Collaborating with industry manufacturers to train managers

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Abstract

Academia is continually confronted with the challenge of creating real-world problems that students can solve by applying technical knowledge. Resources and expertise in current technology within an industry is yet another issue that obstructs learning. To help address this issue, Victaulic, a manufacturer of mechanical pipe-joining systems, approached a faculty member at Purdue University with the idea of a partnership. The goal was to design a curriculum together to enhance a course in mechanical systems for buildings to help build stronger, more skilled leaders for tomorrow’s workforce. The curriculum would give students exposure to real-world design challenges before they begin their career. This paper will expand on the history, development, and future plans for the collaboration of Purdue University and the Victaulic Company.

Introduction

Many challenges are evident in all academic programs during the lean times. How to continue to provide educational opportunities which align with real world challenges while dealing with the limitation of resources is a huge one. Commonly industry professionals have been used as guests in a class to bring new topics to class\(^1\). This process has been very well received by students getting current information from professionals in the industry\(^2\). Another way industry has supported academia is with the support for research projects. It has been argued that funding to U.S. academic programs from industry is smaller than from federal funding agencies, but it has more meaning to students and economically more significant for the programs\(^3,4\). This partnership has provided Purdue University with over $50,000 in material gifts in kind to supplement new technology in a mechanical systems lab. The results of this collaboration increased student knowledge and provided internship and full time work opportunities. As industry supports academic programs, they also want students to be job ready as they become part of the workforce\(^5\).

History

Victaulic understands the importance of having a highly trained and diverse workforce, as it is a critical component success. This is done by providing customer satisfaction through an excellent product and technical training to each unique project that supports the customer needs. The ingenuity that sparks innovation is driven by knowledge and learning, which has played an important part in building Victaulic into the world leader in grooved and plain-end pipe joining systems.
Founded in New York City in 1925, Victaulic was established to market a radical new concept in the piping industry: a mechanical, bolted coupling that would engage into grooves on the pipe ends and feature a gasket seal. The company’s enthusiasm for crafting unconventional solutions has allowed it to forge new paths as it tackles the industry’s most unique challenges. The concept of joining pipe with bolted mechanical couplings originated during World War I for rapid deployment of fuel and water for Allied forces. The quick delivery of fuel to the troops was made possible by the grooved piping method—what became known during the war as the “victory joint.” This method dramatically reduces the amount of installation time and reduces total installed costs as compared to welding, threading and flanging.

Following the war, the company combined the words “Victory” and “Hydraulics” to form the shortened name, Victaulic. The company shifted its focus to the commercial piping industry and began to market its new innovative method of joining pipe. This product was first very popular with the fire protection industry to run piping that utilizes building safety by providing the pipe which would supply water or other product to a sprinkler head. In this system the sprinkler head is designed to activate when heat breaks a link and the pipes disperse the water to put out the fire. Today, the grooved mechanical pipe-joining system is the predominant global method for the assembly of Heating Ventilation and Air Conditioning (HVAC), plumbing and fire protection piping systems. Headquartered in Easton, Pa., Victaulic has manufacturing and distribution facilities worldwide and employs more than 3,500 people.

In 2006, Victaulic contacted Dr. Daphene Koch at Purdue University to discuss options for collaboration. The contact person from Victaulic was a Purdue Alumni and an advisory board member on the Purdue President’s council. After visiting campus for a meeting, he believed that collaboration with an academic partner and the company would be beneficial to all. The initial telephone conversation led to the development of an academic curriculum.

Development

To augment their traditional studies, students in the building construction management (BCM) major take part in lectures led by Victaulic staff members, in which they learn about the history of grooved-mechanical piping systems, market differences, planning and technology. The initial curriculum was an information session about the company and a demonstration of a grooving machine by the students. The students were experience this during a 2 hour lab session with a maximum of 20 students in each group. The initial presentation included the history of Victaulic, why the process was developed, and explained the basics of the Victaulic system, shown in Figure 1.
Another part of the lab was dedicated to a demonstration of the grooving tool. Each student operated the tool and completed a groove on a 4” diameter piece of schedule 40, black carbon steel pipe. This activity assisted the students in connecting the technical information about the company and their products to a real world activity. The final portion of the lab included putting a system together with the grooved pipe and coupling. The steps for this process include lubricating a gasket, fitting the gasket on the pipe, fitting the housing, and tightening the nuts and bolts with a cordless drill. These steps are shown in Figure 2.

The activity was done by placing students into teams and assigning roles. This replicated a real world situation. Students were responsible for supervision, safety, quality control, project management, and pipefitters. Armed with their newfound knowledge, and equipment and supplies donated by Victaulic, students tackle hands-on projects in the lab session facilitated by Victaulic. From the basic skills of grooving pipe to building a system, students are provided with real-world technical skills and expertise to better prepare them for the future. The piping system configuration which the students completed required coordination of each team member to complete all connections correctly to make the three legged system stand. Figure 3 shows the students poised after the completion of the project.
Six years later, the curriculum has expanded and is becoming documented and finalized to replicate at other universities. Victaulic professionals facilitate a 50 minute lecture along with the 2 hour lab sessions. Each student now gets 2 hours and 50 minutes of contact time per semester. Topics have increased to include sustainable and green material information, lean construction concepts to improve productivity, Building Information Modeling (BIM) examples from real projects, and seismic products for use in earthquake prone areas. The Victaulic product grooved fittings provide a much needed feature for construction projects. Every construction project has unique features which must be addressed before the actual installation. Current owners are requiring Green and Sustainable building aspects. The Victaulic product aligns with these needs by not only how it is manufactured but also the installation. This product does not use open flame or gasses for installation unlike other systems which would be used for systems. For example, in an air conditioning system for a commercial building, chilled water piping is transported from a chiller (usually in a mechanical room of a building) to each room. The chilled water enters into a piece of equipment, maybe unit ventilator, which air from a fan and removes the heat from the room and make it comfortable. Especially in projects which are being renovated, the grooved system can be pre fabricated with the grooved ends made and the correct lengths cut so that the field just needs to hang the pipe and use no flame or gasses to connect the pipe.

This collaboration has grown to inspire ingenuity and forge academic-industry relationships. It has expanded to not only this one course, but another course on campus. It has led to the development of the BCM lecture and lab in the mechanical systems curriculum, which informs students while creating a hands-on problem to solve. In addition to the BCM track, a sales curriculum for marketing students was developed to complement and integrate both programs for optimal learning and success. Now the students have more time to interact with the industry professionals and can get more exposure to real world current issues of the construction industry. Videos, BIM models and additional lab tasks related to productivity improvement have been added to the mechanical lab.

The other session on campus provided by Victaulic is a sales and marketing course in the Agricultural Economics. This lecture based class has over 200 students per semester and is
known for exposing students to real world applications. The course requires a shadowing day to expand a students’ understanding of a career in sales. Victaulic has a unique sales program due to their technical expertise. They do not really sell a product as much as they are technical consultants for mechanical contractors to be more productive. They work with their customers to provide a product and enhance the productivity of installation on each specific project.

Both programs were developed to create enriching relationships with potential future employees and help address the critical skilled workforce shortage. The partnerships led to tailored, innovative curriculums that enable the teaching of specific job tasks, hands-on experience and opportunities for students to engage and learn from an industry leader. Each semester, students taking classes in either Sales and Marketing, or Sales and Selling, participate in classes led by a Victaulic representative from the executive management team. This individual brings real-world global experience in industrial sales and marketing, enabling students and seasoned executives to engage in active dialogue beyond the text book. The sales collaboration has led to internships and full-time employment for Purdue graduates at Victaulic.

Future Developments

Current assessments of the lecture and lab experience in the BCM department have been outstanding. There are students getting experience as interns for the Victaulic and this assists in students getting a required 800 hours of work experience to complete their Bachelor of Science degree. Students also participate in a national competition about mechanical systems in buildings where they apply the knowledge from Victaulic to improve their proposal. National Science Foundation (NSF) grants have been submitted to utilize the Victaulic products and training to K-12 Science Technology Engineering Math (STEM) teachers. The support letter of Victaulic as part of this grant should give it some extra plus marks during review.

The future will be to better assess the pre and post experience of students to create more scholarship of teaching. This experience can also be used to be a model for other manufacturing connections in BCM, Agriculture or there areas of study. Victaulic has support at their corporate level to continue to support and expand the curriculum which has been tested and improved at Purdue University.

Bibliography


6. www.victaulic.com

Biographical Information

DAPHENE KOCH, PhD is an associate professor in the Building Construction Management Department in the College of Technology at Purdue University. She has over 10 years of teaching and over 10 years of industry experience.

BRAD TYCHOLIZ, is a member of Victaulic’s Training department. He has been with the company for six years, previously as a human resource specialist with campus recruiting and for the past 2 years in the capacity of Training Specialist.