

Innovation, research and development

The future of design and engineering

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In the Chair:

Lord Oxburgh KBE FRS,
Rector, Imperial College of Science, Technology and Medicine
Council Member, Foundation for Science and Technology

Speaker:

Mr James Dyson, Chairman, Dyson.;

In his prize lecture Mr Dyson spoke of a prejudice against the activity of designing and making things. In discussion attention was drawn to the importance of education in shaping the attitudes of young people. The first batch who had studied design and technology at school when it was a compulsory subject were now coming through tertiary education, and it was to be hoped that even those who made their careers in unrelated areas would retain a taste of what they had learnt. Teachers were an important influence, for better or worse. The unhappy example was given of a first-class history teacher who had said that his school now offered engineering, but that many were not capable of doing the necessary maths and physics.

Even in the heyday of the Industrial Revolution those who prospered in manufacturing tended to put themselves at a distance from it as soon as they could. Nowadays school leavers seemed to favour quick-fix careers, for instance going into finance in order to make money fast. The question was how to break this mould, make children proud to go into manufacturing and convince them that it could be a way to make a fortune too. The key was to show that making things could be fun. Manufacturing tended to look boring from outside, and it was hard to convey the excitement of making something work, tackling problems when they arose and discovering that the customers were happy with the results.

The disappearance of the traditional apprenticeship system was regretted by some speakers. One recalled working for a company run by time-served engineers who had long experience of how a factory worked and how to train apprentices. When the rate of technological change speeded up these engineers struggled to adapt and were eventually superseded by graduate engineers who did not want get their hands dirty. Perhaps the wrong sort of engineers were being trained now.

Dyson was able to plough every penny it made back into research and development because it had no shareholders. There was a case for rethinking the financing of industry so as to recognise the long pay-back period for research and development.

Almost all the research at Dyson was done in house. They had tried commissioning it from universities but there was too much paperwork, too little control and problems over intellectual property. Now they preferred to recruit people from universities to work within the company. Similarly they made little use of external advisers such as market researchers and financial experts: instead the company employed the specialists it needed. (Market research was in any case not found very helpful because it did not forecast the future.) The major external source of advice was customers. Selling and talking to customers gave designers confidence by helping them to understand what they could and could not get away with.

Mr Dyson described in his lecture how he developed the dual cyclone vacuum cleaner by testing empirically, making one change at a time and observing the effect. One speaker was concerned if the value of modelling as a way of short-circuiting the process was being overlooked. In fact the company now used analysis and empirical development in tandem. The important point was that it was hopeless to expect to jump to a solution.

Persuading people to accept innovation could be a major problem. One speaker's experience as director of research for a major industrial corporation was that it had been easy to see problems and not too hard to find solutions, but production managers were reluctant to put prototypes to use and had to be given incentives.

Dyson found it harder and harder to obtain components, and very little of what it produced was made in England. UK manufacturers had declined to supply a yellow power plug; first a French product had been used, now it came from Taiwan where better flexes were made. He said good quality plastic was no longer supplied by ICI and came from Korea instead. Rubber parts were now from Malaysia and steel tubes from China. Part of the problem was the reluctance of suppliers to expand their business in response to demand or allow one customer to take too large a slice of their output.

The conventional view was that the British were good at innovation but bad at marketing. A contrary view was that they were good at selling but tried to sell bad products.

The lecture referred to the Hobsbawm thesis that Britain in the 19th century had chosen to exploit its Empire at the expense of investing in its industrial base. One speaker questioned this: the flag had followed trade, and Imperialist ideas only emerged late

in the century. The point was nevertheless made that access to the Empire as a market had made it easy for Britain to export. The United States had no such ready-made overseas market and so had to make better products if it wanted to sell them.

Concern was expressed over the tax burden on companies in the UK, not only corporation tax but, for example, fuel duty and rates on industrial premises. In the US tax relief on research and development, introduced 15 years ago and renewed every year since, had led to a resurgence of manufacturing. One speaker warned, however, against using taxation to influence the shape of the economy. The Selective Employment Tax introduced by the Wilson government did not work. Attitudes within Government, on the other hand, could be influential. At one time it had been the conventional wisdom among senior civil servants that the UK ought to move out of manufacturing. Government incentives were likely to be aimed at companies rather than lone innovators. There were charities which wanted to give money to individual inventors but had difficulty finding them. It was debatable how many lone inventors wanted to do it professionally. Business incubator units on university campuses, enabling inventors to come out of the garden shed and work with other people, were a better way forward.

It was asked how companies such as Dyson could best stop their ideas being stolen. The patent system was criticised: litigation was very expensive, the law on prior art was artificial, the defendant was allowed too much leeway and there was no immediate remedy even when a case had been decided. The best national strategy, it was argued, was to invest disproportionately in research and development, in order to establish a continuing technological lead over competitors, rather than relying on patents. In response it was observed that many companies brought their patent litigation to Britain where the system was seen as fair, and that quick justice was not good for the losers.

It was asked how companies could manufacture sustainably, not harming the environment. One view was that manufacturers should take products back at the end of their life. Dyson produced vacuum cleaners which were designed to be recycled, but they cost more to make and recycling itself cost money. Arguably a recycled product should be zero-rated for VAT, on the ground that it was the same article on which VAT had already been paid!

Mr Jeff Gill

The discussions were held under the rule that nobody contributing to them may be quoted by name after the event. None of the opinions stated are those of the Foundation for Science and Technology, since, by its constitution, the Foundation is unable to have an opinion.