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Lorrie Frear

Alex Lobos

Rochester Institute of Technology

Sandra Turner

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Model for Interdisciplinary Collaboration in Packaging Design

Lorrie Frear, Alex Lobos, Sandra Turner

Rochester Institute of Technology, USA

Abstract

This paper explores a studio course in packaging design within Rochester Institute of Technology, which touches on three key elements: First, the course is designed as an interdisciplinary studio comprised of fourth year and graduate students in graphic design, industrial design and packaging science, allowing them to refine skills in their own disciplines while expanding their breadth in other methods of thinking. This model, commonly called “T-shape” profile, is crucial in today’s professional practice (Design Council 2006). Second, the course involves a Fortune 500 company sponsor, who challenges students to develop packaging solutions in an internal design competition. While collaborations between academia and industry have been common since the Nineteenth Century, they never cease to offer great benefits to all parties involved (Lee 2000, 111). Third, the course assignments require students to develop environmentally friendly solutions. Sustainability has become a key element in packaging design, given the negative effect that current practices in manufacturing and mass consumption have on the environment (Elshof 2008, 134).

Introduction

Packaging design is a complex endeavor. Bringing packaged goods to market involves significant considerations such as product protection and preservation, material selection, distribution and inventory, user convenience, and sustainability and end-of-life (Petrie 2010, 13). Also of great importance are marketing strategies focused on presentation and positioning of products at the point of sale, which ultimately positions a brand within the minds of consumers and differentiates it from its competitors (Ambrose and Harris 2011, 13). While a collaborative approach between disciplines in the packaging industry is ideal to address all of these issues, this is not always the case (Elliott 2009, 598-599). When the process is translated to academia, cross-disciplinary collaborations are even more rare, daunting and challenging.

The methodology used for this course involves students working in interdisciplinary teams. The first step is for students to gain an in-depth understanding of the sponsor’s organization, product line(s) and the design challenge. They begin the process by conducting visual audits and market research of products at point of sale. The next steps in the process are to generate concepts based on brainstorming and ideation, and to build virtual and physical prototypes. By having physical prototypes to communicate important design elements, students are able to receive critical feedback from faculty, sponsor and the class to evaluate and refine their solutions. The time allocated to the competition is eight weeks,

emulating the intensity and expectations common in professional environments. The competition concludes with team presentations to representatives of the sponsor. The sponsor, faculty and external packaging experts select winning solutions based on a rubric (Fig. 1) provided with the project brief, which includes areas such as technical feasibility, sustainability, visual appeal, and brand differentiation. This fast-paced, team-based experience allows students to develop crucial skills that will help them in becoming successful professionals; such as interdisciplinary awareness, teamwork, and focus on sustainability (AIGA 2009).

Figure 1: Course’s grading rubric

The primary goal of the project is to modernize its brand assets and strengthen its consumer appeal by the packaging at the point of purchase, and in use of the product.			
	Category	Weight	1-5 Grading
1. Adding value to the primary packaging for the consumer:			
in-buying decision – increase visibility and communication to the consumer	1	0.15	
Wow Effect -Uniqueness - on shelf	2	0.15	
in-use – improve consumer use and storage of the packaging	3	0.3	
2. Sustainable Use of Packaging Materials in the Supply Chain		4	0.2
3. Adding value to the primary packaging for the retailer		5	0.2
Reduce moving of product and handling in store			
Optimize store shelf space			
Total Score			
Max points = 50			
Deliverables			
1 Students will deliver a presentation of 15 - 20 minutes presenting their concepts to best solve the issues above.			
2 A group of judges will grade the students on their presentation material presented based upon the above criteria.			
3 The group of judges will be a mix of individuals from Kraft and RIT - TBD.			

Packaging Design at RIT

Rochester Institute of Technology (RIT) is a private university in upstate New York. With colleges in areas such as Engineering, Science and Technology, Art and Design, and Sustainability, RIT offers unique opportunities for interdisciplinary collaborations and experiential learning (RIT 2011, 5). Packaging design at RIT is covered in several departments, each one with a particular focus. The College of Applied Science and Technology (CAST), offers a highly technical approach to packaging, with strong interest in materials science and sustainable practices. The College of Imaging Arts and Sciences (CIAS), covers packaging design in both industrial and graphic design curricula. In order to take full advantage of this academic diversity, there have been continued efforts to integrate packaging design courses within the different academic areas. This integrated model prepares students to become engineers and designers able to envision the entire lifecycle of complex systems rather than developing isolated products (Blair-Early 2010, 211).

Interdisciplinary approach

The benefits of project-based interdisciplinary collaborations have been covered extensively in education research. Hinkel talks about how a “successful transformation of creative ideas into product packaging requires the integration of aesthetics and the melding of artistic vision and technical knowledge” (Hinkel 2009). Students who take part in these types of courses often expand their marketable skillsets and form a more holistic approach that goes beyond the expected roles of their own disciplines. For example, it is not uncommon to see industrial designers discussing branding strategies, and to observe graphic design students analyzing physical form studies. The nature of interdisciplinary courses produces innovative outcomes that are unreachable in courses with only one discipline

For a package design to be successful, it must have both a functional design and visual consistency that “leads consumers to immediate brand and product recognition. When a properly positioned brand identity, graphic architecture, color, artwork, structure and communication hierarchy are part of a cohesive system, packaging maximizes the retail presence of a brand. And, it enhances consumers' experience with the brand” (Mininni 2009). For this approach to be successful, it is critical that all participants have an equal stake and ownership in the project and the opportunity to meet as a group to discuss and evaluate options and ideas.

Throughout this course, it is often noted that students assume particular roles in a natural way, complementing each other. Graphic design students lead the identity and visual branding of the concepts and become natural interpreters of the end-users aspirations and expectations. Packaging science students provide extensive technical and sustainability expertise. Industrial design students tend to be the “glue” that connects all the elements of the project together. They combine the technical needs of materials and forms, while also addressing physical elements of user experience and interaction. The results are real-world solutions that positively benefit manufacturers, retailers and end-users.

In the process of working together, students refine interpersonal communication skills, and become familiar with the vocabularies, challenges, skill sets, limitations and expectations of the other disciplines. Marketers, designers and packaging engineers speak different languages and approach packaging from nearly opposite perspectives. “Engineers tend to consider packaging primarily in terms of its functionality and to focus on rational benefits (easier to open, etc.). Brand managers tend to think primarily in terms of return on investment (ROI) and focus on incremental costs and sales revenue” (Young 2009). Students therefore develop a valuable understanding and respect for the contribution of the other disciplines in the course. This deeper level of thinking allows for students to go beyond skill building and to really understand the power of multiple disciplines working on the same task (Alexander, Walsh, Jarman and McClune 2008, 33). In addition to contact with industry sponsors, students receive guidance and feedback from the three instructors of each discipline, an opportunity that would be impossible in a traditional classroom setting.

Involvement with industry

An integral component in interdisciplinary projects is the industry sponsor. Students tend to perform at a higher level when they are addressing needs of a real client outside of the academic environment. In today's world of business, it is vital that students have the skills to collaborate effectively across all disciplines within a company and understand "their important role of shepherding package design from concept to store shelf—bridging the gap between design and implementation" (Hinkel 2009). This course provides students with an opportunity to learn how to work in interdisciplinary teams and prepares them for these situations. Industry sponsors are asked to define the project assignment or design brief, and act as clients and mentors to students. . The course outlined in this paper is the model for successive courses and serves as a case study. Considerable analysis, refinement and improvement takes place at the conclusion of each course and the information obtained is incorporated into subsequent versions of the course. Sponsors in this course are typically Fortune 500 companies, such as Kraft Foods, Colgate-Palmolive, American Packaging Corporation, Wegmans Supermarkets and Sun Products.

Course goals and learning outcomes

The course combines visual, verbal, interactive and experiential learning modes to fully engage all students and to include a wide range of learning styles. Activities include lectures, demonstrations, guest speakers, blog postings, required readings, process critiques, group discussions, field trips, field research, market analysis and the final digital presentation to the industry sponsors. The goals and learning outcomes of the course are:

***Goal 1:** Work collaboratively in a team environment, learning about the skill sets, vocabulary, challenges, limitations and expectations of the other two disciplines, in an understanding and respectful manner.*

Learning Outcomes from Goal 1: By working closely with their team members, students are introduced to the working methodology, terminology and challenges of the other two disciplines as they refine and complete their solutions. It is expected that students take ownership of their role in the team and make improvements where needed in order to meet expectations and the deadlines. In addition, the project rubric is used throughout the course to provide students with the opportunity to evaluate their individual performance as well as that of their team members. This information affords the faculty an opportunity to evaluate team and individual performance on a regular basis throughout the project. Students appreciate this process for ensuring fairness in grading and encouraging a high level of performance by all class members.

***Goal 2:** Gain an in-depth knowledge of materials, processes, terminology and technologies related to the packaging industry.*

Learning Outcomes from Goal 2: Participating in the complete process of designing, refining and moving a package design to market is an invaluable experience for students. For example, graphic design students enter the course with experience and skills in branding, logo design, typography, and marketing and communication strategies, but know very little about the technical side of the packaging design process. Material selection, human factors and form concerns, sustainability issues, shipping, storage and end-of-life considerations are not skills learned in the traditional graphic design program. In addition to gaining more experience in applying these tactics to a “real” problem, the graphic design students begin to see packaging as being more than just applying graphics to an already-existing form or vessel. Many students are overwhelmed at first with the technical information, but they quickly gain an appreciation and understanding of the role all disciplines play in packaging design. Some students surprise themselves with the level at which they involve themselves in the whole process.

Packaging science students are generally the most pragmatic in the course in terms of understanding and respecting the realities of technical and production capabilities. They come into the course expecting to provide statistics and data about regarding design options and then quickly find themselves excited about brainstorming logo ideas or building models and prototypes. Some packaging science students find the creative side of the design process uncomfortable, however, over time as they are exposed to the different methodologies, they begin to appreciate the level of skills needed in all disciplines. Packaging science students and the industrial designers find that some of their skills (such as 3D modeling and materials knowledge) overlap, and they have to find ways to contribute without duplication of effort or conflict. The packaging science students have mentioned many times how “cool” it is to work with the design students and how much it has enriched their educational experience.

Industrial design students, also known as the “glue” of the project, come into the course with a high level of rendering skills, (both by hand and digitally), a clear understanding of human factors and form considerations, and a wide-range of knowledge of materials and sustainability. The industrial and graphic design students generally work well together as they share a vocabulary and working methodology. Industrial designers often assist with the branding strategies and tend to enjoy this process. Conveying the benefits of the design solution and telling the story of how it will improve the end user is an area that industrial designers are trained in and expected to deliver throughout the process. They will often need to employ their persuasive techniques to convince the packaging science students of the validity of their design thinking. Students are encouraged by the faculty to use open communication and mutual respect when communicating and they will usually find a common ground without intervention. Industrial designers learn a great deal about the pragmatic concerns faced by the packaging science students with regard to materials, shipping, sustainability issues and manufacturing realities.

Goal 3: Gain insight into the objectives and strategies used to market and promote products from the viewpoint of the industry sponsor.

Learning Outcomes from Goal 3: The industry sponsor's input and feedback throughout the design process is critical to the success of the end product, and to the course in general. Students join the class with little to no practical experience with marketing or product development and promotion making this a great experience before starting their professional career. Throughout the course, students share with the sponsor process presentations to ensure that they are meeting the objectives of the project brief. During the presentation, faculty, sponsor and the class provide feedback to help keep the team on track with the overall objectives of the project. In addition, the final solutions of all teams are graded using one rubric that is designed and agreed upon by all judging parties (Fig. 1). The rubric includes evaluation on marketing and promotion, such as shelf presence and the consumers' buying decision. It also includes sustainability and end-of-life considerations and overall appeal and impact for the intended consumer. The winning team is chosen based on meeting and/or exceeding the objectives of the sponsor. The sponsor takes great pride in choosing a winning team that meets and/or exceeds the project objectives. This careful and rigorous selection and evaluation process demonstrates to the class the importance of how understanding, respecting and satisfying the needs of the client is critical to the successful introduction of products and packages in the marketplace.

Goal 4: Create and present innovative packaging that meets the criteria of the design brief and grading rubric.

Learning Outcomes for Goal 4: During the final week of the semester, all teams present their final design solutions before representatives of the sponsoring company, the faculty of the course and packaging experts. The presentation is open and promoted to the entire RIT community which will often lead to a full room of other students and faculty of the institute. Each team designs a brief yet comprehensive presentation that tells the story of the design process in a way that engages the audience and clearly communicates the elements of the design problem and solution. Students learn presentation techniques from each other during this process and it is expected that students fully participate. This is invaluable experience to all participants, who will be called upon many times to present concepts to peers, vendors, managers and clients.

Course sequence

The course meets two times per week for eleven weeks, following RIT's quarter system. Lectures, short assignments, demos and discussions provide the foundation for the technical instruction on packaging design. The company-sponsored project, which is the main component of the class, is eight weeks in length. The integration of the different disciplines is done in an incremental manner as the project is introduced: industrial and graphic design students begin working together from the first day of classes, while packaging science students join the team project in week three. The course is structured in a way that challenges students organize their workload and time management wisely, in order to produce a successful outcome. The sections of the course are as follows:

-COURSE INTRODUCTION: On the first day of class, the graphic and industrial designers begin an introductory packaging project in interdisciplinary teams. This project is due at the end of week two.

-SPONSORED PROJECT: the sponsor introduces the main project during week three by means of a detailed design brief. At this time, student teams are also assigned. The selection of team members is done by all three faculty members based on interpersonal compatibility, skill level and discipline representation. Research supports this method, noting that matching students based on academic performance and self-selection provides a “reduction of issues that otherwise surround randomly created teams or those that only use one of the two methods” described above (Matta, Luce and Ciavarro 2010, 10).” Other resources for the teams include a \$100 stipend from the sponsor to purchase products for competitive product testing, visits and visual audits at local convenience stores and super markets, field trips to flexible packaging manufacturing plants, and lectures.

-FINAL PRESENTATION: The sponsored project culminates in a formal presentation where each team demonstrates their understanding of the strategies and contributions of each of the disciplines in addressing the requirements of the design brief. For example, students show an understanding of branding, marketing, and consumer communication and education. Teams also present form studies and prototypes, demonstrating their concern for human factors, material selection and sustainability. In order to help students present their best work to the sponsors in their presentations, a mandatory presentation rehearsal is required one week prior to the final delivery. This provides time for additions and changes, raising the quality level of the final delivery.

-JUDGING AND GRADING: At various points throughout the course team projects are evaluated using a consistent grading rubric. Finding a common grading rubric that applies to all disciplines has been challenging but the instructors have noted that having different rubrics for each discipline confuses students and creates internal conflicts within teams. Integration is critical for student performance and following a consistent interdisciplinary grading rubric creates a sense of fairness and collaborative spirit. The grading rubric used in the course (Fig. 1) is modeled after Walmart’s Scorecard, an industry standard for measuring the packaging sustainability performance (Kalkowski 2012). Additionally, two elements are used for assessing progress: first, individual self-assessments and evaluations of all team members which are done periodically. Second, sponsor representatives complete evaluations during presentations. Sponsors are encouraged to send representatives that can comment on all three disciplines, so that each section can receive valuable feedback on their performance.

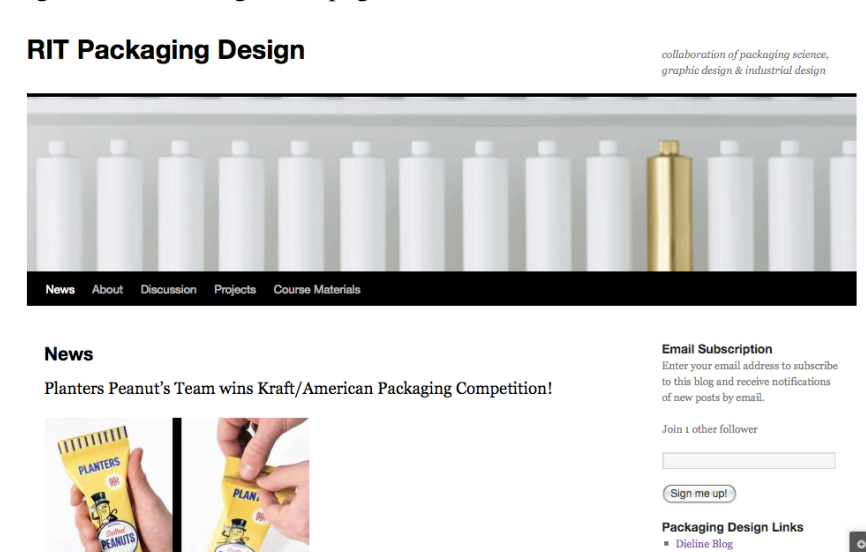
Course blog

An important component of the course is the class blog (Fig. 2). The goals for this resource are to encourage student participation in sharing interesting links, resources and case studies on packaging design. The class blog enables open discussion that was not possible during class time mainly because of

time limitations. A study of a course in Harvard's School of Public Health showed that "most of the students in the class perceived the class blog enriched their learning experience to some degree (Goldman, Cohen and Sheahan, 2008, 1658-63)." The blog also serves as a dissemination tool that allows for people outside of the course to learn about the class and student projects. The blog is always active and can be accessed at: ritpackagingdesigncolab.wordpress.com

Course materials including presentations, syllabi, and project descriptions are posted on the class blog to provide students with easy access to expectations and information discussed in class. Additionally, since the class blog builds from previous years course offerings, it creates a unique time capsule with large amounts of content and resources for students.

Figure 2: Class blog home page



The blog is formally linked to the course by means of assignments and online discussions. Students are required to create 2 discussion posts that meet the assigned criteria. In addition to the discussion post, students comment on at least 2 other posts. Students are encouraged to write engaging posts that promote discussion around the assigned topic. Assignments are based on readings and discussion topics from class.

For example, the following blog assignment (Fig. 3) provided students with an opportunity to share package designs that fit the description of the "containment purpose" and "WOW factor" described in the course textbook, *Package Design Workbook* (DuPuis and Silva 2008, 60).

Figure 3: Example of student blog assignment

Containment: Uluvka Vodka Bottle

Posted on January 23, 2011



Contain: The Uluvka bottle successfully contains the product in the bottle, preventing any loss of product, and preventing anything from contaminating the product, while simultaneously giving the consumer an easily identifiable way to remove the product. Glass is the ideal material for this container because of its transparency, its high quality appearance, and because of its freeze-ability. Transparency lets the consumer know how much of the product is remaining, and can be helpful in knowing at how much of an angle to pour the product out. The high quality appearance is self explanatory; if a product seems high quality more people would be willing to purchase it. Glass also allows for the

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Packaging Design Students Win General Mills Contest



Student project examples

Planters Peanuts

Provided by Kraft Foods and American Packaging Corporation, this project involved modernizing Kraft's brand assets and strengthening its consumer appeal in intermediate retail channels, such as convenience stores and gas stations. The solutions had to address packaging in all stages of the lifecycle: manufacturing, distribution, point-of-sale, product use, and end of life. The team formed by Isaac Alves, Hong Yong Guo, Vicki Julius, Andrew Lakata, Keelyn Nori and Marc Priddy developed an innovative concept for Planters Peanuts (Fig. 3). Their concept takes traditional imagery from Planters branding and repositions it in a bold and modern style. The team paid strong attention to user interaction, creating a bag that is self-standing, easy to hold and pour with one hand (Fig. 4). Attention to technical details are also evident in a competitive analysis using Walmart's Scorecard (Fig. 5) and a projection of how the product will be placed in secondary packaging for transportation (Fig. 6).

Figure 4: Flexible package design that is easier to open, improves consumer experience, decreases shipping costs and overall environmental impact.



Figure 5: Competitive analysis based on Walmart's scorecard

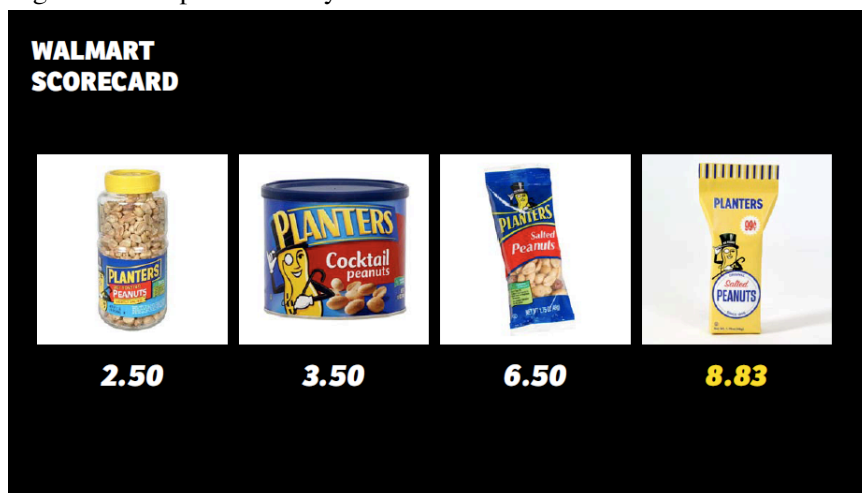
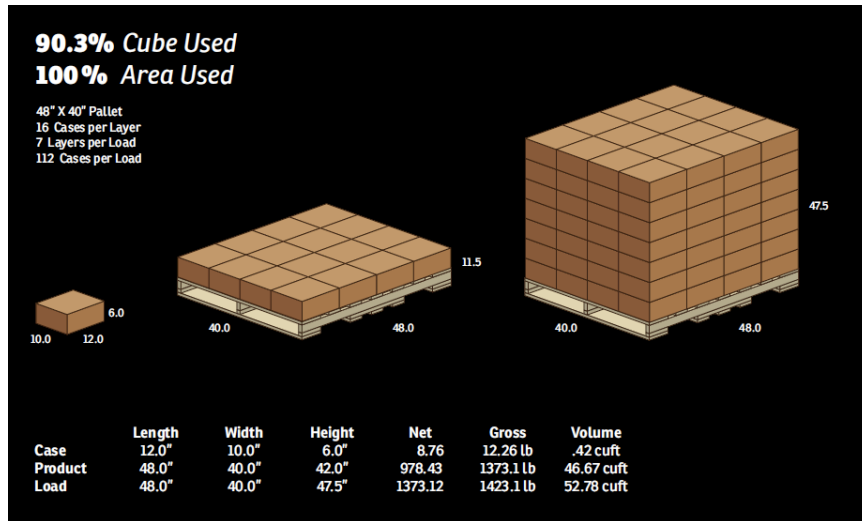


Figure 6: Cube projection of secondary packaging during transportation and distribution.



The Planters project is a good example of the type of projects developed in this course. It is evident that the interdisciplinary nature of the class promotes solutions that are integrated and balanced. When asked about his experience in this project, Andrew Lakata, one of the Planters team members commented, “Everything from the packaging to the graphics and form of the project fit together in the end seamlessly” (RIT University News 2011).

Wegmans Advance detergent

Provided by Wegmans Food Markets, this project focused on increasing brand presence for the company’s private label products, while improving sustainability advantage for container, primary and secondary packaging. The team formed by Katherine Bukys, Dom Colaprete, Jess Crawford, Bailey Kennedy, Kai Lei and Victor Santiago developed a bold and appealing design for Wegmans Advance laundry detergent. Their concept uses a clever rectangular bottle that is compact and comfortable to hold without needing a handle, while optimizing shipping volume (Fig. 7). The team also developed a visual style that provides strong visibility on shelf and is versatile enough to work with different scents in the product line (Fig. 8). A comparison with competitive products shows benefits that the new design offer to both consumers and manufacturers (Fig. 9).

Figure 7: Detergent bottle is compact and easy to handle.



Figure 8: Visual variations for product line.



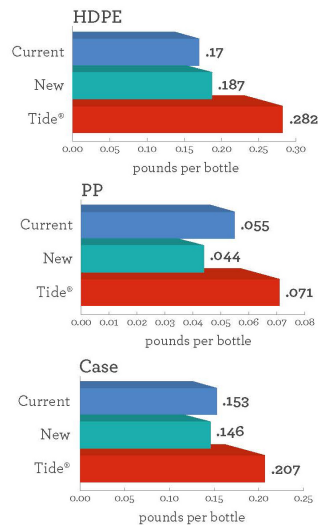
Figure 9: Summary of benefits of the new detergent packaging design.

Sustainability

- Less corrugated per bottle
- 96 more bottles per pallet
- Improved cube utilization
- Completely recyclable
- Less material in cap & spout

Retailer Benefits

- Increase in shelf visibility
- Able to store more in less space
- Less handling and restocking



Wegmans Barbeque Sauce

Another project for Wegmans' private label products focused on barbeque sauce. The goal for this category was to increase perceived value of the product and move it from 'value' to 'premium' level. The team formed by CJ Alessio, Sumeet Deshpande, Marco Fesyuk, Chen Guo, Simon Jones and Tuan Tuan developed a new design that is elegant, contemporary and convenient (Fig. 10). The team struggled with how to move from the existing glass bottle to a plastic one. While this change reduces shipping weight it also has the potential of making the bottle feel 'cheaper.' The team balanced the material change with a design that is more sculptural and elegant, and proposed the use of plastic thick enough so that the bottle feels substantial when holding. During user research, the team realized that barbeque bottles are messy due to residue left at the opening of the bottle. Their solution was to add a 'reducer' that makes pouring easier and cleaner. This feature made the change to plastic even more important, given that the reducer needs for the bottle to be squeezed while pouring. The graphic design of the concept uses multiple visual cues to communicate the different flavors while maintaining a consistent look (Fig. 11). The design also allows for more product to be shipped within the same volume, making secondary packaging more efficient and sustainable (Fig. 12).

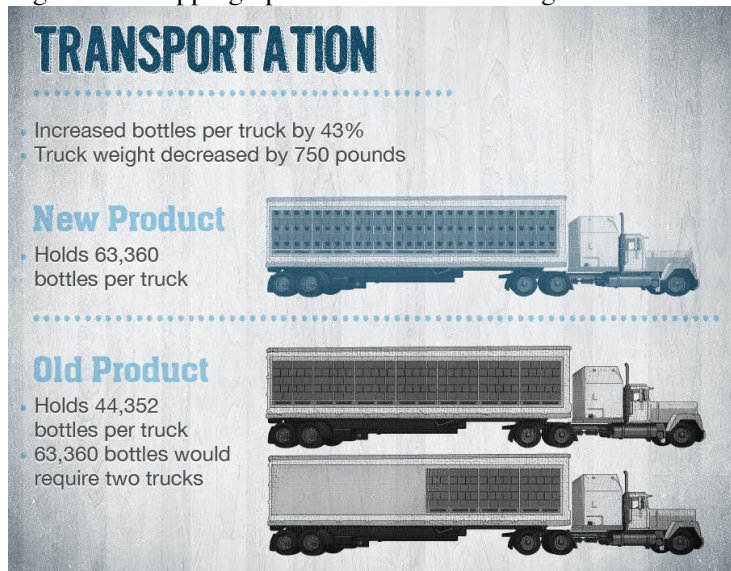
Figure 10: New design for barbeque sauce line.



Figure 11: Bottle design features and benefits.



Figure 12: Shipping optimization of new design.



Course Improvements

Thus far the course has been successful in meeting the learning goals for students. It has received positive feedback from sponsors and the RIT community. However, several shortcomings in the methodology have been observed and new offerings of the course include the following improvements:

-**CLASS SIZE:** The large course population of 59 students proved to be challenging to manage, even with three instructors and teaching assistants. Class size has now been reduced to an average of 16 students per discipline, for a total of 48 students. It is believed that the 30% reduction in class size will allow for more individual attention to students and better time management during reviews and presentations.

-**INTERACTION BETWEEN DISCIPLINES:** In previous years it has been hard to have all three disciplines meeting together during class time due to scheduling conflicts. This causes its share of challenges, as it is hard for teams to find times to meet outside of class that work for all members. This year all sections have the same schedule and teams have the last hour of each session to meet and work on their projects.

-**SPONSORED PROJECT:** We have reduced the sponsored competition from two per quarter to one per quarter to provide more time and focus. Deliverables are spread out throughout the quarter and students have more time for analysis and refinements. In addition, having the entire class working with the same sponsor increases the sense of community and promotes healthy competition.

-TECHNICAL INSTRUCTION: The course is highly interactive and has many opportunities for integrated learning. This decreases the need for assigned readings and other traditional lecture-based instruction. Students benefit from technical assistance from the sponsors, by first-hand experience and by helping and observing others at work.

-FINAL PRESENTATION

Final presentations are treated as formal and professional events. College-wide invitations are sent out and many faculty and students from RIT attend the presentations. Students are highly encouraged to rehearse their entire presentations in the space to familiarize themselves with technical issues and timing/pacing constraints.

Conclusions

This course is challenging to teach due to the large and diverse student population, but the rewards to the students are well worth the time and energy spent in organization and management. Students benefit greatly from the contributions the mix of disciplines and what type of expected role their discipline plays in the packaging design process. Students learn empathy and gain respect for the skill sets, challenges, limitations and expectations faced by the other disciplines. To have a successful collaboration, it is critical that there is open dialogue and respect among students. It is beneficial to our students to learn to work with other disciplines as students, before they enter their respective professions.

It is also a challenge for three faculty members to plan and coordinate the projects and the course, and this requires mutual-respect, trust and open communication between all members to be successful. Being able to overcome these differences "is hard work, but most faculty teaching interdisciplinary courses recognize that it is not fair to leave this task to the students, the novices, who, running from course to course, are expected to integrate their learning (Davis 1995, 51)." Interdisciplinary collaborations provide learning experiences and growth opportunities to faculty just as much as to students.

As in any educational experience, positive energy is dependent upon group dynamics and committed leadership. This interdisciplinary packaging design course is an invaluable experience for our students as they enter the workforce, where teamwork and collaboration are essential to creating the best possible products and packaging solutions.

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