ENGINEERING CORNER

Engineering innovation at USMC

> A successful engineer has a curious mind

Chong, who graduated as the best student in his course at Cranfield University, UK, today takes delight in sharing his expertise with students at USMC.

DR William Chong, assistant professor at the University of Southampton Malaysia Campus (USMC), currently teaches Mechanical Engineering Design and Computer Aided Design (CAD) in the MEng Mechanical Engineering programme.

During his time as a postdoctoral researcher at Loughborough University, UK, prior to joining USMC, he worked closely with automotive industrial collaborators such as Aston Martin, Capricorn, Ricardo and British Petrol (BP).

What is your academic and research background?
I am a mechanical engineer specialising in the field of automotive product design and tribology. I obtained my first degree in Mechanical Engineering from UTM, Malaysia, before securing a JPA scholarship to further my studies at Cranfield University, UK, where I graduated as the best student in my course, MSc in Automotive Product Engineering.

After that, I was offered a full PhD studentship under EPSRC's Encyclopaedic grant to pursue my doctorate. The doctorate first led to my postdoctoral research at Loughborough University, UK and then a year later, my first lectureship with the University of Southampton, based at our Malaysia campus (USMC).

Since my PhD, my research has always focused on the fundamental study of interfacial interactions between sliding surfaces. This enables me to investigate the tribological characteristics (for example, friction, lubrication and wear) of machine elements such as engine lubrication.

My research interest helped me to secure two MOE grants within my first year back in Malaysia and also international collaborations with renowned tribology research groups in the UK, including the National Centre for Advanced Tribology at Southampton (nCATS) and also the Dynamics Research Group at Loughborough University.

What inspired you to follow your area of expertise?
I am always fascinated by the science behind all moving engineering components. Obviously, for something to move, you first have to overcome resistance, better known as friction in engineering terms. For example, an internal combustion engine has to overcome the in-cylinder friction in order to operate.

The friction along the piston ring contact, if not taken care of properly, might affect the mechanical efficiency of the engine, leading to probably higher fuel consumption. On the other hand, when the vehicle is moving, the most efficient way to resist motion is by friction, via braking. Therefore, the double-edged existence of friction inspired me to take up tribology, allowing me to better understand friction and more importantly, to develop engineering designs with optimal efficiency.

What is the most challenging project you have been involved in?
I would say the aim of my research, which is to find a link between nano-scale and micro-scale tribology, is the most challenging activity. This is because my aim is to apply nanotribology to a larger scale application in order to better predict the frictional performance of the engineering design. At a nano-scale, surfaces are minute and researchers are still heavily exploring the science at such levels using Atomic Force Microscopy. This already presents a challenge and we are not yet talking about the integration of such knowledge for engineering product development.

What research projects are you currently working on?
I am currently working with my collaborators in the UK (University of Southampton and Imperial College, UK) in an attempt to explain friction force in terms of energy instead of the typical coefficient of friction. The idea of using energy is in the hope that the knowledge gap between nano-scale and micro-scale tribology can be bridged. Besides this, I have a PhD student working on the design of lubricant-surface interaction in order to reduce friction and wear of materials.

What advice do you have for students entering your field of study?
I would advise students to be proactive and ask constructive questions. With this mentality, it allows one to actually gauge whether one has fully understood the problem. This is essential for engineers as we are problem solvers; we need to come out with creative and innovative solutions to problems faced by mankind.

I think a successful engineer needs to have a curious mind. This would inspire one to ask constructive questions that might lead to creative and innovative solutions.

How do you see your students making an impact in their profession when they graduate?
The students at our Malaysia campus are always proactive in and out of class. With young and creative minds like theirs, I can only see a bright future for them in engineering. It would not be a surprise to see them being leaders in their respective engineering fields in the foreseeable future.

In your own words, how would you describe a typical day at USMC?
As for my typical day at USMC, I get the opportunity to mingle with students during their free time, to casually discuss their student design projects and even their future career plans at times. I also share my experience as an engineer and researcher with the students. This is only possible at USMC because of the significantly higher number of staff to student ratio.