Reverse Design
Motivation

Reverse engineering refers to the process of examining an existing product with the goal of understanding how it works.

Reverse engineering may analyze functionality, form, physical operation principles, manufacturability, and assembly methods.
What we can gain

*Understanding functionality and overall execution:* In-depth understanding of a product’s design philosophy, operation, and production.

*Benchmarking:* Compare a group of products in a detailed manner to direct new or redesigned product development.

*Evaluating competitors' products:* Examine the competition for patent rights, copying or design modification.

*Design improvement:* Search for ways to improve an existing product.

*Cost Reduction:* Evaluate product design, materials and manufacturing methods in search of cost savings.
Reverse Design

Reverse Design: Extend reverse engineering to include not only engineering functionality but also how the product functions from the perspective of the assumed users and producers.

For example:

• Identify intended users and market segments.
• Study product functionality from the users’ perspective, and product craftsmanship.
• Cost shavings looked more in view of overall profit, namely, include pricing and product demand improvements not just cost reduction.
Activity: Before Disassembly

1. What is the main functional task that the product is meant to accomplish? What other uses might it have?
2. Who are the intended users and market for this product? Can it be used as is in the US and other countries or would it need modifications?
3. What is the price range for this product? What about its competitors? How large is the market for this product in the US? In other countries?
4. How good is the product’s craftsmanship (i.e., the initial perception that this is a well-made, well-functioning, high quality product)?
5. How do you think the product works? Be specific. What do you expect to find after disassembling it? one or more of the existing components?
Activity: Disassembly

6. Begin disassembling the product. What is the function of each component?

7. How do the various components work together?

8. How was this component manufactured? What materials were used?

9. How might another device serve the same function as one or more of the existing components?

10. Is there a more economical way to achieve the same functionality?

11. Is there a more environmentally sound way to achieve the same functionality?

12. Now that you have studied the product more closely, how would you modify the product to increase its market appeal? Modify its price? Effect its manufacture in other countries? Use in a global market?