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A Story of Innovation: The Cyclone Vacuum Cleaner Invented by James Dyson

Robin Roy



Robin is (Emeritus) Professor of Design and Environment at the Open University. He joined the University in 1971 and chaired and contributed to many courses on design, innovation and environment. His current interests are ecological design and sustainable development. He has written widely on these and related subjects.

While James Dyson was developing his on Ballbarrow invention (wheelbarrow with ball wheel), the resin powder used to coat the metal parts of the Ballbarrow kept clogging the filtration system. Dyson was advised to install an industrial cyclone (similar to that used to remove dust from the air in sawmills and other industrial plant) to separate the fine powder from the air. While installing the cyclone James got the idea for a domestic cleaner that used the cyclone principle to separate the dust from dirty air. Although it may be argued that the cyclone cleaner idea arose by chance, it is significant that Dyson is always on the lookout for such ideas and 'chance favours the prepared mind'. Dyson's cyclone cleaner involved a mental transfer of technology from one application to another - 'We're never original' he observed, 'there are always connections somewhere'.

Dyson established the basic technical feasibility of his idea by testing a simple cardboard model cyclone fitted to a conventional vacuum cleaner and then considered the commercial potential of his invention before attempting to develop it...Conceiving the basic idea behind the cyclone cleaner was only the beginning of a lengthy research, design and development process. Determining the precise shapes of the cyclones needed to efficiently separate coarse particles and fine dust entailed Dyson in making and testing many thousands of brass, aluminium and perspex models in his workshop. He argues that this empirical 'cut and try' approach was necessary because none of the theories about how cyclones worked could provide the answers he wanted. Nevertheless, other individuals might have attempted to model the cyclone mathematically before proceeding to empirical ex-



perimentation. The first prototypes, with two cyclones, one for particles and one for dust, placed side-by-side was built in 1981. This innovative design was an upright cleaner that did not clog or lose power as it filled with dust, was easy to empty and had a built-in retractable hose to provide the functions of a cylinder vacuum cleaner. Its design involved Dyson's combination of skills as inventor, engineer and industrial designer. Dyson showed his prototype cyclone cleaner to the two major UK manufacturers of vacuum cleaners. Although keen to see his invention, these manufacturers were not willing to license it for production. Dyson believes that this rejection was partly due to the 'not invented here' syndrome and partly because such a radically new product represented too great a risk and challenge to the established technology. Undeterred, Dyson conducted further design and development work and produced a completely new design with concentric cyclones plus other improved features (the 'G-force vacuum cleaner').

'The first UK-made Dyson Dual Cyclone cleaner, the DC01, was launched in the UK in 1993, 15 years after the initial idea. The DC01 cleaner was commercially successful and quickly gained nearly a fifth of the British market. A cylinder version, the DC02, soon followed and Dyson now runs a design-driven business worth around £530 million which, as well as other products, has a number of new models in its vacuum cleaner range. The company continues to carry out the research and development needed to create new and improved technologies. This R&D work remains UK-based, but since 2002, to reduce costs and bring component suppliers closer to the factory, Dyson cleaners have been manufactured in Malaysia.'



He deliberately designed the product to be coloured pink to emphasise its innovativeness and made the cyclone enclosure transparent so that customers would be able to observe the swirling dust particles. 'From a market standpoint', Dyson argues, 'if the product contains any new ideas then it is absolutely essential that the product be visually different'. This design was successfully licensed in 1986 to a Japanese manufacturer after an abortive contract involving a British, an Italian and a US firm. The US firm subsequently copied the cyclone cleaner, which forced Dyson to combine the ability to conceive and develop technical inventions with the design skills to translate those inventions into attractive products. His particular approach to invention and creative design depends on getting ideas and solving problems when working with and observing physical objects, what Thring and Laithwaite call 'thinking with the hands', rather than by drawing or theorising. Dyson says he almost never solves problems by getting 'brainwaves in the bath' - a classic psychological model of creativity - for him solutions come when 'welding or hammering something in the workshop'. Dyson also believes that at the initial concept stage of an invention or new design it is best not to be too expert because the innovator has to question established ideas. However, in order to develop an idea into something that works and can be economically manufactured it is usually necessary to become highly expert technically. He observed: 'The more you get involved and study something in depth, the more creative ideas arise. You can't create marketable innovations as an amateur.' Fortunately, acquiring the necessary in-depth expertise is not very difficult when focussed on a finite problem and specific area of knowledge.

For Dyson, innovation is a matter of having good ideas based on experience and careful observation of the real world followed by hard work involving practical skills and technical expertise to convert that idea into a marketable product.

References

The article is an edited extract from

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