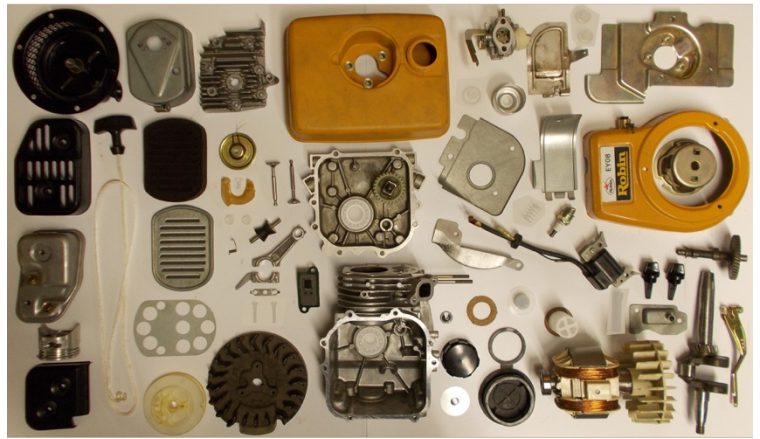


ENGINEERING TRIPOS Part IIA

Extension Activity: Product Disassembly

Open to students in all Engineering Areas –
but particularly relevant to Module 3C1



INTRODUCTION

Product disassembly provides a good hands-on opportunity to learn about choice of material and process in product design and manufacture. In this ExA, students will work in pairs to take apart household products, seeking to answer a selection of the following questions:

- (a) What material is each component made of? [from its appearance and measuring density]
- (b) What are the mechanical, functional, and other design requirements for each component?
- (c) For strength-limited parts, what is the hardness and microstructure? [using hardness testing, microscopy]
- (d) How were the components shaped? [using appearance, microscopy, and knowledge of manufacturing processes]
- (e) What joining/assembly methods have been used? Can these be categorised systematically, in relation to the materials involved and geometric characteristics, in a structure that could be applied across all products?
- (f) What secondary treatments (e.g., on the surface, or to the bulk) have been applied, and why?
- (g) Has the product failed, or is it just obsolete? If it has failed, how difficult would it be to repair it?
- (h) How feasible is it to separate different materials for recycling at the end of life?
- (i) What is the embedded energy in the materials of the product, and how important is this in the life-cycle energy of the product?

ARRANGEMENTS

This ExA will run in the Michaelmas and Lent Terms (dates TBC on Moodle). **Capacity will be limited, and may be balloted.**

Choice of products: We will have some products available to pull apart – but students may propose their own to the course leaders, and bring them along if suitable. Ideally products should contain more than one material class and a sensible number of components, and possibly energy-using. Be mindful of logistics for products that are large/heavy. We can manage a washing machine, but not a car!

To undertake this ExA *in either term*, students should **sign-up online by 5pm on Friday of Michaelmas week 1** via the link in the table: <http://teaching.eng.cam.ac.uk/node/4133#hdr-2>. A ballot will be held (if required) and students notified of the result (so they may then complete their choice on COMET).

During each ExA period (just over 2 weeks) students will:

- (1) attend an initial briefing.

(2) work independently in pairs/teams in the lab with technician support, and with staff supervision to guide the choice of investigation and help with technical queries.

(3) give 10 minute presentations *in pairs/teams* to the rest of the group.

(4) submit individual one page visual summary posters on Moodle (this could be a piece of artwork – the figure at the top is from a previous IIB project, showing a disassembled portable power pack).

The total time spent should be around 20 hours, and satisfactory completion of all tasks will lead to a full mark of standard credit.

Dr Matteo Seita (ms2932), Dr Hugh Shercliff (hs10000), Prof Athina Markaki (am253) October 2023