

## **Implementing ISO 14001 - Sustainable Design Exploring Existing Products for Reuse**

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](mailto:rsimonea@keene.edu)

**Copyright: Edmonds Community College 2009**

**Abstract:** To help technology and engineering students implement the concepts implicit in ISO 14000 on pollution prevention, it is helpful to study existing consumer product. Many of today's products are already being designed for reuse and recycling. This module analyzes four commodity products: reusable envelopes, dental floss cases, safety razors, and water filters in order to understand how the redesigns of these products lend themselves to reuse.

**Objective:** The major objective of this demonstration is to show how easily, with a little imagination, existing products can be reused or with minor modifications, redesigned for reused.

### **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 and market analysis regarding proposed design changes.
- Suggest appropriate design changes to enable reuse.
- Suggest what aspect of a design limits the life cycle of the product.

**Key Words:** ISO 14000, sustainability, design for disassembly, pollution prevention

**Mode of Presentation:** Classroom PowerPoint presentation and/or activity

**Duration:** Approximately 60 minutes

**Prerequisite Knowledge:** Imagination

**Grade Level Intended:**

Technical High School – 12<sup>th</sup> grade and freshman exploratory  
College – freshman – non-majors and majors

**MatEd Core Competencies Covered:**

- 1.B Interpret technical drawings.
- 7.J Demonstrate how materials properties are used in engineering design.
- 10.A Identify properties and applications of thermoplastic materials.
- 19.B Apply statistical, cost, life cycle and related management principles to manufacturing processes and management.

**Table of Contents:**

Abstract	1
Module objective and student learning objectives	1
Module data	1
MatEd course competencies covered	2
Equipment and supplies needed	2
Curriculum overview and instructor notes	2
Module procedures	2
Supporting materials	3
References	3
Acknowledgment	3
Evaluation packet	4

**Equipment and Supplies Needed:** household items, PowerPoint projector

**Instructor Notes:** ISO 14001 is the international environmental management standard. The major objective of this demonstration is to show how easily, with a little imagination, existing products can be redesigned for reused, an important part of ISO 14001. These examples are intended to show 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 of reuse and recycling apply to all products. Educators have the option to choose products outlined in this demonstration or they can select products that are more familiar to them. Going from simple to complex, the students will be challenged to provide increasingly sophisticated engineering solutions to allow reuse of these products.

This exercise is intended to enable educators to think through increasingly complex exercises as student's progress through their technology or 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.

**Procedure**

Pre- class exercises and possible homework assignments:

1. The faculty should ask their students to consider: what are some of the problems with reusing consumer products?

2. Ask the students to analyze 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.
3. Another possible assignment is to ask students to bring in one "simple" consumer product and try to determine how it could be redesigned to be more easily reused or one that it is already available for reuse.

**PowerPoint presentation:**

Use the accompanying PowerPoint presentation with the class, pausing at each of the examples for discussion:

a. *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.

b. *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? Injectible blades are actually an old design feature found with single blade shaving razors.

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

c. *Water filter:* These are sturdy housing designed to withstand water pressure. How can this item be redesigned for future use?

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

d. *Reusable envelopes:* These envelopes were used for a time to pay electrical and other bills. However they were discontinued due to poor consumer acceptance.

- Explore marketing issues. Can this product be reintroduced?

**Supporting materials:** accompanying PowerPoint presentation

**References on ISO 14001:**

[http://www.iso.org/iso/iso\\_14000\\_essentials](http://www.iso.org/iso/iso_14000_essentials)

<http://www.ehso.com/iso14000.php>

**Follow-up activity:**

To evaluate student understanding assign a homework problem that requires them to select an item, dissect it and discuss reuse and recycling. Ask them to show how to make a case based on cost and market analysis regarding proposed design changes. Additional evaluation questions are given below.

**Acknowledgment**

I would like to acknowledge the kind support of Mel Cossette, Principle Investigator of the National Resource Center for Materials Technology at Edmonds Community College who helped make the creation of this curriculum module possible. I would also like to

thank Dr. Tom Stoebe for help with editing of this module. This work was funded under a National Science Foundation grant # 0501971.

### **Evaluation Packet:**

#### **Student evaluation questions (discussion or quiz):**

1. Explain what percentages of today's products are consumed by labor vs. materials costs.
2. Explain what design features enable ease of reuse.
3. Explain how to redesign a product for reuse.
4. Explain some of the marketing implication of proposed design changes.
5. Suggest what aspect of a design could limit the life cycle of the product.

#### **Instructor evaluation questions:**

1. At what grade level was this module used?
2. Was the level and rigor of the module what you expected? If not, how can it be improved?
3. Did the module work as presented? Did they add to student learning? Please note any problems or suggestions.
4. Was the background material sufficient for your background? Sufficient for your discussion with the students? Comments?
5. Did the module generate interest among the students? Explain.
6. Please provide your input on how this module can be improved, including comments or suggestions concerning the approach, focus and effectiveness of this activity in your context.

#### **Course evaluation questions (for the students)**

1. Was the module clear and understandable?
2. Was the instructor's explanation comprehensive and thorough?
3. Was the instructor interested in your questions?
4. Was the instructor able to answer your questions?
5. Was the importance of materials testing made clear?
6. What was the most interesting thing that you learned?