



## **Problem-Based Learning in Engineering Education Monash University Sunway Campus (MUSC) Experience**

Article by : Ir. Mathew Thomas

**M**odern engineering activities are conducted in team settings. There is high interaction among team members and the nature of work is multi-disciplinary. In our global competitive environment, many organisations do not have sufficient time & resources to invest in providing full training program for new recruits and wait for the much-needed skills to be developed on the job. Studies in the US, Canada & Germany in the early nineties have shown that employers of Engineering graduates are looking for Engineers who not only possess engineering knowledge but also essential soft skills. Monash University has therefore recognized that their graduates had to acquire both technical knowledge and non-technical skills.

With this in mind MUSC has developed the common first year subject called Engineering Profession in their endeavour to bridge this gap and at the same time to overcome two perceived problems of new engineering students namely:

1. The lack of understanding of what engineers actually do, and
2. The lack of understanding of the environment in which engineers work and interact with the community.

The subject is covered by lectures, guest lecture by industry expert/partner, tutorials and workshops. The assessment for the subject is 70% project (continuous assessment) and 30% final exam.

Topics covered in lectures are:

- System approach
- Engineering Economics,
- Management
- Project Tender & Process
- Product Life Cycle Assessment
- Sustainable Development
- Quality, Safety Analysis
- Technical Drawing, CAD, 3D modeling
- Communication Skills
- Professional Ethics

The subject uses *problem-based learning* to introduce students to engineering. Groups are formed to work on an actual industry related engineering problem/project where the groups engage in project discussion sessions, search for information, visit project site and engage in project tendering process. All of these are used to demonstrate:

- a) the scope of engineering
- b) client-tenderer relationships
- c) inter-disciplinary nature of engineering work
- d) professional decision-making process

Project & people management concepts and communications skills are developed through group work and activities; interviewing & oral presentations; and project progress reports. Self-learning through group work is promoted in this problem-based learning approach.

Use of industry related projects with inputs from industry partners in student-learning help in demonstrating the inter-disciplinary nature of engineering work. It enhances the realism in engineering environment and activities in the subject provides a good exposure to students on the needs of the industry.

The subjects approach presents a big challenge to first year students. It is a new learning method, learning curve is steep, cultural and language diversities are faced by students including group conflicts which they have to resolve amongst themselves. There is heavy workload for students and staff with suitably identified projects with industry support.

The benefits of *problem-based learning* using industry related projects are:

- There is an appreciation of specific industry business and their operations.
- There is an understanding of the needs of the client/tenderer, the community and the environment.
- There is an understanding of the scope of inter-disciplinary engineering activities, group work & professional ethics.
- The student knowledge of professional engineering skills and essential soft skills (communications, interpersonal, teamwork, leadership & problem solving skills) are enhanced.
- It improves students' attitudes & motivation to study engineering.

Feedback from students and industry partners has been positive on this approach to learning. Hopefully this program better prepares would-be engineers on the reality of being engineers!