

MCHE 201: Introduction to Engineering Design

Spring 2019 – Mini-Project 3

Assigned: Tuesday, February 19th

Assignment: In-class dissection of an Oral B electric toothbrush. Submit your team's responses to the 26 prompts for information contained in this document before leaving class.

1 Assignment Details

1.1 In-Class Dissection

Each team will be given an Oral B electric toothbrush for disassembly and inspection; this is often called a mechanical dissection. The process of disassembling the toothbrush and some questions to take note of are included below. To reassemble, just reverse these steps. The toothbrushes should be returned in working order. Read the entire dissection process before beginning.

1. Operate the device.
 - Observe the operation of the device. What indicates how to operate the device? Are these indicators clear? Why?
 - Sketch the brush and note the brush's head motion
 - List the customer needs and engineering specifications.
 - Identify the relationship between the various subsystems of the device and their interdependence.
2. Take off the brush head carefully. Do not disassemble it.
 - How was the brush head removed?
 - Was it easy to remove?
 - Is the brush head meant to be replaceable? Is this obvious?
3. Operate the device without the brush head attached. Take notes on what you observe.
4. Remove the bottom of the device by unscrewing it.
5. Remove the battery. How is which way to insert the battery indicated?
6. Remove the battery and motor subsystem. Do not disassemble it.
 - How was the subassembly removed?
 - Why are the snap fits located where they are?
 - Is this a good design? Why or why not?
7. Put the battery back and operate the subassembly.
 - Sketch and discuss observations about its operation.
 - What mechanisms are utilized to achieve device functionality? Sketch them.
8. Remove the rocker switch.
 - What happens?
 - Why?
9. Examine the motor.

- Notice the lack of wires? Why would it be designed this way?
 - What replaces them? Why?
10. Examine the metal shaft. How does its design create brush motion?

2 Acknowledgements

This lab is based on one developed at Georgia Tech for *ME2110: Creative Decisions and Design*, which itself was developed from work by Prof. Will Durfee at the University of Minnesota. Similar dissection projects are also known to have been conducted at The Pennsylvania State University.