SEPTEMBER 2017

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The Institution of Engineers, Malaysia

THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA

JURUTERA

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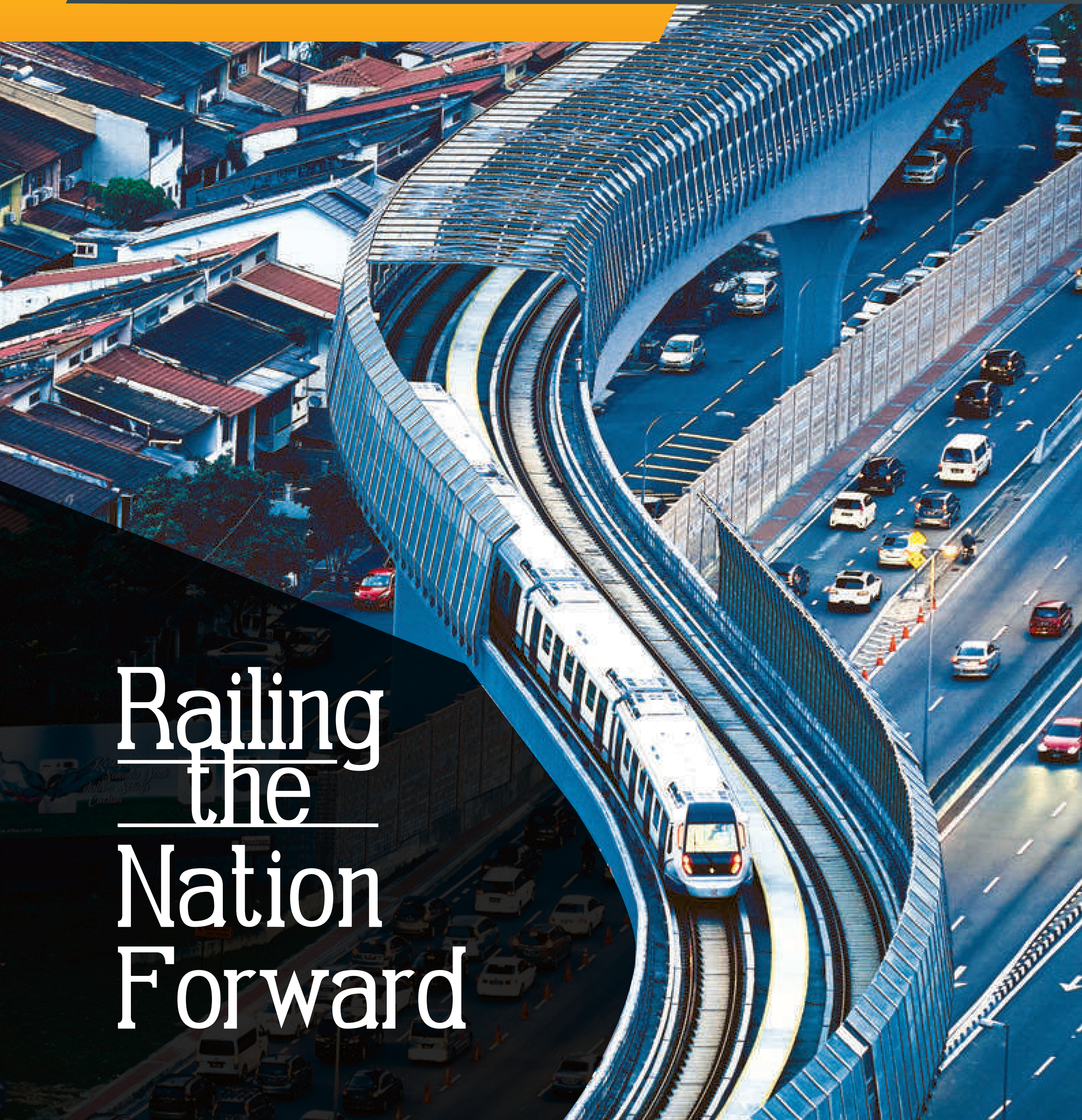

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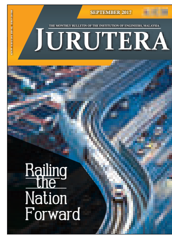

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Half-day Seminar on
"ESTEEM 10.0 Launch (Seismic Modal Response Spectrum Analysis, Design, Detailing According to EC8 Malaysia NA and Transfer Plate)"

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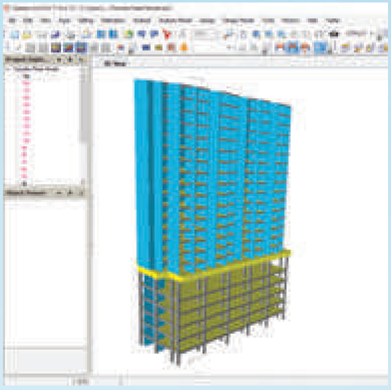
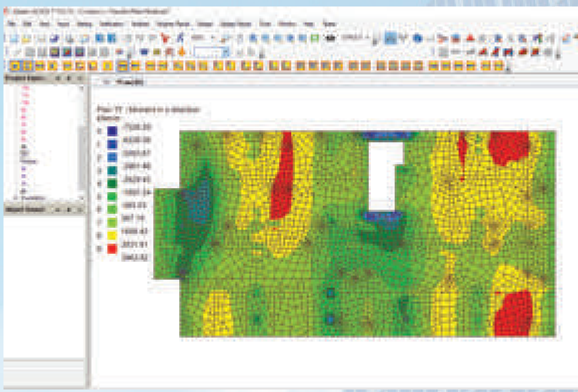


Transfer Plate (Real Model)



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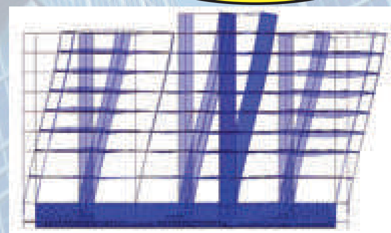

mRSA (Mode 1)

Date #1 : 24th October 2017 (Tuesday) **Time:** 8:30am-1:00pm
Venue : Promenade Hotel, Api-Api Centre, **KOTA KINABALU.**

Date #2 : 26th October 2017 (Thursday) **Time:** 8:30am-1:00pm
Venue : Merdeka Palace Hotel & Suites, Jalan Tun Abang Haji Openg, **KUCHING.**

Date #3 : 31st October 2017 (Tuesday) **Time:** 8:30am-1:00pm
Venue : Four Points by Sheraton @ Bandar Puteri, **PUCHONG, SELANGOR.**

Synopsis
Seismic analysis and design is vital for the structural engineers as the code of practice for seismic design in Malaysia has been well developed for mandatory compliance by professional engineers. The theory and concept of seismic engineering for building structures has been well researched and developed for computational automation. ESTEEM as a pioneer since 1994 for the integrated total solution of reinforced concrete building design has programmed and integrated the Seismic Modal Response Spectrum Analysis, Design and Detailing into Esteem 10.0.

This seminar will be on the launching of Esteem 10.0 (seismic dynamic).The seminar will be mainly focus on features of modal analysis and response spectrum with regards to the requirements of EC8 – Malaysia Annex. Benchmarking of the modal response spectrum analysis will be presented. New features such as transfer plate will also be demonstrated.

Speaker : Ir. John Tiong

Topics covered in this seminar :
1) A comparison between modal response spectrum analysis (mRSA) and equivalent lateral force method.
2) Two methods of carrying out modal analysis and its theories. a. Eigen analysis b. Ritz analysis
3) Theory behind the response spectrum and its incorporation into modal analysis.
4) Modal and directional combinations - types and order of modal combinations.
5) Inter-storey drift.
6) Requirements of EC8 – Malaysia Annex. a. Accidental eccentricity. b. Total effective mass.
7) Limitations of mRSA.
8) Benchmarking of mRSA.
9) Transfer plate.

Registration Fees (per person)
RM 80.00 (included GST)
RM 60.00 (Included GST) for early bird who registered & paid 2 weeks before the seminar date.
* Morning tea refreshment and buffet lunch will be provided.

Please download the Registration Form from www.esteemsoft.com
Call 03-80762788 (Mon-Fri) for more information.
Email: sales@esteemsoft.com

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cover note

Rail Transportation Mission

by Ir. Dr Kannan M. Munisamy
Chairman,
Mechanical Engineering Technical Division

"Rail transport is a GUIDED way to travel from one point to another".

Our country's railway system started in the British colonial era when The Federated Malay States Railway began operations as a means of transportation for commodities. Since then, there have been huge developments in the railway system.

In recent years, the implementation of various transport infrastructure projects such as LRT (Light Rail Transit), Monorail and MRT (Mass Rapid Transit), has raised public transportation, especially in the Klang Valley, to a higher level. These projects give our economy a boost and are a catalyst for growth as well as help attract foreign investments.

IEM is working closely with Prasarana Malaysia Berhad and other industry players to ensure quality deliverables in engineering services and products. The Mechanical Engineering Technical Division and other technical divisions (including electrical, structural, civil and water resources) are fully supporting the government's initiatives.

This not only benefits the public but it also opens up new engineering support opportunities such as servicing new locomotives in the recently launched MRT's SBK (Sungai Buloh-Kajang) Line. Local and international engineering teams also work together to share the new technology and knowledge. ■

Rail Passion and Commitment

"To be involved in the rail industry, one has to have passion and commitment as the industry is all about precision and fast response in connecting people. Jurutera talks to Dato' Ir. Zohari Sulaiman, the man at the helm of Rapid Rail Sdn. Bhd. (Rapid Rail)."

Dato' Ir. Zohari started his career in the rail business with KTM Berhad in 1982. He joined STAR LRT in 1995 and was involved in the implementation of operations and engineering training for the first LRT system in Malaysia. Joining PUTRA LRT in 1996 as part of the pioneer group, Dato' Ir. Zohari contributed to the set-up of the maintenance depot to meet the operational requirements, train-the-trainer programme, testing, commissioning and opening of the LRT 2, the first fully driverless train system in Malaysia. He has vast experience in operations, engineering and maintenance of rolling stock and railway related systems.

A Professional Engineer registered with the Board of Engineers, Malaysia and a Corporate Member of The Institution of Engineers, Malaysia, Dato' Ir. Zohari was appointed the Group Director, Infrastructure Services Division, and subsequently the CEO for Rapid Bus Sdn. Bhd. in 2011, CEO for Prasarana Rail and Infrastructure Projects Sdn. Bhd. in 2014 and CEO for Rapid Rail Sdn. Bhd. in 2016.

Rapid Rail is a subsidiary of Prasarana Malaysia Berhad (Prasarana), Malaysia's largest and leading urban rail transportation provider. Rapid Rail is the operator of the LRT networks (Kelana Jaya Line, Ampang Line and Sri Petaling Line) and the KL Monorail in Kuala Lumpur. In December 2016, Rapid Rail was also appointed the official operator for the first MRT services in the Klang Valley.

"I used to go to school each day using three modes of transport -- cycling to the riverbank, then taking the sampan across the river before hopping on the bus for a 20 km journey to school" reminisced Dato' Ir. Zohari. At a young age, Dato' Ir. Zohari, who studied engineering in Liverpool, United Kingdom, under a JPA scholarship, was already showing immense curiosity about how things worked, their designs and how they were built. Although he graduated as a Mechanical Engineer, he was always interested in other disciplines of engineering and spent many hours at work sites including his days off as he wanted to learn about everything.

Everything at the LRT construction site was interesting to him whether it was the different grades of cement used, the types of piling works, the types of tendons or the tension required to hold the Segmental Box Girders (SBGs) etc. These were extremely useful to him later on in his career.

"When we work on a stringent timeline or when there is a crisis, we have to be on the ground to know the actual situation so as to better manage and be in control," he explained.

"We need to do our homework and we also have to be on site. We have to be seen on top of any situation. During a crisis – such as a (train) derailment – we must show our commitment by getting to the site before other staff members".

"This way, we not only get to see for ourselves the needs and constraints involved but we will also be able to provide the necessary motivation for the people doing the work, to be more effective. They will surely move faster in taking action".

URBAN RAIL IN MALAYSIA

With the two pioneer urban rail systems (STAR and PUTRA) up and running successfully, the government then invested heavily to further develop the rail system as a strategic component of modern public transportation. The project named the Klang Valley Integrated Transit System (TRANSIT) consists of two commuter rail lines, five rapid transit lines, one bus rapid transit line and an airport rail link to Kuala Lumpur International Airport, which consists of an express and a transit service.

IEM Delegation led by President attended the IEM-RRSB Advisory Council Meeting

Over the next ten years, we will see the completion of the LRT 3 (a new line developed by Prasarana connecting Bandar Utama to Johan Setia), MRT Line 2, MRT Line 3, KL Singapore High Speed Rail and East Coast Rail Link.

THE CHALLENGES

The main challenge would be the evolving technological advances according to Dato' Ir. Zohari. "The Malaysian railway industry started way back in 1885; that was over 130 years ago," he said.

"At that time, Keretapi Tanah Melayu was the sole operator of the nation's railway system. The railway workforce then comprised mostly British personnel who also helped train the local workforce".

"Obtaining the know-how to maintain and run the urban rail system is the easy part" says Dato' Ir. Zohari. "The challenge is to manage and sustain the system at a high-reliability level".

When the STAR LRT system was first introduced in 1996, a "Train-the-Trainer" concept was adopted which saw selected members of the engineering team being trained at the manufacturer's assembly plants in Germany and Australia and at the Belgium Metro for the operations team. Similarly, when the PUTRA LRT was introduced in 1998, key members of the workforce were trained at the manufacturer's assembly plant at Kingston and the operations team at Vancouver Sky Train, both in Canada. These are now known as Ampang & Sri Petaling Line and Kelana Jaya Line, respectively.

Thereafter, the Rail Academy was established to provide in-house learning and development programmes which stressed on Competency-Based Training, with comprehensive modules and skilled trainers.

He stressed that Rapid Rail's mission is to deliver friendly, integrated, reliable, safe and timely services and to this end, Rapid Rail has managed to maintain its service reliability at 99.8 per cent, and this is comparable to the best system in the world.

In May 2017, Prasarana the driver in Malaysia's transformation of the urban public transport services has been recognised as Provider of World Class Public Transport by the Malaysian Canada Business Council (MCBC).

According to Dato' Ir. Zohari, to maintain this high level of reliability, it is imperative to ensure constant upgrading of Rapid Rail's staff knowledge as well as improving their competency level.

"To meet the increasing demand, Rapid Rail has started a collaboration programme with tertiary institutions to ensure that the supply of a skilled railway workforce is not adversely affected".

The institutions involved include Politeknik Seberang Prai, Universiti Tun Hussein Onn (UTHM), Advanced Technology Training Centre (ADTEC) Shah Alam and recently, UniKL for special skills like the rolling stock.

He explained: "In the long-term, it is the aspiration of Prasarana and its subsidiary, Rapid Rail, to work with the stakeholders and the government to establish a Railway University, similar to the ones set up by TNB, Telekom and Petronas".

Another challenge, according to Dato' Ir. Zohari, is cost management.

"As with any business entity, we have to ensure that stakeholders receive good returns for their investment," he said.

"For Prasarana and Rapid Rail, it is important for us to balance both our social responsibility and our financial responsibility".

EMERGENCY RESPONSE PLAN EXERCISES

Recently, Rapid Rail organised an emergency response plan (ERP) exercise at the Tun Razak Exchange (TRX) underground station for the Mass Rapid Transit (MRT), depicting a scenario where a train "derailed and caught fire".

The exercise was part of Rapid Rail's preparations for the opening of the second phase of the MRT Sungai Buloh-Kajang Line. It involved the participation of some 200 passengers, 300 Rapid Rail staff, eight evaluators, 18 observers and 200 staff members from various agencies such as the Police, the Fire & Rescue Department, the Civil Defence Force, Kuala Lumpur City Hall and the Health Ministry. Evaluation was also conducted by the Land Public Transport Commission (SPAD), which was responsible for issuing the approval for the opening of the second phase of the MRT line.

Dato' Ir. Zohari, who was overseeing the entire exercise, said this required detailed planning and preparatory work which included holding several series of discussions, training and dry-run sessions.

As the TRX station is the deepest underground train station, the ERP exercise posed a huge challenge as the "victims" had to be brought to the surface via a shaft, up 252 steps of stairs.

Every month, he added, ERPs are conducted, albeit on a much smaller scale, to ensure the preparedness of the staff as well as the efficiency of the equipment and system used.

GROWING THE COMPANY AND THE NATION'S ECONOMY

Looking ahead, Dato' Ir. Zohari said he would like to see a fully-integrated urban rail network which will spearhead the country's economic growth in the coming decade.

"I believe this vision for the country, especially in and around the Klang Valley, is not far off as currently, there are lots of on-going works and plans for future urban railways, including the MRT 2, MRT 3, the High-Speed rail and the East Coast rail," he said.

"The BRT, which has already been running for several years in Bandar Sunway, will soon see similar development in other cities in Malaysia".

"I also foresee the LRT being introduced in other cities such as Johor Bahru, Penang, Kuching and even Melaka as these already have the population mass to sustain such urban rail services".

"In addition, the government is planning a Rapid Transit System between Johor Bahru and Woodlands in Singapore. This system will offer services similar to those running between Hong Kong and Shenzhen, besides the high-speed rail and the KTM line".

BACKBONE OF RAIL INDUSTRY

Dato' Ir. Zohari acknowledges that there is a need for a developed public transportation system in Malaysia as we seek to attain developed nation status.

The railway industry is ideal for engineers of all disciplines as building, operating and maintaining the system and infrastructure will involve every aspect of engineering, from design and computing to mechanical, civil, electrical, electronic and mechatronic.


LRT Station at IOI Puchong

In view of this being a booming industry, Rapid Rail will continue to instill the culture of innovation as well as provide continuous training and upgrading for its employees.

"Engineers are the backbone of industry and they should be competent and professional," said Dato' Ir. Zohari.

"Prasarana and Rapid Rail engineers already have a good reputation for their professionalism and cooperation; it is equally vital that they remain passionate about the industry and the services we provide".

Dato' Ir. Zohari said he has always encouraged his staff members to come up with innovations which will help increase productivity and reduce operational cost. In view of the excellent innovations, the Rapid Rail teams have won various levels of Awards such as the Malaysian Productivity Corporation (MPC) National Team Excellence Convention, Land Public Transport Symposium organized by SPAD, International Convention of Quality Control Circle in Busan (Korea), Bangkok (Thailand), Bali (Indonesia) and Taipei (Taiwan).

In one of the innovation projects, he said, Prasarana was able to save millions of ringgit in operating costs after six technical staff members at Rapid Rail invented a "Test Rig" for use in the LRT Linear Induction Motor (LIM) Fan cooling system. The Test Rig cost less than RM5,000.

The system, which took eight months to complete, made use of the Test Rig to test and verify the LIM Fan cooling system which often caused interruptions that obstructed the smooth flow of the train, especially on the Kelana Jaya line.

The six were staff members of the LRT Kelana Jaya Line (Rolling Stock Department): Muhammad Firdauss Ab. Jalil, Muizzuddin Mohamad, Mohd Nazri Ismail, Ahmad Mahazam Mat Zaid, Muhammad Nor Ahmad Shupi and Fahkri Noor Ramli. They were also named as the event's overall champion at national-level in the National Annual Productivity & Innovation Conference and Exposition 2016 at PICC. This innovative project has resulted in operational cost saving of RM 1.3 million/year.

The relentless effort by Rapid Rail in its drive for innovation has received global recognition from the Union Internationale des Transports Publics (UITP) – the world's highest body in championing public transport; grouping international operators and transport authorities worldwide.

Meanwhile, the 37km Light Rail Transit 3 (LRT3), which will link Bandar Utama and Johan Setia in Klang, will be the next light rail line in the country. Targeted to be operational by the year 2020, the line will see the introduction of several technologies, including the first use of the U-Trough technology in Malaysia. Recognised internationally as the latest, most efficient and most economical response to the needs of urban development, the U-Trough allows for viaduct spans of up to 30 metres, to be pre-cast in a centralised, controlled site. These will be then assembled at the construction sites along the alignment. This method is expected to speed up the timeframe and process of the project.

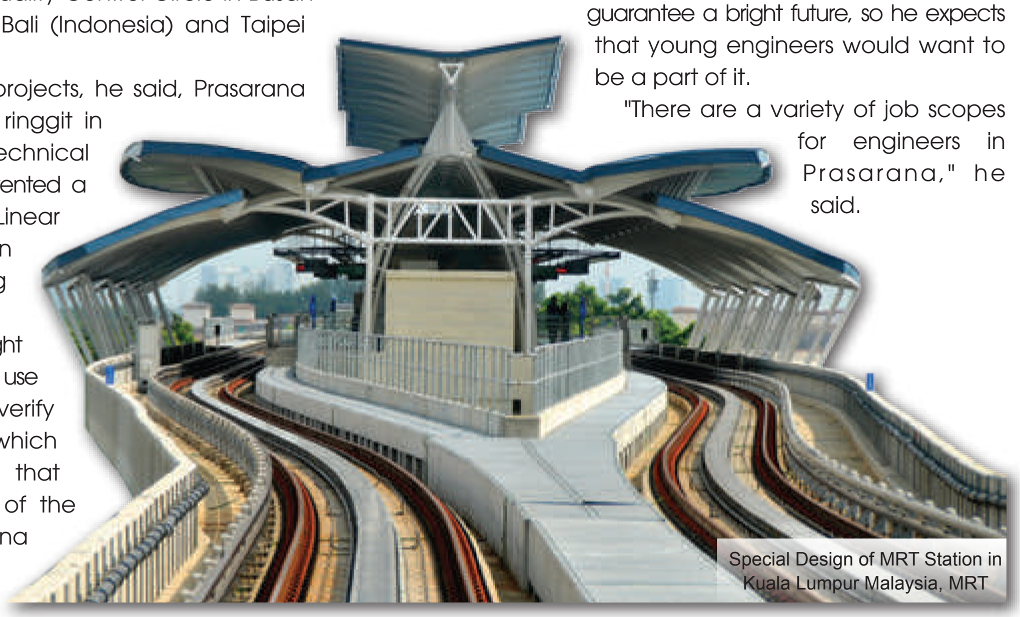
Unlike traditional methods using SBG, the U-Trough has the advantage of being faster installation method, i.e. one day for the erection of 3 spans instead of three days per span using traditional method, cheaper installation cost compared to the traditional methods and has better visual impact.

The safety factor is also greatly improved because fewer people will be needed in the erection process as the work involved to match cast segments and post tension will no longer be required.

INDUSTRY BOOM

Dato' Ir. Zohari believes the railway industry is well-placed to guarantee a bright future, so he expects that young engineers would want to be a part of it.

"There are a variety of job scopes for engineers in Prasarana," he said.


Special Design of MRT Station in Kuala Lumpur Malaysia, MRT

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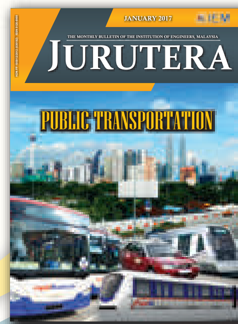

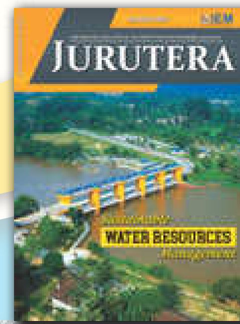

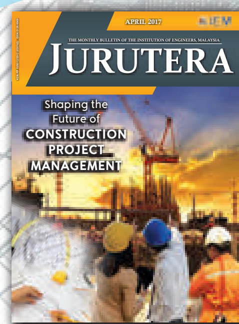

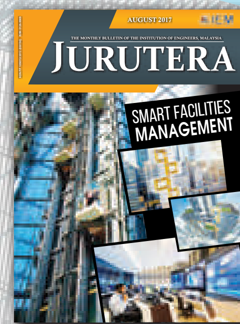

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Representatives of IEM Mechanical Engineering Technical Division with Dato' Ir. Zohari

"Unlike other industries, this is one that features the convergence of a multitude of engineering and technological knowledge needed to move large numbers of people from one place to another. We need to ensure the system is operationally-friendly, maintenance-friendly, customer-friendly and OKU-friendly".

Dato' Ir. Zohari added that even when engineers are promoted to the position of project director or other top management jobs, their engineering background will continue to be an added advantage.

ADVICE FOR PEERS AND SUBORDINATES

Dato' Ir. Zohari's philosophy has always been to work hard with full interest and passion in the work.

"If you work hard, you can never go wrong", he said, using phrases such as "hit through the wall", "burn your fingers" and "think outside the box" to describe his work ethics.

"Work with full of interest but never with conflict of interest. Be fearless when it comes to decision-making. I feel it is better to evaluate the risk and make a decision rather than not making any decision".

He advised all engineers to register with The Institution of Engineers, Malaysia (IEM) and the Board of Engineers, Malaysia (BEM) so that they would be exposed to greater source of professional knowledge and network of fellow engineers.

"This way, the industry will get to know you better through the work and passion you have," he said of the same advice he offered to his son when the latter graduated in engineering.

Last but not least, Dato' Ir. Zohari stressed that having the support of the family is all-important to engineers as the profession had often proved to be very demanding on one's time. ■

ANNOUNCEMENT

IEM wish to inform that in accordance with Section 4.3 of the IEM Bylaws, the IEM annual subscriptions becomes due on 1 January 2017.

Section 4.8 states that members whose subscriptions becomes four (4) months in arrears, shall lose all privileges, the right to vote and to receive publications.

Payment of annual subscriptions can be made by issuance of a cheque to The Institution of Engineers, Malaysia or just log on to ***www.myiem.org.my*** to make an online payment.

We wish to inform that active members of IEM are able to enjoy numerous benefits through corporate rates from our merchant partners such as ***Focus Point, Mercedes Benz, BMW, AUDI, PJ Hilton, Armada Petaling Jaya, BP Healthcare Group*** etc.

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Ensuring Safety in Railway Tunnels

Ir. Yeoh Jit Shiong

With land getting scarcer in developed cities, infrastructures are sometimes forced to go underground so as to minimise the impact on the city landscape as well as social economics. Malaysia is not spared this. Major cities such as Kuala Lumpur have become very congested above ground. So, like Singapore and Hong Kong, we are also constructing a new Mass Rapid Transit system right under Kuala Lumpur. All around the country, there are numerous railway tunnels, constructed and being constructed.

Fires in railway tunnels are major hazards, both for people trapped inside and for fire fighters. The lack of escape paths and difficulties that fire fighters face in accessing a tunnel, especially those underground, result in the need for stringent safety measures. Tunnel fires not only result in loss of life and severe property damage but also leave the public with a fear of using such systems.

When it comes to fire & life safety for railway tunnels, we must consider multiple elements such as structural design, architectural design, passive fire protection, active fire protection, ventilation system, evacuation strategy, smoke control system, detection system, monitoring system and fire personnel access.

A tunnel environment is usually a significant fire and life safety challenge. This is due to the different characteristics between a building and a railway tunnel. The life and safety of tunnel users depend heavily on the fire detection and prevention system in the tunnel. In the event of emergency, an evacuation strategy and operational control are critical in ensuring their safety. See Table 1 for a list of major railway tunnel incidents around the world for the past 50 years.

Channel Tunnel fire damage – ART (picture from subways.net)

REGULATIONS

Malaysia has yet to have its own standard with regards to railway tunnels although the designs for such tunnels in the country are based on international standards such as NFPA and Singapore Standard & British Standard, to name a few. Table 2 shows a comparison between NFPA 130 and Singapore Standard.

Table 1: List of Major Railway Tunnel Incidents

YEAR	NAME	LOCATION	INCIDENT	FATALITIES/INJURIES
2015	L'Enfant Plaza Metro station	Washington, USA	Electrical arcing, smoke in tunnel	1 dead/80+ injured
2008	Channel Rail Tunnel	France/UK	Truck fire on Eurotunnel rail (24 hours duration, 1200°C)	None reported
2003	Daegu Subway Tunnel	South Korea	Arson. Introduction of gasoline in wagon	192 dead/148 injured
1996	Channel Rail Tunnel	France/UK	Truck fire on Eurotunnel rail (10 hours duration, 1100°C)	None reported
1995	Baku Subway Tunnel	Azerbaijan	Short circuit in a wagon followed by fire	289 dead/270 injured
1987	Kings Cross London Subway	UK	Accidental ignition on escalator (matches)	31 dead
1972	Hokoriku Fukui	Japan	Passenger train, restaurant car fire	30 dead/714 injured

Table 2: Comparison of NFPA 130 & Singapore Standard for Railway Tunnel

			NFPA 130	SINGAPORE STANDARD
TUNNEL	PASSIVE	Motorised Trolley (Battery Operated)	1. Not mentioned	1. Required for Station Platform Level, Mid Tunnel Exit Staircase > 380m from a station & Trainway Portal
		Tunnel Cross Passage (CP) & Intervention Shaft (IVS)	1. Required for Tunnel 2. Spacing of 244m throughout the tunnel 3. Distance to exit staircase of station & portal < 244m 4. Clear width: 1.120m	1. Required for Tunnel 2. Additional CP required for turn-out/cross-over 3. Spacing of 250m 4. Distance to exit staircase or station public area < 500m 5. Distance between turn-out/cross-over and the nearest CP shall not be less than 125m and shall not be more than 250m 6. Clear width: 1m
		Exit Staircase	1. Required for Tunnel (in lieu of CP) 2. Spacing of 762m 3. Clear width: 1.120m	1. Required for Tunnel (in lieu of CP) 2. Additional 1m wide access staircase at portal shall be provided 3. Spacing: 760m 4. Clear width: 1m
		Escape Walkway	1. Required for Tunnel 2. Clear width: 610-760-610mm	1. Required for Tunnel 2. Clear width: 800mm
	ACTIVE	Hosereel	1. Not required	1. Required for Tunnel 2. Tank capacity: 18m^3
		Standpipe	1. Required for Tunnel 2. Required during construction 3. Tank capacity: 114m^3 4. Combined with Sprinkler 5. Access road to breeching inlet < 30.5m 6. Type: Wet riser for building > 23m, Dry riser for building < 23m	1. Required for Tunnel 2. No tank required 3. Access road to breeching inlet < 18m 4. Type: Dry riser

SAFETY DESIGN OBJECTIVES

The principle of the design is to eliminate any risk present in an underground environment. However, we know this is not always possible, so the next best solution is to mitigate the risk. Primarily, the objectives are to ensure the safety of passengers, occupants, employees and emergency services personnel.

The design should also minimise the impact of fire on the property, operation and environment and allow emergency personnel to conduct response activities. The fire engineer plays a huge role in ensuring that these objectives are met.

In Malaysia, for a tunnel design, a Fire Safety Design Philosophy (FSDP) has to be developed to address all fire safety concerns in the tunnel. Further to the design, the fire engineer has to model the underground environment to compare the Available Safe Egress Time (ASET) with the Required Safe Egress Time (RSET). The modelling is based on the scenario and criteria stated in the FSDP. This FSDP will be the base for designers to further develop their respective designs. The fire authority, (Bomba, in the case of Malaysia) also plays a big role as they will review the FSDP submitted by fire engineers so as to ensure fire-fighting and rescue operations have been taken into consideration in the design.

FIRE LIFE SAFETY SYSTEMS

1. **Smoke Management:** Typically, a Tunnel Ventilation System (TVS) will be in place in the tunnel. This consists of jet fans to regulate the flow of smoke and heat generated in the tunnel. In the event of a fire, the TVS will provide sufficient airflow to prevent smoke back-layering to ensure passengers can evacuate safely. The TVS will control the smoke to flow in the direction opposite to the occupants' escape route and be discharged outside the tunnel to maintain the tenability of the tunnel. This way, fire-fighters will be able to access the tunnel safely to fight the fire.

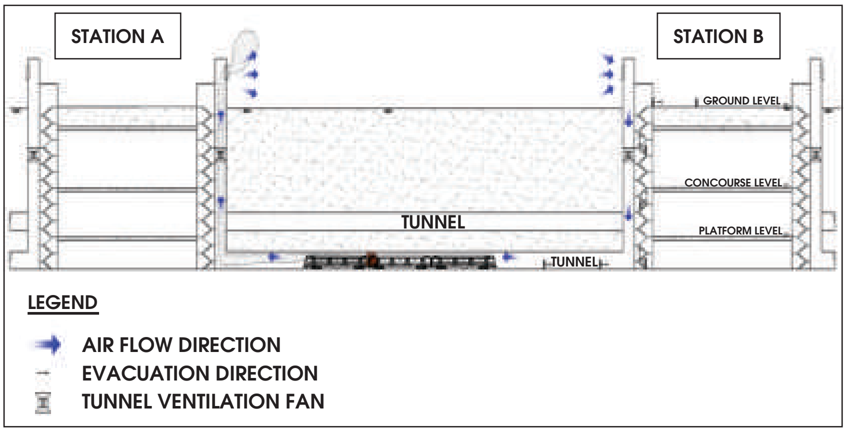

Diagram 1: Evacuation & smoke control

2. **Fire Fighting:** Landing valves are placed at appropriate intervals in accordance to codes, standards and local regulations. In tunnels, landing valves are usually placed at 60m intervals, with 2 numbers of 30m lengths hose provided. These valves can be of the wet or dry systems, depending on local regulations.

   In Malaysia, we use a wet riser while in Singapore, a dry riser is preferred. Nevertheless, in both countries, the intervals are 60m apart.
3. **Fire Detection:** There must be a system to detect a fire incident or event in the tunnel as well as accurately pin-point its location. Usually, a Linear Heat Detection (LHD) system is utilised in a railway tunnel as it is able to detect an anomaly such as a fire or any increase in temperature.
4. **Escape Staircase & Cross Passage:** In a railway tunnel, there are escape staircases and cross passages. These are used for the evacuation of

Daegu 2003 smoke (picture from railsystem.net)

Daegu 2003 train (picture from subways.net)

tunnel occupants in the event of a fire. Escape staircases are placed no more than 762m apart here while in Singapore the standard is slightly more stringent at 760m. In lieu of an escape staircase, cross passages can be utilised; however the maximum distance for a cross passage is only 244m. Cross passage designs consider the non-incident tunnel as a place of safety although it doesn't allow evacuation to the ground.

5. **Communication:** Railway tunnels are enclosed places and are usually equipped with communication systems such as:

a) Emergency telephone system.
b) Fire services telephone system at Escape Staircase/Cross Passage.
c) Mobile radio system.
d) Government Integrated Radio Network (GIRN).

CONCLUSION

A fire hazard in a railway tunnel presents significant fire & life safety issues to occupants and emergency response personnel, compared to normal building. In the event of fire, tenability for occupants and emergency services personnel relies heavily on the tunnel being equipped with an effective and reliable system which includes passive construction, active systems and proper response strategies.

It is of utmost importance to provide a safe and reliable railway tunnel, complete with the latest available technologies to ensure that public safety is not compromised. In this aspect, we can proudly say that railway tunnels in Malaysia are one of the best and most technologically advanced. ■

REFERENCES

[1] NFPA 130
[2] Singapore Standard for Fire Safety in Rapid Transit Systems

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[1] NFPA 130 - Standard for Fixed Guideway Transit and Passenger Rail Systems
[2] Standard for Fire Safety in Rapid Transit Systems (Singapore)

Author's Biodata

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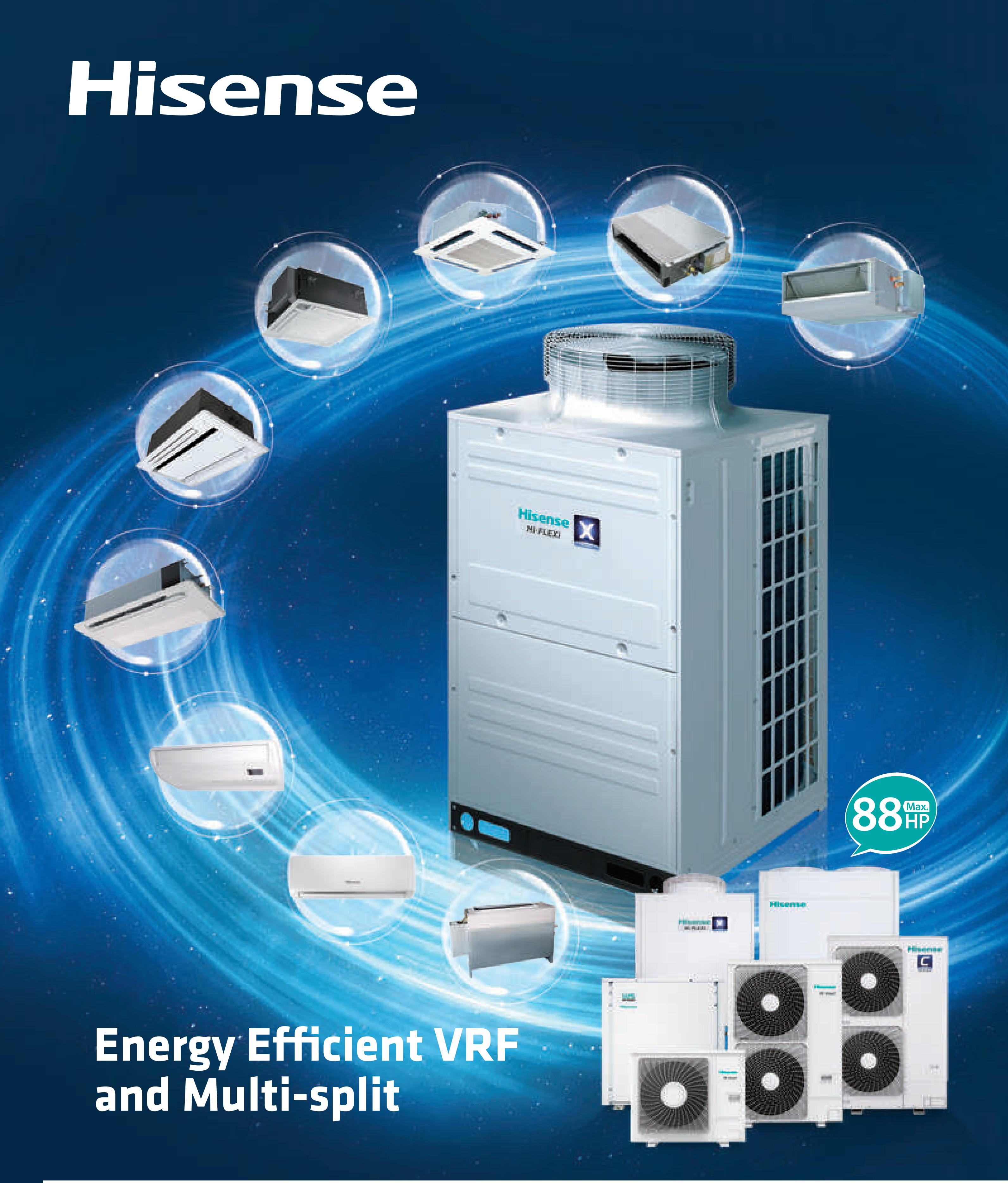
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Pipe Wall Thickness Calculation: An Alternative Approach in the Petroleum Industry

Ir. Puvanesan Mariappan

Calculations on pipe wall thickness are performed to verify the pipe wall thickness of a selected pipe material specification in offshore/onshore oil and gas projects and are usually part of any oil and gas related piping engineering deliverables.

In most parts of the world, such calculations are generally performed based on ASME B31.3. However, in recent years, some shortfalls in this method of calculation have been highlighted. The most common solution proposed was to use a more fit purpose equation against the conservative equation.

DESIGN

Pipe wall thickness is a function of allowable hoop stress. It is derived from cylindrical stress under mechanics of material. A cylindrical stress has these patterns: Circumferential stress, hoop stress, axial/longitudinal stress and radial stress. In relation to internal pressure, we will use the hoop stress to calculate the pipe wall thickness for thin-walled cylinders (wall thickness less than 1/10th of the radius).

HOOP STRESS FOR THIN WALL PIPE

The hoop stress can be expressed as:

$\sigma_h = p\, d / 2\, t$

Where

σ_h = *hoop stress (MPa, psi)*

p = *internal pressure in the tube or cylinder (MPa, psi)*

d = *internal diameter of tube or cylinder (mm, in)*

t = *tube or cylinder wall thickness (mm, in)*

For thick walled cylinders, the Lame's equation will be used to determine pipe wall thickness. This equation is best suited for thicker walled high pressure piping, with wall thickness outside the schedule range (r/t ratio of less than 10).

HOOP STRESS FOR THICK WALL PIPE

The hoop stress can be expressed as:

$\sigma_c = ((p_i\, r_i^2 - p_o\, r_o^2) / (r_o^2 - r_i^2)) - (r_i^2\, r_o^2\, (p_o - p_i) / (r^2\, (r_o^2 - r_i^2)))$

Where

σ_c = *stress in circumferential direction (MPa, psi)*

p_i = *internal pressure in the tube or cylinder (MPa, psi)*

p_o = *external pressure in the tube or cylinder (MPa, psi)*

r_i = *internal radius of tube or cylinder (mm, in)*

r_o = *external radius of tube or cylinder (mm, in)*

r = *radius to point in tube or cylinder wall (mm, in)* $(r_i < r < r_o)$

Maximum stress when $r = r_i$ *(inside pipe or cylinder)*

Generally, pipe wall thickness is calculated by

- Determining the applicable ASME/ANSI B31 Code.
- Calculating the required thickness for internal pressure.
- Checking the calculated thickness to determine its acceptability for external pressure and other applied loads, if applicable.
- Increasing the calculated thickness, as needed, to account for corrosion allowance and mill tolerance.
- Selecting a thickness from an ANSI/API table of standard pipe thickness requirements.

All piping component wall thicknesses specified for the individual piping classes are calculated according to the formulae specified in Para 304.1.2 (3a) of ASME B31.3, and are based on continuous long-term internal design pressure and design temperature, specified corrosion/erosion allowance (under-tolerance), the manufacturing minus/under tolerance and the threading allowance as applicable.

Piping subject to any additional loading such as short-term upset conditions, occasional loads, external pressure, thermal loading, live loads, marine motions or bending allowances shall be individually assessed to ensure full compliance with ASME B31.3.

A typical pipe class sheet (diagram)

Sl. No.	Material Group	Rating
1.	Carbon Steel	CL150
2.	Duplex Stainless Steel 22Cr	CL150
3.	Duplex Stainless Steel 25Cr	CL150
4.	Austenitic Stainless Steel 316	CL150
5.	Austenitic Stainless Steel 316	CL150
6.	Austenitic Stainless Steel 6Mo	CL150
7.	Austenitic Stainless Steel 6Mo	CL150
8.	Titanium	CL150
9.	Titanium	CL150

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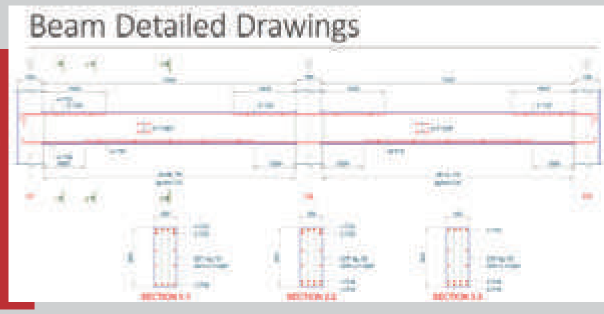

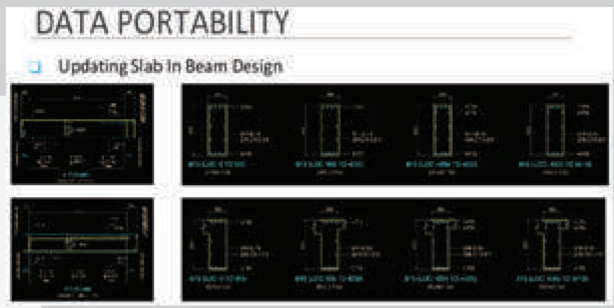

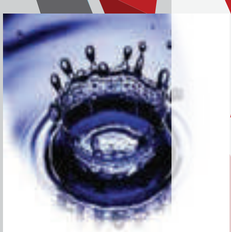

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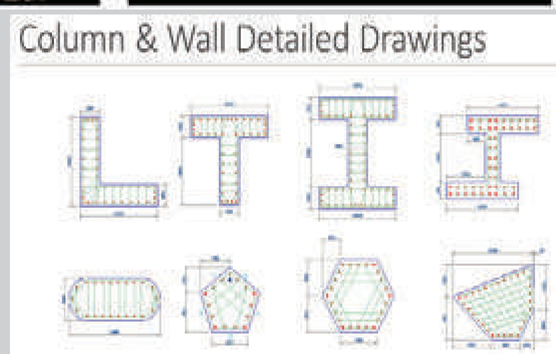

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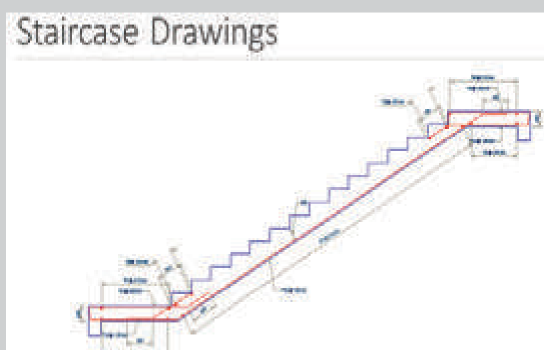

Sl. No.	Material Group	Rating
10.	Duplex Stainless Steel 22Cr	CL300
11.	Austenitic Stainless Steel 316	CL300
12.	Austenitic Stainless Steel 6Mo	CL300
13.	Duplex Stainless Steel 22Cr	CL600
14.	Duplex Stainless Steel 22Cr	CL600
15.	Duplex Stainless Steel 25Cr	CL600
16.	Austenitic Stainless Steel 316	CL600
17.	Austenitic Stainless Steel 6Mo	CL600
18.	Duplex Stainless Steel 22Cr	CL900
19.	Duplex Stainless Steel 22Cr	CL900
20.	Duplex Stainless Steel 22Cr	CL900
21.	Austenitic Stainless Steel 6Mo	CL900
22.	Duplex Stainless Steel 22Cr	CL1500
23.	Duplex Stainless Steel 22Cr	CL1500
24.	Duplex Stainless Steel 22Cr	CL1500
25.	Duplex Stainless Steel 22Cr	CL1500
26.	Austenitic Stainless Steel 6Mo	CL1500
27.	Duplex Stainless Steel 22Cr	CL2500
28.	Duplex Stainless Steel 25Cr	CL2500
29.	Austenitic Stainless Steel 6Mo	CL2500
30.	Carbon Steel AISI 4130	API10000
31.	Duplex Stainless Steel 22Cr	CL4500
32.	Duplex Stainless Steel 22Cr	CL4500
33.	Duplex Stainless Steel 25Cr	CL4500
34.	Duplex Stainless Steel 22Cr	CL4500
35.	Austenitic Stainless Steel 6Mo	CL4500

The following pipe class sheet has higher pressure rating than tabulated in ASME B16.5/ ASME B16.34 (diagram)

Sl. No.	Material Group	Rating	Temp. °C	Pressure, Barg	
				Pipe Class Sheet	ASME B16.5
1.	Duplex Stainless Steel 22Cr	CL300	100	51.5	50.7
			150	50.2	45.9
			200	48.6	42.7
2.	Austenitic Stainless Steel 6Mo	CL300	100	51.5	50.7
			150	50.2	50.2
3.	Duplex Stainless Steel 22Cr	CL600	100	103.0	101.3
			150	100.3	91.9
			200	97.2	85.3
			250	92.7	80.9
4.	Duplex Stainless Steel 22Cr	CL600	100	103.0	101.3
5.	Duplex Stainless Steel 25Cr	CL600	100	103.0	101.3
6.	Austenitic Stainless Steel 6Mo	CL600	100	103.0	101.3
			150	100.3	91.9
7.	Duplex Stainless Steel 22Cr	CL900	150	140.0	137.8

Sl. No.	Material Group	Rating	Temp. °C	Pressure, Barg	
				Pipe Class Sheet	ASME B16.5
8.	Duplex Stainless Steel 22Cr	CL900	100	154.6	152.0
9.	Austenitic Stainless Steel 6Mo	CL900	100	154.6	152.0
			150	150.5	137.8
			200	131.4	128.0
10.	Duplex Stainless Steel 22Cr	CL1500	100	257.6	253.3
			150	250.8	229.6
11.	Austenitic Stainless Steel 6Mo	CL1500	100	257.6	253.3
			150	250.8	229.6
			200	219.0	213.3
			250	209.7	202.3
			300	199.1	194.3
12.	Duplex Stainless Steel 22Cr	CL2500	150	395.0	382.7
13.	Duplex Stainless Steel 25Cr	CL2500	150	394.1	382.7
14.	Austenitic Stainless Steel 6Mo	CL2500	100	429.4	422.2
			150	418.1	382.7
15.	Duplex Stainless Steel 22Cr	CL4500	140	715.3	703.1

As individually noted in the following pipe class sheet, for certain sizes the selected pipe wall thickness is lower than the calculated value. This is because the Lame's equation used gives a lower wall thickness where the difference is small.

Sl. No.	Size, NPS	Material Group	Rating	Calculated thickness, mm based on hoop stress	Calculated thickness, mm based on Lame's equation	Difference, mm
1.	12	Austenitic Stainless Steel 6Mo	CL900	14.35	14.27	(-) 0.08
2.	16	Duplex Stainless Steel 22Cr	CL1500	16.76	16.66	(-) 0.10
3.	4	Duplex Stainless Steel 22Cr	CL1500	6.06	6.02	(-) 0.04
4.	24	Austenitic Stainless Steel 6Mo	CL1500	38.93	38.89	(-) 0.04
5.	1.5	Duplex Stainless Steel 22Cr	CL2500	5.10	5.08	(-) 0.02
	10			28.85	28.58	(-) 0.27
6.	8	Duplex Stainless Steel 25Cr	CL2500	18.37	18.26	(-) 0.11
	12			25.54	25.40	(-) 0.14
	14			28.01	27.79	(-) 0.22
7.	6	Duplex Stainless Steel 22Cr	CL4500	25.23	25.00	(-) 0.23
	10			40.08	40.00	(-) 0.08
	12			40.47	40.00	(-) 0.47
8.	8	Duplex Stainless Steel 22Cr	CL4500	36.11	36.00	(-) 0.11
9.	0.5	Austenitic Stainless Steel 6Mo	CL4500	2.79	2.77	(-) 0.02
	6			22.08	21.95	(-) 0.13

THE CHALLENGE

The main challenge identified in pipe wall thickness calculation is the alternative formula against the conservative formulae. The reason for the difference in pipe wall thickness calculations is based on a different formula used in the calculation. ASME B31.3 gives a more conservative calculation which, in general, is more accurate for thinner walled scheduled piping with thickness below ($t<D/6$).

The alternative formula is based on the Lame's equation where variables such as external pressure are given more consideration in the calculation. Lame's equation is better used for thicker walled high pressure piping, with wall thicknesses outside the schedule range ($t>D/6$ or $P/SE >0.385$).

Section 304.1.2 (a), ASME B31.3 formula with $t<D/6$ and $P/SE<0.385$ is used for validation. The conditions/criteria and application of the formula, as given in section 304.1.2 (a), meet the design requirement. Hence, the design is accordance with section 304.1.2 (a), ASME B31.3 and the provisions of section 304.1.2 (b) should not be used.

However, under certain circumstances (refer to reasons mentioned below), the most common solution proposed will be the acceptance of using a fit purpose equation against the conservative equation.

1. Pipe wall thickness calculations aren't part of the discipline engineering deliverables.
2. Difference of the calculated wall thickness is negligible and most of the sizes are not used in a particular project.
3. Most of the line which uses the affected pipe classes are not designed as per maximum design, where the pipe wall thickness is calculated based on the maximum design pressure and temperature.

CONCLUSION

Pipe wall thickness calculation shall be performed based on ASME B31.3. However, issues such as acceptance of using a more fit equation can be accepted as the option for an alternative method. ■

Author's Biodata

__Ir. Puvanesan Mariappan,__ is Principal Mechanical Engineer with Duriane Professionals. He has been working in the building services and oil & gas industry as a mechanical/piping engineer for over 9 years. He is a sub-committee member in the Mechanical Engineering Technical Division.

IEM DIARY OF EVENTS

Title: 2-Day Course on "Sanitary System, Odourless Toilet, Rainwater Harvesting Concept & Design"

27 - 28 September 2017

Speaker : Ir. Gary Lim Eng Hwa
Organised by: Building Services Technical Division
Time : 9.00 a.m. - 5.30 p.m.
CPD/PDP : 13

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Ampang Depot Remodelling Works

Ir. Syed Neguib bin Syed Mohamed

For centuries, railways had played an essential role in the urban, economic and social development of many nations, especially during their early years.

For many decades, the focus of our country's transport landscape was mainly on roads. But with road congestion and the continuing increase in fuel prices, the Government has invested in rail projects with the aim to reduce traffic congestion, increase fuel savings and reduce carbon emission.

The National Key Economic Area (NKEA) for the Greater KL/Klang Valley set an objective to achieve a Top 20 ranking in city economic growth as well as to be among the top 20 most liveable global cities by 2020.

In July 2012, Syarikat Prasarana Negara Berhad (Prasarana) awarded the Ampang Line Extension Project to George Kent-Lion Pacific JV (GKLP). The project was listed as one of the key initiatives under the National Key Result Areas (NKRA). Phase 2 was completed and opened to the public on March 31, 2016. It was expected to have a daily ridership of more than 170,000.

To enhance the existing Ampang Line (which ran from Ampang to Sri Petaling) and to increase the capacity and service performance, a new fleet of 50 trains would be deployed. To facilitate this, a remodelling of the existing Ampang Depot to stable 20 new Light Rail Vehicles (LRV), was of the utmost priority. In operation since 1995, the depot used non-signalise (manual) operations, including hand-operated switch turnouts which presented a unique set of challenges to the constructability of the system.

THE OBJECTIVES

The purpose of remodelling the Ampang Depot was to allow the new LRVs to be operated from the depot which would be installed with the Communication Based Train Control System (CBTC), monitoring and controlling system of the load break switches system for the 750V DC

Northern view of Ampang Depot

The last Adtranz LRV to be decommissioned from Ampang Depot

distribution system and the track alignment and turnouts to accommodate the new LRV turning radius which could not navigate the entirety of the depot.

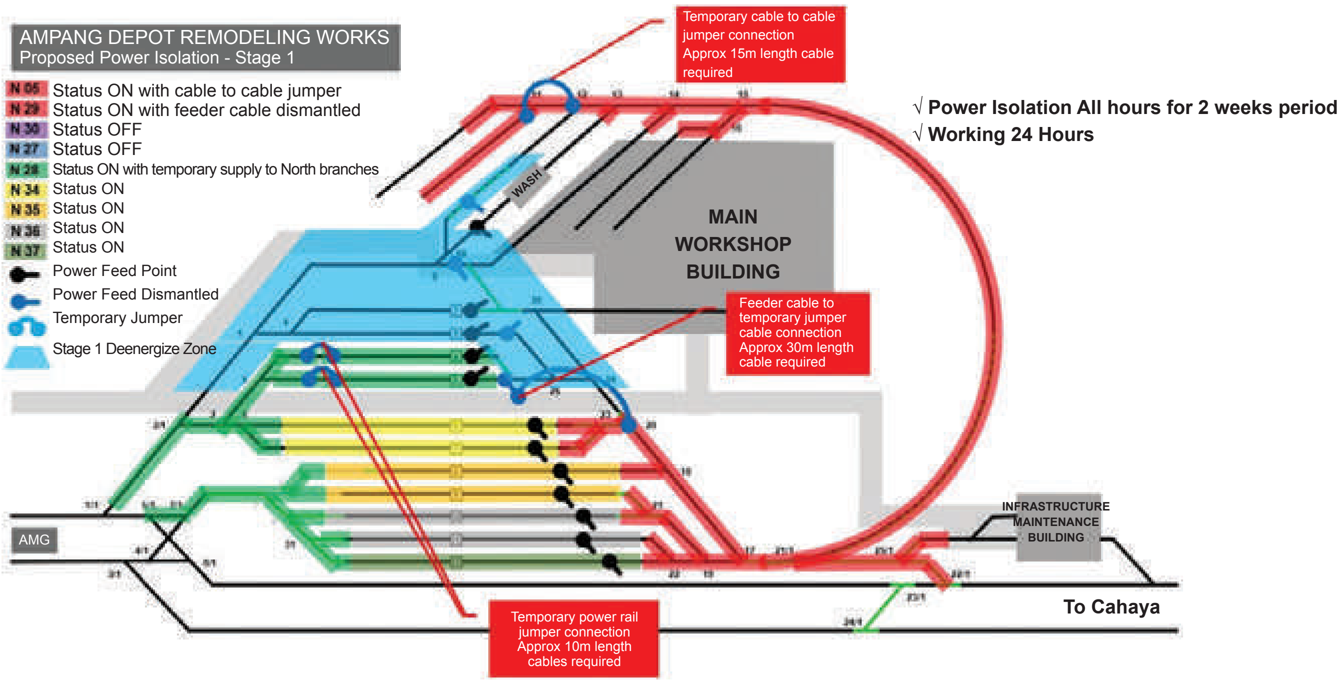
THE CHALLENGES

On a daily basis, Ampang Depot is a beehive of activities, so to reconstruct the track layout and the signalling system means overcoming a plethora of unique challenges.

First, specific track lines had to be closed for work on the trackwork and a staggered power rail isolation plan was required. If track lines were closed, there would be a need to find parking areas (see figure below) for the trains. The challenge here was to juggle between the parking capacity of the existing and new LRVs to ensure the trains would be ready for service every morning, to modify the 750V DC power section to enable works to be done safely within the depot while allowing the LRVs to manoeuver around the depot for operation flexibility. At the same time, the old trains would be decommissioned stage by stage and new trains delivered to the depot.

Before embarking on the project, there was a need to identify each feeder and jumper cable for each power section within the depot. The work was done during "engineering hours" (1.00 - 4.30 a.m.) by opening the breakers at the Traction Power Sub Station to check the power feeds at ground level. When each cable feed to the conductor rail was determined, an as-built single line diagram was drawn and power isolation concept (see diagram below) was designed to facilitate the work sequence of the project and to provide a safe working area for the crew.

The project was divided into 4 sections at different locations, with the ultimate objective to realign the



Stage 1: Power Isolation Diagram

trackwork, modify existing infrastructures and install the CBTC signalling system to accommodate the new trains.

TRACKWORK

The new trains have a continuous gangway concept design. A gangway connection is a flexible corridor that connects two coaches. The track geometry at certain sections of the depot would have to be realigned to accommodate this new design.

Turnouts are geometrically precise track components and high risk areas which can cause train derailment as the basic function is to guide a train moving from one track to another. Through the principle of leverage, the switch road switches the moveable rails and guides the trains into the designated route.

The existing 1:5 turnouts at Ampang Depot were to be replaced with new 1:6 turnouts which had a smaller crossing angle. To accommodate the existing alignment of the depot, a custom-made equilateral turnout and crossover were installed as well. A crossover is a pair of switches that connects to parallel tracks and an equilateral turnout is a Y-Shaped turnout. A total of 14 turnouts were affected, including 3 on the mainline. Due to site constraints, the existing turnouts had to be dismantled piece by piece, and transported out of the locations, before the new turnouts were transported in pieces and installed at the final locations.

Modification of Existing Diamond Crossing

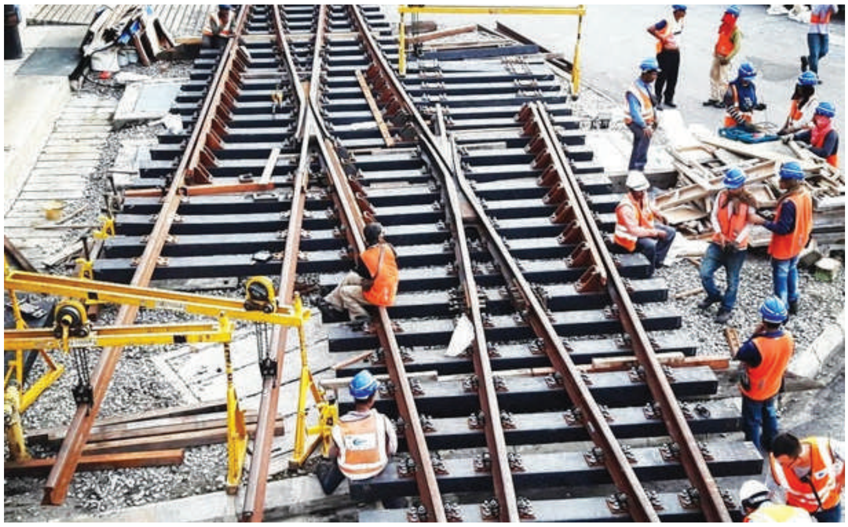
Each rail joint was connected using alumino thermic welding. The preparation works included cleaning the joints of rust, dust or other contaminants to avoid these fusing with the weld material.

The rails were then aligned using straight edge along the running edge of the rail head with a gap of minimum 25mm between rail joints to get a satisfactory result when the thermic portion is poured into the weld mould. Alumino thermic welding is fundamentally a process that causes a fusion of metals by heating them with superheated molten metal from the alumino thermic reaction between aluminium and metal oxide. For the Ampang remodelling works, approximately 500 thermit joints were performed.

INFRASTRUCTURE MODIFICATION

Ampang Depot is the oldest metro depot in Malaysia. One of the major challenges of the project was to modify the existing infrastructure to accommodate the new track layout and LRV Structure gauge.

A structure gauge is the minimum body clearance outline of the train to clear structures around the railway such as tunnels, bridges and station platform. One modification was to remove the existing stabling platforms to allow the LRV to pass through while retaining the mechanical and electrical services at the platform. Where required, 750V cables, SCADA communication cables, were also relocated to protect against damage during the remodelling works. After the project was completed, an interface test was done to ensure the new infrastructure cleared the structure gauge of the LRV.



Crossover Crossing Assembly

MAIN LINE WORKS

On 11 December, 2016, work shifted from the depot to the main line to remove and replace the existing crossover. This was extensive and, engineering and project management wise, required surgical precision to execute. The uniqueness of the work required making a special application to Suruhanjaya Pengangkutan Awam Darat (SPAD) to extend the engineering hours from 4.30 a.m. to 9.00 a.m., which meant the LRT operating hours would be delayed by 3 hours. With the consent of SPAD, an announcement was made via mainstream media and notices were put up to inform the public.

Failure to execute the work satisfactorily and hand over the line possession back to Rapid Rail, would result in a hefty fine of up to RM300,000 an hour.

A comprehensive plan was drafted, detailing every step in 30-minute blocks, including each worker's responsibilities and targets for the night. Risk analysis was done and mitigation plans were proposed with sufficient redundancies provided to ensure the risks were as low as possible.

A week before the date, intensive preparation works started, including the preassembly of the crossover. At 1.05 a.m. on 11 December, with more than 100 workers and engineers on site, the crossover that was first commissioned almost 20 years ago as Malaysia's first LRT system, was lifted out with a 300-tonne crane.

The work was completed at 8.20 a.m. The engineers did the final checks and waited for the first train from Ampang Station to navigate the crossover at 9.00 a.m., completing the crown jewel of the Ampang Remodelling works.

LESSONS LEARNT

Even with all the designs and work planning, it required tremendous coordination and cooperation between all parties concerned throughout the construction period, to put all the pieces together. The engineers worked untiringly, no matter the hour, to ensure the project was a success.

From the reconstruction of the track layout and the modification of the existing infrastructure, to the staggered power isolation and juggling the LRV parking plan and re-signalling the depot, we are reminded of how important the human element is to the success of a project.

The success of the LRT Extension Project and the recent launching of the KVMRT Line 1, including the ongoing works for KVMRT Line 2, LRT 3, East Cost Rail Link (ECRL) and South Double Track, demonstrates the government's commitment in railing the nation forward. ■

Author's Biodata

***Ir. Syed Neguib bin Syed Mohamed,** is the Managing Director of Interfleet Rail Engineering & Consulting. He is also in the General Committee in Corporate Affairs, Membership Drive & Promotions, Mechanical Engineering Technical Division and Logbook Training Scheme.*

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Technical Visit to Continental Tyre PJ Sdn. Bhd.

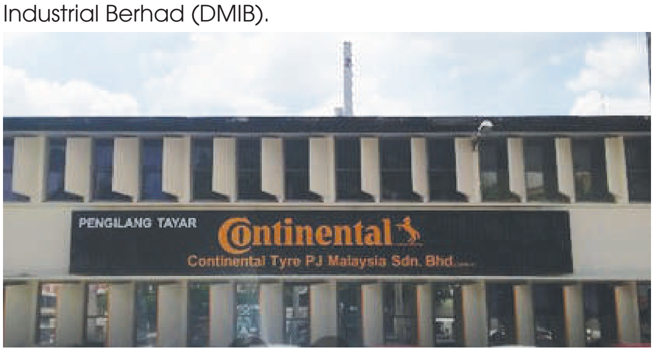
MECHANICAL ENGINEERING TECHNICAL DIVISION

reported by

Nor Azilan bin Jaafar

On 5 April 2017, METD arranged a factory visit to Continental Tyre PJ Malaysia Sdn. Bhd., in Petaling Jaya, Selangor, which produces tyres made with German technology.

Opened in 1963 by our first Prime Minister, Tunku Abdul Rahman Putra Al-Haj, it was initially known as Dunlop Factory and was fully owned by Dunlop UK. In 1986, Sime Darby took over and it was renamed Dunlop Malaysia Industrial Berhad (DMIB).



Continental Tyre PJ Malaysia Sdn. Bhd.

The delegation of 7 IEM members and 30 university students were welcomed by the Head of HR, Encik Ahmad Kamal, and staff members from the Shop-Floor Training Centre.

IEM participants at the briefing

After a safety briefing by Environment Safety & Health Manager Encik Kamal Bahardin, the delegation proceeded to the shop-floor. Continental Tyre has two manufacturing facilities. One factory is located in Petaling Jaya and the other in Mergong, Alor Setar.

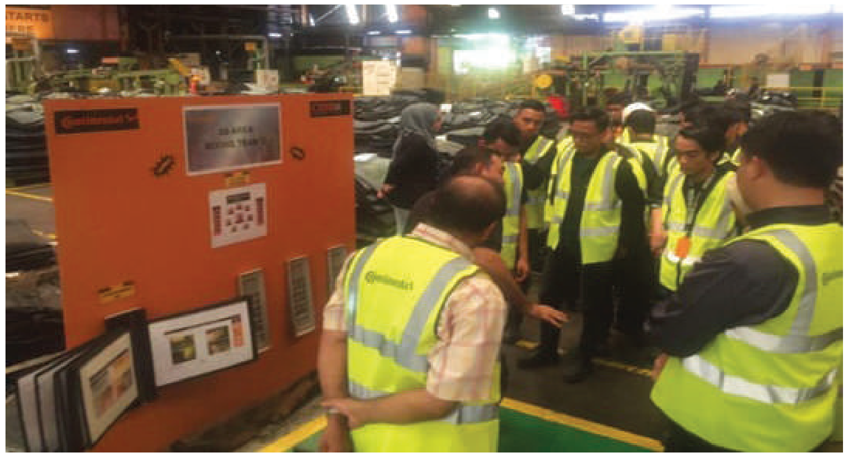
The PJ plant, spread over 37.5 acres, is at No. 7 Jalan Tandang. It produces commercial type tyres such as Truck and Bus Radial (TBR) tyre, Light Truck (LTX), Off Road (OTR) , Earth Mover (EM) and Retread.

Continental commercial type tyres

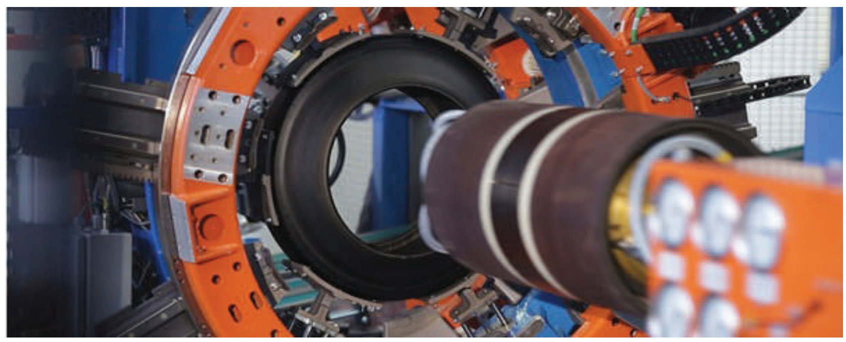
The delegation took a close look at the making of commercial type tyres which was similar to the manufacturing of light vehicles/passenger tyres. In the Banbury mixer were the main ingredients of natural rubber SMR 20 and synthetic rubber polybutadiene. Other support materials that help strengthen the tyres include Black Carbon, Silica, Struktol, DTPD, zinc oxide.

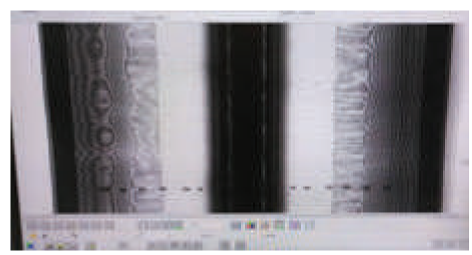
IEM participants at the briefing

Then, the delegation went on to watch the tyre manufacturing process, mostly extrusion and hot mill. Reinforced materials such as steel cord, nylon and fabric are put together in the rubber to produce plies, breakers, beads, sidewall, inner liner and tread. All these components are made in different machines. German mechanical, automation and control technologies are the key pillars in the production of Continental Brand tyres.


The IEM delegation on the shop-floor

To conclude the tour, the delegation was brought to see the tyre building machine and tyre moulding machine where the tyre components were assembled and cooked in high pressure steam.


Tyre Building Machine


Tyre X-ray

The tyre mould machine marks the brand name, Continental Tyre, on the side wall, and creates the performance profile of tread tyre. Every tyre is fully checked by the quality assurance control department, and goes through an X-ray machine, tyre balancing machine, radial runout check and visual inspection machine.

When the visit ended at 1.00 p.m., the participants were happy that they were able to see how the Continental brand tyres were produced. ■

Group photo at Continental Tyre PJ Sdn. Bhd.

Community Service: Thangam Illam Welfare Society

MECHANICAL ENGINEERING TECHNICAL DIVISION

reported by

Lawrence Wan

Thangam Illam Welfare Society, formerly known as Pusat Anak-anak Yatim Wawasan, was established in 1996 to provide food, shelter, care, education and guidance to orphans, underprivileged children and those from broken homes, the handicapped, etc. With little financial support and no commitment from other sources, the home was started on faith alone.

Today, Thangam Illam Welfare Society is home to 30 children, aged 4 to 20. The premises in a double-storey corner terrace house, is equipped with basic furniture and facilities only.

First, a representative from the IEM Mechanical Engineering Technical Division (METD) made a few visits to the home to identify the kind of assistance required so that help could be arranged for from the appropriate resources, namely a contractor.

Problems identified included a sunken front yard roofing sheet and water ponding, a clogged gutter which overflowed and caused water to leak inside the house, broken ceiling boards and missing windows panes, just to name a few. These problems had to be attended to urgently because the leaks were getting worse whenever it rained.

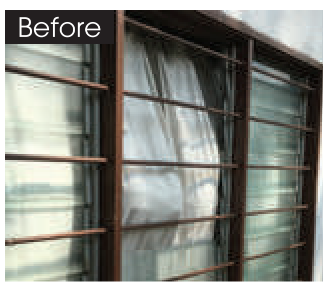
To rectify the front yard roofing sheet problems, the sagged roofing sheets were dismantled for repair and cleaning. Additional horizontal hollow steel members were installed in between the existing beams to support the roofing sheets and to prevent them from sagging. All steel supports under the roofing sheets were then painted to prevent corrosion.

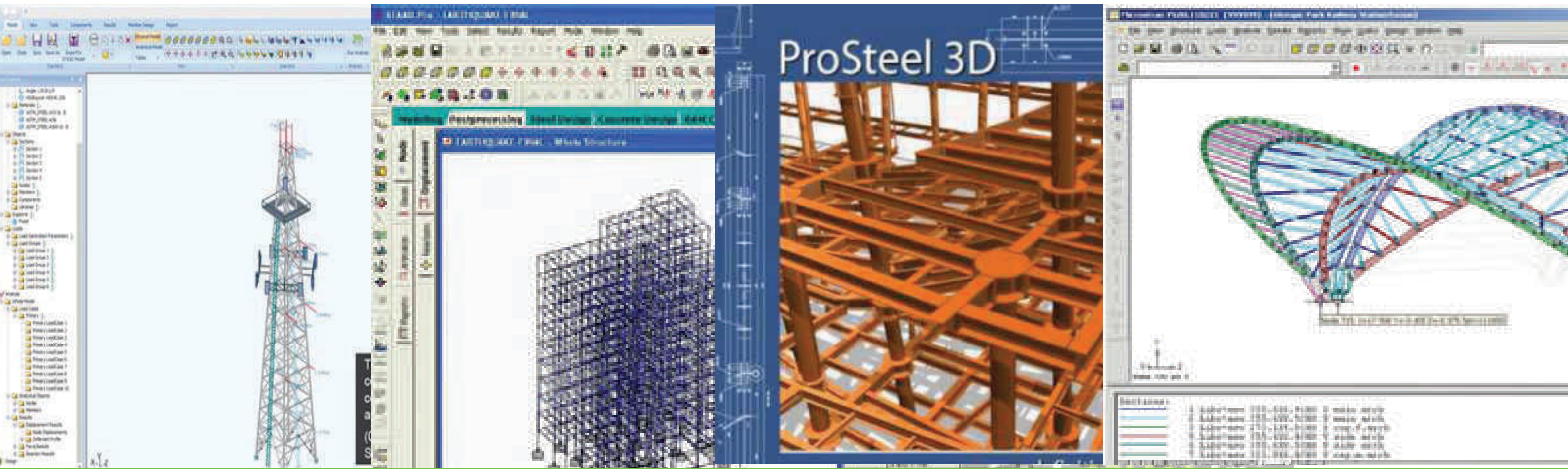
The clogged gutter was cleared of rubbish and a waterproof sealant applied. Broken ceiling boards were replaced and painted. As for the broken window panes, 15 were replaced with new ones while those with minor breakages were repaired.

The repair work was finally completed after a few days and the living conditions were greatly improved. The smiles on the children's faces were worth all the sweat and hard work. More importantly, these gestures of support would give the children a sense of appreciation and belonging, which was vital for their positive development.

We are grateful that there are many people who are willing to reach out to help those in need. Every little bit makes an impact and ensures that these children will have the chance to succeed and pursue their dreams. The home still needs volunteers to provide tutoring and counselling for children. Any assistance is welcomed, including sponsorship of bills payment and education-related expenses. ■

Thangam Illam Welfare Society
Address: Lot 1, Jalan Pandan Indah 1/11, Taman Pandah Indah, 68000 Ampang, Selangor.
Contact person: Ms. Saseikala Jayakumar
Contact number: 0111-636 8509, 016-627 7409





ProSteel 3D

Reflections on the Slope Safety System of Hong Kong from 2008

GEOTECHNICAL ENGINEERING TECHNICAL DIVISION

reported by

Ir. Mak Wai Kin

The Geotechnical Engineering Technical Division invited Ir. Chan Yun Cheung, former Head of Geotechnical Engineering Office (GEO), Civil Engineering and Development Department of Hong Kong, to give a talk on 10 January 2017. The talk at Tan Sri Prof. Chin Fung Kee Auditorium, Wisma IEM, was chaired by Ir. Mak Wai Kin and attracted 61 participants.

First, Ir. Chan talked about the severe rainstorm in Hong Kong on 7 June 2008. Hong Kong Observatory recorded the highest hourly rainfall of 145.5mm since 1884. The return period was 1 in 742 years.

In western Lantau, the 24-hour rainfall of over 600mm was recorded with a return period of 1 in 1,100 years. A total of 274 minor and 100 major landslide incidents were reported.

The rainstorm highlighted some aspects of the slope safety system such as areas it was found lacking and where improvements were required to manage the risk of landslides.

Ir. Chan said the GEO experience showed that annual rainfall was not a good measure of the severity of individual rainstorms in terms of their potential to trigger landslides. In 2005, GEO introduced Landslide Potential Index (LPI) to describe the severity of a rainstorm with respect to its potential to cause a landslide, by using rainfall and landslide records to obtain the statistical relationship between rainfall intensity and landslide frequency. Figure 1 shows the recorded LPI in Hong Kong since 1984, with the rainstorm on 7 June 2008 recording the highest LPI of 12.

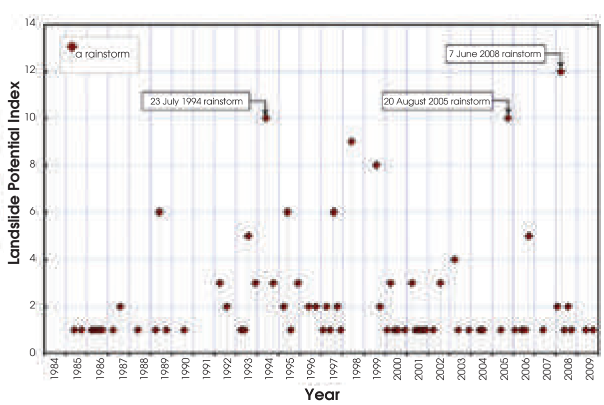


Figure 1: Landslide Potential Index Against Rainstorm Occurrence (1984 to 2009) in Hong Kong

Ir. Chan said some 8,800 man-made slopes were constructed from late 1970s to late 1980s, using "old technology" and based on the geotechnical knowledge and skills of that time. These were not sufficiently robust for long-term performance and posed the risk of landslides. During the rainstorm of June 2008, slope failures were recorded on a number of these slopes.

It was important, he said, to manage natural terrain landslide hazards. For instance, during a rainstorm on North Lantau Highway, landslides in the upper catchment sent debris downstream, blocking the drainage system at the hillside toe along the road. It caused severe flooding of the highway, resulting in traffic disruption.

Next, Ir. Chan talked about how to manage natural terrain landslide risks which were basically similar to that for man-made slopes. He emphasised on expanding the scope of works as a tool to control landslide risks. After the Landslip Preventive Measures Programme ended in 2010, GEO launched the Landslip Prevention and Mitigation Programme (LPMitP).

The differences between the two programmes and their features are summarised in Figure 2.

	Landslip Preventive Measures Programme	Landslip Prevention and Mitigation Programme
Time Frame	2000 - 2010	2010 and beyond
Government man-made slopes	Upgrade 250 per year (pre-1977 slopes)	Upgrade 150 per year (Any slope)
Private Man-made slopes	Safety-screening 200 per year	Safety-screening 100 per year
Natural hillside catchments	Ad hoc, a few per year on average	30 per year
Budget	HK$900M	HK$600M
Target	Dealt with all high consequence pre-1977 man-made slopes Residual risk 25% of that at 1977	To contain landslide risk to the As Low As Reasonably Practicable level

He concluded by highlighting two important aspects: Conceptual framework and the human resources to operate the system.

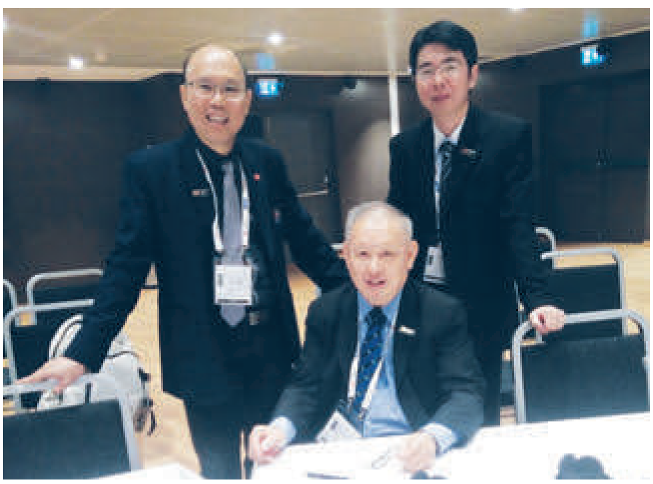
Technical Division chairman Ir. Yee Thien Seng then presented Ir. Chan with a memento and certificate of appreciation. ■

IEM Wins Bid to Host ITA-AITES World Tunnel Congress 2020 and 46th General Assembly in Kuala Lumpur

TUNNELLING & UNDERGROUND SPACE TECHNICAL DIVISION

reported by

Ir. Dr Ooi Teik Aun



Ir. Dr Ooi Teik Aun, voting delegate representing Malaysia with Ir. Dr Tan Yean Chin and Ir. Khoo Chee Min

The Institution of Engineers, Malaysia (IEM), through its commercial arm IEMTC, beat contenders Australia and India to win the bid to host the ITA-AITES World Tunnel Congress (WTC) 2020 and the 46th General Assembly in Kuala Lumpur, Malaysia.

The Bid Documents were submitted and accepted in January 2017 by ITA. The winning team comprised Ir. Dr Tan Yean Chin, President of IEM, Ir. Dr Ooi Teik Aun, Chairman Organising Committee, Ir. Khoo Chee Min, Deputy Chairman Organising Committee and Ir. Ong Sang Woh, Secretary Cum Treasurer Tunnelling and Underground Space Technical Division (TUSTD).

The team arrived in Bergen on 9 June 2017 with the Bid Documents which weighed over 100kg, and made haste to prepare the documents for distribution to Member Nations attending the 43rd ITA-AITES General Assembly on 11 June 2017. Bid presentations by the three candidates were made the same day.

After the presentations, the three candidates jointly hosted a dinner at a restaurant located at the city's mountain top for the attendees of the General Assembly on 13 June. The candidates were given time to make their presentations again before the dinner started.

The Malaysian team was very lucky to get the support of Mr. Edward Lim from the Malaysia Convention and Exhibition Bureau (MyCEB) who arrived in time with the news that the Malaysian Government had confirmed a financial grant to WTC 2020. This announcement played an important role in strengthening the Malaysian bid.

Initially, the IEM team felt overwhelmed by the two other challengers which had brought big teams to the conference while there were only 5 members in the Malaysian team, including the MyCEB representative. Luckily, this was a case where the size did not matter and where substance was what really counted.

The first round of voting took place on Wednesday, 14 June, at the ITA-AITES 43rd General Assembly. It was a very close competition. IEM garnered 25 votes and Australia followed very close behind with 23 votes. India received only 4 votes and was eliminated.

IEM then had to get ready for the second round of voting. This time, IEM secured 30 votes, beating Australia which only managed to obtain 22 votes. ITA President Prof. Tarcisio Celestino then declared that the World Tunnel Congress and 46th General Assembly would be held in Malaysia in 2020.

Prior to Bergen, IEM had organised the first Southeast Asian Conference and Exhibition in Tunnelling and Underground Space (SEACETUS) in April 2017 at the Dorsett Grand Subang Hotel in Subang Jaya, Selangor.

The conference, which attracted some 400 participants and over 20 exhibitors, received great feedback and comment. Tunnel Talk, in its June 2017 issue, reported

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that "Good organisation, choice and quality of the presentations at the conference, together with past and future development of underground space in the region with innovative, challenging and outstanding projects, are reasons why Kuala Lumpur wants to host the WTC 2020".

The bid to host one of the most prestigious events in the world for the tunnelling industry, was made possible with great effort and the commitment of a team of dedicated IEM members from the Tunnelling and Underground Space Technical Division (TUSTD). The division was formed in 1999 with the encouragement of International Tunnelling & Underground Space Association (ITA).

Ir. Dr Ooi Teik Aun was elected its Protem Chairman and subsequently the Founder Chairman at the Inaugural General Meeting in 2000. In 2006, IEM TUSTD organised the first International Conference and Exhibition on Tunnelling & Underground Space (ICETUS 2006) to coincide with the opening of the SMART Tunnel.

In 2011, the TUSTD again organised ICETUS 2011 in conjunction with the launch of Interstate Pahang-Selangor Raw Water Transfer project. ICETUS 2015 was organised to coincide with the substantial completion of KVMRT-SBK line.

With its team of dedicated members, IEM TUSTD had worked very hard over the last 17 years to promote Malaysia in the tunnelling world. Over the years, it had been TUSTD's objective to showcase our achievements in tunnel technology such as the Variable Density Tunnel Boring Machine (VDTBM) which was invented to overcome the sinkhole and blowout problems encountered in the SMART project when tunnelling through the Kuala Lumpur Limestone Formation. This invention was a first-of-its-kind in the world and was jointly developed by MMC-Gamuda and Herrenknecht, a German TBM Manufacturer. Our tunnelling industry is ready to join the ranks of the world league in Innovations & Sustainable Underground serving Global Connectivity.

To host the World Tunnel Conference was Ir. Dr Ooi Teik Aun's vision and it dated way back to the WTC2012 in Bangkok. With the support and dedication of all the members of the TUSTD since its formation, and its current team led by Chairman Ir. Syed Rajah bin Syed Hussain, this vision has now been realised. The huge effort by the Committee members to promote IEM prior to the General Assembly in Bergen was instrumental in winning the bid. They participated in various activities and conferences overseas with promotions in San Francisco by Ir. Dr Ooi, in Singapore by Ir. Khoo Chee Min, in Dubai by Ir. Frankie Cheah, in Myanmar by Ir. Ong Sang Woh and in Croatia by Ir. Neo Boon Kheng.

IEM is proud to carry the Jalur Gemilang in hosting the WTC 2020 in Kuala Lumpur and the Organising Committee has already started preparation works to ensure WTC 2020 will be a success story for Malaysia!

For more information, visit http://www.seacetus2017.com/ ■

43rd ITA – AITES General Assembly in Session

IEM YES National Summit 2017

YOUNG ENGINEERS SECTION - MIRI BRANCH

reported by

Aaron Ch'ng Duan Xian

Group Photo at MJM (Palm Oil Mill) Sdn. Bhd.

The Institution of Engineers, Malaysia (IEM) Young Engineers Section (YES) held its 11th National Summit (NATSUM) in Miri, Sarawak, from 20 to 23 July, 2017. NATSUM is an annual gathering where young engineers come together to discuss current issues that Graduate and Student members of IEM face, to share their opinions and to enhance rapport with fellow engineers.

IEM YES Miri Branch hosted this year's NATSUM with the theme, "Engineer Together, Empower the Future". The Organising Chairperson, Ms. Adeline Wong, said: "A scientist dwells on a principle and tries to understand the physics behind it; an engineer applies the principle to build and design, resulting in thousands of inventions which we take for granted, such as washing machines, digital cameras and even PlayStation consoles. In other words, engineering feats shape our future."

Taking part in this year's event were 97 delegates from 10 branches (Kuala Lumpur, Penang, Southern, Perak, Sabah, Sarawak, Miri, Pahang, Kelantan and Melaka) and from PUJA (Pertubuhan Ukur Jurutera & Arkitek) of Brunei. They arrived in Miri on 20 July 2017.

NATSUM kicked off the next day with a brief ice-breaking session, followed by a technical visit to MJM (Palm Oil Mill) Sdn. Bhd. in Bekenu, 66 kms from Miri. MJM, a subsidiary company of Pui Groups, focuses on the milling of palm oil to produce crude palm oil, palm kernel, palm kernel shell and bunch ash. As the mill is located such a distance from the city, it is crucial that the company is able to generate electricity and clean water for its own consumption.

After the technical visit, the delegates headed for the inter-branch meetings at Curtin University Malaysia; YES and Student Section held separate meetings. Ms. Adeline Wong chaired the inter-branch meeting for YES and the chairperson of IEM Student Section of Curtin University Malaysia, Ms. Kaylene Anjek, chaired for the Student Section.

All the branches presented their past year's activities and plans for the coming year as well as discussed issues such as why young engineers are not joining IEM. The inter-branch meeting concluded with the appointment of Pahang Branch as the host for IEM YES NATSUM 2018.

On the morning of 22 July, 2017, the delegates went to Bungai Beach for a team-building session and in the afternoon, they headed for Mokeng Longhouse to witness a welcoming ceremony and a cultural performance. After lunch with the villagers, the delegates headed back to Miri to get ready for the closing dinner.

The evening's guests of honour were Dato' Sebastian Ting Chiew Yew (Member of Parliament for N.73 Piasau), Ir. David Lai Kong Phooi (Deputy President of IEM Council), Ir. Paul Chiew Lik Ing (Chairman of IEM Miri Branch), Prof. Ir. Lau Hieng Ho (Vice Chairman I of IEM Miri Branch), Ir. Lim Chye Ing (Honorary Secretary of IEM Miri Branch), Ir. Sean Wong Siong Ung (Honorary Treasurer of IEM Miri Branch) and Mr. David Kung (representative of Sarawak Energy Berhad, silver sponsor of NATSUM 2017).

IEM Miri Branch thanks all the sponsors of NATSUM 2017. The star sponsors included Sarawak Convention Bureau, Dai Lieng Machinery Sdn. Bhd., Sarawak Oil Palms Berhad and Fully Contractor Sdn. Bhd.

At the dinner, the Outstanding YES Branch Award was presented to Miri, Penang and Sarawak. The Outstanding Student Section Branch Award went to University of Nottingham Malaysia Campus (UNMC, KL Branch), Universiti Tun Hussein Onn Malaysia (UTHM, Southern Branch), Swinburne University of Technology Sarawak Campus (Sarawak Branch), Universiti Malaysia Pahang (UMP, Pahang Branch) and Universiti Malaysia Sarawak (UNIMAS, Sarawak Branch). ■

Group Photo at Bungai Beach

IEM Negeri Sembilan Branch 2017 Annual Dinner

reported by

Ir. Dr Oh Seong Por
NS Committee Member 2016/2017
Standing Committee on Information and Publications Committee Member 2017/2018
Editorial Board Committee Member 2017/2018

IEM President Ir. Dr Tan Yean Chin, IEM NS Chairman Y.Bhg. Dato' Ir. Zainurin bin Karman, JKR Negeri Sembilan Director Y.Bhg. Dato' Abdul Karim bin Mohd Tahir, IEM Executive Committee and IEM NS Committee

The Institution of Engineers Malaysia, Negeri Sembilan (IEMNS) held its annual dinner on 22 July, 2017, at the Seri Negeri Ballroom, Royal Chulan Hotel, Seremban. Among the 300 guests were Dato' Abdul Karim bin Mohd Tahir (Director of JKR Negeri Sembilan), engineering consultants, contractors, property developers, manufacturers, heads of government agencies, academicians and IEMNS members. Also present were IEM President Ir. Dr Tan Yean Chin and his wife, members of Executive Committees Ir. Prof. Dr Ruslan bin Hassan, Ir. Prof. Dr Jeffrey Chiang, Ir. Ong Ching Loon, Ir. Yap Soon Hoe, Dr Wang Hong Kok and IEM Melaka Branch Chairman Ir. Dr Tan Chee Fai.

The theme, Engineer As The Nation's Transformation Agent, was picked to honour engineers who played invaluable roles in building, developing and advancing the community, particularly in Negeri Sembilan.

In his welcome speech, IEMNS Chairman Dato' Ir. Zainurin bin Karman thanked everyone for their presence and contributions to IEMNS. He also unveiled the latest 30-year development plan for Negeri Sembilan. The Malaysian Vision Valley (MVV) plan covers a total area of 153,000 hectares and includes Seremban, Nilai and Port Dickson. It is part of the spillover development strategy of Greater Kuala Lumpur towards the southern states and is expected to attract about RM290 billion in investments while creating 1.38 million new jobs. Contribution to the annual GDP growth is estimated at 6.2-7.3%.

Dato Ir. Zainurin urged fellow engineers to proactively participate in the development plan by using their talents

IEMNS Chairman Dato' Ir. Zainurin bin Karman presenting the Platinum Award to Seri Pajam Development Sdn. Bhd. Looking on is IEM President Ir. Dr Tan Yean Chin

to provide value added services and to build quality products. He also mentioned the signing of an MOU with Negeri Sembilan Menteri Besar Dato' Seri Utama Haji Mohamad bin Haji Hassan for IEM to assist state agencies such as Majlis Perbandaran Seremban, Majlis Perbandaran Port Dickson, Majlis Perbandaran Nilai and other technical departments by providing engineering solutions. Ir. Dr Tan Yean Chin also delivered a speech in which he emphasised on the importance of close cooperation between engineers and engineering technologists to realise our nation's aspiration to become a developed and vibrant country.

The highlight of the event was the award presentation. Dato' Ir. Zainurin presented local property developer Seri Pajam Development Sdn. Bhd. with the Platinum Award. Since its inception in 1994, the company has built many innovative in-demand properties, from single storey houses to luxury bungalows at locations in Pajam, Nilai, Seremban, Senawang and Bahau.

There were also three rounds of lucky draws, with prizes that included electrical appliances and hampers. For entertainment, live band Frendy Aswara Entertainment played evergreen Malay and English songs.

The evening proved meaningful as IEMNS members and their guests networked and deepened cooperation. The organising committee thanks all guests, sponsors and volunteers for the making the 2017 Annual Dinner a success. ■

IEM DIARY OF EVENTS

Title: Talk On "Arbitration: The IEM Rules and the Law"

29 September 2017

Organised by : Subcommittee on Dispute Avoidance and Resolution Practice (DARP)
Time : 5.30 p.m. - 7.30 p.m.
CPD/PDP : 2

Kindly note that the scheduled events below are subject to change. Please visit the IEM website at www.myiem.org.my for more information on the upcoming events.

Annual General Meeting of IEM Southern Branch

reported by

Ir. David Puen Ming Shen
Hon. Secretary

Back row (from left): *Ir. Elaine Liew (Committee), Ir. So Wee Siang (Committee), Dato' Ir. Tay Yew Chong (Committee), Dato' Ir. Chuah Lam Siang (Committee).* ***Front row (from left):*** *Ir. Chan Choong Cheong, Ir. David Lee, Ir. Teo Ki Yuee (Vice Chairman), Ir. Assoc. Prof. Hayati binti Abdullah (Immediate Past Chairman), Ir. Lai Sze Ching, Ir. Mohd. Khir (Chairman), Ir. Haji Zainuddin (Vice Chairman), Ir. David Puen (Hon. Secretary), Ir. Wong Yee Foong (Hon.Treasurer), Ir. Teh Sea Chuan*

The Institution of Engineers Malaysia (Southern Branch) held its 44th Annual General Meeting on 17 June, 2017, at a hotel in Johor Baru. This year's AGM recorded the highest attendance with 175 members present, compared to previous years. The IEM President was represented by vice-president, Ir. Lai Sze Chin. Earlier, the Young Engineers Section (YES) conducted its Annual General Meeting at the IEM Southern Branch office on 8 July.

The Southern Branch is currently the largest IEM branch in term of membership, and serves members residing in Johor and Singapore. There are a total of 4,537 members, consisting of 741 corporate members, 873 graduate members and 2,923 student members from Universiti Teknologi Malaysia (UTM) and Universiti Tun Hussein Onn, Johor (UTHM).

Back row (from left): *Yan Kim Leong (Committee), Gee Yih Khoon (Committee), Kow Shu Wen (Committee), Ch'ng Han Leong (Committee).* ***Front row (from left):*** *Tee Chin Fang (Vice Chairperson), Tan Xian Hui (Chairman), Chan Yaw Yee (Treasurer), Bong Mai Weng (Secretary)*

Executive Committee for Session 2017-2018 IEM Southern Branch	
Chairman	Ir. Hj. Mohd Khir bin Muhammad
Vice Chairman	Ir. Hj. Zainuddin bin Md. Ghazali Ir. Teo Ki Yuee
Immediate Past Chairman	Ir. Assoc. Prof. Hayati binti Abdullah
Hon. Secretary	Ir. David Puen Ming Shen
Hon. Treasurer	Ir. Wong Yee Foong
Committee Members	Ir. So Wee Siang Ir. Elaine Liew Shu Fang Dato' Ir. Chuah Lam Siang Dato' Ir. Tay Yew Chong

Young Engineers Section (YES) Committee IEM Southern Branch Session 2017-2018	
Chairperson	Tan Xian Hui
Vice Chairperson	Tee Chin Fang
Secretary	Bong Mai Weng
Treasurer	Chan Yaw Yee
Committee Members	Yan Kim Leong Gee Yih Khoon Kow Shu Wen Ch'ng Han Leong

Prior to the meeting, there was a technical talk on "Basement Waterproofing & The Flooring Systems", presented by SIKA Kimia Sdn. Bhd. ■

IEM COUNCIL ELECTIONS 2018 / 2019

NOTICE ON NOMINATION PAPERS FOR COUNCIL ELECTION SESSION 2018/2019

A notice inviting nominations for the Election of Council Members for Session 2018/2019 would be posted on the IEM Notice Board and IEM website from **6 November 2017** for the information of all Corporate Members of IEM. Thereafter, following the close of nominations on **27 December 2017**, the election exercise will proceed. All Corporate Members residing overseas are requested to take note of the requirements of the Bylaw, Section 5.12, as shown below.

> The voting paper shall, not less than twenty eight (28) clear days before the date of the Annual General Meeting, be sent by post to all Corporate Members residing in Malaysia and to any other Corporate Members who may, in writing, request to have the paper forwarded to him. The voting paper shall be returned to the Honorary Secretary in a sealed envelope so as to reach him by a specified date not less than seven (7) days before the Annual General Meeting.

Voting papers will be posted out by **22 February 2018**.

Any Corporate Members residing outside Malaysia, who wish to receive voting papers, are advised to write to the Honorary Secretary on or before 10 January 2018.

Thank you.

Election Officer, IEM

CONGRATULATIONS

Congratulation to our fellow engineers on the conferment of **Darjah Johan Negeri (D.J.N)** from the **Penang State Government**. The recipients were as follows:-

Darjah Gemilang Pangkuan Negeri (D.G.P.N.), which carry the title Dato' Seri'

1. Dato' Ir. Dr Lee Loke @ Lee Yow Ching

Darjah Yang Mulia Pangkuan Negeri (D.M.P.N), which carry the title Dato'

1. Dato' Ir. Ismail Bin Mohamad Taib

Darjah Setia Pangkuan Negeri (D.S.P.N.), which carry the title Dato'

1. Ir. Abd. Razak Bin Othman
2. Kapten (B) Ir. Anuar Bin Yahya
3. Prof. Ir. Dr Norashidah Binti Md. Din
4. Ir. Salleh Bin Awang

Darjah Johan Negeri (D.J.N)

1. Ir. Ting Chek Choon

Bintang Cemerlang Negeri (B.C.N)

1. Ir. Yeoh Lean Huat

Pingat Kelakuan Terpuji (P.K.T)

1. Ir. Dr Mui Kai Yin

Pingat Jasa Kebaktian (P.J.K)

1. Ir. Dr Lee Choo Yong
2. Ir. Tean Sze Nee

Jumping from Boyhood to Manhood

Ir. Chin Mee Poon | www.facebook.com/chinmeepoon

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.*

After visiting the Mursi people, we returned to Jinka and went to Turmi, deeper into the Lower Omo Valley. We arrived at 3.30 in the afternoon. A tour guide from the Turmi Evangadi Youth Association told us we had come at the right time as a Bull Jumping Ritual would be taking place in that evening.

Turmi is a small village with a handful of shops and very basic hotels. It is one of the two places with a high concentration of Hamer people; the other is Dimeka, less than 20km away. The Hamer is one of the 16 colourful ethnic groups in the Lower Omo Valley. They are subsistence agropastoralists and there are only about 46,500 of them.

We left at 4 p.m. in a 4WD to watch the Bull Jumping Ritual which would be held at a venue 12km away. Our guide was John Workineh, a 19-year-old Hamer youth who had earlier collected a guide fee of 300 birr and a visiting fee of 600 birr per person.

After driving 30 minutes along a very bumpy dirt road, we reached a place in the bush that was later filled with many other cars. We got out of the vehicle and walked another 30 minutes to an open space where a crowd had gathered, including camera-wielding tourists. There were a few village huts nearby with thatched cone-shaped roofs. My wife and I seemed to be the only non-Caucasian tourists.

The Bull Jumping Ritual does not take place regularly. It only happens when a Hamer boy is ready to go through a test that will mark his transition from boy to man. Sometimes several boys may do the Bull Jumping together. This ritual is also practised by the Banna people, another ethnic group in the Lower Omo Valley.

The boy going through the ritual that day was being prepared and given advice by close relatives, friends and village elders. Some girls and women were dancing, singing and blowing horns. They had rubbed a mixture of ochre, water and resin into their hair which they then twisted into shinning, copper-coloured tresses. They also decorated their bodies with beads/metal necklaces and wore bands around their arms, wrists and ankles as well as a string of bells on their lower legs. Some of them wore beaded head-bands too.

On the other hand, the men had shaved their heads, wore loincloths and a colourful striped T-shirt. They also decorated themselves with necklaces, head-bands, arm-bands, wrist-bands and ankle-bands as well as carried a borkoto, a unique headrest known as which doubled as a stool.

While waiting for the bull jumping to start, we witnessed a very astonishing practice. Some girls expressed their devotion to boys by asking the men to whip them hard with a twig; the harder they were whipped, the greater their devotion it seemed; they did not even groan from the pain. I saw bleeding arms and backs. Old wounds on the backs of some women had turned into thick calluses.

Finally after much anticipation, the Bull Jumping started after sunset. A group of cattle had been rounded up and placed tightly side by side with men holding their horns and tails to keep them still. The boy, now stark naked, ran and jumped on the back of the first animal, keeping his arms stretched out to maintain his balance. He continued to run till the last animal and then jumped down to the ground. With barely a few seconds to catch his breath, he turned around and repeated the feat in the opposite direction. After 4 times, he was deemed to have crossed the hurdle from boyhood to manhood.

As a man, he was now free to choose his bride, possibly from among the girls who had offered themselves for a whipping earlier. ■

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Updated January 2017

Tarikh: Tarikh: 14 August 2017

Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL TAHUN 2017

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2017.

Mengikut Undang-Undang Kecil IEM, Seksyen 3.8, nama-nama seperti tersenarai berikut diterbitkan sebagai calon-calon yang layak untuk menjadi Ahli Institusi, dengan syarat bahawa mereka lulus Temuduga Profesional tahun 2017.

Sekiranya terdapat Ahli Korporat yang mempunyai bantahan terhadap mana-mana calon yang didapati tidak sesuai untuk menduduki Temuduga Profesional, surat bantahan boleh dikemukakan kepada Setiausaha Kehormat, IEM. Surat bantahan hendaklah dikemukakan sebulan dari tarikh penerbitan dikeluarkan.

Ir. Yap Soon Hoe
Setiausaha Kehormat, IEM,

PERMOHONAN BARU

Nama	Kelayakan
KEJURUTERAAN AWAM	
ALI AMRAN BIN KAMARUZAMAN	BE HONS (UM) (CIVIL, 2005)
ALLIM BIN ABDULLAH	BE HONS (UiTM) (CIVIL, 2011) MSc (UiTM) (STRUCTURAL, 2016)
BERNARD TOIDES	BE HONS (UKM) (CIVIL & STRUCTURAL, 1999)
BUDI ISKANDAR BIN IBRAHIM	BE HONS (UiTM) (CIVIL, 2007)
HANAFI BIN ABDULLAH	BE HONS (UTM) (CIVIL, 2002)
IZMAL BIN IBRAHIM	BE HONS (UNIMAS) (CIVIL, 2000)
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SHARIFAH ZAINUN BT SYED MOHAMED NOR	BE HONS (UiTM) (CIVIL, 2003)
SHARUDIN BIN HALIM	BE HONS (UTM) (CIVIL, 2004)
SHERLIZA BINTI ZAINI SOORIA	BE (NOVA SCOTIA) (CIVIL, 1993) MSc (SHEFFIELD) (STRUCTURAL, 2004)
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TAN LAY BOON	BE HONS (UPM) (CIVIL, 2006)
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KHAIRUL A'ALAM BIN ABDUL GHANI	BE HONS (UMP) (ELECTRICAL POWER SYSTEMS, 2008)
MOHD HELMI ALSYUKRAN BIN ABD MALIK	BE HONS (UTM) (ELECTRICAL, 2008)
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MOHD AZWAN BIN AZIZ	DIPL.-ING. (FH) (KARLSRUHE) (MECHANICAL, 2009)

PERPINDAHAN AHLI

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
39179	AHMED FAIZAL B. AB.LLAH	BE HONS (UTM) (CIVIL, 2009)
30651	ELIYANI YAZREEN BINTI A. RANI	BE HONS (UiTM) (CIVIL 2006)
34362	EMMY SHERINA BINTI ISMAIL HASHIM	BE HONS (UKM) (CIVIL & ENVIRONMENTAL, 2004)
9227	HARJIT SINGH A/L INDER SINGH	BE HONS (NUS) (CIVIL, 1985) MSc (USM) (PROJECT MANAGEMENT, 2001)
28078	HO KIAT YEE	BE HONS (USM) (CIVIL, 2007)
42352	LAI KER TZE	BE HONS (UMS) (CIVIL, 2011)
50249	LEE CHECK SHIN	BE HONS (KLiUC) (CIVIL, 2011) ME (UPM) (STRUCTURAL & CONSTRUCTION, 2014)
27116	LEE KING SHEN	BE HONS (UNIMAS) (CIVIL, 2005)
32090	LIM CHEE HIN	BE HONS (USM) (CIVIL, 2011)
66052	LING EE GEE	BE HONS (RMIT) (CIVIL & INFRASTRUCTURE, 2010)
24764	MOHAMAD RODZI BIN HASAN	BE HONS (UTM) (CIVIL, 2002)
28318	MOHD ERIE HUSAIRRIE BIN ISMAIL	BE HONS (UTM) (CIVIL, 2007)
12565	MUHAMAD YATIMI BIN ABDUL RASID	BE HONS (UTHM) (CIVIL, 2012)
25340	NOR AZLINA BINTI KASIM	BE HONS (UiTM) (CIVIL, 2004) ME (UPM) (HIGHWAY & TRANSPORTATION, 2015)
33806	RAMLAN BIN HAMZAH	ADV DIP (UiTM) (CIVIL, 1994) ME (UTM) (PROJECT MANAGEMENT, 2011)
23159	SAIPULLAH BIN HUSIN	BE HONS (UTM) (CIVIL, 1991)
33511	SITI AISAH BINTI MAT YAACOB	BE HONS (UiTM) (CIVIL, 2010)
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60011	CHEONG CHEE LEONG	BE HONS (UNITEN) (ELECTRICAL POWER, 2012)
25417	CHOW WAI MUN	BE HONS (UTM) (ELECTRICAL, 2000)
58638	HIEW ZHI CHEUN	BE HONS (UMS) (ELECTRICAL, 2006)
66364	IZHAM HAMEIRY BIN MOHAMAMAD DIN	BE HONS (UiTM) (ELECTRICAL, 2010)
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38893	MOHD AFIZAN BIN ISMAIL	BE HONS (UTM) (ELECTRICAL, 2008)
50151	MUHAMMAD MIQDAD BIN IDRIS	BE HONS (UNITEN) (ELECTRICAL POWER, 2009)
75316	SHARIN BIN AB GHANI	BE HONS (UTeM) (POWER ELECTRONIC & DRIVE, 2008)
70454	SYAZWAN BIN JASNI	BE HONS (UiTM) (ELECTRICAL, 2007)
78416	TAY ENG CHONG	BE HONS (MONASH) (ELECTRICAL & COMPUTER SYSTEMS, 2013)
KEJURUTERAAN ELEKTRONIK		
83290	LOH SIU HONG	BE HONS (SHEFFIELD HALLAM) (ELECTRONIC SYSTEM, 2002) MSc (BELFAST) (ELECTRONICS, 2003) PhD (DUBLIN) (2011)
KEJURUTERAAN MEKANIKAL		
54518	AHMAD FAIZAL BIN SALLEH	BE HONS (NAGOYA) (MECHANICAL, 1998) ME (UTM) (MECHANICAL, 2006) PhD (MIE) (2012)
27329	AHMAD HAZLEY BIN MAT YUSOH	BE HONS (UTeM) (STRUCTURE & MATERIAL, 2008)
47577	GUAN SHAN LI	BE HONS (UNITEN) (MECHANICAL, 2007)
80536	LEE JIN MING	BE HONS (UTP) (MECHANICAL, 2010)
30852	MOHD KHIDHIR BIN ZULKIFLI	BE HONS (UTM) (MECHANICAL, 2011)
47639	MOHD NASIR BIN MAT SAAD	BE HONS (USM) (MECHANICAL, 2006)
79307	SIM JIA SIANG	BE HONS (UTM) (MECHANICAL-MATERIALS, 2010) ME (UTM) (MECHANICAL-MATERIALS, 2012)
77251	CHAN WAI LOON	BE HONS (NEW SOUTH WALES, 2010)
50671	CHING PING SHOON	BE HONS (CURTIN) (MECHANICAL, 2009)
KEJURUTERAAN STRUKTUR		
29812	SIAW WAI SAN	BE HONS (UTM) (CIVIL, 2000)
43973	TEO WEE	BE HONS (BELFAST) (CIVIL, 1998) PhD (BELFAST) (2005)
KEJURUTERAAN INDUSTRI		
85984	ANNUAR BIN MOHD SAFFAR	BSc (MISSOURI) (INDUSTRIAL, 1984) MSc (MISSOURI) (INDUSTRIAL, 1986)
KEJURUTERAAN PEMBUATAN		
58686	NG TAN CHING	BE HONS (UTeM) (MANUFACTURING MANAGEMENT, 2009)

PERMOHONAN BARU/PEMINDAHAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN MEKANIKAL		
84937	IR. DR MOHD ZULHILMI PAIZ BIN ISMADI	BE HONS (MONASH) (MECHANICAL, 2009) PhD (MONASH) (2015)

PERMOHONAN MENJADI AHLI 'COMPANION'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRIKAL		
0	MOHD SALMI BIN ISMAIL	B.E.HONS.(UNIMAP)(ELECTRICAL SYSTEM, 2007)
KEJURUTERAAN ELEKTRONIK		
0	ABDUL HIJAN BIN ABDUL HALIM	B.E.HONS.(STAFFORDSHIRE)(ELECTRICAL, 2006) M.E.(STAFFORDSHIRE)(ELECTRICAL, 2007)
0	SASHIRAJA A/L CHANDRASEKARAM	B.E.HONS.(UTM)(ELECTRICAL-MECHATRONICS, 2007) M.E.(MALAYA)(2013)
KEJURUTERAAN KIMIA		
0	MOHD FAMEY BIN YUSOFF	B.E.(MCMASTER)(CHEMICAL, 1996)

PEMINDAHAN KEPADA AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
68846	AFIQAH BT CHE ABU BAKAR	B.E.HONS.(UITM)(CIVIL, 2015)
52755	CHIN VINCENT	B.E.HONS.(CURTIN UNI. OF TECH.)(CIVIL & CONSTRUCTION, 2014)
47840	LIM CHIE TUNG	B.E.HONS.(USM)(CIVIL, 2012)
49698	LIM SUO HUI	B.E.HONS.(UTAR)(CIVIL, 2015)
51848	MOHD SHAZUAN AZROY BIN RAZAK	B.E.HONS.(UTHM)(CIVIL, 2014)
39121	MOHD ZAKI BIN ZAIDAN	B.E.HONS.(UTHM)(CIVIL, 2012)
41579	MUHAMMAD HANAFI BIN SELAMAT	B.E.HONS.(UTHM)(CIVIL, 2012)
33416	MUNAWARAH BINTI HAMZAH	B.E.HONS.(UITM)(CIVIL, 2011)
28100	NG KAR KIN	B.E.HONS.(USM)(CIVIL, 2009)
44452	NOR RASHIDAH BINTI NAWAWI	B.E.HONS.(UITM)(CIVIL, 2011)
44489	NUR IDZUMI BINTI MOHAMED HASNAN	B.E.HONS.(UITM)(CIVIL, 2011) M.SC.(UITM)(CIVIL-ENVIRONMENTAL, 2012)
61838	WONG CAI CHING	B.E.HONS.(UTHM)(CIVIL, 2014)
41754	WONG PU YING	B.E.HONS.(UKM)(CIVIL & STRUCTURAL, 2012)
KEJURUTERAAN ELEKTRONIK		
31887	WAN AMIROL ALIF BIN WAN NORAZLI	B.E.HONS.(USM)(ELECTRONIC, 2011)
KEJURUTERAAN KIMIA		
36478	MASHAIDA BINTI MD SHARIF	B.E.HONS.(UMP)(CHEMICAL-BIOTECHNOLOGY, 2009)
78919	SHEE JIA WEI	M.E.HONS.(NOTTINGHAM)(CHEMICAL, 2015)
KEJURUTERAAN MEKANIKAL		
50668	ACHUGOVIND KUMAR A/L PRAMAKUMAR	B.E.HONS.(MONASH)(MECHANICAL, 2015)
36888	MOHD RUZAINI BIN MOHAMAD NOOR	B.E.HONS.(UTP)(MECHANICAL, 2009)
46636	MUHAMMAD IZZAT BIN ZAKARIAH	B.E.HONS.(UITM)(MECHANICAL, 2013)
69360	SIM WEE SIANG, SIMON	B.E.HONS.(SWINBURNE UNI. OF TECH.)(MECHANICAL, 2014)

PERMOHONAN MENJADI AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ALAM SEKITAR		
86277	HO CHIA YIKE	B.E.HONS.(UNIMAP)(ENVIRONMENTAL, 2012)
86160	LIM YONG JIAN	B.E.HONS.(MALAYA)(ENVIRONMENTAL, 2011)
KEJURUTERAAN AWAM		
86290	ABANG HARUN BIN ABANG SULAIMAN	B.E.HONS.(UPNM)(CIVIL, 2012)
86268	AISYAHIRA BINTI MELAN	B.E.HONS.(UPNM)(CIVIL, 2015)
86166	ALEXANDER GAYO GUMISI @ HILARY	B.E.HONS.(UTM)(CIVIL, 2006)
86154	ANG DING SHENG	M.E.HONS.(NOTTINGHAM)(CIVIL, 2014)
86151	AZHAN LUTFI BIN MOHAMED	B.E.HONS.(UITM)(CIVIL, 2013)
86180	AZLIZA @ MOHD ANUAR BIN ABD GHANI	B.E.HONS.(UTM)(CIVIL, 2006)
86193	BENYAMIN BIN MUHD NAJIB	B.E.HONS.(UTM)(CIVIL, 2015)
86329	CHAK WAIYIH	B.E.HONS.(CURTIN UNI. OF TECH.)(CIVIL & CONSTRUCTION, 2016)
86335	CHAN WAY HONG	B.E.HONS.(UPM)(CIVIL, 2014)
86158	CHEW MING SIANG	B.E.HONS.(RMIT)(CIVIL & INFRASTRUCTURE, 2012) M.E.(MELBOURNE)(PROJECT MANAGEMENT, 2013)
86182	CHONG KEE YANG	M.E.HONS.(NOTTINGHAM)(CIVIL, 2014)
86253	DONG QUIWAN	M.E.HONS.(LEEDS)(CIVIL & ENVIRONMENTAL, 2010)
86333	HENG ZEN HWA, RAYMOND	B.E.HONS.(ADELAIDE)(CIVIL & STRUCTURAL, 2012) M.SC.(IMPERIAL COLL. LONDON)(GENERAL STRUCTURAL, 2015)
86284	KHAIROL AZHAR BIN NORDIN	B.E.HONS.(UTM)(CIVIL, 2013)
86181	LEE KWAN HAU	B.E.HONS.(UTM)(CIVIL, 2014)
86282	LING HAN UNG	B.E.HONS.(UNIMAS)(CIVIL, 2008)
86178	MOHD ANU ROKID BIN ANNUAR @ MOHD TAHIR	B.E.HONS.(UTM)(CIVIL, 2007)
86165	MOHD ZAHARUDIN BIN AYEP	B.E.HONS.(KUITTHO)(CIVIL-CONSTRUCTION, 2006)
86155	NG WEI HAN	M.E.HONS.(NOTTINGHAM)(CIVIL, 2015)
86287	NORUL AZUWA BINTI ALI RUSDAN	B.E.HONS.(MALAYA)(CIVIL, 2005)
86156	ONG CHUN SHAN, DAVID	M.E.HONS.(NOTTINGHAM)(CIVIL, 2015)
86157	ONG LI YING	B.SC.(IOWA)(CIVIL, 2014)
86152	PEI LING LING, SHARON	B.E.HONS.(UNIMAS)(CIVIL, 2014)
86169	RAJA NUR HARNANEE BINTI RAJA RAFIAUDIN	B.E.HONS.(UITM)(CIVIL, 2008)
86177	SAMSUDIN BIN AWANG	B.E.HONS.(UTM)(CIVIL, 2006)
86300	SIP MING FEI	B.E.HONS.(INTI. INT.)(CIVIL, 2014)
86271	TAI PEI WEN, MICHELLE	B.E.HONS.(INTI INT.)(CIVIL, 2015)
86262	TAN AI TANG	B.E.HONS.(UNIMAS)(CIVIL, 2008)
86163	TAN CHEE CHUAN	B.E.HONS.(MANCHESTER)(CIVIL, 2012) M.SC.(MANCHESTER)(STRUCTURAL, 2013)
86255	TAN KIAN HUAT	B.E.(MELBOURNE)(CIVIL, 2002)
86175	THURAI A/L SARASAIDY	B.E.HONS.(IUKL)(CIVIL, 2014)
86153	WONG CHOON SIANG	B.E.HONS.(UTM)(CIVIL, 2010) M.E.(UTM)(CIVIL, 2012)
86194	ZAMZURI BIN ABD RAHIM	B.E.HONS.(KUITTHO)(CIVIL, 2005)
KEJURUTERAAN BIO-PERUBATAN		
86293	HASLIDA BT ABU BAKAR	B.E.HONS.(MALAYA)(BIO-MEDICAL, 2010)
86184	TING SHYUE HORNG, JOSEPH	B.E.HONS.(UTAR)(BIO-MEDICAL, 2013)
86292	ZURAIDAH BINTI BAKRIM	B.E.HONS.(MALAYA)(BIO-MEDICAL, 2006)
KEJURUTERAAN ELEKTRIKAL		
86330	AHMAD BASRI BIN MAZLAN	B.E.HONS.(UTHM)(ELECTRICAL, 2010)
86276	AIZAT BIN NOOR AZMI	B.E.HONS.(UITM)(ELECTRICAL, 2010)
86296	AMIR FAISAL BIN MUHAMAD	B.E.HONS.(UNITEN)(ELECTRICAL & ELECTRONICS, 2005) MEM.(UPM)(ENRG. MANAGEMENT, 2015)
86269	AZHARI BIN HASHIM	B.E.HONS.(UTM)(ELECTRICAL, 2015)
86196	AZLAN BIN RAMLI	B.E.HONS.(UITM)(ELECTRICAL, 2009)
86295	CHAN BUN SENG	B.E.HONS.(UMS)(ELECTRICAL & ELECTRONICS, 2012) M.E.(UMS)(ELECTRICAL & ELECTRONIC, 2015)
86170	CHUA CHEN YONG	B.E.HONS.(NORTHUMBRIA AT NEWCASTLE)(ELECTRICAL & ELECTRONIC, 2005) M.E.(UNITEN)(ELECTRICAL, 2015)
86278	FIJAY BIN FAUZI	B.E.HONS.(UTM)(ELECTRICAL, 2003)
86183	KOMALESHWARI CHANDRASEKARAN	B.E.HONS.(TWINTECH)(ELECTRONIC & INSTRUMENTATION SYSTEMS, 2008) M.E.(MALAYA)(POWER SYSTEMS, 2015)
86259	KUEK JIN HAO	B.E.HONS.(MALAYA)(ELECTRICAL, 2014)
86172	LEOW SHOUN YING	B.E.HONS.(UNITEN)(ELECTRICAL & ELECTRONICS, 2011) M.E.(UNITEN)(ELECTRICAL, 2013)
86150	MAHADIR BIN MOHD TAZRIN	B.E.HONS.(UTEM)(ELECTRICAL-INDUSTRIAL POWER, 2010)
86187	MELVIN NISCHOL SINGARAM	B.E.HONS.(WESTERN AUSTRALIA)(ELECTRICAL, 1995)
86173	MOHD AZROL BIN ABDUL AZIZ	B.E.HONS.(UNITEN)(ELECTRICAL & ELECTRONICS, 2004)
86179	MUHAMMAD FARID BIN RUSLIN NOR	B.E.HONS.(UNITEN)(ELECTRICAL POWER, 2013)
86265	NIK ABD AZIZ BIN NIK MUSTAFA	B.E.HONS.(UTP)(ELECTRICAL & ELECTRONICS, 2010)
86189	NIK MUHD AZRI BIN NIK MUHD AFANDI	B.E.HONS.(UTM)(ELECTRICAL, 2010)
86199	NURUL HUDA BINTI HILMI	DIPL-ING. FH.(HEILBRONN)(ELECTRONICS & INFORMATION TECHNOLOGY, 2009)
86185	QUAH POOI CHI	B.E.HONS.(TAYLOR'S)(ELECTRICAL & ELECTRONIC, 2016)
86331	SI ZHI YAN	B.E.HONS.(UTP)(ELECTRICAL & ELECTRONICS, 2009)
86327	SUHAILES BINTI AHMAD	B.E.HONS.(UPNM)(ELECTRICAL & ELECTRONIC-POWER, 2014)
86332	SUNDRAM A/L RAMAHLINGAM	B.E.HONS.(UTEM)(ELECTRICAL-INDUSTRIAL POWER, 2013)
86197	TEOH SIN YU, MICHELLE	B.E.HONS.(NOTTINGHAM)(ELECTRICAL & ELECTRONICS, 2014) M.SC.(STRATHCLYDE)(ELECTRICAL POWER WITH BUSINESS, 2015)
KEJURUTERAAN ELEKTRONIK		
86257	AMIRAH BT JAAFAR MAD ARIFF	B.E.HONS.(UTEM)(ELECTRONIC-TELECOMMUNICATION ELECTRONICS, 2009) M.SC.(UITM)(TELECOMMUNICATION & INFORMATION, 2014)
86171	DR. CHEE YEN MEI	B.E.HONS.(UTM)(ELECTRICAL-TELECOMMUNICATIONS, 2009) P.HD.(UTM)(ELECTRICAL, 2013)
86260	DR. NOR FARAHIDAH BINTI ZA'BAH	B.E.HONS.(UNITEN)(ELECTRICAL & ELECTRONICS, 2002) M.SC.(NEWCASTLE UPON TYNE)(MICROELECTRONICS, 2004) P.HD.(NEWCASTLE UPON TYNE)(TOP-DOWN FABRICATION OF SILICON NANOWIRE USING OPTICAL LITHOGRAPHY, 2012)
86198	KHOO XIN PING	B.E.HONS.(MMU)(ELECTRONIC-TELECOMMUNICATIONS, 2015)

86328	LEE MUN KIT	B.E.HONS.(UTM) (ELECTRICAL & ELECTRONIC, 2008)
86294	MOHD HAIZAD BIN SALIM	B.E.HONS.(UTM) (ELECTRICAL-MECHATRONICS, 2004)
86270	NGU KAI YUN, SHARON	M.E.HONS. (NOTTINGHAM) (ELECTRICAL & ELECTRONIC, 2016)
86266	YEAP LEE SEN	B.E.HONS.(UTP) (COMPUTER, 2007)
86162	ZAMRI BIN ZAKARIA	B.E.HONS.(UTM) (ELECTRICAL-ELECTRONIC, 2006)

KEJURUTERAAN KIMIA

86291	DR HILMI BIN MUKHTAR	B.E.HONS.(WALES) (CHEMICAL, 1990) P.HD.(WALES) (CHEMICAL, 1995)
86263	LEE WAI LUM	M.E.HONS. (MANCHESTER) (CHEMICAL-BUSINESS MANAGEMENT, 2013)
86261	LOCK SOW MEI, IRENE	B.E.HONS.(UTP) (CHEMICAL, 2015)
86192	MOHD HAFIZ BIN IBRAHIM	B.E.HONS.(UITM,) (CHEMICAL, 2014)
86195	MOHD SOLIHIN BIN MOKTAR	B.E.HONS.(UTM) (CHEMICAL-POLYMER, 2012)
86279	NGAN BAN LEONG, DANIEL	B.E.HONS.(UTAR) (CHEMICAL, 2012)
86161	SAHRIN BIN MUHARAM	B.E.HONS.(UTM) (CHEMICAL, 2012)
86168	SIN YI WEN	M.E.HONS. (BIRMINGHAM) (CHEMICAL, 2015)
86164	SITI NORAZIAN BINTI ISMAIL	B.E.HONS.(UTM) (CHEMICAL, 2005) M.SC.(UPM)(CHEMICAL, 2010)
86286	YEN JING XUAN	B.E.HONS. (QUEENSLAND) (CHEMICAL, 2015)

KEJURUTERAAN KOMUNIKASI

86301	KHAIRAYU BINTI BADRON	B.E.HONS.(IIUM) (COMMUNICATION, 2006) M.SC.(IIUM) (COMMUNICATION, 2011)

KEJURUTERAAN MEKANIKAL

86252	ABDUL MUHAIMIN BIN ABDUL JALIL	B.E.HONS.(UNSW) (MECHANICAL, 2012)
86174	AHMAD FAIZ BIN ROSLAN	B.E.HONS.(UPNM) (MECHANICAL, 2014)
86256	AMIR SHARIFFUDDIN BIN KHALIB	B.E.HONS.(UPNM) (MECHANICAL, 2014)
86283	ANG KAH SOON	B.E.HONS.(UKM) (MECHANICAL, 2007)
86186	B.VICKNESH A.BALASUBRAMANIAM	B.E.HONS.(MMU) (MECHANICAL, 2011)
86288	CH'NG DUAN XIAN, AARON	B.E.HONS.(UPNM) (MECHANICAL, 2015)
86167	DR. KOH CHING THENG	B.E.HONS.(UTM) (MECHANICAL, 2005) M.SC.(ROCHESTER) (MECHANICAL, 2009) P.HD.(CAMBRIDGE) (MECHANICAL, 2014)
86334	FARID RUMAIZEE BIN MOHD ZAILANI	B.E.HONS.(UPNM) (MECHANICAL, 2012)
86191	HON LAI HOONG	B.E.HONS.(LIVERPOOL JOHN MOORES) (MECHANICAL & MANUFACTURING, 2004) M.E.(UNITEN) (MECHANICAL, 2013)
86289	ILLIYAS BIN MOHD RAZIF	B.E.HONS.(UPNM) (MECHANICAL, 2011)
86285	LIM CHEE KHONG	B.E.HONS.(UNITEN) (MECHANICAL, 2007)
86299	MUHAMMAD AQIF BIN SUHAIMEE	M.E.HONS.(IMPERIAL COLL. LONDON) (MECHANICAL, 2014)
86274	MUHAMMAD ASYRAF BIN ABDULLAH	B.E.HONS.(MMU) (MECHANICAL, 2015)
86297	MUHAMMAD QUSYAIRI BIN MUHAMMAD AMIN	B.E.(MELBOURNE) (MECHANICAL & MANUFATURING, 2010)
86159	N RAJESWARA RAO A/L APPAROW	B.E.HONS.(MMU) (MECHANICAL, 2009)
86188	NARAYANA MOORTHY A/L MUTHUKRISHNAN	B.E.HONS.(USM) (MECHANICAL, 2005)
86254	NORANIZAH BINTI ABDULLAH	B.E.HONS.(UMS) (MECHANICAL, 2012)
86281	RAVIN MUTHUKARUPPAN A/L ANNAMALAI	B.E.HONS.(UTM) (MECHANICAL-AERONAUTICS, 2015)
86190	SAIFULLAH BIN AHMAD FUAD	B.SC.(KOREA UNI.) (MECHANICAL, 2014)
86264	SAKKTHI GANTHAN NADARAJASHIVAN	B.E.HONS.(UCSI) (MECHANICAL, 2014)
86251	TAM YEE HOWE, GARY	B.E.HONS.(MMU) (MECHANICAL, 2012)
86176	TAN WEE HEAN	B.E.HONS.(UTAR) (MECHANICAL, 2015)
86258	WONG SZE YENG	B.E.HONS.(UTAR) (MECHANICAL, 2009)
86149	YANG YONG SENG, ROGER	B.E.HONS.(UNITEN) (MECHANICAL, 2010)
86148	YEU YEE LEE	B.E.HONS.(CURTIN UNI. OF TECH.)(MECHANICAL, 2009)
86298	YUZREENA FAREZEE BINTI YUSOFF	B.E.HONS.(UMS) (MECHANICAL, 2014)

KEJURUTERAAN MEKATRONIK

86280	GAN KENT LOONG	B.E.HONS.(UTEM) (MECHATRONICS, 2012)
86273	NURUL SYUHADA BINTI AHMAD RUDIN	B.E.HONS.(IIUM) (MECHATRONICS, 2015)
86326	SANGARAN A/L SELVARAJU	B.E.HONS.(UNIMAP) (MECHATRONICS, 2011)

KEJURUTERAAN PEMBUATAN

86272	MOHAMAD FAHMI BIN MOHD YASIN	B.E.HONS.(UTEM) (MANUFACTURING-ROBOTICS & AUTOMATION, 2012)

KEJURUTERAAN PETROLEUM

86275	KHAIRUNNISA BINTI AZMI	B.E.HONS.(UTM) (PETROLEUM, 2015)

PERMOHONAN MENJADI AHLI 'INCORPORATED'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRIKAL		
85477	LIM WAI XIANG	B.E.HONS. (NORTHUMBRIA AT NEWCASTLE) (ELECTRICAL & ELECTRONIC, 2015)
85961	MANIMARAN A/L MALAYANDY	B.E.HONS. (HERTFORDSHIRE) (ELECTRICAL & ELECTRONIC, 2011)

PERMOHONAN MENJADI AHLI 'AFFILIATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN KIMIA		
0	DR MD ABDUS SALAM	B.SC.(NATIONAL UNI.) (PHYSICS, 2002) M.SC.(NATIONAL UNI.) (PHYSICS, 2008) P.HD.(UTP)(CHEMICAL, 2014)

PERMOHONAN MENJADI AHLI 'ASSOCIATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRONIK		
86325	CHIN BENG KEAT, JEFFREY	DIP.(NANYANG POLYTECHNIC) (EMBEDDED SYSTEMS, 2009)
86267	RAMLEE BIN AHMAD	DIP.(UTM) (ELECTRONICS, 2004)

Note: *New list would be published on page 48 in this issue. For the list of approved "ADMISSION TO THE GRADE OF STUDENT", please refer to IEM web portal at http://www.myiem.org.my.*

Pengumuman yang ke-107

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 2017 adalah seperti jadual di sebelah:

NO.	NO. AHLI	NAMA
1	10820	AZIZAN BIN AB. RAHMAN
2	17679	CHOY WENG WAH
3	47585	FAZILAH BINTI HATTA @ ANTAH
4	20091	LEE TIAN SIN
5	19936	MARCELLINUS LEO BIN P. LINUS
6	88780	MOHD HAIZAD BIN HUSIN
7	42013	MOHD REDZUAN BIN ISMAIL
8	25259	NG SENG YEW
9	18655	NG YEOK POH
10	03317	ONG GUAN HOCK
11	24443	PANG WEI LI
12	80720	QUSANSSORI NOOR BIN RUSLI
13	49313	YUZRIAN EFREN YUNUS

IEM DIARY OF EVENTS

Title: Course on Vertical Transportation Systems Course 1: Design and Installation of VTS Course 2: Maintenance Management of VTS

26 - 27 September 2017

Organised by: Mechanical Engineering Technical Division (IEM)
Time : 9.00 a.m. - 5.00 p.m.
Venue : Wisma IEM
CPD/PDP : 13

IEM DIARY OF EVENTS

Title: Seminar On "Engineering Shopping Malls III (2017)"

1 November 2017 (Wednesday)

Organised by: Mechanical Engineering Technical Division (IEM)
Time : 9.00 a.m. - 5.30 p.m.
Venue : Wisma IEM
CPD/PDP : Applying

PERMOHONAN BARU / PEMINDAHAN AHLI

Persidangan Majlis IEM yang ke-**403** pada **18 July 2016** telah meluluskan sebanyak **1411** ahli untuk permohonan baru dan permindahan ahli. Berikut adalah senarai ahli mengikut disiplin kejuruteraan:

DISIPLIN	GRED KEAHLIAN									
	FELO	SENIOR	AHLI	COMPANION	SISWAZAH	"INCORPORATED"	"AFFILIATE"	"ASSOCIATE"	SISWA	JUMLAH
Aeronautikal			1							**1**
Aeroangkasa			1		3				14	**18**
Pertanian										**0**
Automotif			2		1				10	**13**
Biokimia					1					**1**
Bioperubatan						1			2	**3**
Perkhidmatan Bangunan								1		**1**
CAD/CAM			1							**1**
Kimia			2	1	31				134	**168**
Awam	3		39	3	91	3		2	94	**235**
Komunikasi					1				43	**44**
Komputer					1				1	**2**
Elektrikal	1		40	1	76	2			132	**252**
Elektronik	1		8	2	28			1	166	**206**
Alam Sekitar			2		3				2	**7**
Proses & Makanan					1					**1**
Geoteknik			**1**							**1**
Industri									**1**	**1**
Kawalan & Instrumentasi			**5**							**5**
Pembuatan			**1**		**4**				**34**	**39**
Marin			**1**							**1**
Bahan					**2**				**24**	**26**
Mekanikal	**1**		**19**	**1**	**90**	**3**			**170**	**284**
Mekatronik			**2**		**3**	**1**			**60**	**66**
Mikroelektronik							**1**			**1**
Arkitek Naval					**1**	**1**	**1**			**3**
Petroleum					**23**					**23**
Polimer					**1**					**1**
Struktur			**1**							**1**
Telekomunikasi			**1**		**2**					**3**
Sumber Air			**2**							**2**
Produksi			**1**							**1**
JUMLAH	**6**	**0**	**130**	**8**	**363**	**11**	**2**	**4**	**887**	**1411**

Senarai nama ahli dan kelayakan adalah seperti di bawah. Institusi mengucapkan tahniah kepada ahli yang telah berjaya.

Ir. Yam Teong Sian
Setiausaha Kehormat, Institusi Jurutera Malaysia

PERMINDAHAN AHLI KEPADA AHLI FELLOW

KEJURUTERAAN AWAM

No. Ahli	Nama	Kelayakan
14357	MD. AZLIN BIN MD SAID	BE HONS (LIVERPOOL) (CIVIL, 1985) MSC (LIVERPOOL) (WATER RESOURCES, 1987) MSC (USM) (PROJECT MANAGEMENT, 2005) PHD (WALES) (1992)
04982	NG CHEE HING	BE HONS (NEW SOUTH WALES) (CIVIL, 1981)
14357	WAHID BIN OMAR	BSC HONS (STRATHCLYDE) (CIVIL 1986) MSC (SURREY) (BRIDGE, 1989) PHD (BIRMINGHAM) (CIVIL, 1998)

KEJURUTERAAN ELEKTRIKAL

No. Ahli	Nama	Kelayakan
20852	GOH HUI HWANG	BE HONS (UTM) (ELECTRICAL, 1998) ME (UTM) (ELECTRICAL, 2003) PHD (UTM) (ELECTRICAL, 2007)

KEJURUTERAAN ELEKTRONIK

No. Ahli	Nama	Kelayakan
26383	BHUVENDHRAA RUDRUSAMY	BE HONS (UTM) (ELECTRICAL-MECHATRONICS, 2004)

KEJURUTERAAN MEKANIKAL

No. Ahli	Nama	Kelayakan
9362	AHMAD ASRI ABDUL HAMID	BSC (ADELAIDE) (MECHANICAL, 1985)

PERMINDAHAN AHLI KEPADA AHLI KORPORAT

KEJURUTERAAN ALAM SEKITAR

No. Ahli	Nama	Kelayakan
41273	NG CHOON AUN	BE HONS (UTM) (CIVIL, 2000) ME (UTM) (CIVIL, 2002) PHD (NANYANG TECHNOLOGICAL) (CIVIL, 2008)
52420	NURUL HUDA BINTI MAT NOR	BE HONS (UM) (ENVIRONMENTAL, 2006)

KEJURUTERAAN AUTOMOTIF

No. Ahli	Nama	Kelayakan
37588	NORHABIB BIN MOHD KAMIN	BE HONS (UTEM) (MECHANICAL-THERMAL FLUIDS, 2009)
59076	TG MUHD AIMAN BIN TG ABDULLAH	BE HONS (IIUM) (MECHANICAL - AUTOMOTIVE, 2011)

KEJURUTERAAN AWAM

No. Ahli	Nama	Kelayakan
21588	AHONG ANAK MANCHU	BE HONS (UNIMAS) (CIVIL, 2000)
38991	AZIZUL BIN HAWARI	BE HONS (UTP) (CIVIL, 2010)
12985	AZMI BIN IBRAHIM	BSC (TOLEDO) (CIVIL, 1986)
72580	BENEDICT CHAN WEI CHIANG	BE HONS (UITM) (CIVIL, 2007)
23234	CHAN KONG LIM	BE HONS (HERTFORDSHIRE) (CIVIL, 2000) MSC (NEW CASTLE UPON TYNE) (TRANSPORT & OPERATIONS, 2005)
43177	CHOO KOK WAH	BE HONS (UTM) (CIVIL, 2009) MSC (UTM) (CONSTRUCTION MANAGEMENT, 2012)
47585	FAZILAH BINTI HATTA @ ANTAH	BE HONS (UTM) (CIVIL, 2006) MSC (UTM) (CONSTRUCTION MANAGEMENT, 2011)
22419	HONG POH TECK	BE HONS (RMIT) (CIVIL, 2000)
48456	JOVILIS BIN MAJAMI	BE HONS (UMS) (CIVIL, 2010)
54337	KOK SIEN TI	BE HONS (UNITEN) (CIVIL, 2006)

***Note:** Remaining list of the Transfer Companion, Election Companion, Transfer Graduate, Graduate, Incorporated, Affiliate and Associate would be published in the October 2017. For the list of approved "ADMISSION TO THE GRADE OF STUDENT", please refer to IEM web portal at http://www.myiem.org.my.*

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