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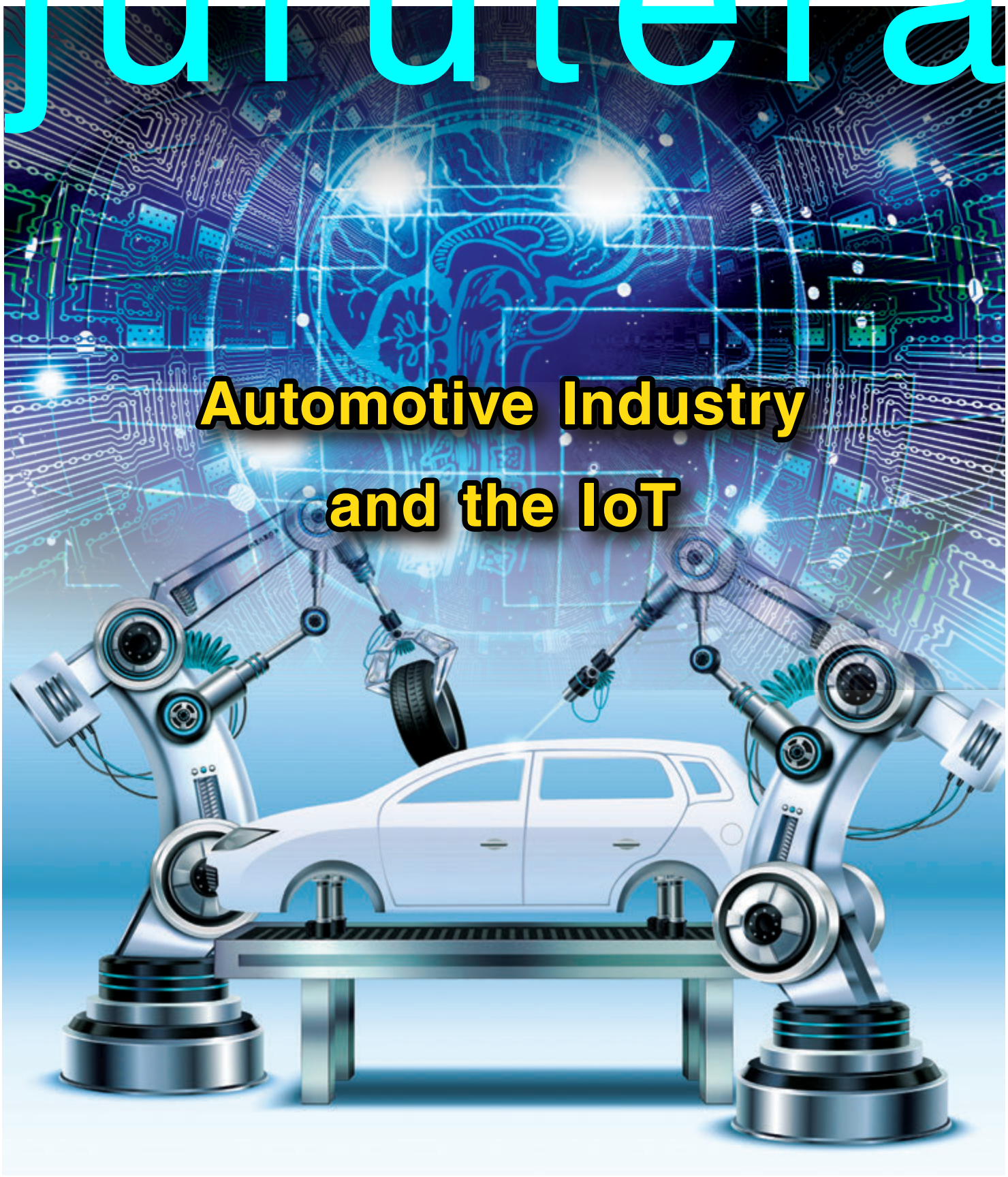

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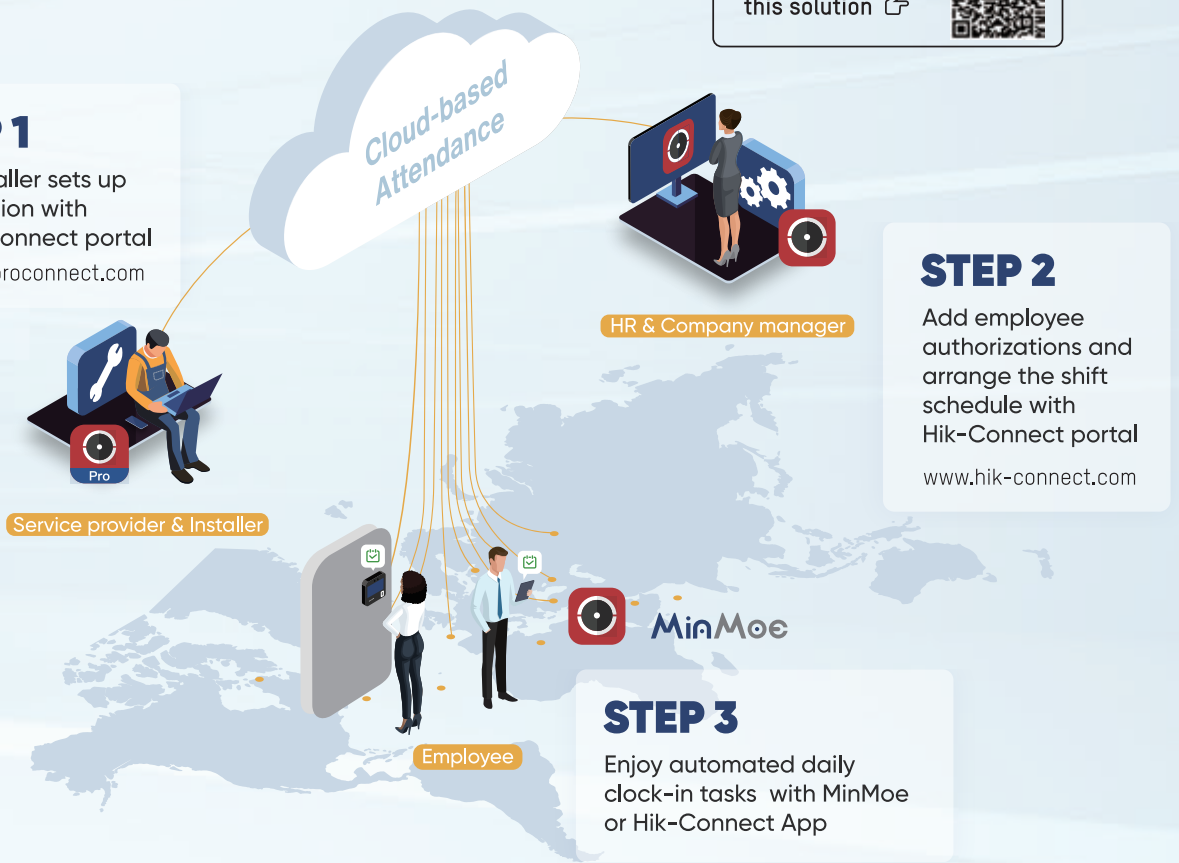

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COVER NOTE

DIGITALISING THE AUTOMOTIVE INDUSTRY

by Ir. Syed Neguib bin Syed Mohamed
Chairman, Mechanical Engineering Technical Division

The ongoing Covid-19 pandemic has transformed how we live and changed how we conduct our business. The situation has highlighted gaps and weaknesses in the industry and has forced us to take a real hard look at where we can improve. This should be viewed as an impetus for us, as a nation, to strive to drive innovation especially towards digitalisation and automation.

The automotive industry plays a significant role in transforming Malaysia into an industrialised nation, which translates into high-value economic activities, improving standards of living and creating higher-paying jobs. The National Automotive Policy 2020 aims to promote participation of local companies in the domestic and global supply chain, encourage R&D and engineering activities, build capabilities and the capacity of the local workforce, support national car projects as well as enhancing exports, investments and local production volume. Its vision is to enhance our automotive industry in the era of digital industrial transformation from 2020 to 2030, enabling Malaysia to realise connected mobility.

In this issue, Dato' Ts. Madani Sahari, the CEO of the Malaysia Automotive Robotics & IoT Institute, discusses enhancing technology, human capital, supply chain, market outreach and aftersales capabilities in the automotive industry and connected mobility ecosystem. ■

EDITOR'S NOTE

POTENTIAL OF CONNECTIVITY

by Ir. Prof. Dr Zuhaina binti Zakaria
Principal Bulletin Editor

You step into the car and a message pops up on your phone that says you will reach home in 30 minutes. Then, another message appears to say you've run out of milk. This information is very timely since you can now stop at a convenience store on your way home and pick up some milk.

This is the concept of Internet of Things (IoT) where your phone is connected to not only your car but also your fridge. With the cost of Internet connection decreasing, more devices, from mobile phones to household appliances, are being equipped with sensors and WiFi capabilities.

On a larger scale, IoT has opened doors to many opportunities, including the automotive industry which is the focus of this month's issue of *JURUTERA*. It is hoped that it will benefit car makers as well as support technology providers and consumers. The application of IoT in motor vehicles promises to reduce human error and make driving more comfortable and safer.

However, IoT can also expose users to security threats in terms of privacy loss and data sharing. Strategies need to be put in place to make sure that all information stays secure. In the meantime, greater awareness of IoT is required for us to assess its potential impact on our lifestyles. ■

MARii:
Spearheading Automotive Innovation in Malaysia

Dato' Madani Sahari has over 18 years' experience in the manufacturing and service industries in the automotive sector. His experience includes strategic collaboration, project development and manufacturing with national and international manufacturers such as Proton, Perodua, Honda, Toyota, Renault, Hyundai, Nissan and General Motors.

A Certified Quality Engineer, he graduated from the University of Lorraine (formerly Nancy-Université), France, with a degree in Industrial Technology. He also has Master of Science MS.c (Quality Engineering), Masters in Environment Science Management (Majoring in Energy Management), Dipl. Ing. (FR) (Industrial Engineering), Six Sigma Black Belt and Lead Assessor ISO/TS 16949.

Nestled in the green and luscious smart city of Cyberjaya, Selangor, is the Malaysia Automotive Robotics and IoT Institute (MARii) campus. Established under the purview of the Ministry of International Trade & Industry (MITI), the agency serves to spur the development of smart systems through the implementation of digital technologies, with a special focus on big data analytics and artificial intelligence, including automotive and connected mobility ecosystem.

Just a 30-minute drive from Kuala Lumpur and MITI, the campus is open to the public, industry players and academia for discussing plans, strategies and activities to enhance the nation's automotive industry.

ROLE OF MARii

The 4th Industrial Revolution (4IR) sees the world embracing new technologies, with traditional methods giving way to new systems that require a new set of skills, especially the automotive industry, which is based on a global platform. As such, MARii's focus includes enhancing technology, human capital, supply chain, market outreach and aftersales capabilities in the automotive industry and connected mobility ecosystem.

Chief Executive Officer of MARii, Dato' Ts. Madani Sahari said that MARii's open space campus was designed to create an environment of creativity, innovation and openness for all industry stakeholders.

"Our main working area, the Perdana Innovation Space, houses our core operational executives who cater to the important areas of enhancement within the industry, such as strategic research, supply chain development and human capital development," he said.

The Perdana Innovation Space houses the Digital Content Development Centre which is responsible for creating digital content such as videos, graphics and social media content to help develop deeper awareness of the automotive

The Perdana Innovation Space at the MARii campus

industry among stakeholders and the public at large.

MARii also established the Automotive Manufacturing Innovation Centre (AMIC), a virtual centre consisting of a network of capabilities and offerings for OEMs (original equipment manufacturers), vendors and academia to access and utilise services and facilities under MARii's 9 pillars of 4IR. The 9 pillars, formulated to accelerate the adoption of 4IR in the automotive industry, are Augmented Reality, Big Data, Cloud Computing, System Integration, Additive Manufacturing IoT, Cybersecurity, Simulator and Autonomous Robots.

MARii's 9 pillars of 4IR. Source: MARii

Overall, the AMIC will provide a critical mass of research capability, combining the 9 pillars of 4IR in not just the automotive sector but also the transportation and mobility industry.

It also coordinates the use of relevant tools and methodologies which affect the manufacturing domain and comprises advanced manufacturing technologies that are data-driven, through the Mobility Digital Optimisation Transformation Services (MDOTS).

ADOPTION OF DISRUPTIVE TECHNOLOGICAL PROGRESS

With regards to the development of next generation vehicles, mobility-as-a-service and 4IR technologies in the automotive sector, Dato' Madani said the government established the National Automotive Policy in 2020 (NAP2020) to accelerate Malaysia's goal to become a regional leader in manufacturing, engineering, technology and sustainable development in the automotive sector.

The MARii Campus in Cyberjaya uses green technology such as this system which cools buildings with flowing water

"The shift towards a connected, autonomous mobility lifestyle is a global phenomenon, hence the focus in technology and engineering to facilitate and expand the scope of the automotive sector," he said, adding that while vehicle technologies have started moving towards electrification, advances in vehicle connectivity have also forced a shift in business thinking in the global players. This has sparked the emergence of new ownership models, as seen in car-sharing, ride-hailing and mobility-as-a-service (MaaS).

"In line with this, the NAP2020 will focus on the research of new technologies, the creation of business and job opportunities (particularly in future mobility areas) and the development of new manufacturing processes and value chains within the mobility sector," said Dato' Madani.

He said three new elements of technology – Next Generation Vehicle (NxGV), MaaS and 4IR – were introduced to facilitate the implementation of NAP2020 initiatives.

IMPACT OF COVID-19 PANDEMIC

With the global COVID-19 pandemic impacting most parts of the world and the global economy, big challenges are expected in the year ahead. The automotive sector is a major contributor to our economy, with more and more car makers offering consumers competitive options. Consequently, the impact of the pandemic can adversely affect the trend in the production and sales of local vehicles.

According to Dato' Madani, any impact on the industry in future will firstly depend on the frequency of disruptions caused by the MCO, in which OEMs (original equipment manufacturers which make systems or components for use in another company's end products), vendors and materials suppliers are not able to operate and produce according to demand. "It is important to note that there are two major segments: Local demand and exports. In this case, exports are at risk when lockdown situations differ between Malaysia and the target export country and this puts pressure on Malaysian companies to supply products to countries where lockdowns are not happening," he explained.

As we are still reliant on the domestic market to purchase vehicles and components in Malaysia, Dato' Madani said the second thing to look at is the Malaysian economy – in sustaining itself during the pandemic and its ability to recover when the pandemic is over.

He said that in the last decade when the National Automotive Policy was revamped, the gradual liberalisation of the industry produced more affordable vehicles and, most importantly, a higher level of safety features and energy efficiency. This made locally-assembled vehicles (both national and non-national brands) more attractive to the consumer.

"Nevertheless, the key thing to see is how the consumer is incentivised to purchase new vehicles. The Sales Tax & Service Tax (SST) exemption, introduced in June 2020, had certainly boosted the industry which was impacted during the pandemic, pushing the Total Insurable Value (TIV) beyond the half million mark. Since then, the SST exemption has been extended to December 2021. At the same time, loan moratoriums have been offered to consumers to help reduce their financial burdens during the pandemic and, more importantly, have put them in a better situation to return to normal consumer patterns when the pandemic recedes in the future," he added.

The above factors are important observations that will determine the future of the industry beyond the pandemic, said Dato' Madani.

ELECTRIC VEHICLES IN MALAYSIA

The United Kingdom and France have announced that they will phase out new cars running on fossil fuels by 2030 and 2040 respectively. In Asia, Japan also announced plans to stop manufacturing new cars that run on fossil fuels by mid-2030. If Malaysia is to join the bandwagon and push for more EVs in the near future, our electricity infrastructure will need to catch up, considering that electrification in Sabah and Sarawak is still not at 100% and that substantial portions of those are also not renewable energy sources.

The MyKar electric vehicle start-up initiative kicked off in 2019, was designed, developed and researched entirely by Malaysian engineers in collaboration with MARii. Source: MARii

With this in view, the NAP2020 has plans on how to promote engineering activities as well as how to develop our engineers' capabilities in the automotive industry and our local manufacturing sector.

Dato' Madani said the NAP2020 focus on NxGVs and MaaS will enable the emergence of complex parts and components such as sensors, cameras and communication modules which are continuously increasing in demand globally.

"At the time of this query, the government is finalising an EV policy that expands the scope current policy to include direct user incentives, including tax incentives on purchase as well as investing in personal charging facilities," he said.

However, he said, the government's main approach is to enhance the current industry ecosystem to be ready for EV consumption as well as business development in the area of EVs.

"The Government is currently developing an EV Interoperability Centre (EVIC) which will contain various facilities needed for the testing of NxGVs such as charging stations, smart grid integration solutions and various other infrastructures to accommodate the research and development phase of future mobility. The combination of various facilities in the EVIC will create an NxGV ecosystem based on these future technologies," he added.

From the manufacturing point of view, he explained that NAP2020 aims to accelerate the penetration of NxGVs, beginning with the local development of numerous critical components which include EV specific technologies such as battery management systems, on-board charging and its related components, alongside the development of standards and regulations that are compliant with global standards.

"An NxGV Test Bed is also in the works, which will allow all businesses in the mobility ecosystem to collectively design and validate their products in a single location,

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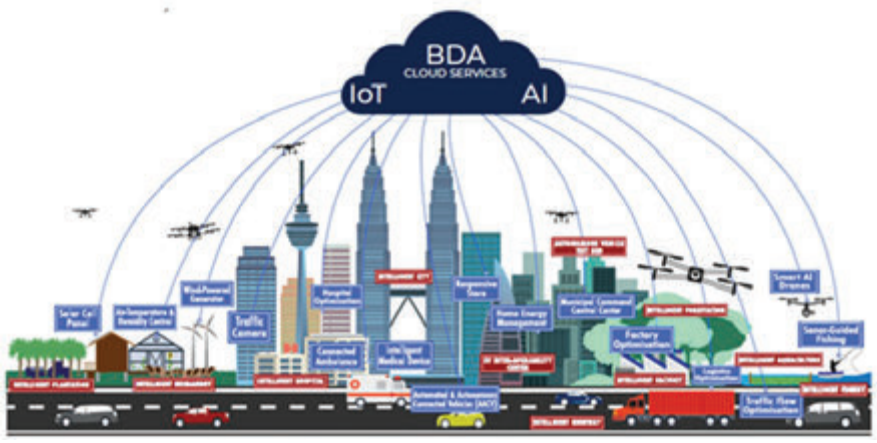

The integration of IoT technologies enables data collection on vehicle locations and operations in real time, enabling companies to expand their operations, handle and manage larger volumes of vehicles with ease. Source: MARii

in collaboration with all members that contribute to the design pool for autonomous driving," he added.

The availability of these elements will enable the transformation of traditional factories to smart factories, where every process is automated as much as possible, simultaneously utilising IoT, BD, and system integrators to synchronise various processes such as research, design, prototyping, production, distribution and client management.

"New standards for EEVs and NxGVs are being continuously developed to accelerate the development of global technologies. These standards will be published under the Malaysian Standards and will include testing processes for fuel consumption and CO2 emission for EEVs while standards for autonomous technologies will be focused on the development of NxGVs," he said.

ENHANCEMENT OF VEHICLE SAFETY, IMPROVING VEHICLE INTELLIGENCE & PROMOTING ENVIRONMENTALLY-FRIENDLY CARS

MARii has developed numerous platforms for businesses to enhance their technology uptake, from human capital development programmes to shared technology platforms which can be utilised by businesses without the need to invest heavily in technology uptake. As the nation moves towards higher standards in safety and driving technologies, MARii invites stakeholders to work with them to achieve the needed developed technology, human capital, and value chain to improve the automotive and mobility sector.

Mobility-as-a-Service builds on the ability to bring together multiple modes of transport so that users can find the best method to reach their destination quickly, easily and customised to their needs. The implementation of IoT in its development will enhance the consumer experience. Source: MARii

To enhance vehicle safety, improve vehicle intelligence and promote environmentally-friendly cars to the public, MARii offers programmes and training for vendors as well as the public, including Automotive Supplier Exellence Programme (ASEP), MS 4R2S Certification Body, MARii Unlimited, Dealers Entrepreneurship Enhancement Programme, Workshop Transformation Programme and CarBengkel App, Technopreneur Development Programme, MARii Industry 4WRD Technology Platform (MITP), Safe Car-Vehicle Safety Campaign and Car Care Week – Vehicle Inspection Campaign.

"The Automotive Industry Certification Engineering (AICE) programme was developed by MARii in recognition of the need to meet the skilled human capital demands of the industry. AICE will help engineering graduates jumpstart their careers as the syllabus will allow them to be immediately employable by the industry upon graduation," said Dato' Madani.

"The programme comprises 8 months of intensive exposure to the various skill and knowledge sets within the automotive industry. Trainees are equipped with skills in product and process design as well as manufacturing processes and quality management systems," he explained, adding that trainees will also be exposed first-hand to the inner working cultures of the industry through direct attachments with automotive companies.

MARii also has an Academy of Technology. This technology commercialisation centre was set up to undertake technology transfer, validation and adoption of automation practices. "The electric bus homologation, robotic programming

IPC and AICE training conducted by MARii

and 3D printing capabilities are some of the technology commercialisation activities being undertaken at the MARii Academy," said Dato' Madani.

Then there is the MARii Design Centre which was established for the purpose of enhancing the implementation of 4IR in the automotive industry, specifically in design engineering, simulation and prototyping.

The National Emission Test Centre, under MARii and located in Rawang, is the first full-fledged vehicle emissions testing facility in the country. Its facilities include real-time measurement of exhaust emission gases for passenger cars in accordance with UN Regulation 83 and 101.

"Also, the MARii Industry4WRD Technology Platform is a one-stop advanced production management solution that tracks and gathers accurate, real-time data on the complete production lifecycle, including production planning, resource management, performance analysis, product tracking and genealogy, process execution, data collection and quality management in a single, integrated cloud-based solution," said Dato' Madani.

The platform provides information that allows decision-makers to understand the state of factory operations to optimise the production process. This in turn benefits manufacturers by boosting production efficiency, product quality and improving quality control response times.

"The technology platform is a homegrown solution for enhancing engineering capabilities, digitalisation, connectivity, productivity and user-experience through the digital engineering platform under MARii," said Dato' Madani, adding that it provides for seamless orchestration and synchronisation of all the elements in the manufacturing process.

"The technology can also be leveraged by SMEs to deploy 4IR technologies to encourage growth as a system integrator that is affordable for 4IR transformation. Apart from use in the automotive and mobility sector, the platform is applicable to various industries, from smart furniture and handicraft/ souvenir manufacturers to optimising process lifecycle and offering higher value products." ■

Interview with Dato' Madani Sahari (right) in MARii

Dato' Madani Sahari (centre) with representatives from IEM's Mechanical Engineering Technical Division, Ir. Syed Neguib (right), Puan Hanna Sheikh Mokhtar, Ir. Tajul Ariffin (second from left), and Ir. Za'im Azyze (left).

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ARE WE ON THE RIGHT TRACK TO INSPIRE AND MOTIVATE FUTURE ENGINEERS?

by Ricky Liew Chee Leong

On 16 Dec 2019, the Berita Harian reported that Malaysia faced a severe shortage of not 10,000 or 20,000 engineers but a shocking 150,000! Despite this problem, there were debates on local social media recently which discouraged the younger generation from pursuing engineering studies with low monetary remuneration as the primary reason.

Although the public offered different opinions and responses, the comments had both negative and positive influences on the younger generation and engineering profession. It was also quite unfortunate to note that some of the negative remarks came from practising individuals within the engineering fraternity. More negative remarks such as these will eventually affect our beloved nation's aspiration towards becoming a developed nation.

The driver of a developed nation needs the strong support of engineering and technological professionals. China's advancement in recent years is very much due to its engineering and technological fraternity. Her current President himself is a chemical engineer by training and one who fully understands the importance of engineering and technological pillars in a nation's development.

So why is there seemingly a lack of understanding of the nobility of the profession, even among the local engineering fraternity? Like many other professions, engineering is a noble profession that supports the safety and needs of the society. Almost every facet of our lives, from the house we live in, our refrigerator and electricity supply to cars and airplanes, is made possible only because of this special group of people known as engineers.

The negative remarks in the social media also raised the question of whether some of those who took up engineering study or the profession had the right motivation from the very beginning. The issue of whether students had the right motivation to pursue engineering had been acknowledged and discussed among industry advisory panels meeting at local institutions of higher learning.

Inculcating the right motivation in individuals before they decide to study engineering is crucial so that they are prepared with the proper mindset to walk the path to becoming successful engineers. Using monetary gain as the primary motivator to study engineering can easily lead to a catastrophic casualty of the engineering profession.

One common question at recruitment interviews is why an individual takes up a specific engineering course. It is quite common to hear "prepared answer" responses such as they like the chosen discipline or branch of engineering. However, more often than not, the results of their engineering fundamentals recruitment exam do not show the engineering interest that they claim to possess.

Upon further study of their application forms, one may also notice that many young graduates state unreasonably high salary expectations even though they do not have any job experience. It will appear that the majority of them do not appreciate that an initial employment is a golden opportunity for them to practise what they have studied in order to gain valuable experiences which can then be used to their advantage in their career development and employment negotiations in the future.

So what should be the primary motivator for young individuals who are planning to study engineering? It is important that the motivation be the passion to work in a field that uses the principles of physics, science and mathematics to create or improve designs or processes to

solve engineering problems for the safety and benefit of mankind. It appears that the majority of employment candidates do not display such passion; instead they are applying for the job merely because they have studied engineering. Have the stakeholders (parents, school, government agencies, institution of higher learning and learned societies) actually developed activities to cultivate the right mindset and instill a passion for engineering in the younger generation and, if so, have these been done effectively?

Engineering is a noble and interesting profession. It involves hard work to solve problems and offer solutions which is what makes it so interesting. Take for example, an aircraft engineer. It is the passion for the marvel of aircraft engineering systems and technology that drives engineers to solve problems related to aircraft design, operations and maintenance. Most will agree that these are some of the reasons that keep the fiery interest in this profession, with the majority staying in the same profession until the day they retire. Though some may experience a low financial start-up, it eventually leads to a lot of job satisfaction when they are able to solve the many problems related to aircrafts after production roll-out from the manufacturing plant.

When engineers accumulate knowledge, skills and experience with proven accomplishments, monetary gains will come along naturally, without having to bang tables or kick chairs to demand for higher salaries. Technical problems have always been the catalyst for exercising an engineer's right knowledge, skills and attitude; eventually these are testimony that what an engineer has learnt has benefitted the people and industry.

Practising engineers realise that their sense of accomplishment is attained particularly in an unavoidable situation of a complex and complicated technical problem with limited financial resources and support. Instead of running away, they will face the problems with responsibility and use a systematic approach to find a solution. It will be even more challenging if they have superiors who are unreasonably demanding and who will often shift the project datelines. Engineers will take on these problems and devise various optional solutions. Each solution will have its own merits and it is up to the engineer to choose the best solution, taking into consideration the circumstances at that time. Whether the solution is good or bad, an engineer will feel proud that he/she has the ability and resourcefulness to solve all sort of technical problems.

Engineers can find joy in the continuous learning process and growth which money cannot buy. Initially, some problems may sound complex until engineers work out a solution systematically and implement it in stages. Then they will see that the problem is not that difficult after all.

Engineers are able to view problems from the physics and mathematical perspectives first before working to find a practical solution. If the physics principles and numerical formula make sense, the practical solution will usually work and, even though it may not be the best solution, the problem will be solved.

In aircraft engineering for example, engineers have designed and developed several aircraft support equipment for in-house use through the principles described above. The process of identifying the requirements of the desired equipment, the application of physics and mathematics principles, fabrication, validation and testing are what keeps an engineer's job interesting. The satisfaction of finding a solution and the sense of accomplishment will strengthen an engineer's efforts to solve technical problems regardless of whether these are major or minor problems.

Perhaps, engineers who have walked the path will feel and understand the value of being an engineer. How can this be translated into an inspiring

message for the younger generation? One way is to show them the right examples as these will inspire and motivate them.

Take this case which happened quite a few of years ago. Due to a technical problem in a new aircraft, an engineer (and the pilots) almost perished in the Pacific Ocean. The new aircraft model was the first of its type in that particular country at the time and the engineer was picked to be the duty flight engineer for the mission. Prior to departure from its manufacturing plant in Kansas, USA, the engineer was involved in the acceptance test flight of that aircraft. The test flight data was reviewed and found to be acceptable well within the limits. Several hours of the test flight did not reveal any flaw in the system and due diligence was also carried out satisfactorily.

The flights from Kansas to California and Hawaii were perfect, with all systems functioning normally. However, after the plane departed from Hawaii and was cruising at 43,000ft, its air-cycle system shut down abruptly. There was a sudden gush of hot air into the cabin, making a loud noise. The pilots responded quickly as per emergency situation and this was the first time they encountered this system failure in the new aircraft. Loss of aircraft pressure at high altitude puts the occupants at risk of hypoxia which could turn into fatal anoxia. This is the physiology condition due to a lack of oxygen to the human brain and tissues. An emergency descent to a lower altitude was not acceptable as it would mean insufficient fuel to reach the intended destination and the plane would potentially end up in the Pacific Ocean.

Aircraft engineers know that in aircraft engineering and system design, there is always a redundancy and backup system incorporated. This also shows how important it is for engineers to think beyond design and to prepare for the worst-case scenario. This is because engineers are responsible for public safety. This is the time where the pressurisation system design engineer can save the life of the people.

The emergency pressurisation system kicked in instantly, allowing the crew a bit of time to respond and assess the emergency situation. Designing a system that used the direct hot bleed air tapping from the engine and by-passing the normal air-cycle and pressurisation system might not be comfortable for the aircraft occupants but it would save the lives of the people on board. This system was not designed for comfort but rather for safety in an emergency though that might be very unlikely.

The engineer who designed the cabin air sealing system also helped save the lives of those on board by ensuring the loss of pressurised cabin air was well controlled. Indeed, what an engineer designs and what an engineer does will have huge impacts on people's lives. Safety is a priority, a principle that applies to all fields of engineering.

The crippled aircraft eventually landed on a remote island with very limited resources. Modern aircrafts are complex machines made up of complex mechanical and avionics systems that integrate with each other. Perhaps many people would think of the captain as the most important person in an aircraft but, in this case, the engineer who found a solution to the problem was more important. The engineer would not permit any further flight until the solution was executed properly, even though an aircraft could fly in an unpressurised mode with many restrictions. The engineer then did a complete analysis of the parameters of the system. Not only did the air-cycle machine system failure not make sense as this was a brand new aircraft but the complete system parameters interpretated from the diagnostic computer did not show vague or abnormal systems operations data.

By plotting graphs against the system design and behaviour with the synthesised information, the engineer concluded that the solution would not to be found in the aircraft but outside and perhaps in home utility appliances. Based on the principles of physics and mathematics, the engineer devised a solution. With the help of a local senior mechanic, he developed a wire at a local workshop which he tested and plugged into the system circuit; when tested, the system worked perfectly and safely. The pilots were overjoyed as the engineer managed to solve the pressurisation system failure despite having landed on a remote island with limited support and resources.

This was communicated to the manufacturer's team of design engineers who found that the developed solution was acceptable, so the aircraft departed for home base safely and without any further incident.

Such is the ability of engineers in the real world as they solve not only problems on paper but also technical problems in real life and wherever they may be.

The complexities of world technical problems mean engineers need to work as a team rather than claim superiority over one another. Each discipline and field has its own knowledge, skills and expertise. Engineers communicate and respect each other's discipline and expertise.

The aircraft system operated perfectly as how it was designed. The engineer saved the US$20 million airplane from being stranded on the remote island.

The case above shows how important engineers are to society and the world. Engineering incidents, accidents and failures do occur and should be used as lessons to be learnt so that we do not repeat the mistakes of others.

So, back to the question: How are we motivating and inspiring the younger generation to take up engineering studies and be engineers? Is the nobility of engineers in solving technical problems to benefit mankind being used to inspire? Is the pride of the profession in putting public safety first, one of the motivating points? Is enticing the younger generation with wealth and status the right motivation for them to study engineering? Are the stakeholders concerned with the development and

growth of engineering profession? Undeniably, many engineers do become wealthy in the course of their careers but these are built on the foundation of a passion for solving technical problems safely. Then everything else, such as financial gains etc., will fall in place naturally.

Whether the engineering discipline is civil, mechanical, electrical or chemical, Malaysia needs more engineers who can solve problems and help propel our nation forward. Without engineers, we will not be enjoying the quality of life, comfort and conveniences that we have today. Of course, there is still a lot more that engineers can do for the benefit of mankind now and in the future. ■

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Ricky Liew Chee Leong is Head of Engineering in a local aircraft engineering and maintenance organisation. He is a registered engineer with the Board of Engineers Malaysia and a Fellow of ASEAN Academy of Engineering & Technology.

CONGRATULATIONS

Heartiest Congratulations to
***YBhg. Dato' Ir. Ng Sin Chie** and*
***YBhg. Dato' Capt. Ir. Dr Koay Ban Hing**,*
IEM Penang Branch Past Chairman
on being conferred the
Darjah Setia Pangkuan Negeri (DSPN)
award by the
Yang di-Pertua Negeri Tun Ahmad Fuzi Abdul Razak
on his 72nd birthday.

Heartiest Congratulations to
***Ir. Dr Mui Kai Yin** on being conferred the*
Darjah Johan Negeri (DJN)
award by the
Yang di-Pertua Negeri Tun Ahmad Fuzi Abdul Razak
on his 72nd birthday.

OPPORTUNITIES FOR SAFETY ENGINEERS IN 4IR

by Ir. Tajul Ariffin bin Mohamed Nori

Ir. Dr Mohd Fairuz bin Ab. Rahman

Ts. Zainor Akramin bin Hj. Zaini

The primary purpose of an engineer is to play key roles which have great impacts on society's well-being. Engineers are bound by the high values of the Code of Ethics that guide them in the performance of their duties. Every engineer is equipped with a unique specialisation, especially in delivering engineering services, such as developing new designs of plants or products.These engineered solutions which are put forward must have the components of safety and health values, as well as other values such as commercial, aesthetic and sustainable. All engineers have moral and social obligations to ensure that their designs will not pose safety and health risks to himself and other people.

The principles of safety and health can have a beneficial impact on engineering services. One of the main principles which engineers can use is the risk assessment approach, popularly known as Hazard Identification, Risk Assessment & Risk Control (HIRARC).

Risk assessment approach starts with the identification of foreseeable hazards. Hazard means a source with the potential to cause injury and ill health. The next step is to carry out a risk assessment. Risk assessment means evaluating the risks to safety and health arising from the hazards and determining the appropriate measures for risk control. It should be used as part of the design and planning processes.

Occupational accident prevention can be achieved if all safety and health risks are avoided. But this is not always possible. Risks which cannot be avoided must be evaluated and proportionate measures need to be put in place. Proportionate measures mean that risk control is determined according to the severity and probability of hazards occurrence. Proportionate measures also refer to the time, money and trouble required to control the risk. This process requires "engineering judgement" by the engineer. If the risk is too significant and hence must be controlled, engineers can refer to the Hierarchy of Controls, a set of control measures with a systematic selection and level of effectiveness for each risk control method. This is the fundamental method of risk management in accordance with ISO 45001: Occupational Health & Safety Management Systems.

This approach provides a more effective mitigation strategy instead of arbitrary decisions. With this approach, the high level of control provides more effective protection compared to the low level control. Figure 1 illustrates the hierarchy of control in risk assessment.

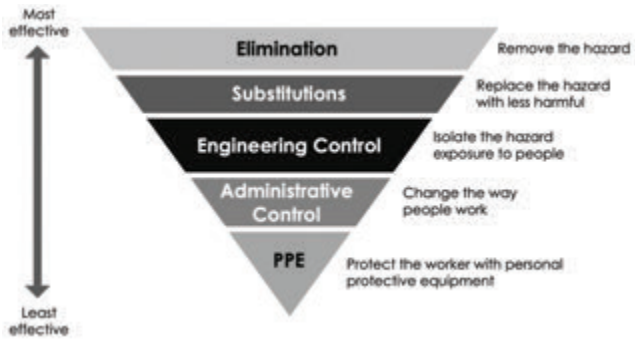

Figure 1: Hierarchy of Control

The most common controls are elimination, substitution, engineering control, administrative control and provision of personal protective equipment. Bear in mind that not all risks can be eliminated or substituted. Thus, engineering control can provide a more reliable control strategy in the long run rather than administratively depending on human, system or protective equipment.

Every facility, machinery, plant, substance, chemical, equipment or transportation has its own inherent risks which can harm those who come into contact with it. For certain solutions or control approaches, risk of accident can be managed by most people and managers or supervisors but not all risks can be mitigated without engineering intervention.

Most solutions require the knowledge and intellect of an engineer. Hazardous substances which can be of benefit to our well-being, such as the large quantities of ammonia used in refrigerators, require engineering control to prevent the risk of injury at all operational stages. Without complex engineering solutions, it will be impossible to reap benefits from such harmful chemicals.

DESIGN FOR SAFETY

Design is a process to create something based on fundamental engineering or science principles which may optimise development, usage, cost and most importantly, safety. Machineries, chemicals, plants, safe tools and equipment as well as design of facilities are mostly attributed to the work of engineers, especially at the design stage. Avoiding risk is a very challenging process if it is not treated as early as possible in the lifecycle of a certain product. Those who create something may plan for proper risk management by considering the design stage as an opportunity to deal with possible hazards before any facility, equipment or plant is used or operated.

Safety and health have a huge impact and influence on how things are designed. Safety has influenced the way many things in life are created and evolved to what they are today. For example, the construction of buildings using Industrial Building System (IBS) material technology (precast parts made in factories) not only simplifies and reduces construction time but major accident are also avoided by reducing the number of workers required to work at height during construction as compared to conventional construction and cast in-situ method. The IBS concept improves construction safety.

Furthermore, safe design encompasses a spectrum of risk mitigation strategies with consideration of protection beyond the operational stage. It also considers how residual risk can be further mitigated in case of machinery or plant failure. This includes how certain facilities respond in an emergency to reduce the risk of human injuries and their severity. Take for example, the design of scrubber systems in a chemical plant which acts as a safety barrier to prevent the release of harmful gas into the environment in case of leakage.

In chemical engineering, Process Safety Management (PSM) is a branch of engineering with a complex engineering system to prevent dangerous occurrences in major hazards installations. This area involves engineers of various disciplines, from design, construction and operation to maintenance of chemical processing plants. The purpose of PSM is not only to find cost-effective engineering solutions but also, and most importantly, the long-term safe operation of a chemical plant. In Civil Engineering and building construction, fire prevention through the design of passive and active fire prevention facilities, is a mandatory requirement in the building design and construction that must be approved by a Professional Engineer.

SAFETY ENGINEERING STATE OF THE ART

There is no way to avoid the disruptive industrial revolution. Big data, Internet of Things, cloud computing, blockchain and artificial intelligence have become common terms today. With the rapid advancement of engineering technology, especially with the advent of the 4th Industrial Revolution, the use of engineering control has become a very effective option to ensure great improvements in safety and health risk management in various industries.

Take for example, a skyscraper project involving many tower cranes. IoT can improve the connection and communication of the whole system and

between each tower crane at the construction site to avoid unexpected collisions.

Drones with artificial intelligence can help improve safety, especially during plant and heavy machinery inspections which are, traditionally, carried out physically by safety inspectors. With drones, the inspection can be done remotely without the need for humans to be exposed to the hazardous areas. Social distancing at workplaces can also be possible with wearable electronic devices that will send GPS data to the central control station for safety and health compliance.

Figure 2: Drones can ensure the well-being and safety of humans in many areas of life. Image courtesy of pixabay.com

OPPORTUNITIES FOR ENGINEERS IN SAFETY & HEALTH ENGINEERING

With the creation of more AI and automation, traditional tasks may now be done with robotics and smart algorithms. This requires designer intervention at the back end of the system. Robotics may be intelligence by trained data, but humans are still needed to set up what is safe and what is not for a sustainable development.

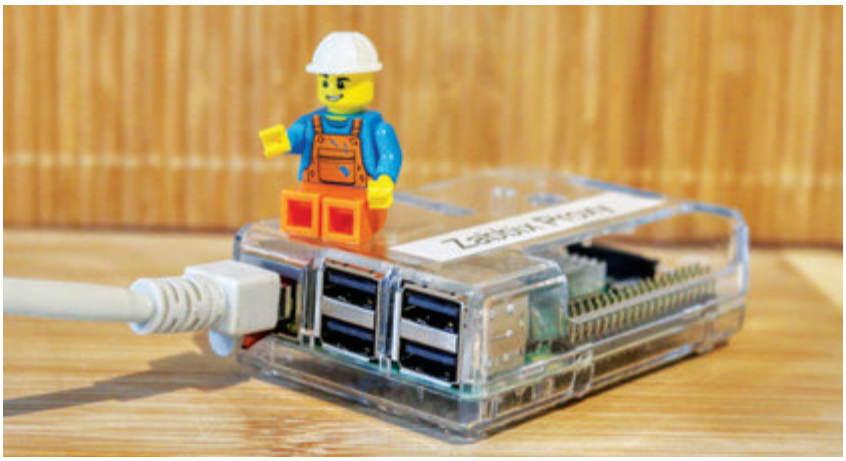

Figure 3: Safety engineers of the future must be equipped with essential knowledge and skills of digital transformation. Image courtesy of pixabay.com

With increased adoption of automation in various industrial and manufacturing sectors, the field of engineering has become more significant with the development of new areas of engineering specialisation especially in control engineering. The job demand in this area will expand. There are no exceptions for safety and health aspects which are highly influenced right from the design stage. Supervision of workers will continue to be done via remote monitoring, reducing the number of safety supervisors required. As smart algorithm and intelligent factories become a reality and common repetitive and routine tasks are taken over by robotics, more engineers will be required to supervise the hardware and systems.

Traditional engineers must embrace the new knowledge and skills, innovation and creativity to remain relevant with today's digital transformation. Some may think that transformation can be done by just depending on IT departments to improve their systems or any future engineering development. However, this may not be a sustainable approach. Having an engineer onboard with a better understanding of how digital technology works will be more feasible to get optimum outcome in an organisation's digital transformation. Self-enrichment with continuous learning including essential recent technological revolution skills and knowledge in software, coding, electronics, automation and big data should be a part of an engineer's development programme. ■

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Dear IEM members,

I am delighted to announce the launching of IEM's very own Mobile App (on 14 April 2021)! Named "IEMGo", this mobile app will enhance communication between IEM and its members. For a start, it will enable IEM members to connect to the IEM Community site for easy access to IEM Bulletin, IEM Journal, obtain information or first-hand announcements and to register for events. More features will be added in future to further enhance the app, such as providing job matching opportunities for members, enabling communication between IEM members and a host of other possibilities which we are exploring.

In fact, the need for IEM's very own mobile app was one of the feedbacks we obtained from members in our first survey carried out during the MCO last year. We are very excited to have accomplished this in just one year and without incurring any cost for IEM. On this note, I would like to thank Silverlake – the developer of IEMGo and IEM Secretariat for its relentless efforts to make the app a reality.

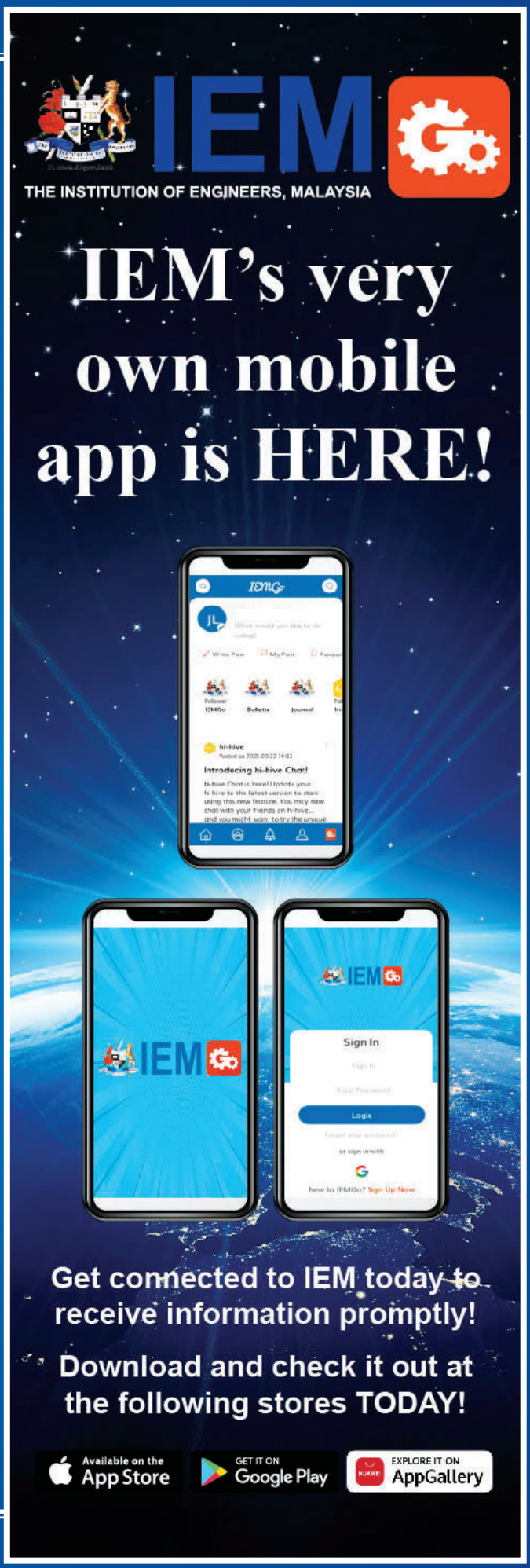
I hope all our members will join the community under IEMGo and make this project a success. You can download the app from Google Play Store, Apple App Store or Huawei App Gallery.

We will be sharing the steps on how to install IEMGo and how to make use of the app in our email blast, social media channels and website. Should you need further information, please contact our Secretariat staff for assistance.

Finally, I would like to express my appreciation to the IEM Council and Excomm, the respective Committees and Members for their support and I look forward to the success of IEMGo.

Thank you. Stay Safe and Stay Healthy.

Ir. Ong Ching Loon,
IEM President



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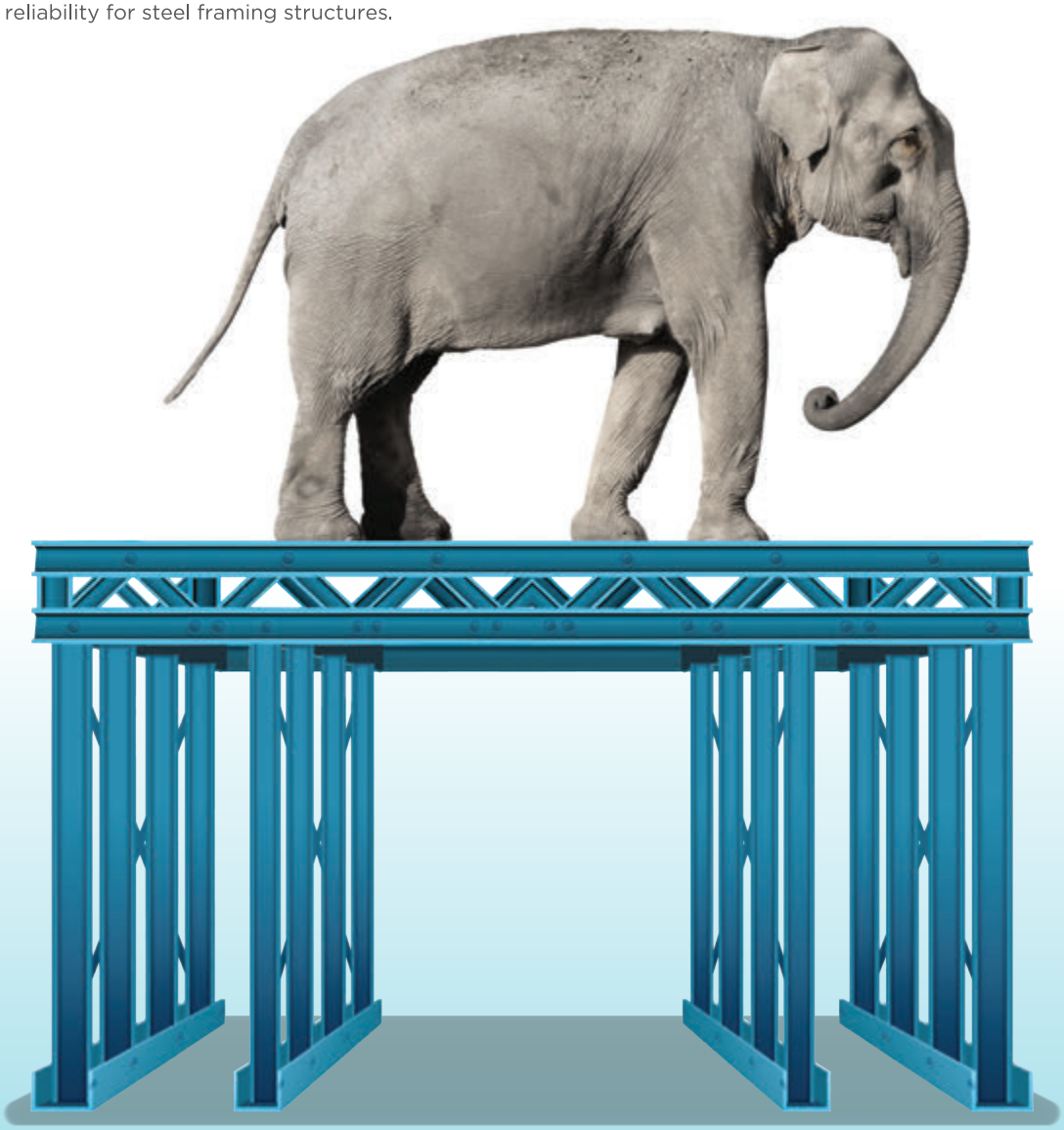

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INDUSTRIAL SOLUTION FOR HYDRAULIC SYSTEM MAINTENANCE

by Ts. Nor Azilan bin Jaafar

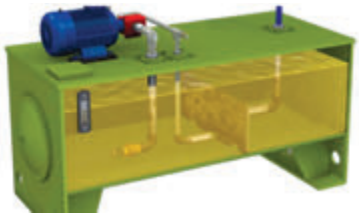
Improper maintenance of hydraulic systems can cause the components and systems to fail. This is mainly due to maintenance personnel who do not understand the proper recommended maintenance techniques.

There are 2 main areas of concern: The first is Corrective Maintenance or Reactive Maintenance which, in many cases, contributes to failure of components when it is not performed as per OEM recommendations or standards. The second area is Preventive Maintenance (which is key to success of machine reliability) when this is not performed as per schedule.

The correct and recommended parts from OEM must be used for corrective and preventive maintenance in a hydraulic system pack

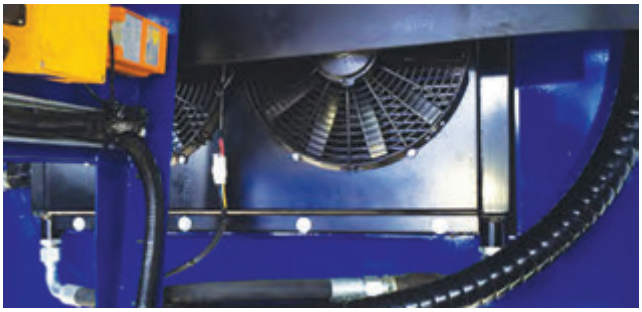
KNOWLEDGE

Very often, maintenance personnel are not trained to perform maintenance as recommended by the OEM. In an industry, the skills of the maintenance team can be divided into two categories. The first is to carry out troubleshooting of faulty hydraulic components and the second is general hydraulic maintenance.



It is most important that all maintenance personnel are able to check the condition of hydraulic components such as AC motor, hydraulic pump, solenoid valve, strainer, filter, pressure relief valve, baffle and diffuser plate, air breather and filters

The oil level in the hydraulic tank should also be read frequently to ensure it is correct. If it drops too low due to leakage, the system will not work efficiently. It is estimated that the loss of one drop per second will add up to 1,500 litres of oil lost in a year. The low oil level can cause a vortex in the reservoir. Subsequently, air trapped in the pump inlet will cause dangerous fluctuations and unbalanced pressure on system.



Maintenance personnel also need to monitor the hydraulic oil temperature. With cooling devices installed, the oil temperature will be significantly lowered. When hydraulic fluid heats up, it damages the piston seal and the subsequent oil leakage will result in loss of input power

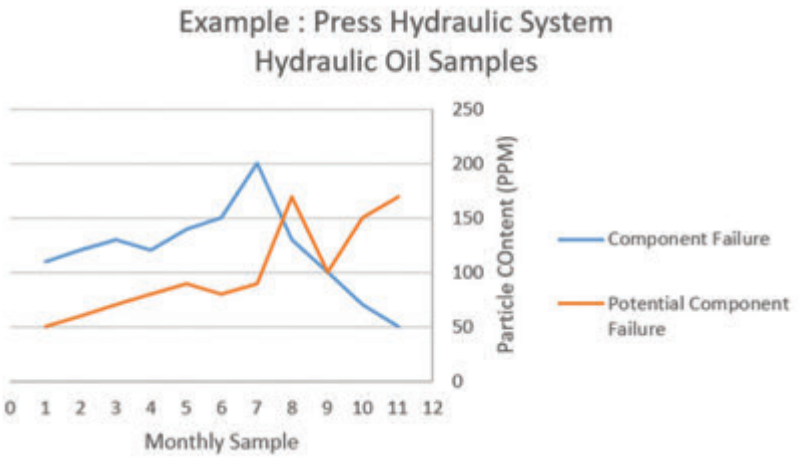
Selecting the correct hydraulic fluid viscosity is also important to ensure the system is long lasting, durable and functions properly. Hydraulic ISO VG 32, 46 and 68 are commonly used in hydraulic pack systems. It is strongly recommended to use the hydraulic fluid supplied by or recommended by the OEM

ISO 3448 Viscosity class	Kinematic viscosity at 40°C (mm^2/s = cSt)		
	Mid-point	Minimum	Maximum
ISO VG 2	2.2	1.98	2.42
ISO VG 3	3.2	2.88	3.52
ISO VG 5	4.6	4.14	5.06
ISO VG 7	6.8	6.12	7.48
ISO VG 10	10	9.0	11.0
ISO VG 15	15	13.5	16.5
ISO VG 22	22	19.8	24.2
ISO VG 32	32	28.8	35.2
ISO VG 46	46	41.4	50.6
ISO VG 68	68	61.2	74.8
ISO VG 100	100*	90	110
ISO VG 150	150	135	165
ISO VG 220	220	198	242
ISO VG 320	320	288	352
ISO VG 460	460	414	506
ISO VG 680	680	612	748
ISO VG 1000	1000	900	1100
ISO VG 1500	1500	1350	1650

PREDICTIVE MAINTENANCE

To measure the efficiency of a hydraulic system, it must be tracked and supported by both the management and maintenance personnel. There should be a benchmark for measuring the success of a hydraulic system.

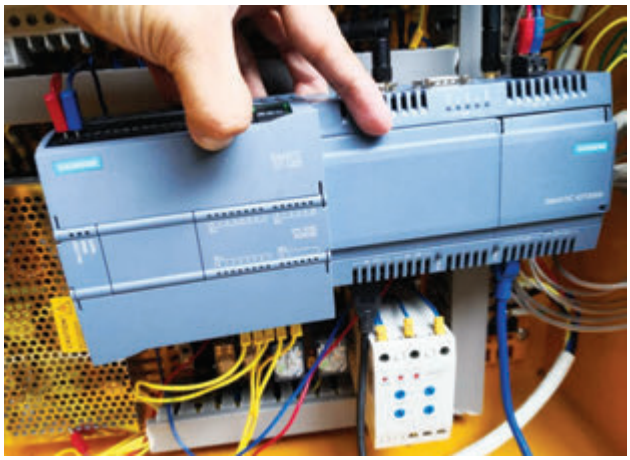
During the tracking process, the trend of information can be plotted and this will allow maintenance personnel to identify positive or negative consequences.



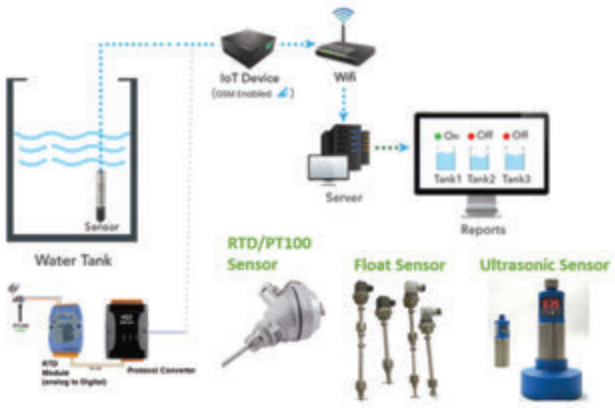
Example of tracking oil content through frequent oil sampling which can identify any component failure

IoT IN HYDRAULIC SYSTEM MAINTENANCE

With Internet of Things (IoT), tracking the system has become easier today. Connecting to IoT can relay a host of information, including operational data such as energy consumption and function status. This information can be accessed anywhere by not only maintenance personnel but also others in the production chain (e.g., parts manufacturers) who can use the information to bolster their products for increased efficiency and lifespan.

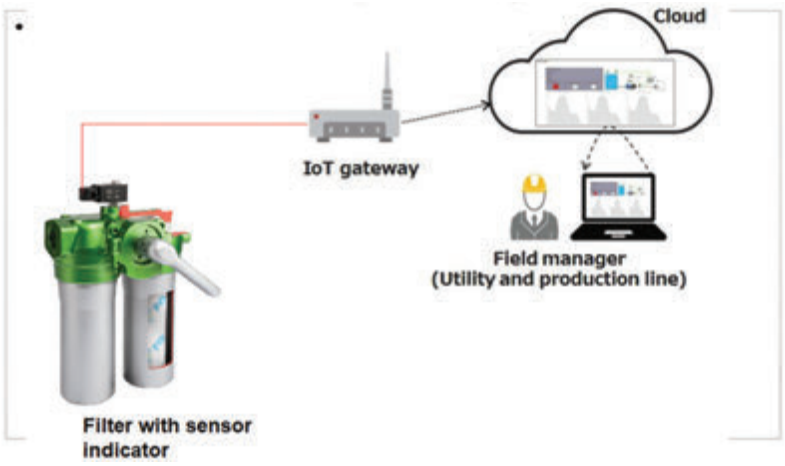


For example, SIMATIC IOT2000 can easily connect machines and plants to IT or Cloud

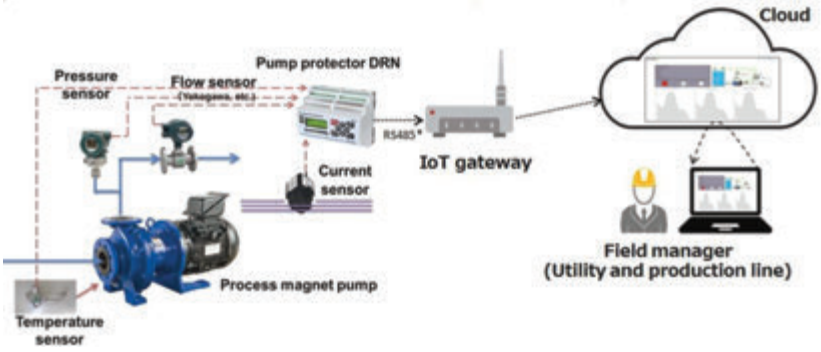


Level sensors can be used to keep watch on oil levels. The sensor (float or ultrasonic type) can be fitted inside the reservoir tank and an IoT device such as Programmable Logic Control (PLC) or microcontroller such as Arduino or Raspberry Pie with WIFI generated, for transferring data to MQ Telemetry Transport (MQTT) and Broker Cloud system.

For temperature monitoring through IoT, the Resistance Temperature Detector (RTD) or (PT100) temperature sensor analogue signal can be connected to PLC. The same goes for MQTT and sharing in Broker Cloud System which can be shared with smart phones and computers.

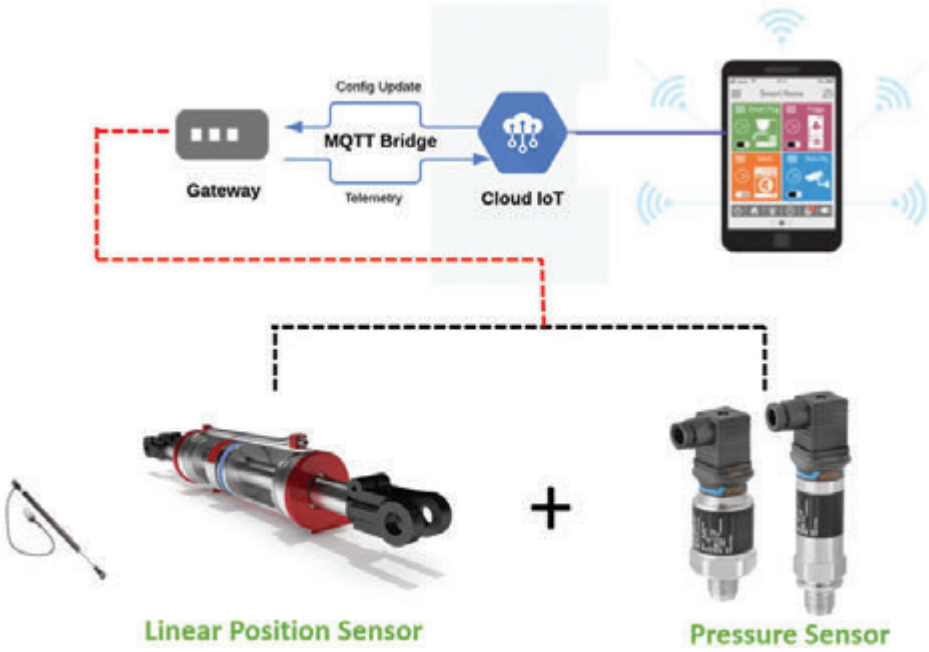


Other than that, IoT technology can help monitor the condition of hydraulic oil filters. The filter casings now have sensors for use with IoT to measure pressure drop and differential pressure on filters as well as the condition of hydraulic oil, including density, viscosity, dielectric constant and resistivity. Knowing these characteristics will allow maintenance personnel to make more informed maintenance decisions.

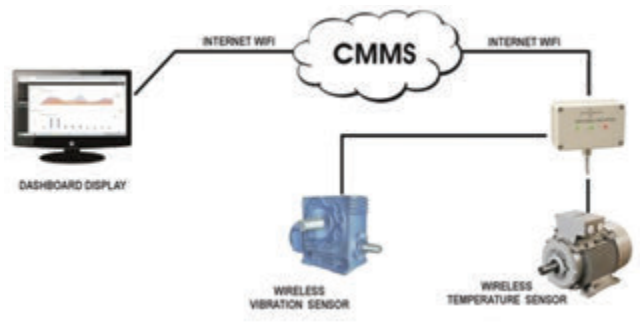


IoT sensors have now been introduced in hydraulic pump systems. Measuring devices can register hydraulic process variables such as pressure, flow rate, filling lever and temperature in real time from the pump.

The IoT sensor in the hydraulic pump can be a key indicator of its health by monitoring the flow, temperature and pressure. Users can enter information such as case-drain port size, maximum case-drain pressure, continuous input shaft speed and maximum displacement. Most importantly, it can monitor historical pump data and make a scheduling for predictive maintenance.



In order to monitor the efficiency of hydraulic flow in a cylinder or actuator using IoT sensor, the linear position sensor or wire-actuated encoder can be used inside hydraulic cylinder. When rod seals a leak, the cylinder becomes hydraulically locked due to fluid flowing from one side of the piston to the other, creating an imbalance of pressure around the piston. The linear position sensor or wire-actuated encoder can help identify or predict an abnormal situation.

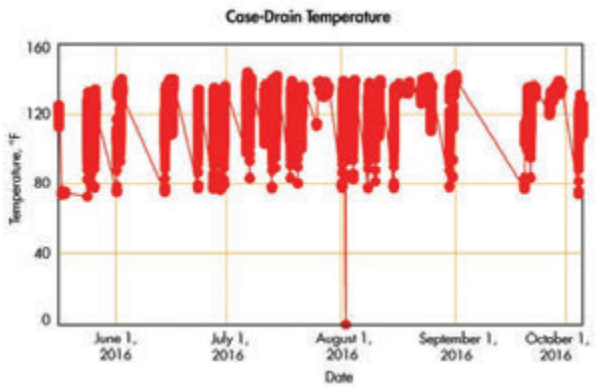


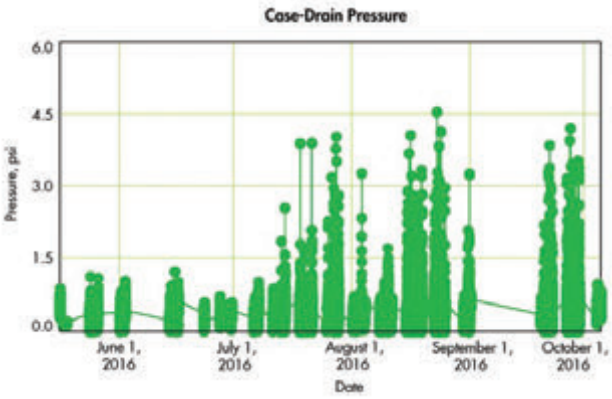
A next generation maintenance solution will bring a digital transformation to the plant and it should feature a user-friendly interface for team members to work with ease. Computer Maintenance Management System (CMMS) can be easily integrated with IoT, cloud and cognitive computing to become an indispensable part of a smart factory. With the collected data, the next generation maintenance solution should be able to issue powerful analyses.

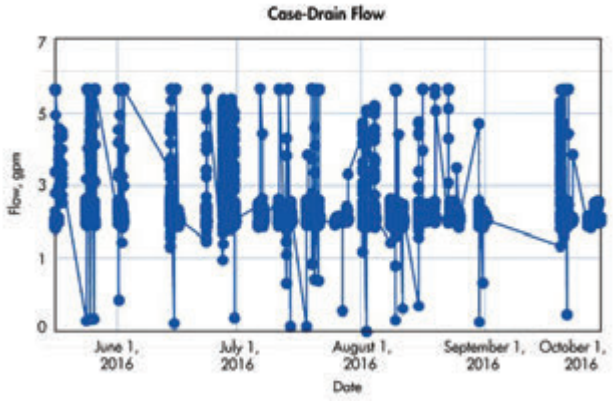
Lastly, we know that oil sampling can track, measure and predict the efficiency of a hydraulic system. IoT sensors such as digital refractometer and continuous oil conditioning sensor which can track the presence of copper, silicon, H_2O and iron content, can be used in place of the manual sampling process. These sensors can detect materials contamination which will affect the quality of the hydraulic system in viscosity rapidly, additives and oxidation. The graphs above show examples of signal output from sensors and the historical data. The sensors can be as simple as a plug-and-play which measures spikes or drops.

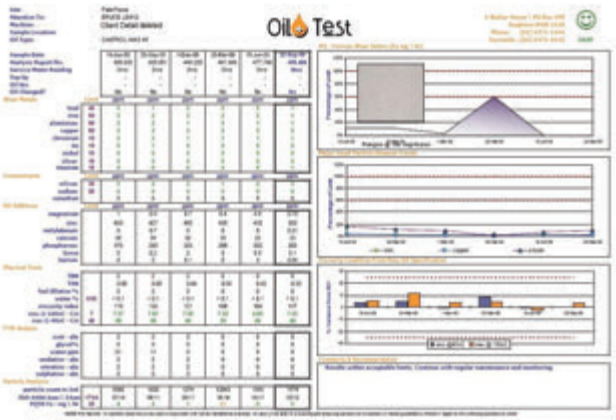
SUMMARY

A well maintained hydraulic system is the first line of defence to prevent components failure and to improve equipment reliability. Knowledge is also important for troubleshooting. IoT in hydraulic system maintenance can be used to perform routine calendar-based inspections and component replacements, predictive monitoring and for notifying when a part replacement is required. This will reduce the costs associated with replacing parts and labour. With more and more systems having internet connectivity, the concept of predictive maintenance is likely to expand exponentially. ■









LESSONS LEARNT: MRR2 VIADUCT, KUALA LUMPUR

by Ir. Dr Anizahyati Alisibramulisi

The Civil & Structural Engineering Technical Division (CSETD) organised a webinar talk titled Lessons Learnt – MRR2 Viaduct, Kuala Lumpur, on 27 March 2021, via the GoToWebinar platform.

The talk, moderated by Ir. Dr Anizahyati Alisibramulisi, a committee member of CSETD, was attended by 198 participants, including engineers from consultancies, contracting firms, government agencies and local authorities as well as faculty members from local institutions of higher learning.

The speaker was Dato' Ir. Dr Ismail bin Mohamed Taib of the Public Works Department Malaysia (PWD), who had over 35 years' experience in buildings, highways and bridges. His last posting was as Managing Director (2009-2016) of Jambatan Kedua Sdn. Bhd, the concessionaire for the Second Penang Bridge project. He was responsible for the in-house project management and technical expertise in the planning, design, construction and maintenance of the award-winning RM4.5 billion project.

Prior to that, he headed the Bridge Unit, Roads Branch and later was Senior Director of the Civil, Structural & Bridge Engineering Branch of PWD. He had a PhD in Civil Engineering from University of Wales, Swansea and MSc in Structural Engineering from Heriot-Watt University, Edinburgh, UK. He graduated in 1980 with an Advanced Diploma in Civil Engineering, ITM and had presented more than 30 papers at local and international seminars.

The talk was on the Middle Ring Road 2 (MRR2) Viaduct in Kuala Lumpur. The main viaduct of Package 11 of the MRR2 in Kepong was completed in May 2002 and consisted of twin concrete 45m precast segmental box girders constructed span by span on 31 T-shaped concrete piers (Figure 1), two concrete portals and two T-shaped abutments. Cracks on the pier crossheads, measuring 0.1 to 0.2mm in width, were first detected in November 2002. In August 2003, 20 of the 33 piers were found to have cracks and in May 2004, the main viaduct was closed to heavy vehicles.

Figure 1: Pier 32, one of the 31 T-shape concrete piers that showed cracks

Four types of cracks were observed at MRR2 as illustrated in Figure 2. A crack of 6.5mm width was discovered at Abutment B. The cracks were initially caused by poor detailing and temporary loads during erection. Cracks allowed water into the concrete, creating a Delayed Ettringite Formation (DEF), which was a consequence of very high temperature in early age concrete and this worsened the situation.

Strengthening with prestressed Carbon Fibre Reinforced Plate (CFRP) tendon was completed by early 2007. However, in August 2008, three of 18 CFRP tendons at Pier 28 failed. The CFRP tendons in all piers had to be replaced with high strength steel post-tensioned cables. The presentation also included some details of the cause, repair and strengthening of the main viaduct.

In conclusion, 3 probable major factors that contributed to the cracking were deficiency in design, deficiency in structural detailing and poor construction

practice, such as failure to control curing temperature in a mass concreting construction.

In addition, invaluable lessons were learnt from the remedial works such as understanding the suitable analysis for the design of the viaduct, knowing the nature of failure, awareness of new materials and technology usage and employing the right method and material to address the problem.

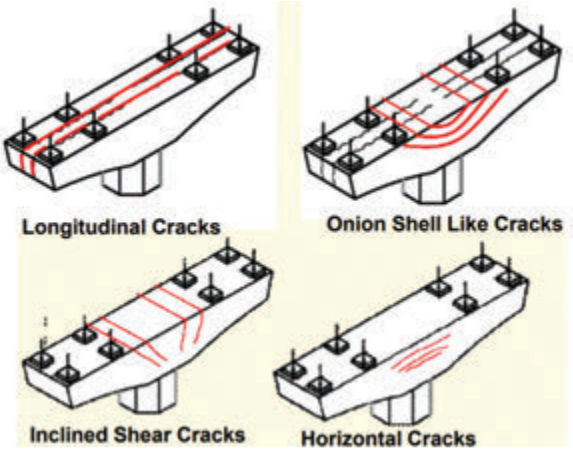


Figure 2: Types of cracks observed in the MRR2

Auditing of Design & Build is a necessity during both design and construction phase. Errors in design, detailing and poor construction practices led to the devastating failures in the MRR2 structure that almost caused a catastrophe.

The lessons were well learnt. At the end of the talk, there were questions from the audience which Dato' Ir. Dr Ismail answered and clarified in greater detail. ■

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PRECAST CONCRETE & ELECTROMAGNETIC WAVE MODELLING SOFTWARE WEBINAR

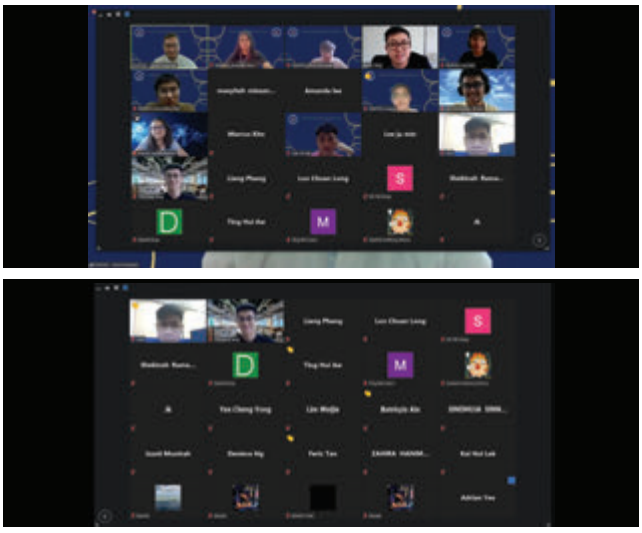
by Amanda Siaw

Concrete is an important construction material that is widely used for the foundation for most structures. In view of this, IEM Monash Student Section took the initiative to invite Ts. Dr Ong Chong Yong, an expert in concreate technology, to deliver a talk on precast concrete to engineering students of Monash University Malaysia on 23 April 2021. The 2-hour event from 3pm to 5pm, was conducted virtually with 50 students, including committee members, taking part.

First, Ts. Dr Ong introduced the current precast concrete and, using various picture slides, showed where this would be used. This was very helpful as participants could then visualise the building process using precast concrete. Students also learnt about the different types of precast concrete and their applications to achieve maximum construction efficiency. Ts. Dr Ong also talked about the integration of precast concrete and other engineering disciplines which would require the close cooperation of engineers. After a short break, Ts. Dr Ong shared tips on how to become a competent engineer.

Another webinar titled Design for Innovation was held on 29 April 2021, organised in collaboration with IEEE Monash Student Section. This webinar was on electromagnetic wave modelling software, a vital tool made possible through the advancement of the IoT industry. Mr. Mahan Rudd, a senior technical specialist from Altair, shared his knowledge on EM modelling and simulation with the webinar participants. It was a short but concise event where participants learnt about how modern simulations had given a boost to the development of the communications industry. ■

Poster for the webinars



Speaker(s) and participants at the end of the sessions

SCENIC RACK RAILWAY OF GREECE

Ir. Chin Mee Poon

***Ir. Chin Mee Poon** is a retired civil engineer who derives a great deal of joy and satisfaction from travelling to different parts of the globe, capturing fascinating insights of the places and people he encounters and sharing his experiences with others through his photographs and writing.*

It was on Christmas Day 2017 when my family and I arrived in two rented vehicles in Kalavrita in northern Peloponnese, a peninsula in the southern part of Greece. We were approaching the end of our two-week family trip and were on our way to the extraordinary Mega Spilaio Monastery, 11km northwest of Kalavrita.

At the Kalavrita railway station, we discovered to our delight that there was a regular tourist train service between Kalavrita and Diakofto on the Gulf of Corinth coast. Being a heritage train buff, I immediately bought tickets for a return train ride from Diakofto to Kalavrita for the following day. We had to settle for the afternoon train because the earliest train had only a few seats left and the two subsequent trains were sold out. We also re-scheduled our visit to the monastery to the following day before the train ride as it was closed when we got there after purchasing our tickets at the railway station.

It was late morning when we reached Mega Spilaio Monastery the following day. The monastery is located within a large cave in a sheer cliff at Mount Chelmos. It is believed to have been founded as early as AD 362 and is therefore the oldest monastery in Greece. However, it suffered major damage and destruction over the years due to fires and wars; its present 8-storey façade was constructed after the Second World War. We spent an hour exploring the small part of the monastery that was open to visitors, including a small church and the Treasury. Photography was not allowed in the Treasury where the upper floor windows afforded us spectacular views of the adjacent valley.

Our train for Kalavrita departed from Diakofto station at 14:10 hours. The railway track, which is of 750mm gauge, was constructed by the French between 1889 and 1895 to improve connection between the seaports and the interior, and was regarded as a remarkable engineering feat of its time. It climbs from near sea level to an altitude of 720m above sea level, winding and twisting its way over many bridges and through numerous tunnels in the Vouraikos Gorge. The line covers a total distance of 22.3 km while overcoming slopes as steep as 17.5%. Sections of the track with grades more than 10% have a toothed rack rail between the two running rails. Trains operating on this railway are fitted with one or more cog wheels or pinions that mesh with this rack rail. Of the total length between the two terminal stations, there are 3 rack sections totalling 3.8 km in length. On grades of not more than 10%, known as adhesion sections, the maximum speed of the train is 40 kph, and on grades of more than 10%, known as rack sections, the maximum speed is 12 kph.

With only 3 carriages, the train was packed, making movement within the carriages a bit difficult. Owing to this, my attempts at photographing the passing scenery were often hampered. Nevertheless, the one-hour journey, with a stop at Zakhlorou Station from where one could walk up to Mega Spilaio Monastery, was very pleasant and the views in Vouraikos Gorge were superb.

We only had 15 minutes to stretch our legs before embarking on our return journey to Diakofto. The journey took the same amount of time even though the train enjoyed the assistance of gravity all the way. ■

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CALL FOR NOMINATIONS

IEM ENGINEERING HALL OF FAME AWARD 2022

The Sub-Committee of Engineering Hall of Fame under the auspices of the Standing Committee on Professional Practice is proud to invite nominations for the IEM Engineering Hall of Fame Award 2022.

It is timely and expedient to induct and to record the accomplishments of engineers in the country who have or had demonstrated particularly outstanding professional achievements and provided excellent services to the Institution, the engineering industry and the Nation.

The IEM Engineering Hall of Fame is established with the aim to confer recognition and to celebrate the accomplishments of members of the IEM:

- Who have demonstrated outstanding professional achievements.
- Who have made significant contributions to the engineering profession, the Institution of Engineers, Malaysia (IEM) and the Nation.
- Who have rendered valuable service to the Community.

The Engineering Hall of Fame will serve as the focal point or showcase of outstanding Malaysian engineers, past and present, who had or have made great contributions to the engineering profession and to the quality of life in Malaysia. Engineers honoured in the Engineering Hall of Fame will also serve as a beacon and as role models for young engineers as well as create greater interest in engineering in general and awareness of the contributions made by outstanding engineers in the country.

Nominations for the Award are open to Malaysian citizens who are or have been Corporate Members of the IEM.

The closing date for receipt of nominations for IEM Engineering Hall of Fame Award is 31 October 2021.

Please submit nominations to:

Honorary Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, 46720 Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

For further details, kindly contact IEM Secretariat at **03-7968 4001/2**

IEM AWARD FOR CONTRIBUTIONS TO THE ENGINEERING PROFESSION IN MALAYSIA 2022

To encourage an interest in engineering and to recognise important services or contributions to engineering in Malaysia, the IEM Award for Contribution to the Engineering Profession in Malaysia is to be presented to the person(s), who has:

- Contributed to the advancement of engineering in Malaysia, and/or
- Designed and constructed an original engineering device or system of merit and applicability to industry.

This Award is open to all Malaysian citizens and permanent residents.

NOMINATIONS

- Nominations will be invited annually. The closing date for receipt of nominations for each year is 30 September.
- Nominations shall be made through a member of the Institution. Each member is restricted to one nomination per year.
- Each nomination shall be accompanied by a brief write up of the services rendered or contributions made or system designed and/or constructed together with relevant photographs and other documents.

AWARD

- The Award is to be made by the Council upon recommendation by the Awards Committee.
- The Award shall comprise a metal plaque, a scroll and a sum of RM1,000.

The closing date for nominations is 31 October 2021.

Please submit nominations to:

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The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

For further details, kindly contact IEM Secretariat at **03-7968 4001/2**

IEM OUTSTANDING ENGINEERING ACHIEVEMENT AWARD 2022

The IEM Outstanding Engineering Achievement Award is created to confer recognition to an organisation or body for outstanding engineering achievements within Malaysia. The award will be given to an organisation or body responsible for an outstanding engineering project in the country.

The basis for the award shall be an engineering achievement that demonstrates outstanding engineering skills which has made a significant contribution to the profession and to the quality of life in Malaysia. In making the selection, the following criteria will be given special consideration:

1. Contribution to the well-being of people and communities,
2. Resourcefulness in planning,
3. Creativity in the solution of design problems,
4. Pioneering use of materials and methods,
5. Innovations in planning, design and construction,
6. Unusual aspects and aesthetic values.

Engineering achievements which include, interalia, the following can be submitted for consideration:

- Bridges, Tunnels, Waterways Structures, Roads
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- Dams and Power Stations
- Ports and Harbours
- Building and Structures
- Airports
- Water Supply, Waste Disposal Projects
- Military projects such as bases, launching units, harbour facilities
- Drainage, Irrigation and Flood Control Projects
- Local design and manufacture of high technology products
- Energy, Heat, Mass Transfer
- Outstanding work in engineering research and development
- Chemical processing of indigenous raw resources such as rubber, palm oil and various other local plants
- Innovative use of local engineering materials
- Outstanding contribution in engineering education
- Original discovery of useful engineering theory

Nominations are invited from all members of the Institution. Each nomination submitted should contain a brief summary/write-up of the project in approximately 1,000 to 2,000 words together with full relevant reports on the project and three copies of supporting documentation including photographs. A project or component part thereof which has received an earlier award, from IEM does not qualify for nomination.

- The award in the form of a metal plaque, naming the achievement shall be given to the organisation or body responsible for the project for permanent display.
- The award shall be presented with due ceremony at an appropriate function of the IEM.

The closing date for nominations is 31 October 2021.

Please submit nominations to:

Honorary Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, 46720 Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

For further details, kindly contact IEM Secretariat at **03-7968 4001/2**

IEM YOUNG ENGINEER AWARD 2022

The objective of the Award is to encourage interest in engineering and to recognise potential among young engineers in Malaysia. The Award will be presented to the person who has shown outstanding ability and leadership qualities, either

i. in the design and/or construction of an engineering device or system of merit; or
ii. in the research and development or teaching of engineering.

In any one year, the Award may be made in either one or both of the categories mentioned above. If the Award is to be made in only one of the two category may be made in the year. The Award is open to candidate who are:

i. Registered member with the Board of Engineers, Malaysia and under 35 years of age
ii. Malaysian citizens or permanent residents of Malaysia
iii. Graduate or Corporate Members of IEM.

The Proposer may or may not be a member of IEM. However, each nomination shall be supported by a brief recommendation from two Referees who are Corporate members of IEM. If the Proposer himself is a Corporate member of IEM (or higher), then he may also act as one of the two required Referees.

The Award will comprise a cash prize of RM500.00, a scroll and plaque, to be presented with due ceremony to each recipient of the Award.

The closing date for nominations is 31 October 2021.

Please submit nominations to:

Honorary Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, 46720 Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

For further details, kindly contact IEM Secretariat at **03-7968 4001/2**

IEM WOMAN ENGINEER AWARD 2022

The primary objective of the Award is to recognise the contributions by women engineers. This Award may also incidentally encourage interest in engineering among women and encourage them to strive towards greater excellence. The Award will be presented to the woman engineer who has shown outstanding ability and leadership qualities, or has been a pioneer in any more of the following areas:

- In the design and/or construction of an engineering device or system, structural system, planned development, environmental improvements or,
- In the research and development of engineering device, systems, processes and/or materials, publication of paper or,
- In the teaching of engineering or,
- In the management of engineering projects,
- Entrepreneurship in the commercial sector.

In making the selection, the following criteria will be given special consideration:

- Contribution to the well-being of people and communities
- Resourcefulness in planning and in the solution of design problems
- Pioneering in use of materials and methods
- Innovations in planning, design and construction
- Unusual aspects and aesthetic values

The Award is opened to candidates who are:

- Registered members of the Board of Engineers, Malaysia,
- Malaysian citizens or permanent residents of Malaysia,
- Graduate or Corporate Members of The Institution of Engineers, Malaysia.

The Proposer may or not be a member of IEM or BEM, or an engineer. However, each nomination shall be supported by a brief recommendation from two Referees who are Graduate or Corporate member of IEM. If the Proposer is herself either a Corporate or Graduate member of IEM (or higher), then she may also act as one of the two required Referees.

The Award shall comprise a cash prize of RM800.00, a scroll and plaque, to be presented with due ceremony to each recipient of the Award.

The closing date for nominations is 31 October 2021.

Please submit nominations to:

Honorary Secretary
The Institution of Engineers, Malaysia
Bangunan Ingenieur, Lots 60&62
Jalan 52/4, 46720 Petaling Jaya, Selangor.

The nomination form can be downloaded from the IEM website at ***www.myiem.org.my***

For further details, kindly contact IEM Secretariat at **03-7968 4001/2**

Pengumuman yang ke-154

SENARAI PENDERMA KEPADA WISMA DANA BANGUNAN IEM

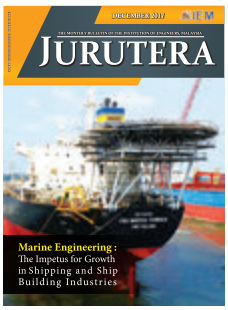
Institusi mengucapkan terima kasih kepada semua yang telah memberikan sumbangan kepada tabung Bangunan Wisma IEM. Ahli-ahli IEM dan pembaca yang ingin memberikan sumbangan boleh berbuat demikian dengan memuat turun borang di laman web IEM http://www.iem.org.my atau menghubungi secretariat di +603-7968 4001 / 5518 untuk maklumat lanjut. Senarai penyumbang untuk bulan Julai 2021 adalah seperti jadual di bawah:

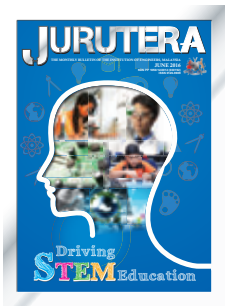
NO.	NO. AHLI	NAMA
1	97287	MR. DAVE SINTI
2	87636	MR. KHONG CHAN YIP

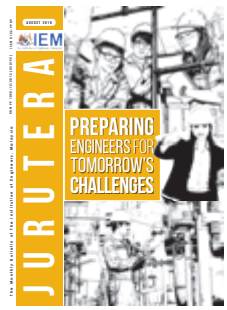
DEEPEST CONDOLENCES

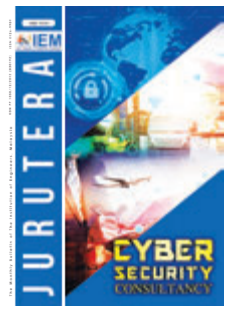
It is with deep sadness,
that we wish to inform that
Ir. Chan Boon Teik,
one of IEM's pioneer Members
with membership number of 00025,
passed away peacefully on 27 July 2021.

Advertise with us !









For advertisement placements and subscriptions, please contact:

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Does your workplace provide good ventilation for better Indoor Air Quality (IAQ)?

Ever since the pandemic, the rising awareness of air quality has been evident as lifestyles are being forced to change dramatically with people spending far more time indoors. This has led to many of us wondering whether the air we breathe can even be considered clean or healthy.

While conventional air conditioning focuses solely on cooling the air. DAIKIN goes the extra mile by providing a comprehensive answer for all air-quality concerns through the combination of air conditioning with advanced ventilation to achieve not just fresh but clean and healthy air.

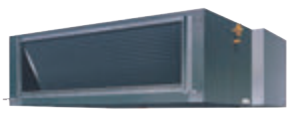
Heat Reclaim Ventilator

Daikin's unique heat exchange element realizes efficient heat exchange between outdoor air and exhaust air. High external static pressure enables flexible installation.

Heat Reclaim Ventilator with DX-Coil

A temperature adjustment function has been added to the Heat Reclaim Ventilator to better maintain comfort and lessen heat load caused by ventilation.

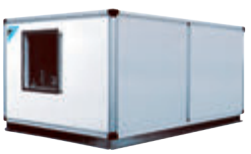
* Can be connected only to VRV



Outdoor-Air Processing Unit

Supplying outdoor fresh air by controlling discharge air temperature from the unit. Thereby maintaining comfort in the room and lessens heat load caused by ventilation.

* Can be connected only to VRV



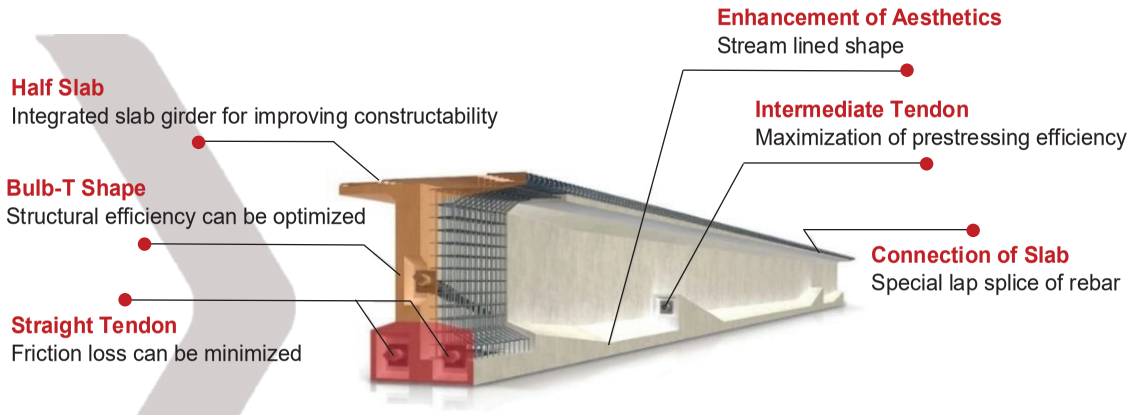
VRV Air Handling Unit

Daikin VRV AHU improves the indoor air quality with filtration of return air/outdoor air to deliver clean air. With large air volumes and high external static pressure, it is the ideal solution for buildings with large size space.

* Can be connected only to VRV

BH GIRDER
We Build Integrity

The BH Girder is an innovative and enhanced version of prestressed concrete Girder that utilizes the Bulb-T shape integrated with Half Slab which enables it to be applied over a span of longer than 60m. By adopting the latest cutting-edge technologies and innovation, the BH Girder has been designed to achieve the ultimate goals of Cost Effectiveness, Rapid Construction, Aesthetics and Safety.



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