

THE VE WORKSHOP AT MCGILL UNIVERSITY: BENEFITS FOR INDUSTRY AND STUDENTS

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ABSTRACT

The McGill University Value Engineering Workshop provides a unique forum for the interaction of students and industry towards the solving of a real world problem presented by a company. All participants learn the Value Engineering (VE) methodology, but mostly learn cooperation and a team approach to solving problem. The mutual exposure raises the engineering professionalism of the students, provides solutions to problems for companies, and contributes to the education process. Companies of all sizes have participated in the workshop over the years, obtaining significant value enhancement to product design, processes or services.

INTRODUCTION

The Department of Mechanical Engineering at McGill University has operated a workshop in Value Engineering for the past 25 years. During this period 165 projects have been done in collaboration with industry. The combination of Value Engineering and industry-university cooperation is unique. The objective of the workshop is to provide a forum for a high degree of interaction between students and representatives from industry. It also trains students and company employees in a systematic, optimization technique for problem solving, Value Engineering.

The McGill University Value Engineering Workshop is the only university course where company representatives sit together with senior Mechanical Engineering students to solve a common problem: a real-life project selected by a company. At the end of the workshop session, each company has one or more specific solutions available which will improve the value of the subject of the study, be it a product, process or

service. The results are presented by the students to company management both at a group session and in the form of a bound report.

McGILL VE WORKSHOP

The McGill University Value Engineering Workshop is organized as a 40-hour intensive course where three to five students are teamed with industry personnel in order to attempt to improve the value of a product, process or service of a participating company. The workshop is led by a Certified Value Specialist (CVS), and the workshop is qualified by the SAVE (the Society of American Value Engineers) as Module 1 towards the requirements for becoming a CVS. In order to accommodate participation by industry, the workshop consists of five sessions of eight hours for formal teaching on Value Engineering methodology and group problem solving. The workshop session is from 1:30 to 9:30 p.m. on Mondays during the fall semester. It is the only course at McGill where coffee and doughnuts as well as an evening meal

are provided for participants!

The weekly sessions closely follow the five-step job plan of Larry Miles, the originator of Value Engineering, ending in the Presentation and Reporting Phase. At the end of the course, the students give a final presentation to the sponsoring companies at a hotel near the university. The companies are also given a final report containing a description of the problem, the results of the value engineering analysis, a set of alternative solutions to the problem, and recommendations for action. Besides the five sessions, usually the value engineering team meets on other occasions to see the problem first-hand at the company site, to review research done by the students, and to coordinate investigations.

The Value Engineering Workshop is also unique in the way that it is graded. There are no tests or exams; 60 % of a student's grade is obtained from the final presentation and report, and 40% is obtained from an evaluation by industry participants.

INDUSTRY BENEFITS

There are many benefits obtained from the Workshop for both company representatives and students. The main one is the mutual exposure between future and practicing engineers. For companies, they additionally benefit from the training in Value Engineering methodology; for some, it is their first exposure to VE; for many, the company knows of or uses VE, but it is new to the participants in the Workshop. Companies, then, learn a systematic method for problem solving which is strongly suggested to be used on an ongoing basis within the company.

The company also benefits from the research done by students. Often, companies have problems where significant investigation is necessary, but there may be neither the time nor resources to do it. Thus, a problem is investigated and solved which may not be looked at otherwise. Also, in many cases students provide a fresh outlook on a problem, so that a novel solution is obtained.

Additionally, company employees are exposed to students. They see students in action, students who could be future employees. Companies also contribute to the education process.

An impressive track record has been logged during the 25 years that the course has been offered. Solutions have been developed for 165 projects where significant value has been delivered to companies. The financial return is customarily measured over a five-year period, and is compared to the necessary investment, including the cost of sponsoring the Workshop. In the 1993 session, the combined five-year return for six projects was \$8.13 million, accomplished with a necessary investment of \$331,000. This represents a return on investment of 26:1. Additionally, in terms of benefits, companies have hired many of the students that they have worked with during the Workshop.

From surveys of past projects, companies implement about 50% of the recommendations. This is due to the low value of some recommendations and also due to changing conditions between the report from the Workshop and implementation of recommendations.

STUDENT BENEFITS

Students benefit from the Workshop by

- learning the Value Engineering methodology,
- developing analytical and investigative skills,
- obtaining experience on a real world problem,
- having exposure to the current, industrial standards in engineering professionalism, and
- seeing the business and technical operations of a company.

TYPICAL PROJECTS

Over the years, companies of all sizes have participated in the Workshop. The complete range of problems has been investigated: new designs for products, manufacturing

processes and business services, as well as redesigns for existing products, processes and services.

Below is a list of companies and the problems investigated for the past three years. The list contains six small, three medium and six large companies. Of the projects investigated, eight were for product design (4 new designs, 4 redesigns), five were for manufacturing processes (2 new processes, 3 existing processes), and two were for service improvement. This is quite representative of the type of companies which have participated in the Workshop over the years and the type of problems they wished investigated.

1995 Projects

Canbro Inc.	Improved production of bronze pigments
CCM Sport Maska Inc.	Wheel chassis design for in-line skates
Pratt & Whitney Canada Inc.	Reduction gearbox design
Robco Inc.	Compressed seal design for rotary pumps

1996 Projects

IBM (Bromont) Canada Ltd.	Precise placement of components on a PC Board
Robert Sproule Inc.	Low cost manufacture of a board cutting device
Moshe Gabbay Inc.	Design of an abdominal exerciser
Astraltech Inc.	Setup time reduction for videocassette production
VIA Rail Canada Inc.	Redesign of the base for a passenger train seat

1997 Projects

ASEA Brown Boveri	Redesign of hood lifting panels
Kraft Canada Inc.	Cost reduction for the maintenance of food containers
McGill Engineering	Job placement services for students
Railtech Ltd.	Performance of a room partition
Santropol Roulant	Meal delivery services
Spar Aerospace Ltd.	Design of a bandpass filter

1997 PROJECT DESCRIPTIONS

To see the content of typical projects, a brief description of those done in 1997 is given. These projects are fairly typical in scope, the level of detail during the study, and the success of results.

ASEA Brown Boveri

Redesign of hood lifting panels

Drying machines for the production of paper are supplied with hood lifting panels (doors) which are about 17' by 7'. There can be several of these panels on a machine to enclose the machine and to provide access for operators. The objective of the VE study was to reduce the cost of manufacture. The complete design was reviewed with a redesign and/or new manufacturing method suggested for 4-5 major sub-assemblies. A 17% saving on the cost of a door was obtained.

Kraft Canada Inc.

Cost reduction for the maintenance of food containers

Kraft Canada operates two food processing plants. Kraft owns and maintains the containers for ingredients which travel back and forth between Kraft and its suppliers. The containers are 55 gallon steel drums. The drums must be cleaned or refurbished after each use. Cleaning is typically a rinse out with the application of a wax coating; refurbishment entails rust removal, dent repair and painting. Corrosion is fairly common, especially with cheese products where the gases emanating from the cheese attack the metal barrels.

A complete analysis was done of the cleaning and refurbishment operations. Alternative processes and barrel materials were studied. Recommendations included

ceasing the wax coating, since it was deemed ineffective, changing the type of paint used for coating the barrels, and using better handling procedures in order to cause less dents. A 33% savings was obtained¹.

McGill Engineering

Job placement services for students

The Faculty of Engineering at McGill University operates three job placement activities for students. There is a summer job program, an internship program and assistance in placing students into jobs at graduation. Each of these activities was operated independently at different locations at McGill. The integration of these services along with increasing the service for more clientele was studied. Recommendations included using more information technology to improve the service as well as reduce costs, the use of more students to operate the services to reduce cost and improve service, and collocation of all services for better coordination and data sharing. As a result the operating cost of the service will be reduced to half at the end of 5 years and the students will receive better counseling.

Railtech Ltd.

Performance of a room partition

Railtech produces an innovative product for dividing large rooms. Where such products traditionally move horizontally, Railtech's product lowers vertically from the ceiling, reducing the use of floor space for storage. The product also has superior acoustics. The complete design was

¹ The financial data given by Kraft was scaled so that students did not know actual figures. The 33% savings could be more or less depending on the scaling factor. This factor could also change the value of certain recommendations.

reviewed with a redesign and/or new manufacturing method suggested for 4-5 major sub-assemblies. The recommendations resulted in a cost reduction of about 10% for an average partition and an increase of sound absorption to over 50 dB, a level which gives a superior product image.

Santropol Roulant

Meal delivery services

Santropol Roulant is a 'Meals on Wheels' type non-profit organization based in the Plateau Mont-Royal region of Montreal. It began as a student project and now serves 120 clients with a volunteer base of 250. The objective of the study was to improve meal quality (hot items, hot and cold items, cold) as well as improve the operating conditions for volunteers. Adverse operating conditions reduce the 'rewards' for volunteers and reduce their stay in the organization. A complete study was done of the operations as well as meal preparation, distribution and delivery to clients. The recommendations included improved kitchen facilities, a new set of processes for meal preparation and distribution, and a better design of backpack for meal delivery. Volunteers deliver meals mostly on foot or bicycle. Present backpacks were standard items modified for meal delivery, and neither stored food well nor were comfortable to use.

Spar Aerospace Inc.

Design of a bandpass filter

For satellite communications Spar Aerospace provide 88 antennas on its satellites, each of which needs a bandpass filter. There are many constraints and requirements for the design of such a filter. The VE study considered the materials, number of components, tuning capability, as well as sensitivity to signal distortion on the satellite. Several design alternatives were produced. A new design as well as some changes to the installation process were recommended. This resulted in a 49% cost reduction in the manufacture of a filter along with improvements in performance.

CONCLUSIONS

Over the past 25 years, the McGill University Value Engineering Workshop has been very successful in providing

- training for students and company representatives in Value Engineering methodology,
- significant value in the solutions to company problems, but mostly
- a unique opportunity for interaction between students and industry.