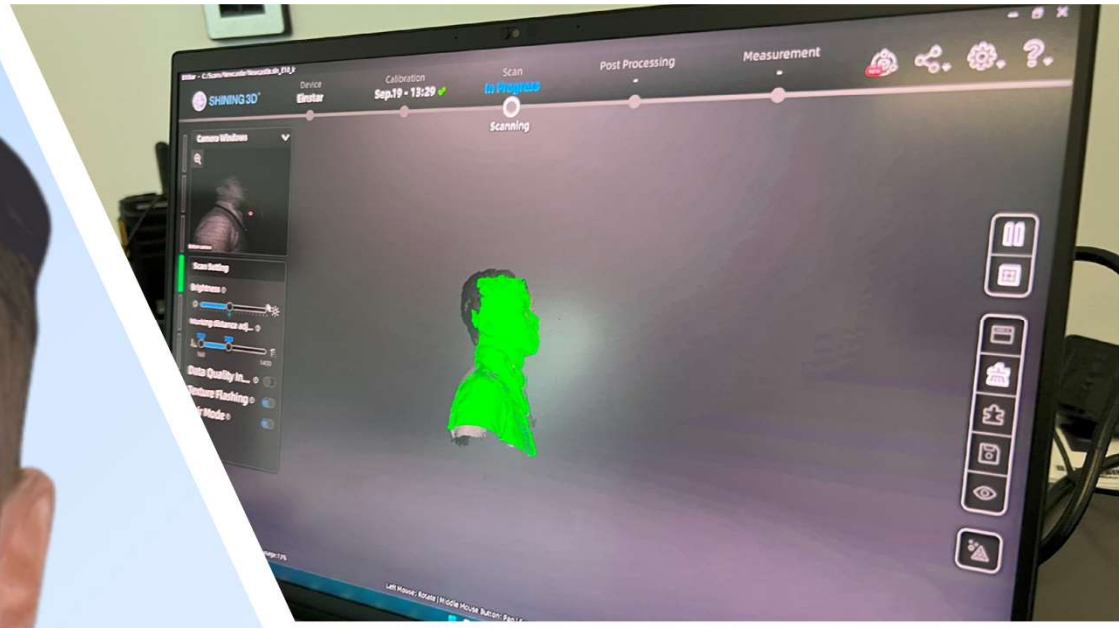
RESOLUTION 2μm

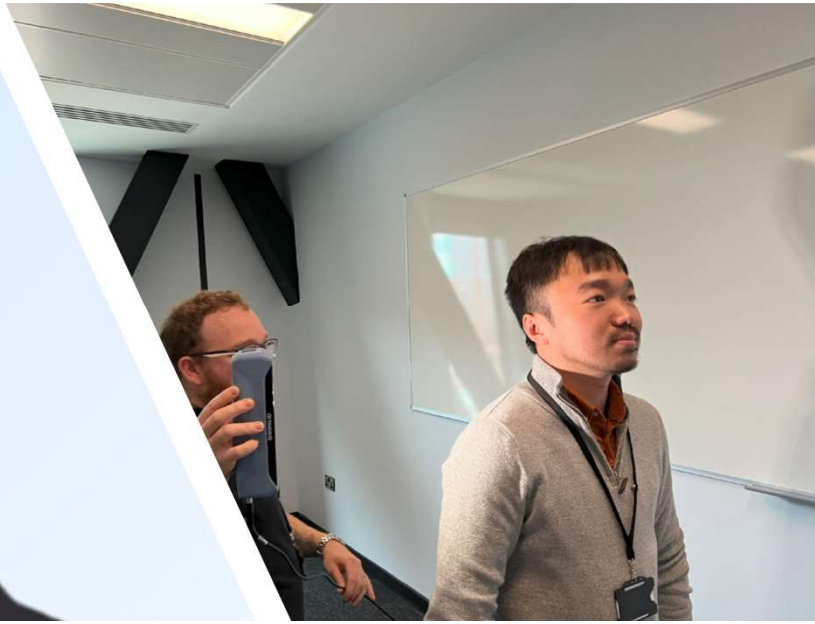
TOLERANCE ±10μm

FEATURES 110μm wall thickness / 110μm hole with helix inside

You can print 240 parts per build at 24.5 minutes per part on the microArch S230.


Original Face


SHINING 3D
Device
Einstar
Calibration
Sep.19 - 13:29
Scan
In Progress
Scanning
Post Processing
Measurement



Pressure forming

Any questions?

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Realigning competence and excellence

Pathway of excellence

Conscious Competence Model - Noel Burch

Unconscious Incompetence	→	Conscious Incompetence	→	Conscious Competence	→	Unconscious Competence
You are unaware of the skill and you lack proficiency		You are aware of the skill but you are not yet proficient		You are able to use the skill but only with effort		Performing the skills becomes automatic

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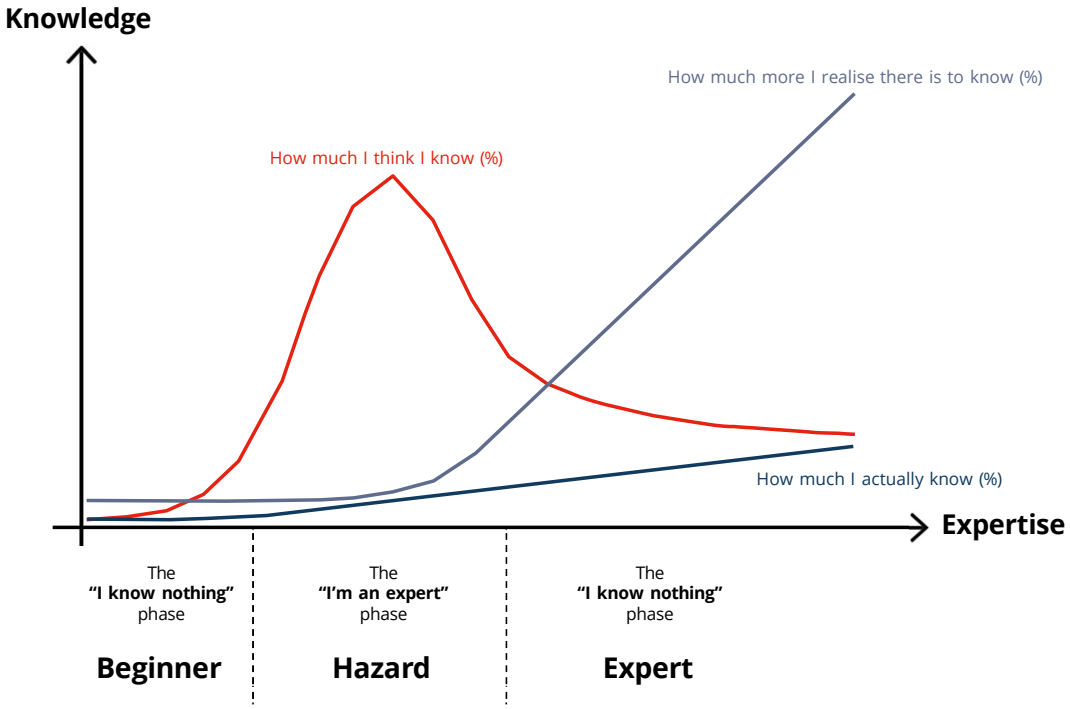
How much do I actually know?



worldskillsuk excellence at work
NCFE
Skills & Education Group
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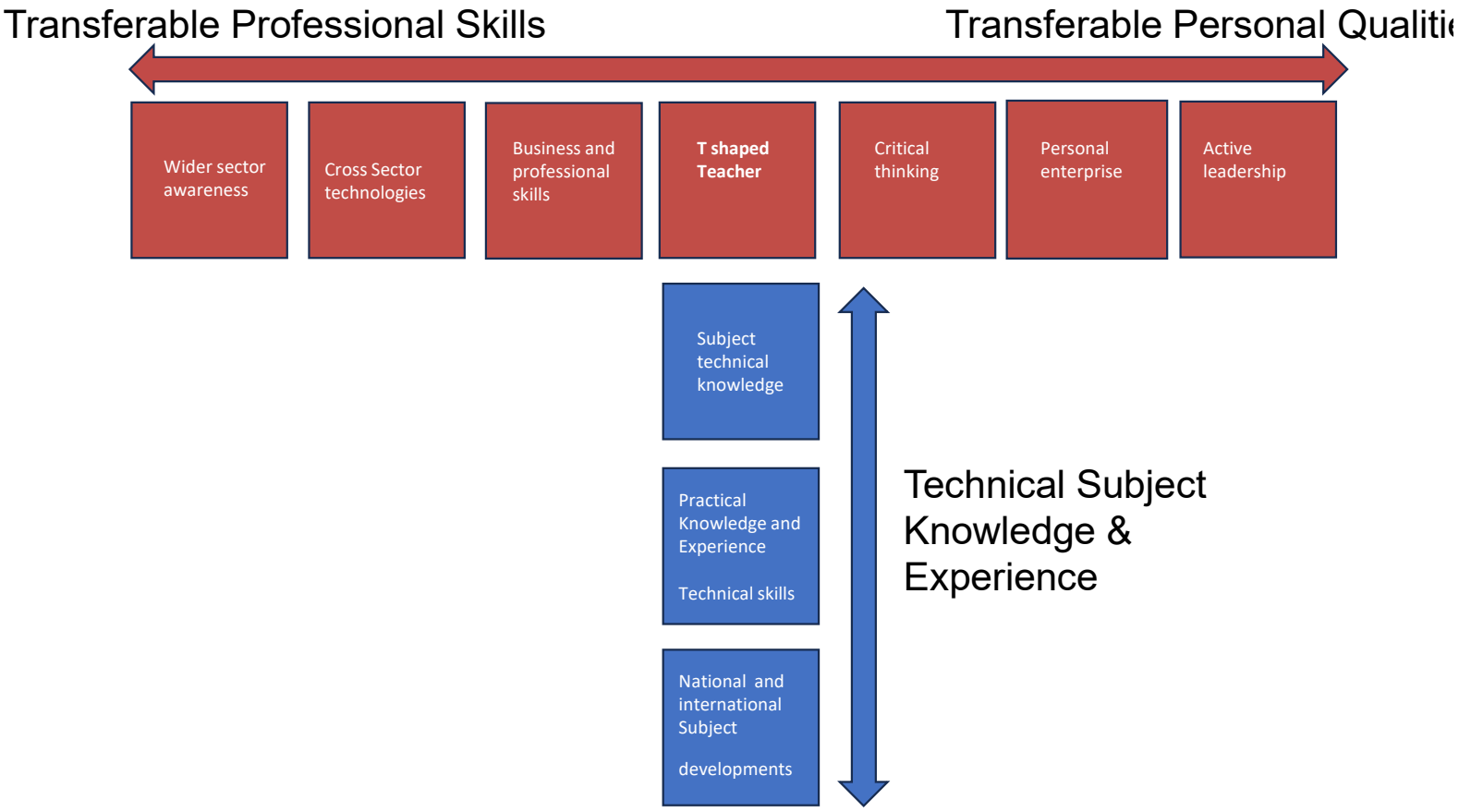
T-shaped thinkers and learners



Adapted from New Engineering Foundation's "T Shaped Technologist"

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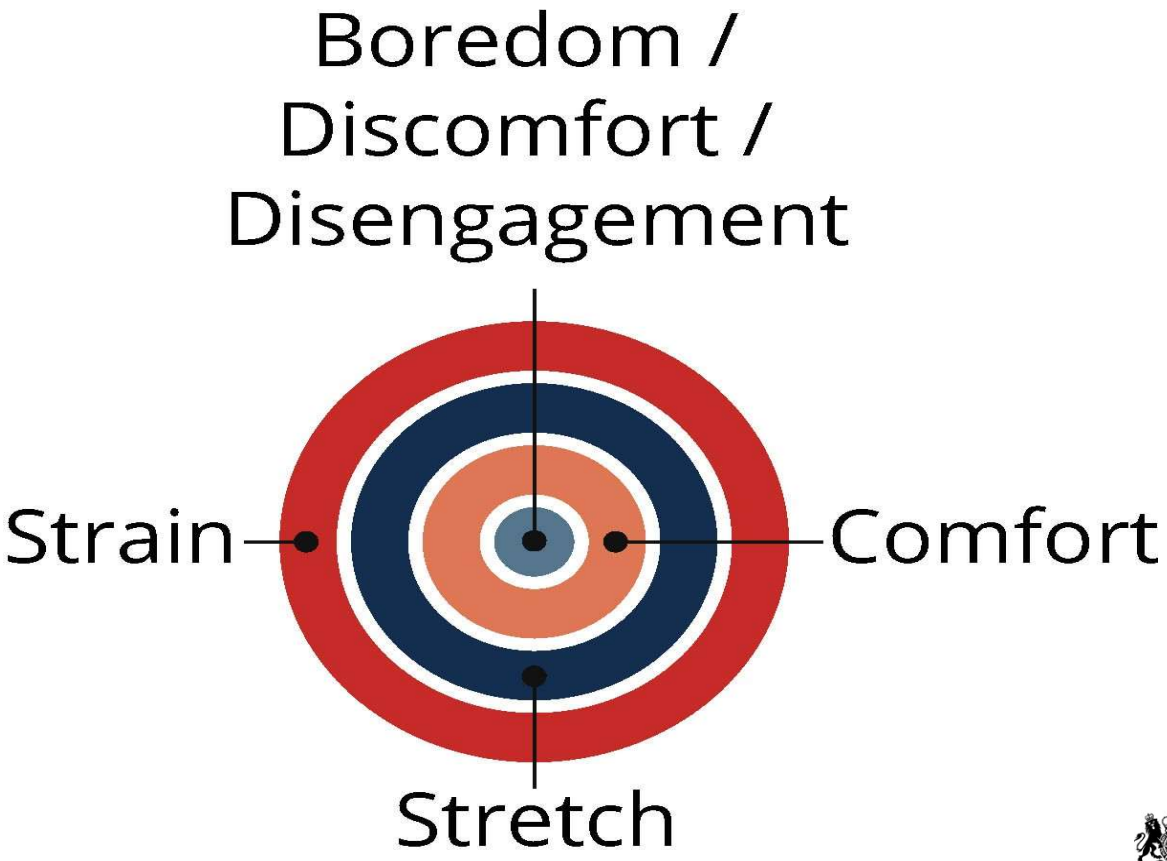
Progression of a Dual Professional



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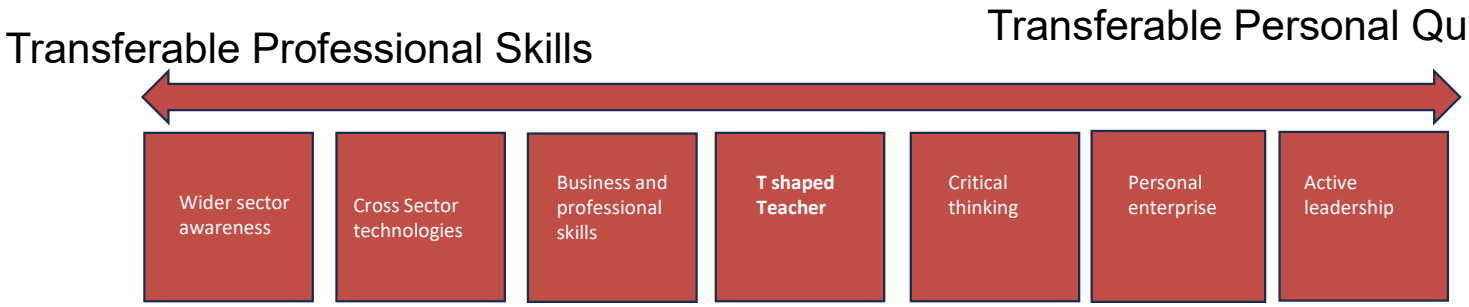
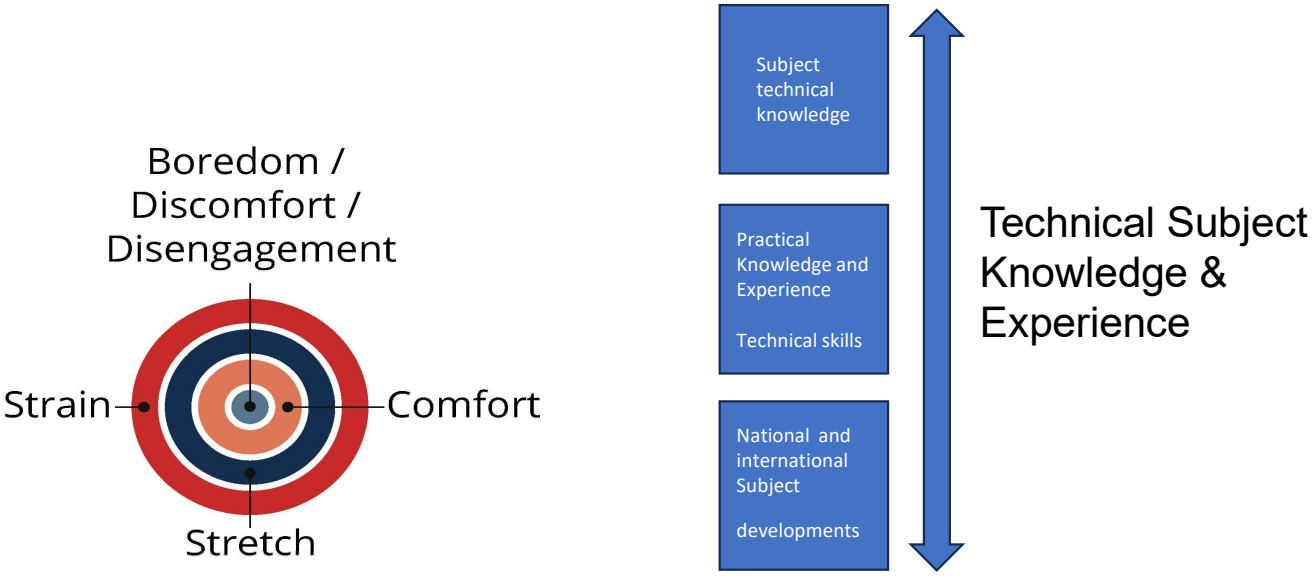
T-shaped thinkers and learners





Adapted from New Engineering Foundation's "T Shaped Technologist"

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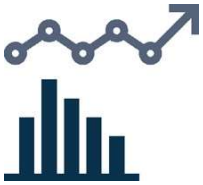
World Skills UK Strategy

worldskillsuk
excellence at work

Learn from the best



Benchmark against the best

Set targets, break them down, make them manageable

Be concerned with the detail

Innovate where required

Focus on the goal not the barriers

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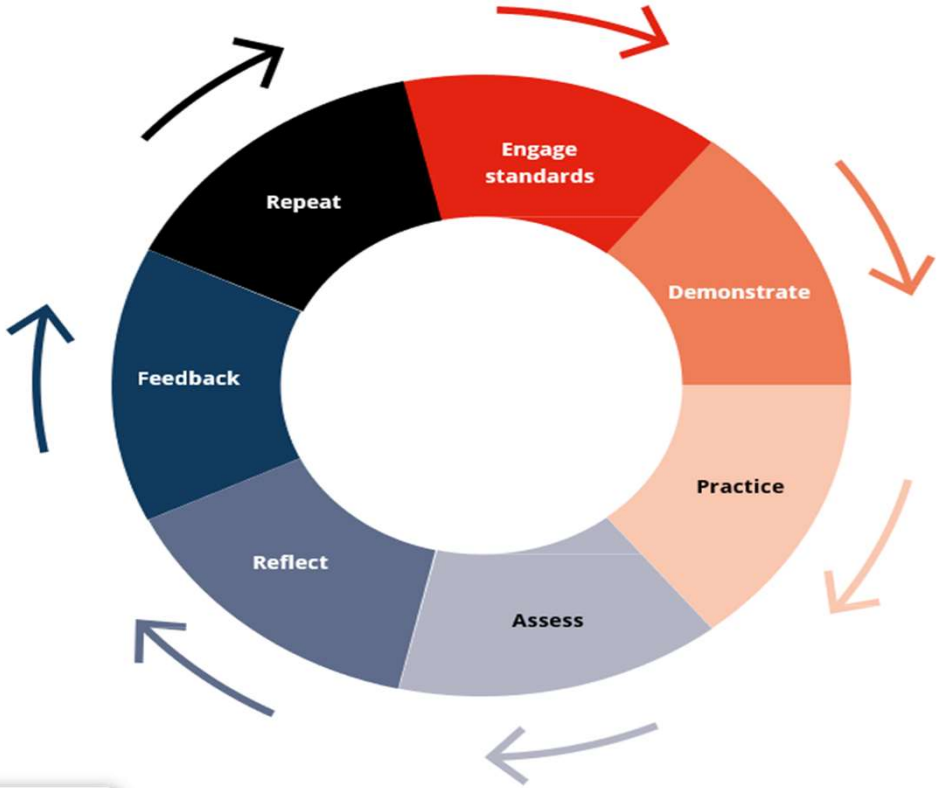
WorldSkills UK Training Approach



7 steps for developing excellence

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Thank you

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