

**Sustainability Product Design & Redesign
Putting ISO 14000 into Practice**

by

Robert W. Simoneau

Associate Professor

Keene State College

229 Main Street

Keene, New Hampshire 03435-2101

Tel: 603-358-2616 e-mail: rsimonea@keene.edu

Abstract: In order to enable engineering technology and engineering students to implement the concepts implied in ISO 14000, pollution prevention, it is helpful to study existing consumer product. Many of today's products are already being designed for reuse and recycling. This demonstration will analyze four commodity products: reusable envelopes, dental floss cases, safety razors, and water filters in order to understand how the designs of these products lend themselves to reuse. This

Key Words: ISO 14000, reuse, design for disassembly, pollution prevention

Grade Level Intended:

Comprehensive High School – 11 & 12

Technical High School – Freshman exploratory through 12

College – Freshman – non-majors and majors

Mode of Preparation: Classroom demonstration and/or activity

Prerequisite Knowledge: Imagination

Equipment and Supplies Needed: household items

Introduction: The major objective of this demonstration is to show how easily, with a little imagination, existing products can be redesigned for reused. These examples are intended to shown that some products can be reused without any design changes. The selection of everyday products was deliberate in order to make it easy for educators to emulate this exercise with the same products. The underlying concepts, reuse and recycling, apply to all products. Educators have the option to choose products outlined in this demonstration or they can select products are more familiar to them. Going from simple to complex, the students will be challenged to provide increasingly sophisticate engineering solutions to allow reuse of these products.

Student Learning Objectives:

After closely examining a consumer product the student will be able to:

explain what percentages of today's products are consumed by labor vs. materials costs.

explain what design features enable ease of reuse.

explain how to redesign a product for reuse.

research and explain some of the marketing implication of proposed design changes.

make a case based on cost analysis, market analysis, regarding proposed design changes.
suggest appropriate design changes to enable reuse.
suggest what aspect of the design limits the life cycle of the product.

Procedure

Pre- class exercise and possible homework assignment:

The faculty should ask their students to consider: what are some of the problems are with reusing consumer products? Another important topic to analyze is how much of a product's cost is the result of materials vs. labor. They should be asked to reflect on the everyday consumer products that are already designed for reuse such as ink jet cartridges. Another possible assignment is to ask students to bring in one "simple" consumer product and try to determine how it might be redesigned to be more easily reused or one that it is already available for reuse.

Demonstration:

Discussion and demonstration - dental floss case: These cases are designed with easy access to the roll of floss. It begs the question: why buy a new package when all you need is a new roll of floss?

- Explore related packaging, pricing, and marketing issues.

Discussion and demonstration – multiple blade shaving razors blades: Why do we throw the whole assembly away when we can simply design a durable housing that will accept new blades in cartridge form injectable blades are actually an old design feature found with single blade shaving razors.

- Explore engineering design requirements, cost analysis, and marketing issues.

Discussion and demonstration – water filter: These are sturdy housing designed to withstand water pressure. How can this item be redesign for future use?

- Explore product and tooling redesign as well as manufacturing methods. Related marketing and consumer acceptance can also be examined.

Discuss and demonstrate product reuse failure – reusable envelopes: These envelopes were used for a time to pay electrical bills. However they were discontinued due to poor consumer acceptance.

- Explore marketing issues. Can this product be reintroduced?

Comments:

This exercise is intended to enable educators to think through increasingly complex exercises as student's progress through their engineering curriculum. As students acquire new knowledge they will be able to make more sophisticated judgments as well as suggest more advanced designs with the requisite cost and final performance requirements.

Evaluation:

To evaluate student understanding assign a homework that requires them to select an items and discuss reuse and recycling. Questions can be added to quizzes to determine if the students can successful meet the student learning outcomes.