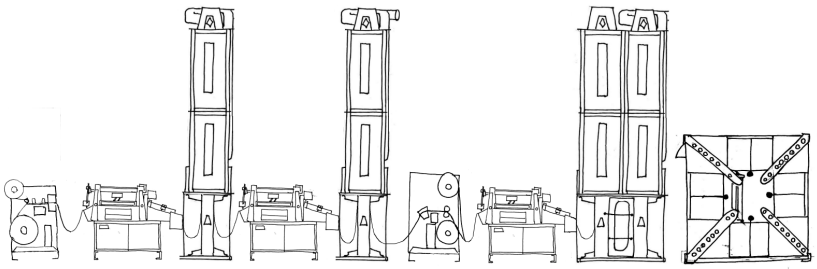
I have been asked to say something about how my father has influenced my engineering career. The answer is a lot, of course, but for me his presence in my life is like the landscape I live in - something I tend to take for granted. I welcome this opportunity to reflect on it.

I was born in 1953, the elder of two sons. Among my early memories are walking to the postbox with my father, a short trip down the lane from the family home, and seeing a train go by, the fine green locomotive hauling a string of chocolate and cream carriages. I asked my dad how a steam engine worked, and later I sat on his knee and he showed me with a sketch. I must have been 7 or 8. I can imagine discussing it with him, and understanding it. All through the time I was growing up he explained the material world to me. As well as understanding these things in themselves I believe I absorbed some guiding principles, some of the things that have become part of my landscape. One piece is that the material world can be understood deeply and explained simply, like a poem. Also, there is a particular value to understanding a practical working thing – like he'd also say; 'a pinch of practice is worth a pound of theory', a view which got me into trouble later at university. More subtly, each explanation had a history and a name, so it was Stephenson's locomotive, or Brunel's bridge. The industrial revolution appeared to be a triumph of individual creative endeavour.

I think this upbringing has made me into a different kind of engineer. At Durham university I remember the engineering students were asked to write about innovation, and I chose the evolution of the world's first flying buttresses as shown in the fabric of Durham cathedral. The earliest buttresses, above the choir, are full semicircles and only later in the nave do the familiar half semicircles appear. I took this to demonstrate the power of intuition and pragmatic reasoning – for if flying buttresses were the result of theoretical analysis the builders could have skipped the earlier full semicircle. I think I was more passionate than coherent: this attitude gave me the greatest trouble with the theories we were taught, nowhere more so than with the mathematics - I graduated with the lowest ever intermediate maths exam mark. I think the staff knew I had some qualities even if they could not qualify them in an examination. I remember that when asked to make the most efficient model bridge out of the least material, I used Bowes notation and optimised the design with a fellow student who knew the workings of the college's punch card computer. Together we produced the lightest design by a substantial margin. This kind of problem solving has supported me to the present day. I also figured that if I was going to practice engineering in this way I would likely be employing myself, and so it has proved.

For the past 25 years I have run a small company making screen printing machines. These print on rolls of flexible material like plastic or paper. We have never employed less than 6, and we have sold the machines all over the world. Each machine is made of pieces common to all of them and assembled in different ways. We make 4 or 5 a year and we haven't quite sold one for more than £1m- typically they're worth about £300,000. Screen-printing remains the method of choice for printing thicker coatings. Sometimes called direct printing, the ink is pushed directly through holes in a mesh onto the part. Other methods involve a transfer, which makes them 'indirect'. Computer printing systems involve direct printing nozzles, to be sure, however the types of inks that can be transferred through the nozzles without blocking them is more limited. We have machines printing durable labels, which survive in the sun, and many more making the electric circuits (the inks can conduct electricity) for

medical sensors, parts of cars, washing machines, telephones, or rubber for colouring moulded parts, and even starch in patterns for cake decorations. While all this sounds complicated the machines we make are simple. I am sure I could explain how they work to anyone in the society in a few minutes. They are not readily patented, because the designs I make for them are commonplaces that make a virtue of simplicity. When the machines have been copied, which they have been from time to time, they're usually made more complicated, which makes them less useful.



Looking around at how old things were made, up to about 1930, I think there were many people who thought like I do practicing in every British town. If I was escorting someone around looking for examples, I'd be looking for objects readily understood spatially and mechanically, whether they would be castings or things jointed or riveted together in a roof or a bridge. In the work for my company, I have made a virtue of this type of thinking, to explain what we make, to understand what different customers want, and to draw sketches and speak simply and truthfully about what is possible. In this type of work I think I am not only practicing engineering as my father would have done, but I am also part of a long British tradition.

There is a photograph, taken around the time of my birth, which is reproduced on the front of my father's book, 'Lines of Character', which is a view taken from the roof of a Talyllyn train, as it heads east, up hill, up the valley from Towyn in Wales. The railway is unlike anything we know today. The rails are embedded in long grass, a sheep track down the middle, and go under overhanging trees. The locomotive is a patinated antique, held together more by desire than reason. This was the railway my father was so involved with preserving, the world's first. I have embroidered this picture in my imagination, and feel I have a particular interest in every detail of it, with my father driving, and with my mother who would be the guard, and in the train itself, how it worked, how and why it was made, where it had come from and where it was going. Where they are going to, the head of the valley, is lit up in the morning light like a glimpse of heaven on earth. Sometimes I think of my father as a kind of heroic innocent: for if there is a heaven on earth, then the works of man should be represented there, and he is taking them there, the driver of the most improbable old train.

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