Product, Process and Business Integration in a Global Context

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Abstract

This presentation reviews the contents, organization and logistics of an undergraduate-level engineering course which aims to introduce students to the "big picture" of engineering activities revolving around the process of ideation and new product development. While primarily focusing on principles of modern manufacturing, connects them with product design and business process issues, and places them in the context of two important trends: globalization and entrepreneurship.

The course aims to analyze the technical and business dimensions of various manufacturing paradigms, and identify concepts relevant to globalization and fragmented markets. It also emphasizes creativity in designing global products and introduces 2nd year engineering students to basic concepts of entrepreneurship by using *Lean Startup* approach for starting new, technology-driven companies.

The main feature of the course is a semester-long project in which students work in teams. Every team consists of up to 5 students, and it is preferred when each student brings to the team a different background and experience. The team assignment is to create a start-up company offering a new product type that potentially fits mass-customization markets on a global scale (e.g., has potential to be offered on multiple national markets). The team has to (1) develop product idea and its design, including multiple product variations, (2) create an outline of the manufacturing processes and system necessary to make the product, and (3) define a business model that covers delivery, organization and cost and profit issues.

While the class has been offered since 2009, in its subsequent edition its contents go over multiple revisions and updates. The most recent modification consisted of merging the course (which usually has over 200 students enrolled) with a separate course on entrepreneurship offered by a business school. As a result, each engineering team was enhanced by addition of an undergraduate student from business. As a result of these changes, new patterns in student behavior started to emerge. Presence of business students and became a significant motivational factor. Interdisciplinarity of the teams received natural boost, which eventually led not only to heightened creativity, but also to mutual appreciation of skillsets associated with collaborating disciplines; it also facilitated vertical integration of students at various stages of their studies and experiences. Use of the *Lean Startup* methodology, which requires the participants continuously verify their design and market hypotheses, has also raised awareness among engineering students that in their professional development they need to broaden the scope of their studies and add management, communication and entrepreneurial abilities to their skillset.

Keywords

Engineering education, Ideation, Design, Product development and Entrepreneurship.

Biography

Dr. Zbigniew J. Pasek is a Professor in the Mechanical, Automotive and Materials Engineering Department and Industrial and Manufacturing Systems Engineering Program at the University of Windsor, Windsor Canada. He holds a Ph.D. in mechanical engineering from the University of Michigan. His research interests include manufacturing systems automation, risk management, health care engineering, engineering entrepreneurship and informal engineering education. He is a member of IEEE, ASME, SME, CEEA and ASEE.