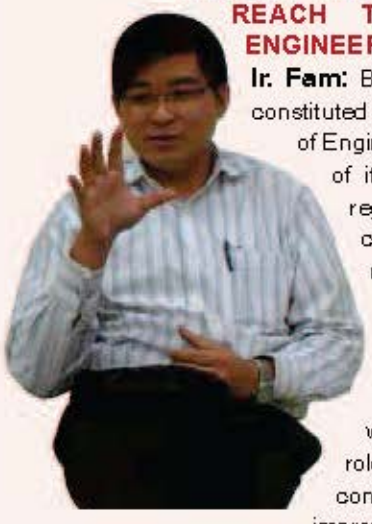
Mechanical Engineering: Its Vital Role and Prospects

by Reika Kua Kee Eng

MECHANICAL engineers have played various significant roles in contributing to not just the industries that heavily rely on their expertise, but also to the society in general. In order to gain an in-depth insight about the various vital roles and prospects of mechanical engineering, JURUTERA conducted an interview session with four key members the Mechanical Engineering Technical Division of IEM, namely Ir. Dr Cheong Thiam Fook, who is the Executive Director of George Kent (Malaysia) Berhad, Ir. Gopal Narian Kutty, the Senior Principal Assistant Director of Mechanical Engineering Branch, Public Works Department Malaysia, Ir. Noor Hisham Yahaya, the Managing Director of Techno Matrix Resources Sdn. Bhd., and Ir. Fam Yew Hin,the Assistant General Manager (Development), Genting Energy.

THERE ARE A NUMBER OF ENGINEERING ORGANISATIONS IN THE COUNTRY SUCH AS IEM, BEM, ETC. HOW DIFFERENT IS THE ROLE OF MECHANICAL ENGINEERING TECHNICAL DIVISION (METD) AND HOW DOES METD PROVIDE A MORE EFFECTIVE BRIDGE TO REACH THE MECHANICAL ENGINEERS IN MALAYSIA?



Ir. Fam: BEM is a statutory body constituted under the Registration of Engineers Act 1967, and one of its main functions is to regulate the professional conduct and practice of registered engineers. On the other hand, IEM is a learned institution (for engineers). Being a technical division within the IEM, METD's roles are to promote continuous learning and improvement among our members, as well as providing a networking platform. For example, METD organises talks, courses, visits, and forum regularly to keep our members continuously updated on the latest technology.

Ir. Gopal: Apart from the aspect of mechanical engineering, another area that we emphasize on is the social contribution of engineers. For instance, a visit to an orphanage or welfare centre. Besides engineering, we also hope our engineers play their role in terms of social responsibility and contribute more to the society at large. We are also trying to encourage more women to join the mechanical engineering field. As compared to 20 years ago, we now have more women mechanical engineers, and it is partly attributed to the awareness programme conducted by METD.

Ir. Hisham: METD is more discipline-based, and caters for the needs of mechanical engineers. In IEM, networking has become an important means of expanding one's contracts. In particular, we are looking into networking among the mechanical engineers within the country as well as within the region. In a broader sense, we are also looking into networking with engineers from other disciplines, not just mechanical engineers, within IEM.

THE WORLD IS MOVING TOWARDS AUTOMATION AND IT, AND THESE AREAS ARE ANTICIPATED TO PLAY AN INCREASING ROLE GLOBALLY. IS MECHANICAL ENGINEERING STILL RELEVANT AND DO YOU FORESEE A CRITICAL ROLE FOR MECHANICAL ENGINEERS IN THE NEAR FUTURE?

Ir. DrCheong: If you look at what I refer to as 'Modernisation of manufacturing and the production processes', automation is the great work of mechanical engineers. Robotics and other automated processes are so critical to those engaged in manufacturing and production, such as the automobile industry, and the reality is that without the mechanical engineers, automation and IT would not have progressed as quickly. I believe that mechanical engineers complement the industry by integrating automation and IT knowledge to make manufacturing more efficient, especially in mass production. Automation and IT is complimentary to the mechanical engineering field.

Ir. Hisham: In terms of robotic automation, the basis of the physical activities is essentially derived from the mechanical parts or components. Automation and IT helps enhance the control of these mechanical parts. Hence, the understanding of the mechanical part is crucial in order to basically work on the control part. In brief, they must have an in-depth knowledge of mechanical engineering before they can exercise control over the mechanical parts using automation and IT.

Ir. Gopal: For instance, mechatronics is an inter-disciplinary branch of mechanical engineering. A mechanical engineer would be able to go into a more specific field such as mechatronics, dealing with robotics application and design; however, it could not be the other way round. That is why we often encourage students to choose their discipline wisely by raising their awareness about the differences between the main discipline of engineering and the other sub-disciplinary or inter-disciplinary branches of engineering. It is recommended that they select first to major in the main discipline, a broader branch, before going into a more specific discipline or engineering field. This is also a message to our future mechanical engineers!

MANY COUNTRIES HAVE BEEN PROMOTING RENEWABLE ENERGY AND ENERGY EFFICIENCY. WHAT IS YOUR VIEW ON THE POTENTIAL DEVELOPMENT OF RENEWABLE ENERGY AND ENERGY EFFICIENCY IN MALAYSIA?

Ir. Dr Cheong: Way back in 1981, I had been constantly reading written materials about renewable energy resources. About 30 years later, we are still talking about renewable energy policy in the country. Whether it is energy efficiency or renewable energy, there is a real need for the government to institutionalise these policies, so that the public in general, particularly the citizens of Malaysia, can really move forward with the implementation of energy efficiency policy. The recent implementation of the 1% levy on the electricity bill has caused a lot of uneasiness among consumers and SEDA has to publicly explain to the consumers that this 1% is actually for the development of renewable energy in the country such as the subsidy given to Solar PV and other renewable energy projects in Malaysia. However, Malaysian awareness in these areas is still very low.

Ir. Fam: One of the main hurdles for implementing renewable energy on a larger scale is its high capital cost requirement (as compared to conventional electricity generation). The same is generally true for projects that adopt energy efficient technologies. Therefore, an appropriate incentive scheme is essential to spearhead the development of both renewable energy and energy efficiency.

The Government has enacted the Renewable Energy and the Sustainable Energy Development Authority Act (SEDA) in 2011, which subsequently led to the implementation of the Feed-in-Tariff. As you may have noticed, this scheme has resulted in an increase in investment in renewable energy as it has helped to make the projects commercially viable. However, until these technologies have matured and achieved grid parity, the development of renewable energy will continue to depend on the incentive scheme.

Ir. Gopal: The Government has been offering a lot of incentives to the industry, but the energy cost is still quite high for the private sector and the domestic consumer. Therefore, mechanical engineers play a vital role in ensuring that any product generated not only provides functional efficiency and comfort, but also involves the use of materials that are energy-efficient. Mechanical engineers ought to play their part in ensuring that we use whatever resources we have sparingly to just sufficiently meet our needs now, while also ensuring that we leave some resources behind for our next generation. This is where sustainability comes in. We need to constantly look for more alternative ways to produce energy such as wind, solar, biomass, etc. However, as a matter of fact, the percentage of energy produced from these alternative resources is very small.

Ir. Hisham: Alternative resources are not commercially viable at this moment. Engineers in Malaysia have the capabilities and capacities to look into renewable energy implementation; however, what is lacking here is more of the social and political contribution. The private sector and consumers at large have a similar mindset, that is, they prefer to use power generated through the conventional way which utilises the existing natural resources such as coal and gas, as the energy cost will be much cheaper than those of alternative resources such as solar or wind-powered energy. Until the fossil fuels become more expensive, renewable energy will take a back-seat.

ENVIRONMENTAL POLLUTION HAS BECOME A CONCERN IN THE PROCESS OF DEVELOPMENT. WHAT IS THE POTENTIAL CONTRIBUTION OF MECHANICAL ENGINEERS TOWARDS CREATING A GREENER SOCIETY IN THE COUNTRY?

Ir. Gopal: The private sector and the public in general have to be aware of their responsibilities in terms of energy conservation too, not just the engineers. It means utilising less energy for a constant service. For example, simple gestures such as switching off the lights when not in use would have its effect when everyone does their part. It is beyond our control for others' behaviour, but what mechanical engineers can do is to select energy-sufficient materials so we can have a better air-conditioning system, a better class of motor vehicles, chillers, or any equipment produced that would contribute less to global warming and help reduce pollution. In short, mechanical engineers can only help improve the technology and features, but will not be able to tackle the overall global issue.

Ir. Dr Cheong: We also focus on what we call 'environmental-friendly processes'. Mechanical engineers

could help by their involvement in planning and designing certain waste treatment systems that would help reduce the waste discharge. Some waste treatment systems can even produce the effect of zero waste discharge. Mechanical engineers play a very crucial role in industries such as transportation and automobile, especially in automobile manufacturing. For example, Volkswagen produces cars that are highly environmental-friendly as it is not only fuel-efficient but also emits zero carbon dioxide. In addition, mechanical engineers also indirectly promote public transportation such as the LRT, Monorail, etc. to help reduce the number of vehicles on the road, and thus help in reducing pollution. In future, when more of these public transport lines are extended, more people can benefit from the convenience of public transport, and thus the impact will be greater.

Ir. Hisham: Looking from the perspective of public transport, why people are not fully utilising the public transport may be because the alternative transportation modes such as the motorcycle or car are relatively cheaper in comparison. Hence, when given a choice, the user would prefer the latter. Not being able to reduce the usage of private vehicles, the mechanical engineers can still contribute by creating a "greener engine" for these vehicles.

Ir. Fam: Fossil fuels are among the most serious sources of environmental pollution. Statistics have revealed that the transport sector, heavy industry as well as power generation are conventionally the major sources of air pollution in modern cities. However, if we take a closer look in recent years, step improvement has been achieved in these sectors through introduction of more efficient engines and generation technologies, enhancement of abatement equipment (to extract and contain the pollutants) as well as implementation of effective maintenance programmes. All of the above will have the participation of mechanical engineers.

THERE HAS GENERALLY BEEN AN INCREASE IN THE NUMBER OF INCIDENTS ON ENGINEERING SAFETY AND QUALITY RECORDED IN RECENT YEARS. HOW CAN MECHANICAL ENGINEERS RENDER A HELPING HAND TO MITIGATE THESE INCIDENTS?

Ir. Hisham: In Malaysia, one of the biggest challenges in terms of safety is related to behavioural safety. For instance, if site workers in Malaysia were told to use scaffolding which did not appear to be safe, they would still climb up without a second thought. However, given the same scenario in other developed countries, the workers would normally refuse to climb up the unsecured scaffolding as it would be a risk to their lives. Another example is the irregular use of safety gear by our local workers although they have been advised to do so. Somehow, the appreciation of the value of life is rather low among the local workers. What mechanical engineers can do is to exercise control and minimise the worker's exposure to risk. Hence, incorporating "engineering controls" in the design is utmost important to ensure that a safe environment or condition is present at all times.

Ir. Gopal: Safety is always a focus of mechanical engineers when it comes to design. However, supervision and enforcement to ensure safety requirements are met is lacking. The safety features or equipment are available but sometimes workers ignore them or just refuse to use them which can put them at higher risk of encountering an accident, which sometimes can be fatal. Authorities such as CIDB which carry out the enforcement of safety are vital. Mechanical engineers may be able to design and build whatever machinery or equipment with all the safety features included, but prompt periodical checks and maintenance are also essential. As there are a number of different parties involved in any form of work requiring stringent safety checks, sometimes human error is just inevitable, although this could be minimised. Safety is a very complicated area to be handled. Thus, every party involved has to be meticulous and thorough.

Ir. Fam: I would say the main causes of workplace accidents can be categorised into two, i.e. design deficiency or human factor. Mechanical engineers are helping, and will continue to help in reducing workplace accidents via constant improvement of equipment and machine design. As for the human factor, mechanical engineers can play a critical role by incorporating safe working procedures at the workplace and ensuring these procedures are adhered to.

THERE ARE CRITICS WHO SAY OUR COUNTRY IS KNOWN FOR ITS FIRST WORLD FACILITIES, BUT THIRD WORLD OPERATION AND MAINTENANCE (O&M) PRACTICES. WHAT IS YOUR VIEW ON THIS STATEMENT?

Ir. Dr Cheong: I do not agree to this statement. In general, I think it is again the behavioural issue where the mentality of having good O&M practices is lacking. Let us look at the property and facility owners around us who tend to utilise all the facilities up to its maximum capacity for the longest time possible, but not giving their facilities proper and timely maintenance. Mechanical engineers are very proud of scheduled maintenance. Certain critical parts that need to be maintained or replaced on a routine basis according to its work span to ensure that they function properly. However, many still fail to understand the importance of scheduled maintenance in reducing the number of accidents and also in ensuring their facilities function smoothly, especially in the production and manufacturing industry.

Ir. Fam: Generally, asset owners should be more willing to embrace proactive maintenance approaches, such as preventive maintenance as well as predictive maintenance.

In most industries, reliability and productivity of capital assets are essential to the financial success of the organisation. Relying on run-to-fail or corrective maintenance could be costly at times.

Ir. Hisham: I think that the statement can partly be attributed to the attitude of the public. A lot of facilities have been vandalised. In terms of continuous maintenance activities, the frequency has to be increased due to vandalism. Vandalism doubles the effort of maintaining such facilities as well as the maintenance cost. Public awareness on costs associated with repair and maintenance works has to be increased. With this awareness, it is hoped that asset owners and the public will contribute towards safeguarding these facilities.

Ir. Gopal: Aside from the human factor, the allocation for maintenance may be low, almost minimum, for both government and the private sector. Hence, such minimal allocation would not be sufficient to cover all aspects of maintenance. Only basic maintenance could be carried out. Unless sufficient allocation is provided, it would be almost impossible to implement maintenance effectively. I presume that people's mindset on O&M will change, but over the course of a very long time.

IN YOUR OPINION, WHAT IS GENERALLY LACKING IN MOST OF THE MECHANICAL ENGINEERS IN MALAYSIA AND HOW CAN THAT BE IMPROVED?

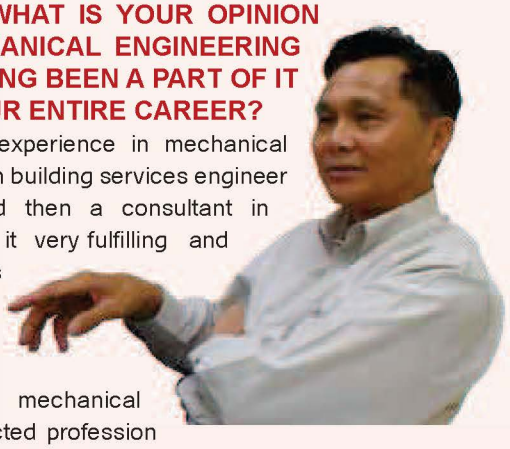
Ir. Fam: When it comes to training and self-development, most mechanical engineers are still pretty much confined to their respective technical fields. I would encourage that fellow mechanical engineers should also get themselves familiar with fundamental financial, commercial and legal knowledge which is essential in today's business environment.

Ir. Dr Cheong: Mechanical engineers should never lose touch of their engineering knowledge even if they might need to work in a multi-tasking environment and perform other non-engineering tasks. The ability to apply relevant mechanical engineering principles as and when required is essential.

Ir. Gopal: Hands-on experience is crucial for mechanical engineers to practise the engineering principles and skills that they have acquired. By merely following theories without practical experience, one cannot become a good mechanical engineer. Both theory and practice are equally important.

Ir. Hisham: I find that mechanical engineers lack in soft skills and multi-disciplinary knowledge. In the present engineering age, presentation skills and commercial knowledge are vital. Having good engineering knowledge means nothing if it cannot be conveyed effectively to others to add commercial value to it.

IN CONCLUSION, WHAT IS YOUR OPINION ABOUT THE MECHANICAL ENGINEERING PROFESSION, HAVING BEEN A PART OF IT THROUGHOUT YOUR ENTIRE CAREER?



Ir. Dr Cheong: My experience in mechanical engineering started from building services engineer to plant engineer and then a consultant in manufacturing. I find it very fulfilling and challenging. But this continues because of my passion to practise as a mechanical engineer. In short, mechanical engineering is a respected profession to be pursued.

Ir. Hisham: I have been practising as a mechanical engineer for over 25 years; the first 15 years, involved in pure engineering practices and the last 10 years venturing into the business sector. Being a businessman, I find that my knowledge in engineering has helped enhance my business portfolio; through analytical thinking, which has assisted me in making better technical and commercial decisions in my business.

Ir. Fam: I have been involved in project development and project management since the start of my career. Being a mechanical engineer, it has allowed me to adapt to various project roles easily by virtue of my engineering background. I would say mechanical engineering offers a wide range of career opportunities as it is one of the broadest engineering disciplines.

Ir. Gopal: I am from the government sector and I have had the opportunity to work in different sectors such as mechanical-related workshops and project management in the Ministry of Defence. Currently, I am involved in projects of the Public Works Department Malaysia. If we look around us, every equipment or system that contributes to the comfort of people is attributed to mechanical engineers (e.g. air-conditioning, lifts, etc.). The future for mechanical engineering is very bright as our country is moving towards becoming a developed nation. In future, facilities or asset management would be one of the major fields, especially in O&M. Hence, mechanical engineers have a very vital role to play in this area. ■