TALK ON SUSTAINABLE PRODUCT DESIGN

NEGERI SEMBILAN BRANCH

Ir. Dr Oh Seong Por

A talk on Sustainable Product Design was held at the seminar room of The Institution of Engineers Malaysia Negeri Sembilan (IEMNS) on 16 March, 2019. IEMNS Chairman Ir. Dr Oh Seong Por delivered the talk to 31 participants comprising engineering consultants, industry operational engineers, lecturers and student members of the Technical Association of Malaysia (TAM).

The talk was co-sponsored by Mr. Lim Swee Ee, President of Kibing Group (M) Sdn. Bhd. and an ardent supporter of IEMNS activities. Four key contents were shared, namely the definition and necessity of sustainable product design, sustainable product life-cycle, combined effort of government-industry-university and case studies.

DEFINITION & NECESSITY

Sustainable Product Design is a design approach that fulfills needs and acquires reasonable profit to maintain business and prevents adverse impact on the planet through the following:

1. Conservation of energy and water as well as protecting air quality.
2. Optimisation of material usage with no over-consumption and no waste.
3. Right material selection that is recyclable and non-hazardous.
4. Protection of supply chain that is renewable and able to sustain resources.

Every product produced creates an impact on the environment although the product may bring convenience to humans. The impact may be big or small, immediate or delayed. Sometimes the impact can be only seen over a period of time of application, for example, the plastic bag.

When it was first introduced, consumers found plastic bags useful as these were convenient for carrying materials or goods. This is so even today. But recently it was established that plastic bags contributed to an enormous amount of waste which was harmful to the environment and living creatures; this triggered a ban on its use in many places.

SUSTAINABLE PRODUCT LIFE-CYCLE

A sequence of product development flow starts from identifying the problem to finding a solution (satisfying need), creating design, production and distribution to buyers with consideration of product disposal function. It covers the entire cycle, from creation for use and beyond. In short, it is a flow sequence from cradle to grave (See Figure 1). Some common product disposal functions are:

- To recycle scrap product to reclaim complete or teardown parts which can be reprocessed for making same product or other applications.
- Quick natural or safe degradation that can be retuned to the eco system.
- To reduce or eliminate the usage of hazardous chemical.
- By-product or process residual which can be recycled or reclaimed.

COMBINED EFFORT & CASE STUDY

This refers to the three key parties – government, industry and university – with each having specific roles and yet supports each other to boost the success of sustainable product design.

According to Ir. Dr Oh, the **government** sector, which is empowered with executive and legislative powers to dictate policy and to perform mitigation roles, has the biggest influence to spearhead the sustainable initiative.

For example, the Norwegian government is committed to completely abolish internal combustion cars and to replace them with electric cars by 2025. Incentives such as toll free, subsidy and zero tax, have encouraged many people to switch to electric cars, significantly cut down CO_2 emission,

Figure 1: Sustainable Product Life-Cycle

the main cause of global warming. Other countries like Finland, Britain, France, China and India are also taking a similar stand. The demand for electric cars has created a domino effect and encouraged electric car makers such as Tesla and battery makers to increase production.

Table 1: RoHS controlled chemicals

No.	Substance	Permissible Level
1.	Lead (Pb)	<1000 ppm
2.	Mercury (Hg)	<100 ppm
3.	Cadmium (Cd)	<100 ppm
4.	Hexavalent Chromium (Cr, VI)	<1000 ppm
5.	Polybrominated Biphenyls (PBB)	<1000 ppm
6.	Polybrominated Diphenyls Ethers (PBDE)	<1000 ppm
7.	Bis (2 - Ethylhexyl) phthalate (DEHP)	<1000 ppm
8.	Benzyl butyl phthalate (BBP)	<1000 ppm
9.	Dibutyl phathalate (DBP)	<1000 ppm
10.	Diisobutyl phthalate (DIBP)	<1000 ppm

Another example is the introduction of Restriction of Hazardous Substance or RoHS directive by European Union (2002) to mitigate 10 hazardous chemicals (See Table 1) and prevent pollution to the environment. Any violation will lead to a ban on the goods in the market.

The **industry** sector has two main roles:

1. To enshrine sustainable product development and protection of environment into the corporate business philosophy.
2. To continuously innovate products or services to optimise usage of resources (material, energy and water) and to cut down waste generation or emission of process residuals. One good example is the cathode ray tube industry. A lean product design approach has been consistently applied to eliminate non-value added features and production processes. The product has become slimmer, thinner and lighter, which successfully reduces energy and material needed to make the product. The environment degrading chemical trichloroethylene (TCE) has also been replaced with an eco-friendly material. Recycling of process waste residuals like phosphor and water has been implemented, reducing the amount of waste impact on the environment. All these initiatives not only minimises contamination to the environment but also improves product cost and competitiveness.

The **university**, a place to cultivate the mind and create new knowledge, can be an important platform to develop or assist industry in green technology. For this reason, some universities have established green technology courses, department or

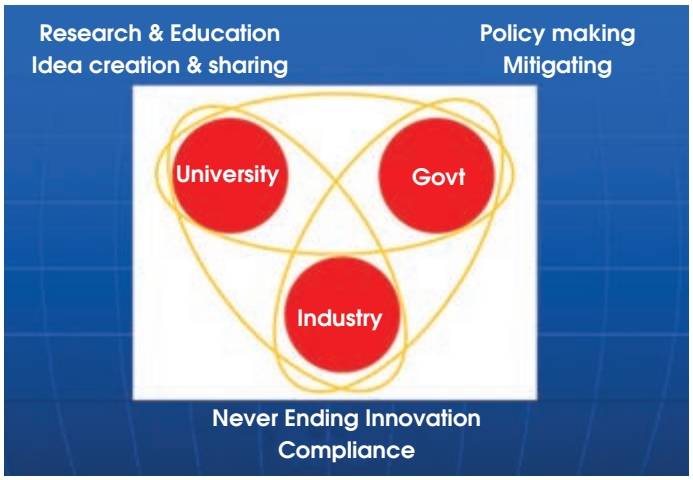

Figure 2: Collaboration for achieving sustainable product design

Ir. Dr Oh Seong Por delivering the talk

research centre to engage in teaching as well as forming useful knowledge about eco-friendly applications. Exposing students – future engineers, technologist and industry leaders – is a good way to prepare them to be mindful and responsible about protecting the planet from pollution. Post graduates students and lecturers may be deployed to industry to participate in sustainable design tasks. Experiences gained will be further enhanced and documented as best practices which can be applied to other sustainable applications.

CONCLUSION

The close collaboration between government-industry-university, with each seriously pursuing respective initiatives to protect the environment, is an effective way to achieving sustainable product design (See Figure 2). ■

The speaker concluded the talk with a Malay pantun before awarding certificates to all participants.

Negara kita serba ada
Ada teknologi ada inovasi
Sustainable product baik berganda
Melindung dunia dan generasi

Group photo of the participants