

The Worshipful Company of Needlemakers

It is a dream come true for me to be here this evening speaking at the Worshipful Company of Needlemakers.

As a boy growing up in Manchester, I could have only dreamed about being at a Black Tie event with a Company Founded in 1656.

The passage of time over the 362 years history of the Company has made me think about Craft, Art, Skills, and Trade. Which leads to the acronym CAST.

CAST made me think of the cast of dreamers who dared to imagine they could change the world since the formation of the Company by John Hobcroft and his fellow Needlemakers.

Within 100 years of the formation of the company, we see the Industrial Revolution in 1760:

- 1. Industry 1.0 The Industrial Age**

2. Iron Manufacture
3. Textiles:
4. Steam Power
5. Machine Tools:
 - a. The Smallpeice Trust's founder's first invention, the world famous Smallpeice Lathe, was a machine tool
 - b. He actually made his fortune from a different product of industrialisation i.e. pneumatics hoists
 - c. Sir Richard Arkwright, whom our Arkwright Engineering Scholarship is named after successful combined Water/Steam Power, Machinery, Semi-Skilled Labour and Coton to create the modern factory system.
6. I know the Company has strong links to The Forge Mill Museum in Redditch

The key thing about the industrial revolution is that the pace of work increased; one textile machine could do the work of 50 people.

Fast forward 110 years to:

Industrial Revolution 1870:

- 1. Industry 2.0 The Technological Age**

2. Chemicals
3. Oil
4. Internal Combustion Engine
5. Gas
6. Electricity
7. Telephone:

Our cast of dreamers now includes:

1. Alexandra Graham Bell
2. Thomas Edison
3. Henry Ford
4. William R Morris, 1st Viscount Nuffield
5. Rudolph Diesel

Fast Forward 110 year to:

Industrial Revolution 1980:

1. **Industry 3.0 The Digital Age**
2. Personal Computers
3. Internet
4. World wide web (invented in the UK)
5. Information Communication Technology

Our cast of dreamers now includes:

1. Tim Berners Lee
2. Bill Gates
3. Steve Jobs
4. Clive Sinclair

Fast forward 40 years to now:

Industrial Revolution. Industry 4.0

1. robotics
2. artificial intelligence
3. nanotechnology
4. quantum computing
5. biotechnology
6. The Internet of Things
7. 3D printing
8. autonomous vehicles

I know we would all welcome a car that would drive us home this evening. I would love a SMART fridge that would email me to tell me my children had finished the milk, so please pick some up on the way home.

Our cast of dreamers now includes:

1. Jeff Bezos
2. Larry Page
3. Mark Zuckerberg

It would appear to me that our revolution time lines are collapsing, having had 100 years between revolutions, we find ourselves with a 40 year gap between 3.0 and 4.0.

Might we have a fifth industrial revolution in the next 30 years?

Might we have a sixth industrial revolution in 50 years time?

I have a six year old and four year old, they would be in their thirties for a fifth industrial revolution. They could be in their 50s for the sixth, and I am guessing they will both be working till they are 80 to pay for my pension as I will no doubt be growing to a ripe old age thanks to new biomechanical body parts.

Might my children work though to two industrial revolutions and be the first generation to do so?

Is this pace of change and technology exciting or disturbing for young people in our schools?

I feel it is only disturbing if you aren't confident about the opportunities it presents to you.

It depends if you are a future dreamer who dares to imagine you can change the world through advances in technology, communication (or connection as I think we call it).

I feel that there are ever increasing opportunities for young people in STEM areas.

But we find ourselves in challenging times, there is a projected shortfall of some 1.82 million engineers by 2022.

There is a projected annual shortfall of somewhere between 83,000 and 110,000.

So that a shortfall that equates to somewhere between the Capacity of Twickenham stadium, or May Day Stadium which is the worlds' largest stadium in North Korea.

Put another way, we need 10% of students in any school year to want to be engineers to close that gap.

It seems somewhat paradoxical to me; young people have access to more technology than their parents, grandparents, great grandparents but don't see its attraction.

I mentioned CAST earlier as an Acronym, well that is because The Smallpeice Trust operates in a sector that loves Acronyms.

I think we go through our own periodic revolutions.

1. It started with Science and Technology – ST
2. Then Engineering was added, and the sector arrived at SET
3. Then came the realization that Engineering is hard without Maths, so Maths was added and the sector arrived at STEM
4. A belief then surfaced that I disagree with, and that is that science, technology, engineering and maths aren't creative in themselves, and so increasingly the sector refers to STEAM to include as Art to encourage creative types
5. The latest thought is based on another belief I disagree with i.e. that there is no innovation in Science, Technology, Engineering, Art or Maths, so iSTEAM has been created

I worry that we keep adding letters, and miss the actual message.

We need more young people to enter engineering careers. FACT.

We need more females to enter engineering careers. FACT.

We need to do more to help young people access higher levels of education, FACT.

These are all opportunities for young people.

We need young people who look at these opportunities as empowering, and something to be pursued full of confidence in short, we need to rearrange iSTEAM as a collection of opportunities and help young people to acquire the confidence to say I AM SET for the future.



This leads me to The Smallpeice Trust, and the dreamers who dare to imagine they can change the world.

Dr Cosby Smallpeice was a dreamer, and his Trust dares to imagine that we can address the engineering crisis we face.

We now deliver programmes to 50,000 young people. Given the shortfall, we need to be bold, and reach 100,000 young people per year.

The outcome we strive for is young people who are confident that a career in engineering is the way in which they can fulfil their potential in a world that evolves at increasing pace.

To this aim, via our 4 programmes, we offer young people a transformation STEM journey based on 6Cs.

1. Connect
2. Curriculum
3. Context
4. Careers
5. Competence
6. Confidence

So let me close out with an invite that pulls together some of this evenings Acronyms:

1. Are you keen to support, STEM Education, or STEAM or iSTEAM?
2. Are you one of the CAST of dreamers who believes we can end the engineering skills crisis?
3. Are you keen to help The Smallpeice Trust increase its ability to reach increasing numbers of students to give them the confidence to say "I AM SET" for a career in engineering, and I AM SET for the opportunities that lay ahead via Industry 4.0, 5.0 or even 6.0?

Thank you very much.

Dr Kevin P Stenson
Chief Executive Officer
The Smallpeice Trust

04 July 2018