

Dyson Day Outreach Activity – disassembly of a battery-operated fan

My 4th year project considered the ways in which product disassembly can be used as a teaching resource within the Cambridge University Engineering Department (CUED) and beyond. Developing a thorough understanding of the intricate relationships between material selection, processing, microstructure, properties and design can take years. A more hands-on approach to teaching design for manufacture has been shown to be very effective; my project recommended areas where disassembly could be used more within CUED, in order to distribute its advantages to the students. It also considered how the results and benefits of product disassembly can be conveyed to students who do not have the means to perform disassembly themselves.

As part of my project, I was looking at how disassembly could be incorporated into the outreach activities that CUED provides. Giving students the opportunity to take something apart themselves, letting them see how the components fitted together and why and how they were made the way they were, was a good way to introduce them to how material selection, processing and design come together in one product. A battery-operated fan (RRP £1) was chosen as the example product. The fan has a good selection of materials and processes, comes in multiple colours, and only requires a small screwdriver and some careful fingerwork to take it apart completely. It was therefore a good product to use to teach the students of Corby Technical School about the benefits of choosing 'plastics' and how they can be moulded.

After a short introduction explaining some of the factors involved in product design, the guided disassembly process began. Each student was given a (not yet disassembled!) fan. Alex (my project partner) and I would disassemble an example fan, step-by-step, in front of the visualiser, making sure that the students from Corby Technical School were following along and disassembling their own fans in the same way. We would then point out and explain interesting facts about the disassembled components (such as inlet sprues and pin marks – implying injection moulding), using an accompanying powerpoint to illustrate our points. The students learnt about several processes (vacuum forming, injection moulding and punching), considered why different materials were used for different parts of the fan, and were even introduced to the benefits of economies of scale. By asking the students questions throughout the process, we gauged how much they knew already and how much they had learnt throughout the activity. Finally, as a fun end to the afternoon, we asked the students to see if they could put their fans back together again and see if they still worked. Thankfully they all did, meaning that the students were able to take the fan home as a memento of the disassembly activity they had just completed.