DONALD BREN SCHOOL OF ENVIRONMENTAL SCIENCE & MANAGEMENT
MASTER OF ENVIRONMENTAL SCIENCE & MANAGEMENT
CLASS OF 2005
GROUP PROJECT BRIEF
ON THE WEB AT HTTP://WWW.BREN.UCSB.EDU
SPRING 2005

Environmental Packaging Guideline and Certification program for the Electronics Industry

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Introduction

Many factors contribute to the design of electronics packaging, including cost, marketing, and theft-prevention. One aspect which is sometimes neglected is the impact of packaging on the environment. Government regulations, corporate goals, and consumer preference are making it more important to evaluate the environmental qualities of packaging designs. However, environmental impact is a broad and complicated topic which can be confusing to navigate. The goal in creating an environmental packaging guideline and certification program is to help packaging professionals in the electronics industry understand the environmental impacts of their packaging decisions. The guideline provides packaging professionals with relevant information and a methodology. This enables them to make practical choices that improve the environmental performance of packaging designs and processes while meeting all other business requirements. In addition, the certification program provides a means for packaging professionals to gain training in this field.

This guideline replaces the 1992 *R3P2 Handbook for Environmentally Responsible Packaging in the Electronics Industry*. These updates take into account the changes in regulations and practices in the packaging industry. In addition, the contents of the guideline reflect the latest understanding of environmental issues.

Significance

According to the EPA, annual generation of municipal solid waste in the United States has increased from 88 million tons in 1960 to 229 million tons in 2001. Containers and packaging made up almost one third of those 229 million tons. The waste generated by the industrial processes involved in the packaging supply chain dwarfs municipal waste. Industry in the United States is reported to create 7.6 billion tons of nonhazardous waste each year. Industrial packaging significantly contributes to that figure.

The Guideline is intended to provide the professionals of the packaging industry with a standard level of knowledge about the environmental impacts of packaging. The base knowledge that packaging engineers will gain from the guideline can be used to help them develop more environmentally responsible packaging. In turn, this should have a positive effect on the environment by reducing the overall environmental impacts from the packaging industry. Additionally, programs to improve environmental performance can help companies stay ahead of regulation. Currently, there are environmental packaging design requirements in more than 25 countries and package reporting and advanced disposal fees in 30 countries (soon to be 35). All these countries' programs vary in terms of material definitions, packaging definitions; type of packaging covered, and fee structures. The redeveloped guideline will delineate these aspects and provide an education and reference tool for the packaging professional. In addition, the certification program will give packaging professionals in the industry a standard measure to demonstrate their commitment to complying with environmental packaging regulations.

Current State of Electronics Packaging

In the past few decades, great strides have been made to reduce environmental impacts in the packaging field. Many toxic materials have been phased out, major ozone-depleting chemicals are no longer used, and concepts like Design for Environment (DfE) are becoming more common. However, there is still much that can be improved. The packaging professional is in a unique position to create positive change while maintaining the important services that well-designed packaging provides. Through expert knowledge and creative thinking, the packaging professional can dramatically reduce the environmental impact of packaging.

The push for more efficient packaging stems from increases in government regulation, consumer demand, and environmental awareness, along with a growing sense of responsibility on the part of today's electronics industry. New technologies have evolved to help meet this demand in the form of new

materials, improvements in old materials, more sophisticated recycling of waste, and increased use of recycled materials in new products. In addition, techniques to assess the environmental impact of different options (such as Life Cycle Assessment) have advanced significantly since their popular emergence in the 1990s. They have also given rise to sophisticated pieces of software such as TEAM, Sima Pro, and GaBi that draw on huge stores of data to give high-quality answers to complicated questions. The role of the packaging professional is to use these new technologies and tools as part of intelligent and creative designs.

The Goal of the Guideline

The overall goal of this guideline is to bring together the information that is needed for packaging professionals to make informed environmental considerations when designing packaging, and distribute this information to the industry. The guideline will accomplish this goal in a way that resists outdating, removes industry biases and adds credibility.

Environmental issues are often complex and require some specialized knowledge to address properly. Approaches that focus on a single issue, such as recycling or toxicity, can give incomplete and even misleading direction. This guideline prepares the packaging professional for the task of reducing the total environmental impact of the packages they design and manage.

Approach

R3P2 Handbook for Environmentally Responsible Packaging in the Electronics Industry was a document created by Hewlett Packard and other companies in the electronics industry in 1992 that introduced strategies that could be used by packaging professionals to reduce the environmental impacts of electronics packaging. Now, over ten years later, this handbook is rather out of date and rarely used. The 1992 document needed to be updated to reflect the changes that had occurred in the packaging industry and in environmental standards since its creation. In addition, there were changes that could be made that would improve the readability and organization of the document and therefore increase its overall usefulness. There were a number of steps that were taken to ensure that the guideline included the proper components and that these components were useful and accurate.

Data Collection

The first step was to gather the necessary data and materials that would help the group project members form a base of knowledge about the packaging industry. HP provided information on internal packaging practices as well as those of suppliers. The research provided by HP was supplemented with additional secondary research from various other industry sources plus online journals and databases that are provided by the UCSB Library. The data provided a solid understanding of the information that should be included in the guideline. An outline of the guideline was then created to organize its structure.

It was important to ensure that the new guideline would be useable and helpful to packaging professionals. The best way to be certain was to request feedback and direction from those that would be using the guideline.

Survey

A survey was created and distributed to various packaging professionals worldwide. The survey was created to gather specific information that will help create a document that will be both useable and effective in reducing environmental impacts. The goal of the survey was to provide additional packaging knowledge, insight into how the 1992 environmental packaging guideline was used, and ways that it could be improved.

Survey results

The survey provided much of the feedback that was needed. The most significant results of the survey are:

- The most common materials used in electronics packaging are; Cardboard, Plastic Foam, Paper, Hard Plastic, Wood (Inks & Adhesives)
- Cost is seen as the largest impediment to environmental packaging practices
- There is a need for knowledge on regulations and recycling infrastructure and a desire for this guideline to include such information
- Several recommendations were included that specified ways that the document's layout and functionality could be improved.

Reorganization of the Guideline and Stakeholder Review

The layout of the 1992 *Handbook* was reorganized based on the guideline's teaching purpose and the results of the survey. In addition, several new

components were added. A Stakeholder review was then conducted with HP and IBM. They provided recommendations on how to improve the organization further. With the incorporation of these recommendations, the structure was finalized. We then wrote the document. Details are included below.

External Industry Review

Once the research was finished and all of the sections were completed, the guideline was distributed to various industry organizations that specialize in the following issues: recycling, fiber manufacturing, and plastics manufacturing. These organizations were approached with the hope that they would provide feedback on the accuracy, timeliness, and relevance of the guideline's content. A number of different companies took the opportunity to comment on the guideline and provided feedback.

The Final Product and Creation of the Certification

The guideline was considered complete once the external review recommendations were assessed and addressed appropriately within the document. The external review validated the accuracy of the document and therefore, the creation of the curriculum could begin. Work has begun in concert with HP to develop a certification program that is based on the guideline.

The Guideline

The information included in the guideline is intended to identify and explain the environmental issues that apply to packaging. The goal is to supplement this knowledge with tools and strategies that can be used in a variety of different packaging applications. It is important to note that this guideline does not include specific instruction on how to design a package, what manufacturing technologies to utilize or what materials to use. Instead it is a resource that can be used to provide information, tools, strategies, and resources that will provide the reader with the components they need to make design decisions that take the environment into account.

The information within the document is organized in such a way that it can be used as both a textbook and reference manual. The flow of the content was carefully thought out and the information in each chapter builds upon previously discussed topics. The guideline was written to be an educational document and will be distributed electronically.

Components of the Guideline:

- A procedure for incorporating environmental considerations into packaging designs
- A general discussion of the various impacts that packaging has on the environment
- General strategies for reducing the environmental impacts of packaging
- An in-depth discussion of each of the most common materials used in packaging (corrugated fiberboard, paperboard, wood, solid plastic, expanded plastic, and inks). This discussion also includes detailed information on the environmental impacts of each material and specific impact-reducing strategies for that material.
- A packaging scenario that continues throughout the document. The scenario is used to illustrate how the packaging procedure and the various reduction strategies contained within the document are applied during the design process.
- A discussion on how to balance the different environmental factors that arise in package design and how these factors interact with other packaging considerations.
- Information on how to properly label and describe the environmental features of the packaging.
- Information on how to stay up-to-date on regulations, new materials, and recycling infrastructure.
- In addition, there are a number of appendices included to provide more detailed information about other topics related to the environment and packaging. The appendices included are: Glossary and Acronym Guide, Material Guides, Recycling Infrastructure, EPEAT, Existing Standards and Guidelines, Standardized Symbols, and Planning Template

Limitations of the Guideline

The guideline, although comprehensive, is not without its limitations. Though it is designed to resist outdating, it is still a living document that will require attention and updating as technology, regulations and the packaging industry changes. Without the time and

effort to maintain this document, it could become outdated. In addition, although this document was written to be an international guideline, some U.S. focus remains. Finally, finding quantitative information on the impacts of the various materials was very challenging and the data that does exist is very limited or expensive to access. Our goal was to include the environmental impacts that result from the complete life-cycle of the 5 most common packaging materials. Unfortunately the impact data for plastics does not represent entire life cycle, it only includes the impacts from raw materials to manufacturing of a plastic product and leaves out use and disposal of that product. This hinders the ability to quickly compare the impacts from plastics to those from fiber products. Although these limitations do exist, they do not to no hinder the guidelines educational value.

Professional Certification

In addition to the guideline, an Environmental Packaging Certification will be available through the Institute of Packaging Professionals (IoPP). The certification program will consist of two components.

- Certification Course – A course curriculum designed to teach and reinforce the key points from the guideline.
- Certification Exam – A test designed to certify that professionals have a solid comprehension of environmental principles related to packaging

How the Guideline connects to the Professional Certification and Curriculum

The environmental packaging guideline is the foundation for the lessons of the professional certification. It contains the information needed to participate in the online training and take the certification exam. The curriculum highlights the most important information included in the guideline and the certification verifies that the professional is able to use these highlighted concepts proficiently.

The professional certification will serve a number of functions. Within the electronics packaging industry the certification presents a way to establish a standard level of expertise in environmentally responsible packaging. Completion of the program gives the packaging professional documentation of their environmentally responsible packaging abilities and knowledge. The certification will also provide employers and peers with a third party verified tool to identify that the professional is knowledgeable on environmental issues in packaging for the electronics industry. In addition, it gives companies a metric for judging their personnel's expertise on these issues. Finally, it enables the companies to demonstrate independently verified action on addressing environmental issues in packaging.

Conclusion

The environmental issues encountered by a packaging professional are complex, highly variable, and require the use of judgement to handle effectively. Because of these attributes, it is not feasible to create a directive to "give the answer" to packaging professionals for every eventuality they will encounter. Instead, packaging professionals must gain the knowledge and tools necessary to make these judgements on their own. By incorporating environmental concerns and expertise into the duties of all packaging professionals, companies are able to address these issues in a systematic way, rather than relying on a few specialized environmental staff to be present for every packaging decision.

The significance will express itself when the packaging professional changes the design of a package because of newly acquired knowledge from the Environmental Packaging Guideline.

Acknowledgements

We would like to thank our advisors: Magali Delmas (Bren), Randy Boeller (HP), Susie Elkins (IBM), Bob Sanders (IBM) and Shaye Hokinson (AMD) for their guidance and assistance throughout this project. We would also like thank our editor, Sarah Doss, and our graphic design artist, ANIMATRIX Computer Arts, Inc for all of their hard work and assistance. Lastly, we would like to thank Paul Russell (HP), Suzanne Keeler (HP), Arturo Keller (Bren) and Roland Geyer (Bren) for their advice and expertise.