ELECTRONIC BOOK DEVELOPMENT ON A SHOESTRING BUDGET

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Abstract

An electronic book on testing methods for transport/distribution packaging was developed to support the Packaging Engineering Certificate Program at Christian Brothers University as part of the author's sabbatical leave project. It is delivered on CD for quick access as well as on the web for public access. This article describes techniques and software used in the project. These software development tools are either readily available to most professors or are inexpensive.

Introduction

Online courses have increased significantly in recent years. Often the development of such courses is expensive and needs significant technical support. It is difficult for the average professor to develop a fully online course without appropriate technical support. Typically an online course consists of video steaming lectures together with the use of course management software. A similar model has been used at Christian Brothers University (CBU), where an IT technician is in the back of the room video recording the lecture. If the professor uses a PC for his presentation, using PowerPoint for example, screen-recording software is also used to record activities on the screen. These recordings are then edited and packaged by a technician for online delivery. This approach is expensive, but it is very effective and suitable for large-scale implementation.

CBU started a packaging program as an elective course for engineering juniors/seniors in the spring of 2001 and has now developed into a certificate program. The Packaging Lab was established in 2003 with almost $300,000 spent on packaging equipment, in addition to almost $400,000 spent on other related lab equipment in the Polymer Lab, Solid Mechanics Lab, and Manufacturing Lab. For more information about the certificate program and its related activities, please refer to a recent article entitled "Packaging Engineering: Responding to Industry Needs & Market Change".[1] As part of the author's sabbatical leave project, an electronic book on distribution/transport testing methods was developed to support the newly established Packaging Engineering Certificate. This e-book is available both on CD for quick access and on the web for public access. The techniques used in this project are also suitable for online course development. The tools used are either readily available to most faculty members or are quite inexpensive. This article describes some of these techniques and tools.

Overview of the Package Testing E-Book

The e-book consists of five major tests that are commonly used to simulate the distribution/transport environment for packages. These tests are drop test, impact test, vibration test, compression test, and shock test. Figure 1 shows a schematic diagram of the organization of pages and links to additional information. Even though the pages in the e-book are organized sequentially, direct access can be done using "Index" on each page (shown in Figure 2) and a "Table of Contents" page.

For each test, the following information is provided: a brief description of the test, a sound clip of information on the page (Link B in in Figure 1), an image of a tester, detailed
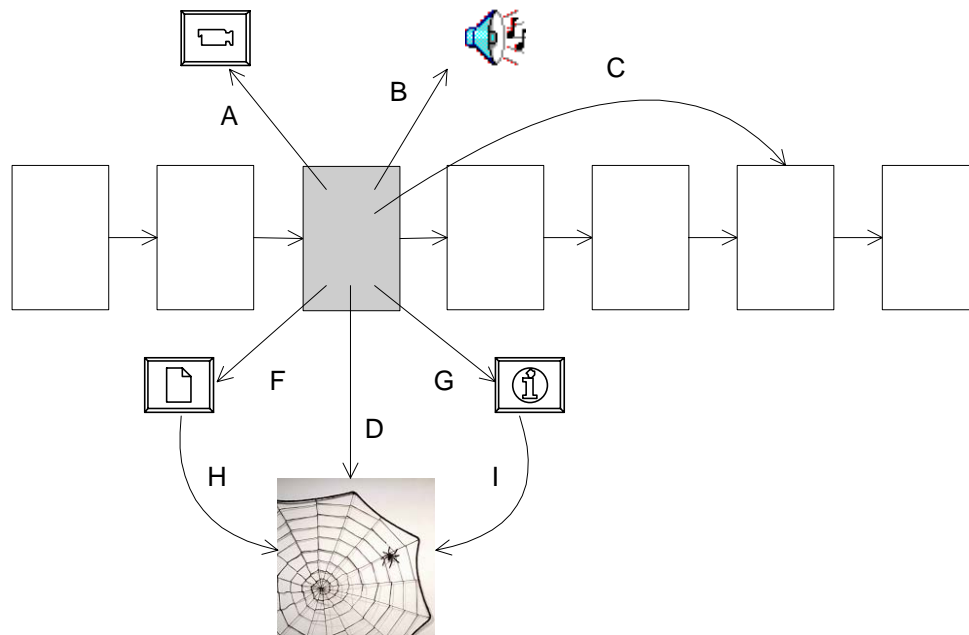
Figure 1. Organization & links.

information of such tester (Link D in Figure 1), overview of test procedure (Link F in Figure 1), links to ASTM for online purchase of appropriate standards (Link H in Figure 1), video clips of the tester in action (Link A in Figure 1), and a database of various commercially available testers (Link G in Figure 1) with links to vendor web pages (Link I in Figure 1). In addition, some pages contain links to other pages in the e-book (Link C in Figure 1) and those on the web (Link D in Figure 1).

Figure 2 shows a typical screen design of each test. Buttons and indexes are provided for easy navigation through the e-book. They are described in Figure 3. Figures 4 and 5 show a Test Procedure in PDF format and a video clip screen, respectively. Ample web resources are provided throughout the e-book as well as in the appendices, shown as an example in Figure 6.

Development Tools & Techniques

The development tools discussed below are either readily available to professors or inexpensive.

PowerPoint Software

PowerPoint presentation software[2] is part of Microsoft Office, which is widely used on college campuses. It is a standard for electronic presentation used by most faculty and students.

Here are a few useful techniques, tips, and comments about PowerPoint:

o Slides can be eliminated and added at ease. This is very useful in maintaining a large number of slides or e-book pages. In addition, slides can also be rearranged simply by dragging from one location to another.

o The slide show can be saved as HTML for web delivery using the "Save as Web Page" option, Save as Web Page..., located on the "File" menu. The reader can be on any web-enabled computer and is not required to have PowerPoint software to view a PowerPoint generated e-book.
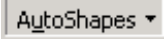
o When the show contains more than one slide, an index (list of slides) is automatically provided on the left frame on the screen (as shown previously in Figure 1). This index is a very useful navigation tool.

o Forward and backward buttons are also automatically provided on the bottom of each page for sequential access to these slides or pages, such as ◁ Slide 16 of 18 ▷ .

o Full screen button, 🖳, is also given on the bottom right of each web page. This allows a full view of each slide. However, doing so eliminates the index and slide navigation buttons mentioned earlier. Thus, custom navigation buttons are highly recommended, such as ◁◁◁ ▷▷▷ . They will stay on the page during full view mode.

o Transparent color of an image can be set with ease using a picture tool, 🖌, which appears when the image is selected.

o Several action buttons, such as 🏠, 🕮, ①, and 🎦, are provided in PowerPoint. They can be found by clicking on the AutoShapes button, AutoShapes ▾ , on the bottom of the screen. An action, including audio and video clips, can then be set for such action button.

o Video clips are embedded into a page using the following sequence of buttons/ commands in PowerPoint: "Insert," "Movies and Sounds," "Movie from file." The same technique can be used to embed sound clips by selecting "Sound from file" last in the same sequence.
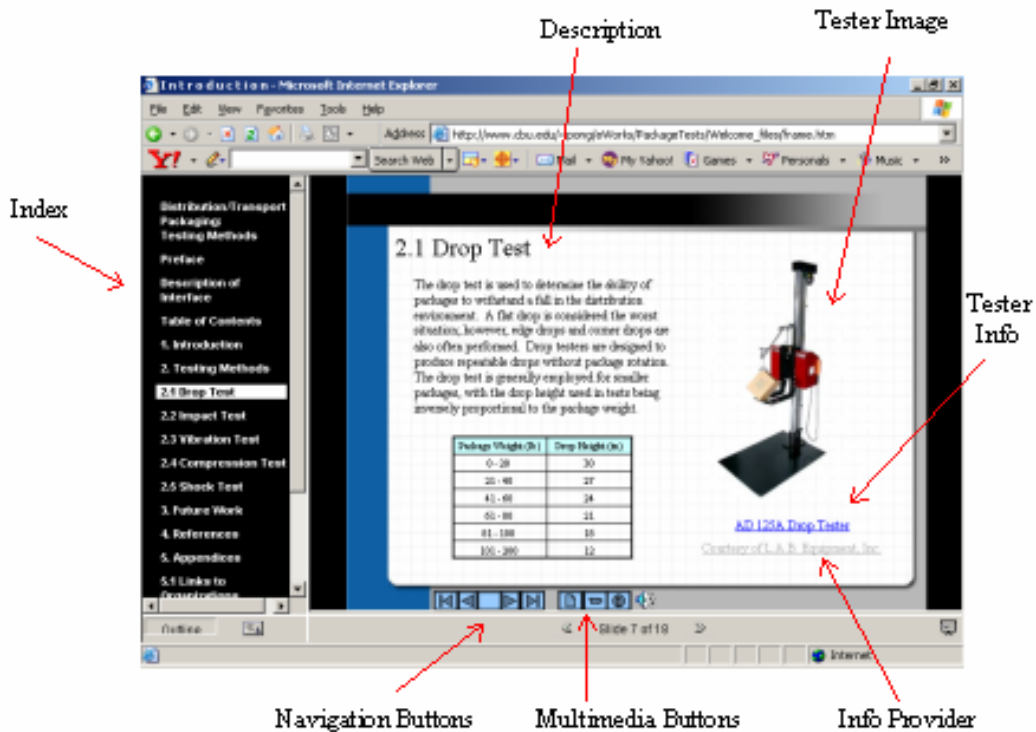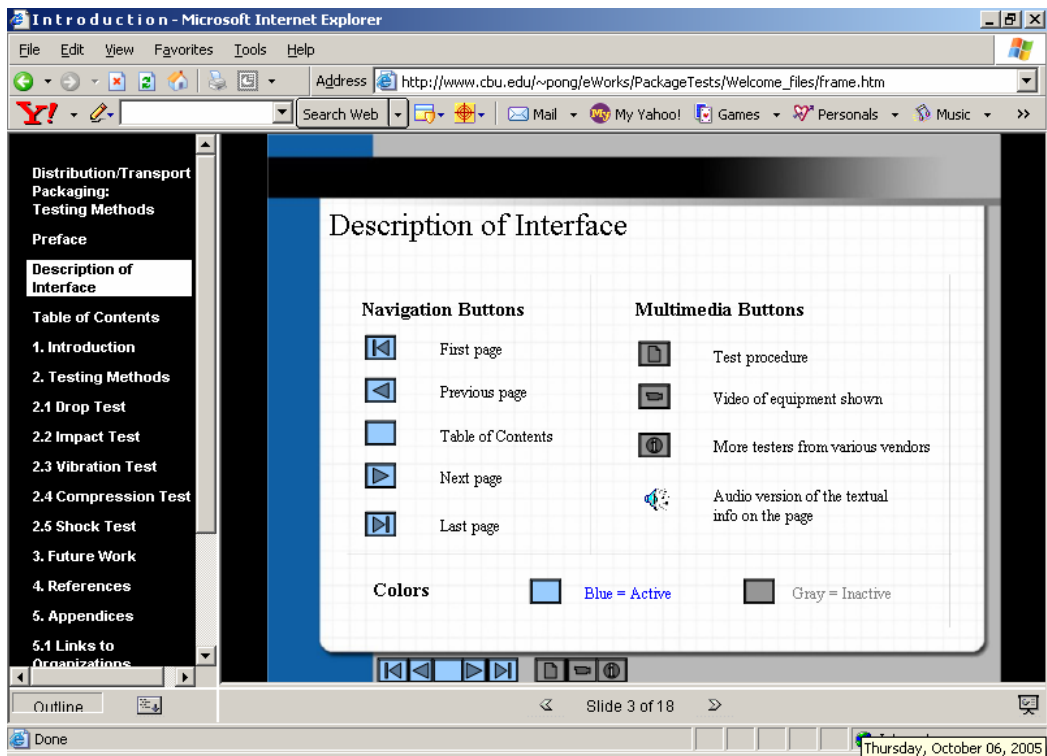

Figure 2. Screen design.
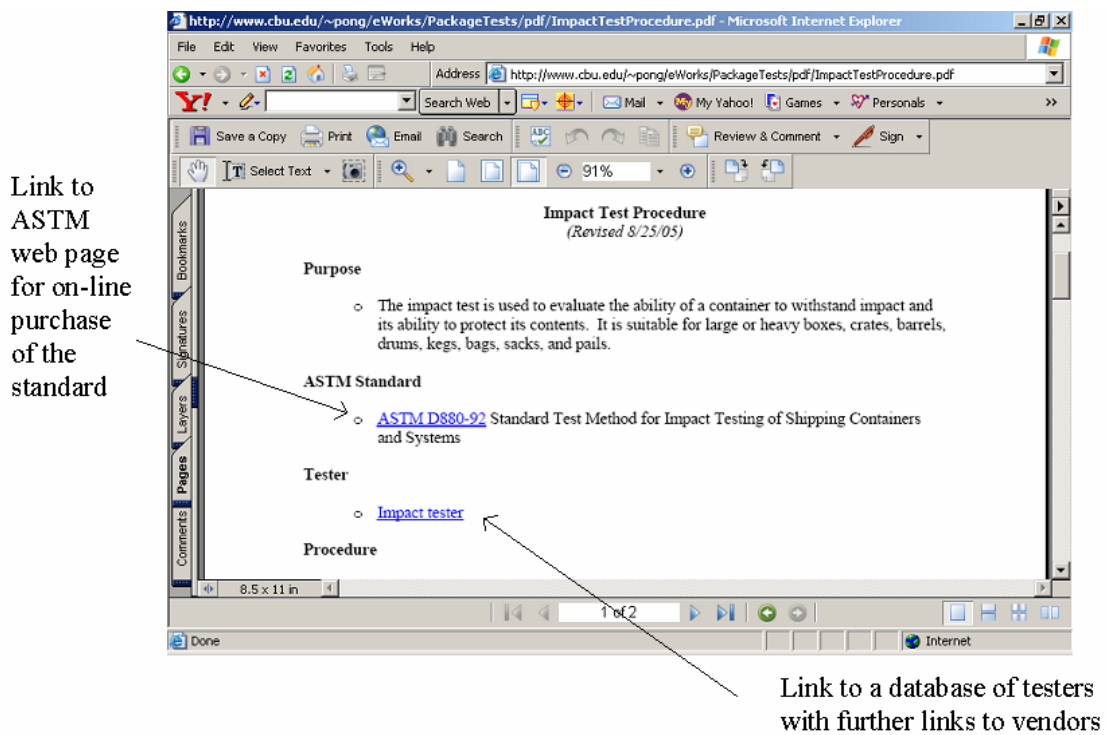
Figure 3. Description of interface.

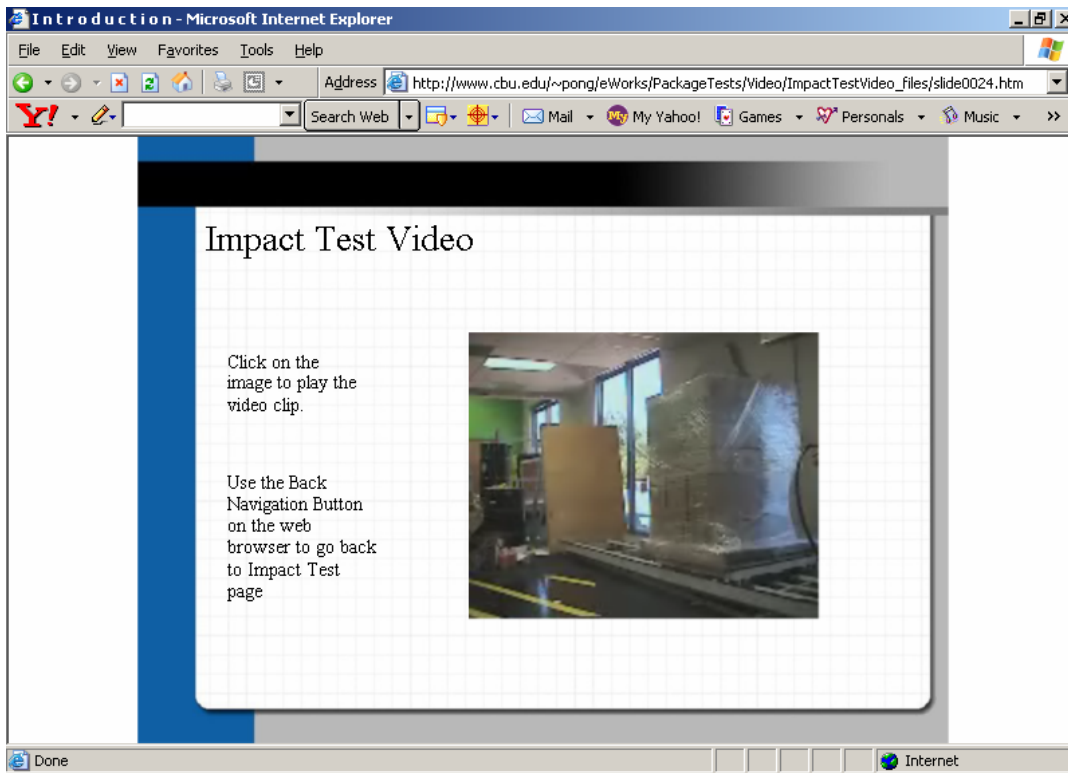Figure 4. Test procedure example in PDF format.
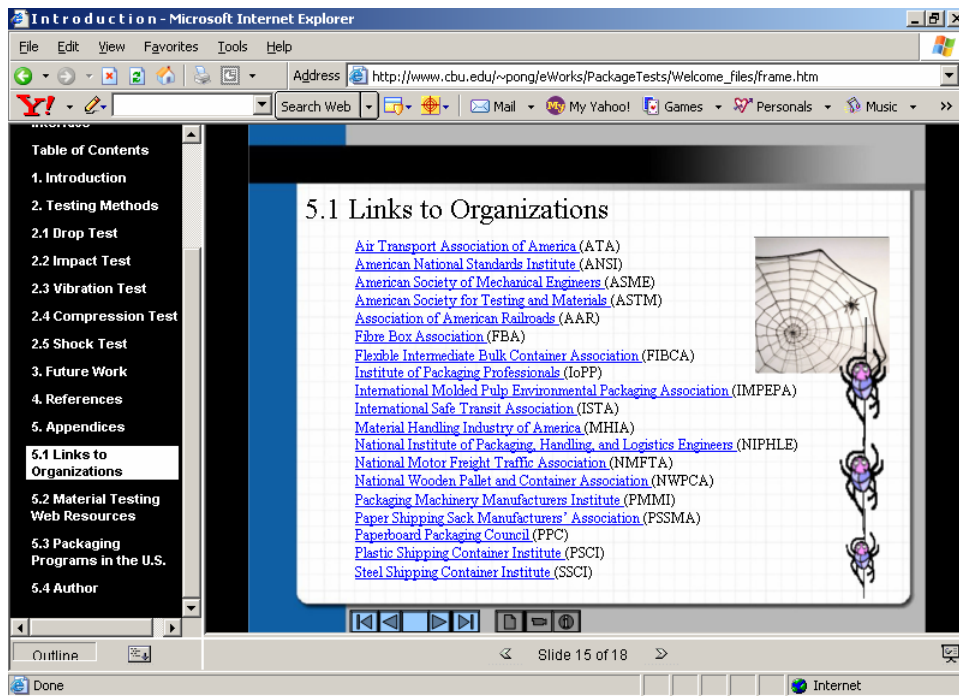
Figure 5. Video page example.

Figure 6. Web Resources.

My Screen Recorder Software

My Screen Recorder[3] allows the recording of activities on full screen or part of the screen. Its output is a video clip in AVI format. It is an excellent tool for developing tutorial video clips showing how to run a software package, etc. This is quite useful for this project since some video clips may contain unwanted surrounding areas. The video clip was first played using Windows Media Player; the recording is then performed on a selected area of the clip shown.

A few notes on My Screen Recording software:

o AVI format is quite large. It can be converted into other more compact formats, such as MPEG and WMV. Windows Movie Maker can be used to convert and/or combine AVI or MPEG clips into a very compact WMV. Blaze Media Pro software (to be mentioned next) can be used for the same purpose.

o For slower computers, the hardware accelerator needs to be turned off before recording. Otherwise, darkened video clips will result. This can be done by using the following sequence of buttons/links/ commands provided by Windows OS: Start, Settings, Control Panel, Display, Settings, Advanced, and Troubleshoot. Typically, the hardware acceleration is set at "Full." The setting should be changed to "None."

Blaze Media Pro Software

Blaze Media Pro[4] is media editing/converting software. Audio/video files can be converted into various standard formats, including WAV, MP3, WMA, OGG formats for audio and AVI, MPEG, WMV formats for video. Audio/video clips can also be edited. In addition, the software allows you to make a movie clip from several media clips. The program is relatively simple to use.

In this project, a video camera was used to record a video clip. The camera comes with media software that captures the recording in MPEG format. My Screen Recording software was used to record only the desired part of the video screen. Blaze Media Pro software was then used to eliminate unwanted frames of the video clip. Then, Blaze Media Pro saved the clip in WMV format.

A few notes on video production:

o WMV was chosen over MPEG due to its much smaller file size (about 1:10 ratio) than those in MPEG format. The quality, however, was compromised somewhat.

o Windows Movie Maker software can also be used to convert an MPEG file to WMV file. It also can be used to make a movie from various media clips. However, it does not have frame-by-frame editing found in Blaze Media Pro and other more expensive media editing software.

o If a CD delivery mode is used instead of web mode, MPEG file is recommended for its higher quality.

o A video clip can be integrated as a link from the page or embedded into the page. The former approach requires the activation of a media player on the user's PC, such as Windows Media Player. In the latter approach, the clip is played directly from the page without a pop-up of another media player. The author feels that the latter approach is cleaner, thus chose to use it.

Adobe Acrobat Professional Software

PDF files have been widely used. The file size is compact and the online as well as printing quality are great. PDF file reader, Adobe Reader, can be downloaded free. However, Adobe Acrobat is needed for creating a PDF file. The Acrobat software, such as the

professional version[5] used in this project, is readily available at many colleges/universities.

For this project, files containing text and graphics are attached to each page. They were first created using Microsoft Word. They were then converted into PDF format. PDF files are excellent for web delivery due to the very compact file size as well as quality.

NaturalReader Text-to-Speech Software

Some users prefer to "listen" to the information than to "read" it. Thus, in this project, an audio button is provided on each page. Initially, a recording voice in MP3 format was planned. MP3 format was chosen due to its compact size as well as quality. Later in the project, the Enterprise version of NaturalReader [6] was used to convert the text on each slide into MP3 sound file. The software comes with two AT&T natural voices, one male and one female. Additional voices can be purchased. Using the text-to-speech software eliminated the need to record a voice for each page. The text is readily available on each page, thus it is much easier to convert into an MP3 file using such a tool.

A few notes on using audio clips:

o NaturalReader generated MP3 in stereo mode with CD quality. In this work, Blaze Media Pro (mentioned earlier) was used to convert the stereo mode to mono mode and the CD quality down to voice quality. The voice quality is still excellent and the file size is reduced about half.

o As in using video clips, sound clips are embedded into the page so no media player software is required.

Conclusions & Future Work

This article demonstrates different techniques and software packages for an e-Book development. They can be used to develop a full-blown online course as well. The current version of the e-Book can be viewed at http://www.cbu.edu/~pong/eWorks/PackageTests.

Advantages of using page-based organization with attached media approach as shown in this work are:

o The development can be incremental. There is no need for the university to commit to an expensive overhead cost for other approaches.

o Revisions can be made by changing certain pages, media clips, and/or adding/deleting pages without having to re-record the entire lecture as found in video-lecture-based organization.

However, the approach used in this work would require commitment and computer skills on the faculty's part. It should also be noted that the author does not claim that the software products used in this project are the best choices. There are several similar products available and some could be better.

The current e-Book provides basic information on transport package testing. The university is in the process of acquiring various packaging lab equipment from a grant from the Assisi Foundation. Future work will include an e-Book on operating instructions for each tester. These future e-Books would greatly benefit students at CBU and those at other institutions who use the same tester. Information about future work can be found under the "Resources" section of the CBU Packaging Engineering web site at: http://www.cbu.edu/engineering/ packaging.

Another future work will be a tutorial e-Book showing techniques used in this and future work. My Screen Recorder will be used extensively to record how to use the software mentioned above to accomplish certain tasks. This work will be useful for other professors who would like to use the approach mentioned in this article.

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Biographical Information

Dr. Siripong Malasri is a Professor of Civil Engineering at Christian Brothers University. He received his Ph.D. from Texas A&M University and is a registered professional engineer in the State of Tennessee. His background includes construction management, structural engineering, solid mechanics, material testing, artificial intelligence, and optimization. He was instrumental in the establishment of packaging engineering at CBU while he was engineering dean at CBU between 1999-2005. He has worked closely with several individuals to secure funding from various sources to support the packaging program, including the Medtronic Foundation, International Paper Foundation, and the Assisi Foundation of Memphis. He was recognized as the 2004 Outstanding Engineer of the Year by the Tennessee Society of Professional Engineers. He can be reached at pong@cbu.edu.