Foundations of Technology, Third Edition / Technology, Engineering, and Design

Presentation 3.3.1
Reverse Engineering

Why?

Steps
**Reverse Engineering vs. Forward Engineering**

**Forward Engineering:**
process of moving from high-level abstractions and logical designs to the physical implementation of a system.

**Reverse Engineering:**
The process of taking something apart and analyzing its workings in detail, usually with the intention to construct a new device or program that does the same thing without actually copying anything from the original.
Why Reverse Engineer?

- The original manufacturer of a product no longer produces a product
- The original design documentation has been lost or never existed
- Some bad features of a product need to be designed out.
- To explore new avenues to improve product performance and features
- To gain competitive benchmarking methods to understand competitor's products and develop better products
- To update obsolete materials or antiquated manufacturing processes with more current, less-expensive technologies
Reverse engineering includes:

- Identifying the system's components and their interrelationships
- Creating representations of the system in another form or a higher level of abstraction
- Creating the physical representation of that system
Steps of Reverse Engineering

Prediction

• What is the purpose of this product?
• How does it work?
• What market was it designed to appeal to?
• List some of the design objectives for the product.
• List some of the constraints that may have influenced the design.
Steps of Reverse Engineering

Observation
• How do you think it works?
• How does it meet design objectives (overall)?
• Why is it designed the way it is?
Steps of Reverse Engineering

Disassemble
• How does it work?
• How is it made?
• How many parts?
• How many moving parts?
• Any surprises?
Steps of Reverse Engineering

Analyze

• Carefully examine and analyze subsystems (i.e. structural, mechanical, and electrical)
• develop annotated sketches that include measurements and notes on components, system design, safety, and controls.
Steps of Reverse Engineering

Test

• Carefully reassemble the product.
• Operate the device and record observations about its performance in terms of functionality (operational and ergonomic) and projected durability.
Steps of Reverse Engineering

Documentation includes the following:

• Inferred design goals
• Inferred constraints
• Design (functionality, form (geometry), and materials)
• Schematic diagrams
• Lists (materials, components, critical components, flaws, successes, etc.)
• Identify any refinements that might enhance the product’s usefulness.
• Upgrades and change
References

Text Needed