Reverse Engineering: An Introduction
What is Reverse Engineering?

A systematic methodology for analyzing the design of an existing device or system, either as an approach to study the design or as a prerequisite for re-design.
Reverse Engineering helps you to:

- Develop a systematic approach to thinking about the engineering design of devices and systems
- Acquire a mental data bank of mechanical design solutions
Levels of Analysis in Reverse Engineering

1. System-Wide Analysis

2. Subsystem Dissection Analysis

3. Individual Component Analysis
System-Wide Analysis

- Customer Requirements
- Engineering Requirements
- Functional Specifications
- Prediction of Subsystems and Components
Subsystem Dissection Analysis

- Document Disassembly
- Define Subsystems
- Determine Subsystem Functional Specifications
- Determine Subsystem Physical/Mathematical Principles
Individual Component Analysis

- Repeat Dissection Steps to Individual Component
- Define Component Material Selection and Fabrication Process
- Suggest Alternative Designs, Systems, Components, and Materials
Example: Small Kitchen Scale

- The Kitchen Scale is a useful device to measure out small amounts of food that are to be prepared. There are many people who need to be careful of the quantity of food that they take in. Diabetics must be careful of the amount of certain foods that they eat in order to maintain a proper sugar level. People on weight loss diets must also be careful with the number of calories that they consume at every meal. The Kitchen Scale is a device that can help control the amount of food consumed by an individual.
Customer’s Perspective:

• Some of the things that the customer might look for in a kitchen scale are the cost of the item and its appearance. Some other factors they would be concerned about would be how sturdy the device is, the accuracy of the weighing process, and its size. The customer may even ask if he/she is getting quality for the price.
Engineer’s Perspective:

The engineer has a totally different perspective from which he operates. The engineer will be looking at things like the material that the object is made of, the mechanisms that are required, the strength of the materials used, etc.

In relation to the kitchen scale:

- Is the riveting process of the plate to the stem adequate?
- Are the materials used strong enough to hold one pound of weight?
- Does the kitchen scale have any sharp edges that could cause injury?
- What mechanism is necessary to give an accurate reading on the scale?
Functional Requirements

- The kitchen scale must be able to accommodate 1 pound of food.
- The plate must be large enough to hold 1 pound of food.
- The stem must be strong enough to support the plate and the food.
- The linkage must be designed so that the reading is accurate to the nearest .25 ounce.
- The read-out must be easily read.
- The design must lend itself for easy cleaning and sanitizing.
Project must have at Least Two Sub-Systems

Each Sub-System must have at Least Two Components
FISHBONE DIAGRAM FOR MECHANICAL DISSECTION

(Example: Small Kitchen Scale)
PLATFORM

TOP PLATE

STEM

RIVETS
SPRING MECHANISM

NUT

SPRING

THREADED PIN
FOUR-BAR MECHANISM & HOUSING
(Example: Small Kitchen Scale)

LINK 1

LINK 2

LINK 3

BOTTOM

READOUT

COVER
ME302
Team Project Proposal

“Reverse Engineering of a Small Toy, Hand Tool, or Home Appliance”

• Cover Page
• General Description
• Graphic Picture

Due February 25, 2008, In-Class
ME 302 Team Project
Spring 2007

Reverse Engineering of a Piston Assembly

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<table>
<thead>
<tr>
<th>Bathroom Scale</th>
<th>Hose Nozzle</th>
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<td>Beer Faucet</td>
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