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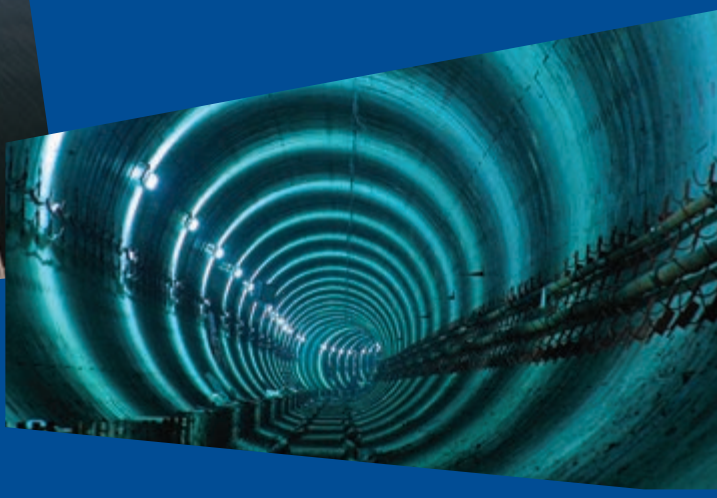

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Website: www.dimensionpublishing.com

Chairman ROBERT MEBRUER

CEO/Publisher PATRICK LEUNG

General Manager SHIRLEY THAM
shirley@dimensionpublishing.com

Head of Marketing & Business Development JOSEPH HOW
joseph@dimensionpublishing.com

Editor TAN BEE HONG
bee@dimensionpublishing.com

Contributing Writers PUTRI ZANINA & ZOE PHOON
putri@dimensionpublishing.com
zoe@dimensionpublishing.com

Senior Graphic Designer SUMATHI MANOKARAN
sumathi@dimensionpublishing.com

Graphic Designer NABEELA AHMAD
beela@dimensionpublishing.com

Advertising Consultants THAM CHOON KIT
ckit@dimensionpublishing.com

Accounts cum Admin Executive YEN YIN
yenyin@dimensionpublishing.com

For advertisement placements and subscriptions, please contact:

DIMENSION PUBLISHING SDN. BHD. (449732-T)
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46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia.
Tel: +(603) 7493 1049 Fax: +(603) 7493 1047
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Chief Editor
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46720 Petaling Jaya, Selangor.
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MARINE ENGINEERING: IMPETUS FOR GROWTH IN SHIPPING & SHIP BUILDING INDUSTRIES

by Ir. Nik Mohd Hasmizie bin Nik Mohd Kamil
Chairman,
Marine Engineering and Naval Architecture Technical Division

The growth of our shipbuilding industry, dating back to the 1900s, is supported by engineering consultancy, machinery & equipment, supply chain, logistic and insurance. In the Third Industrial Master Plan 2006-2020, the Malaysian government has identified it as a strategic industry.

Marine Engineering deals with the design, development, production and maintenance of equipment used at sea and on board shipping vessels while Naval Architecture involves the design and manufacture of sea-going vessels. In line with the demands of the shipping, shipbuilding and oil & gas industries in Malaysia, the need for Marine Engineers and Naval Architects has increased tremendously and more local universities and institutions of higher learning are offering related courses in this field.

There are many local engineering design houses, ship builders, ship owners etc. to support the industry. A holistic approach is required for all parties to collaborate, with the support of Government policy and long-term strategy so that we can be globally competitive, are able to adapt to fast-changing technologies and will achieve the vision of Malaysian Shipbuilding/ Ship Repair Industry Strategic Plan 2020 (SBSR 2020). ■

Issues and Challe

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Maritime In

Shipping is a significant contributor to the Malaysian economy. It plays an important role in moving the country's exports and imports, serves as a crucial link in the entire national transport system and provides employment for a large segment of the population. In 2016, Malaysia's total shipping trade stood at RM1.48 trillion, of which 95% was seaborne trade. However, the industry is declining, with a steady reduction in shipping tonnage and an increasing number of businesses in a worrying state. The Malaysia Ship Owners' Association (MASA) attributes this to the weak global shipping market but one man is more concerned about the domestic issues and vulnerabilities that have exacerbated the situation.

Dato' Ir. Abdul Hak bin Md Amin talks to the *JURUTERA* about the issues and challenges affecting the maritime industry.

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Dato' Ir. Abdul Hak bin Md Amin
Chairman,
Malaysia Ship Owners' Association (MASA)

In 1971, Dato' Ir. Abdul Hak bin Md Amin joined Malaysia International Shipping Corporation Bhd. (now MISC Bhd.) as a Marine Engineering Cadet before moving on to the Fisheries Development Authority as Marine Engineer and then Sime Darby Plantations as Mill Engineer. He next joined Norske Veritas, a Norway-based company as Surveyor and was later appointed its Managing Director in its Kuala Lumpur office. He has worked in many countries such as Norway, Finland, Singapore, Indonesia, Japan, Korea and Australia.

In 2002, he joined his family-owned business, E.A. Technique (M) Sdn. Bhd., which has a current fleet of 44 ships and a marine shipyard in Hutan Melintang, Bekam River, in Perak. It is also one of the leading marine industry players in the country.

"RM25 billion worth of Malaysia's seaborne trade is carried by foreign ships each year. This is a huge loss to the country. The government must look into this," he says.

With 46 years' experience in the maritime industry, Dato' Ir. Abdul Hak has seen its ups and downs.

"Our shipping industry has been hit hard by the recession. It has not picked up much, though it depends on which sector. The container business is down badly, while the tanker business is steadier and bulk carrier is picking up slightly. Offshore operations involving Offshore Supply Vessels (OSV) are facing difficulty as, with no new explorations and productions, many vessels have been left idle. Petronas has also cut exploration and production activities by 30% per annum, affecting the offshore business in the country. Now, we have a situation of an over-supply of OSVs," he says, adding that MASA members are affected badly.

"There are idle vessels not only in Malaysia but also all over the world, including in Singapore, which is a big player in offshore operations. When Singapore dumps its price, the offshore business in Malaysia is naturally affected.

"We look forward to when the world oil price either stays at the current level or to go up to US$65 per barrel; then we will be quite happy. The oil price of US$100 per barrel is history. It won't come to that level again. If exploration works can resume, it will benefit ship owners, especially those in offshore operations."

At one time, he says, Malaysia was No. 17 in the world in terms of fleet size. At the country's peak in the early 2000s, Malaysia achieved 15 million deadweight tonnes (dwt).

"Now, it is less than 10 million dwt and we are down to No. 24 in the world. There's a huge reduction mostly because Malaysia International Shipping Corporation Berhad (MISC) has sold its container vessels and bulk carriers. Companies closed down or went into receivership due to the decline in economic environment worldwide," says Dato' Ir. Abdul Hak.

However, the decrease in dwt will not affect the country's position in the International Maritime Organization (IMO) Council, an agency of the United Nations which is responsible for regulating shipping. Member countries elect the council members and Malaysia sits on the council in Category C (general). The country will be lobbying for a council seat for 2018/2019.

JOB & TRAINING ISSUES

Dato' Ir. Abdul Hak says it's important that the public be made aware that, with the reduction in production of vessels, a lot of job opportunities will be lost.

"For cadet training, the problem is in the lack of training berths. There are no more ships for cadets to obtain their Certificate of Competency (COC) to become officers or engineers. To get COC, you must have one year of training and service as a cadet on board a ship. We need to build more ships but this is very cost intensive," he says.

Dato' Ir. Abdul Hak also touches on the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW). This sets the qualification standards for masters, officers and watch personnel on seagoing merchant ships. To get the STCW certification to become a marine engineer and cadet officer, one must undergo a year of practical training on board a training vessel.

"We have a shortage of such training berths. While institutions of higher learning such as UniKL, Ungku Omar Polytechnique and other universities and colleges are producing potential candidates to be cadets and marine engineers, we have a big problem of where to put them. Some have been waiting two years to go for on-board training but they don't know where to go as there are no training berths," he explains.

"We have talked to the authorities, especially the Marine Department, with regards to offshore vessels which are not categorised as training vessels. These vessels may not have the full training facilities but the authorities should consider the trainees' stay on board these vessels as training because of the lack of training berths. We also hope the authorities will consider reducing the sea time requirement for cadets from one year to six months. Don't penalise the trainees just because they are unable to meet the full sea time service requirement."

As for naval architects, Dato' Ir. Abdul Hak says these normally work in shipyards or in ship consultancy companies which offer ship design services. Today, marine engineering and naval architecture are still relevant though they have undergone changes in order to keep up with the changing industry and technology.

Shipyards, especially those in Sabah and Sarawak, are also having problems. Dato' Ir. Abdul Hak says they do not employ fresh graduates because there is a lack of jobs. This is a reflection of the industry as a whole.

"The government has to look into the problem of our youth. If they cannot find employment, they will end up being a social nuisance," he says.

LOCAL EXPERTISE

Touching more on human capital development, Dato' Ir. Abdul Hak says IEM can also look into the development of the marine industry from design to management of shipping and shipyards.

"IEM members can share their marine expertise with us while MASA has pools of engineers, can share their experiences through dialogues with IEM members. There are so many things that we can do together," he says.

"We have a tendency to think that foreigners can do a better job but that is not true. Locals are just as good if not better. Not all foreigners are experts. We have been in this business for over 40 years and it's time to localise things. It is an irony that we have Malaysians running businesses in Singapore, Dubai, Kuwait, Qatar and elsewhere in the world. Our mindset has to change. We have produced good engineers, architects and other experts."

In naval ship building, Dato' Ir. Abdul Hak says we must endeavour to undertake design work in the country instead of getting it done elsewhere or bringing in ship designs from overseas.

"Ship design is not rocket science. Basic ship design is straight forward and simple. You only need to get model

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(Group picture attached with this article) From left: Ir. Roznan Abdul Rashid, Deputy Chairman of the Marine Engineering and Naval Architecture, Technical Division (MNATD), IEM, Rear Admiral Dato' Pahlawan Ir. Hj. Jasan Ahpandi bin Sulaiman, Advisor, MNATD, IEM, Dato' Ir. Abdul Hak bin Md Amin, Managing Director of E.A. Technique (M) Bhd. and Ir. Leong Yeow Kee, committee member, MNATD, IEM.

tests done overseas if necessary. Refine and optimise. If something can be done here, there's no need to get it done in China, for example. We don't have to buy design. If necessary, we can bring in one or two foreign experts to look at more sophisticated areas. There's no sophistication in the design of trawlers as well," he says.

Dato' Ir. Abdul Hak says E.A. Technique had designed and built the first 10,000 tonne deadweight tanker with double hull in Malaysia.

"Petronas is using it. At the first trial, there was a problem with the speed so we sent it to Amsterdam for testing to find out why we didn't get the speed. After making some adjustments, we got the speed right. So it's trial and error. We should continue to be proactive and the government should offer the encouragement for such work to spur the industry," he says, urging the government to continue to be proactive in providing job opportunities for fresh graduates. One way to do this is to bring the country's shipping tonnage back to the high levels of the past.

SHIPPING TONNAGE

Dato' Ir. Abdul Hak says the government cannot afford to ignore the annual loss of RM25 billion worth of shipping trade to foreign shipping lines. He urges the government to encourage organisations like Sime Darby and Felda to carry palm oil on Cost, Insurance & Freight (CIF) instead of Free on Board (FOB), where buyers dictate.

He says: "Allow CIF so that local players can start to build ships to carry palm oil. Otherwise this cargo will be carried by foreigners, especially the Norwegians and Chinese. It's quite sad when this happens."

CIF and FOB are international shipping agreements used in the transportation of goods between a buyer and a seller. In CIF agreements, the seller assumes insurance and other costs, with liability and costs associated with successful transit paid by the seller up until the goods are received by the buyer. Goods are not considered as delivered until they are in the buyer's possession. FOB contracts relieve the seller of such responsibility as, once the goods have passed the ship's rail, they are considered as having been delivered into the control of the buyer. As soon as the shipping process begins, it's the buyer who assumes all liability.

Looking into such details will help the government bring back the country's shipping tonnage which will, in turn, encourage ship owners to buy more ships.

LOSING COMPETITIVENESS

Dato' Ir. Abdul Hak says the government used to have a fund to assist local ship owners but not anymore.

"There is also the problem of high interest rates charged by local banks. Malaysian banks charge 7% for ship owners to buy ships, while Singapore banks charge only 1.5%. We are already beaten here. In Japan, there is no interest charged. Furthermore, Malaysian banks insist that ships purchased must be Malaysian-flagged, which also causes us to lose competitiveness. To add to that, we have to pay the Goods & Services Tax (GST) when we buy ships and whatever materials that are needed. With GST, we are no longer competitive," he says.

"For example, when we buy equipment, we pay GST; otherwise the equipment can't come in. Although the government says we can collect our money back later, we don't know when we will get it back. In China, shipbuilders get a 15% rebate on whatever they buy or sell. The shipyards get the rebate before ship sale. With all this, Malaysia has lost even before we can start to compete. China is so much more pro-shipping and pro-maritime compared to us."

While he acknowledges that the Ministry of Transport has been helpful, more effort must be made to recover what has been lost in the industry.

He says: "RM25 billion is a huge sum and it can be recovered if the government assists ship owners. We must have more local ships and local owners."

CABOTAGE POLICY

Dato' Ir. Abdul Hak turns to another issue affecting the local shipping business: The government wants to liberalise the cabotage (coastwise trade) policy because of pressure from Sabah and Sarawak.

In the United States of America, the policy is spelt out in the Merchant Marine Act of 1920, which is also known as the Jones Act, introduced by Senator Wesley Jones. Among other purposes, the law regulates maritime commerce in US waters and between US ports. Section 27 of the Jones Act deals with cabotage and requires all goods transported by water between US ports be carried on US-flagged ships, constructed in the US, owned by US citizens and crewed by US citizens and permanent residents. The law also defines certain seaman's rights.

"The USA is supposed to be a free country but it protect its domestic shipping business very tightly, ensuring only Americans benefit from this business. The whole idea is to protect America's shipping business. Their cabotage is strict.

The cabotage that we also practise is now the only avenue we have to protect our shipping industry. Every country in the world is trying to hold on to cabotage. Singapore, Indonesia and the Philippines are tightening their cabotage but Malaysia is liberalising it, bringing in foreigners and allowing them to come into our waters and encroaching on our business. This is wrong. Should all Malaysian ships be gone, the consequences run beyond damage to the economy," he says.

Dato' Ir. Abdul Hak says that in the Merchant Shipping Ordinance, Malaysian ships can be used as navy vessels in times of war.

"If we don't have a fleet of ships, what will happen to us? In Britain, during World War II, all merchant ships were converted to navy vessels and equipped for fighting. During times of peace, nobody talks about it but the government should consider the possibility of wars happening. We are surrounded by water and there's also the distance between Peninsular Malaysia and Sabah and Sarawak to consider," he explains, adding that the cabotage policy problem is political as it relates to the government wanting to meet the needs of Sabah and Sarawak. However, the government was ill informed of the actual situation.

With regards to the higher cost of consumer goods in Sabah and Sarawak compared to that in Peninsular Malaysia, Dato' Ir. Abdul Hak says we must look at the whole supply chain, from factory to transportation, ports and warehouses and then retail outlets. Shipping freight is only a small part in the entire chain. There are other costs involved. The higher prices in Sabah and Sarawak are not due to ship owners' cartel.

He elaborates that 10 years ago, freight cost from Port Klang to Kota Kinabalu for a 20-footer container was RM120,000.

"Now for the same container, the freight cost is only RM600. However, the food stuff in Kota Kinabalu hasn't go down proportionately with the reduction in freight cost. If the freight cost is the reason for the high price of goods, the cost of food items now like Milo or instant noodles should have come down by 50% from 10 years ago.

"The only thing for us to do is to enforce our cabotage policy – goods must be carried by Malaysian ships only, not by foreigners. The current scenario is that there's not enough cargo to go to Sabah and Sarawak. It's not only too little but the throughput to the two states (compared to ships headed for Singapore and Tanjung Pelepas in Johor) is also not worth the while because, most of the time, ships have to wait at ports in Sabah and Sarawak, and this costs money. It is a misconception that MASA members have a cartel that pushes prices up in Sabah and Sarawak. The truth is that ships return from there empty."

Dato' Ir. Abdul Hak says MASA has told the government that it is important to develop Kota Kinabalu and other ports and to improve infrastructure and the overall industry in Sabah and Sarawak so that there will be backhaul cargo on return journeys of ships bound for the peninsula.

"We have told the Government to retain the cabotage policy. This is very important. Don't liberalise the industry by letting foreigners in. When they first come in, they will dump and lower prices. Then, once they control the local market, they will push up prices," he says.

"When we had the policy back in the 1980s, our fleet jumped from 0 to 15 million, and Malaysia became No. 17 in the world in terms of fleet size. The Prime Minister has already liberalised parts of Sabah and Sarawak and allowed the order to stand for six months. So if there's no reduction in the prices of goods in Sabah and Sarawak during this period because of cabotage liberalisation, we have to make representation to the government again."

The peninsula is not as affected by the problem of liberalisation of cabotage.

"The shipping business is huge in Sabah and Sarawak, especially Sarawak, as sea transport from Kuching to Sibu and Miri is faster than on land. Liberalise there and we'll see Indonesian transporters coming in to trade although their ships don't meet our shipping requirements. The rules are strict for Malaysian ship owners but Indonesians can come in a tongkang and they will be allowed to trade. This is what's happening now," he reveals. He adds that most of these vessels do not have insurance or Protection and Indemnity (P&I) Club cover, so if they sink in Malaysian waters, the Malaysian authorities will need to salvage them, which will be a burden to the government.

HELPING SHIPPING COMPANIES

On the future of the industry, Dato' Ir. Abdul Hak says Malaysia should focus on the seaborne trade as it is very big, at 96% of total marine trade. The balance goes to Singapore.

He says: "The government should look seriously at the maritime business. It is sad that money is going out of the country. We incur loss of foreign exchange when cargo is carried by foreigners. The government should help by mobilising the shipping fund as announced by the Prime Minister in 2014. He had announced an allocation of RM3 billion to help our industry but the money had yet to be disbursed. The implementation stage had failed. Many shipping companies had gone down." Dato' Ir. Abdul Hak is of the opinion that the criteria to get the fund is difficult to meet.

"It is impossible. Some companies face difficulties and need help to restructure and get back into business. In cases where these companies are not able to repay their loans, banks should not seize their vessels. Instead the vessels should be released and allowed to operate and earn revenue. Otherwise the ships will become scraps. It's better to restructure the bank loan so that the vessels can continue to operate," he suggests.

He says that MASA has proposed that the government sets up a shipping fund called Dana Kapal, which will be similar to Dana Harta. Shipping companies that face problems can then receive help from the government through Dana Kapal, which can take over and help the companies to manage the ships.

"So far, the government has not taken up the suggestion. MASA, which is already well organised and

has the knowledge in the shipping business, can assist the government with Dana Kapal. We can complement each other," he says.

"We may not be able to achieve what Singapore has achieved. But, like Singapore, we have good infrastructure – a good network of roads, good hotels, airlines and airports near major ports. So why are ship owners not coming to Malaysia?

"This is because they don't want to do bunkering here. They don't want to make the crew change and buy provisions here, mainly because of red tape; there are so many different agencies involved in red tape, such as Immigration and Customs.

"To be a maritime nation, we must be very focused in what we want to do. In Singapore, I only have to deal with the Marine & Ports Authority of Singapore, not with any other authority. I may as well go to Singapore because it is so much easier. Singapore achieves 60-70 million tonnes of bunker every year. If we can get 10% of this (or 7 million tonnes), it is enough.

"In Singapore, the bunker business is huge and amounts to trillions of dollars. Crew change is also very big business there. Crew change involves hotel stays and buying of provisions for meals. Our government should look into crew change business. We already have the infrastructure for crew change but we're making things difficult. If local shippers already find it hard, what more the foreigners? The Malaysian red tape deters shippers from doing business here. We should have a one-stop centre. We need a champion within the government to move this."

MALAYSIA SHIPPING MASTER PLAN

Dato' Ir. Abdul Hak also comments on the Malaysia Shipping Master Plan launched by Transport Minister Datuk Seri Liow Tiong Lai, on World Maritime Day on 5 September, 2017.

"We put our heads together and spent two years to come out with the plan to make Malaysia a maritime nation," he says of the five-year plan (2017-2022) which contains specific maritime industry targets that concern both tonnage and markets.

In terms of tonnage, the plan states that 90% will come from bulk carrier, 65% container ships, 34% general cargo ships, 31% oil tankers and 9% other vessels. The targets set for markets are 20% from global energy shipping, 30% intra-Asean shipping, 75% domestic OSV, 90% domestic shipping and 90% local port tugboat operations.

"There are also targets in terms of investments, human capital and financing. Various issues of the present and the future have also been addressed and we have the Malaysia Shipping Council to look into the implementation. If we follow the plan, we will, hopefully, achieve the targets," says Dato' Ir. Abdul Hak.

"We have come a long way. We have not reached a dead end but there's a lot of room for improvement. We want to be more competitive and on par with Singapore. The maritime industry is still very big and for Singapore, it's good business."

Dato' Ir. Abdul Hak explains further about how GST can affect the industry in the future.

"Our value chain can close down because of the GST issue. In the past, our value chain thrived in Johor, but not anymore. Because of the GST requirement to pay tax upfront before goods are sold, companies are now buying in Singapore. Companies should be taxed only after they have sold their goods, not before," he says.

"It should be zero-rated for the shipping and maritime industry. The government should not impose GST on shipbuilding, ship repair and spare parts. It should be zero-rated for all these as otherwise we are no longer competitive."

He suggests that the government should also look at the definition of ships in so far as the imposition of GST is concerned. He says it should be standardised according to the definition as stated under the Merchant Shipping Ordinance 1952 (MSO), which states that a "ship" includes every description of vessel used in navigation not propelled by oars.

"The problem is that the various agencies have their own interpretation of ships. For example, Customs and Inland Revenue have different interpretations of ships and this affects us in terms of corporate tax. Ship definition should be standardised in order to address the tax issue. Follow the MSO definition. Ships are vessels without oars; if you propel with engines, you come under ships. It's that simple," he says.

ENERGY EFFICIENCY

Dato' Ir. Abdul Hak says the industry is also looking into engines fuelled by LPG and LNG, which affect pollution level.

"We are discussing with Petronas on how to bring LNG vessels into our waters for local owners to build ships that use LNG as fuel. We must address this and have the infrastructure to accept LNG as fuel so as to make the bunkering facility for Malaysia," he says.

Dato' Ir. Abdul Hak also touches on the Energy Efficiency Design Index (EEDI) which concerns all the elements that influence the energy efficiency of a ship, starting from its design phase.

"I am involved at the International Maritime Organisation level on the EEDI issue. All new ships have been regulated. They must meet the requirements with regards to the emission of carbon dioxide (CO_2). It is already enforced. All manufacturers of ship engines must find solutions to address this. As for old and existing vessels, the operators have been given a timeframe to find ways to reduce CO_2 emission, such as by reducing speed and having the most economical passage planning," he says.

Big ships are also governed by the International Oil Pollution Prevention Certificate. It is already enforced on and implemented by big ships. Dato' Ir. Abdul Hak concludes by saying that the concern now is for small vessels to be equipped with facilities such as better sewage disposal methods and other environmental-friendly systems and methods. ■

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Implementation of Green Port Policy Due to Climate Change

Ir. Prof. Dr Abdul Saman Abd. Kader

Global climate change and warming due to excessive emission of carbon dioxide (CO_2) have an impact on the Malaysian climate and environment. Shipping and, in particular, port operations are exposed to the vagaries of climate change. The rise in sea level, increase in temperature, rainfall, storm, flood and runoff affect overall port operations, damaging infrastructure, equipment, cargo as well as contribute to coastal erosion and sedimentation.

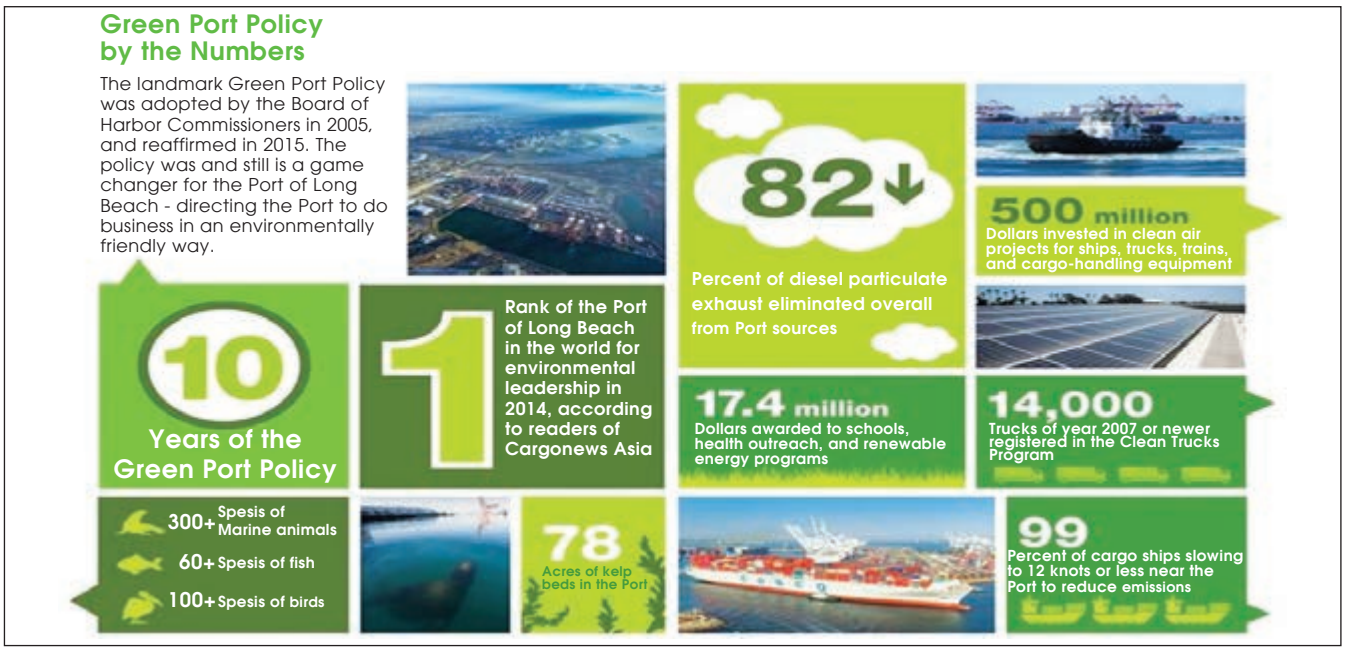
Data from the United Nations shows that in Malaysia, carbon emissions in 2006 stood at 187 million tonnes (or 7.2 tonnes per person), one of the highest in the world. In view of this, the government established the National Climate Change Policy in 2009 with the aim to reduce CO_2 emission in Malaysia to 40% by 2020 compared to 2005.

Ports are an important player in the shipping industry; they play a crucial role as transportation hubs for most of the goods transported globally. Ports are usually located in areas of sensitive environment and high risks, which make them vulnerable to climate-related changes. *Becker, et al.,* (2012) stated that most port operators believe that climate change will significantly affect operations.

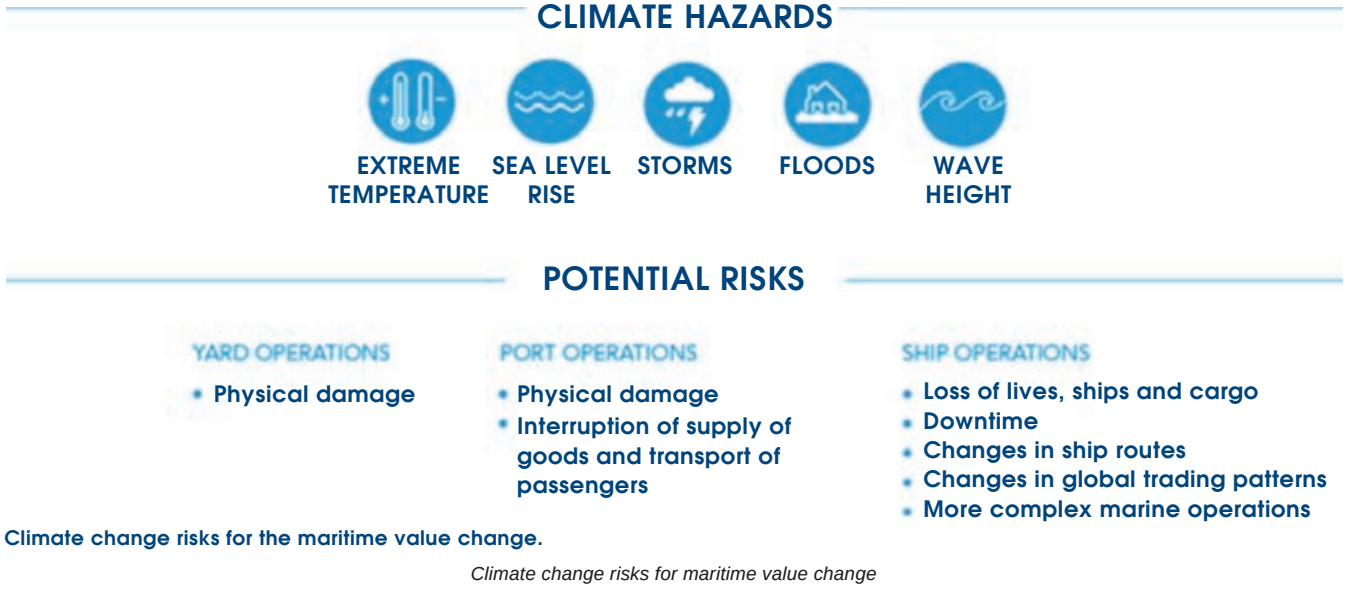
Artist's impression of the Green Port of Hull (Port of Hull 2017)

CLIMATE CHANGE

Climate change can be "attributed directly or indirectly to human activity which alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC, 2004).



Green Port Policy by the numbers (The Port of Long Beach 2017)



Climate change risks for the maritime value change.

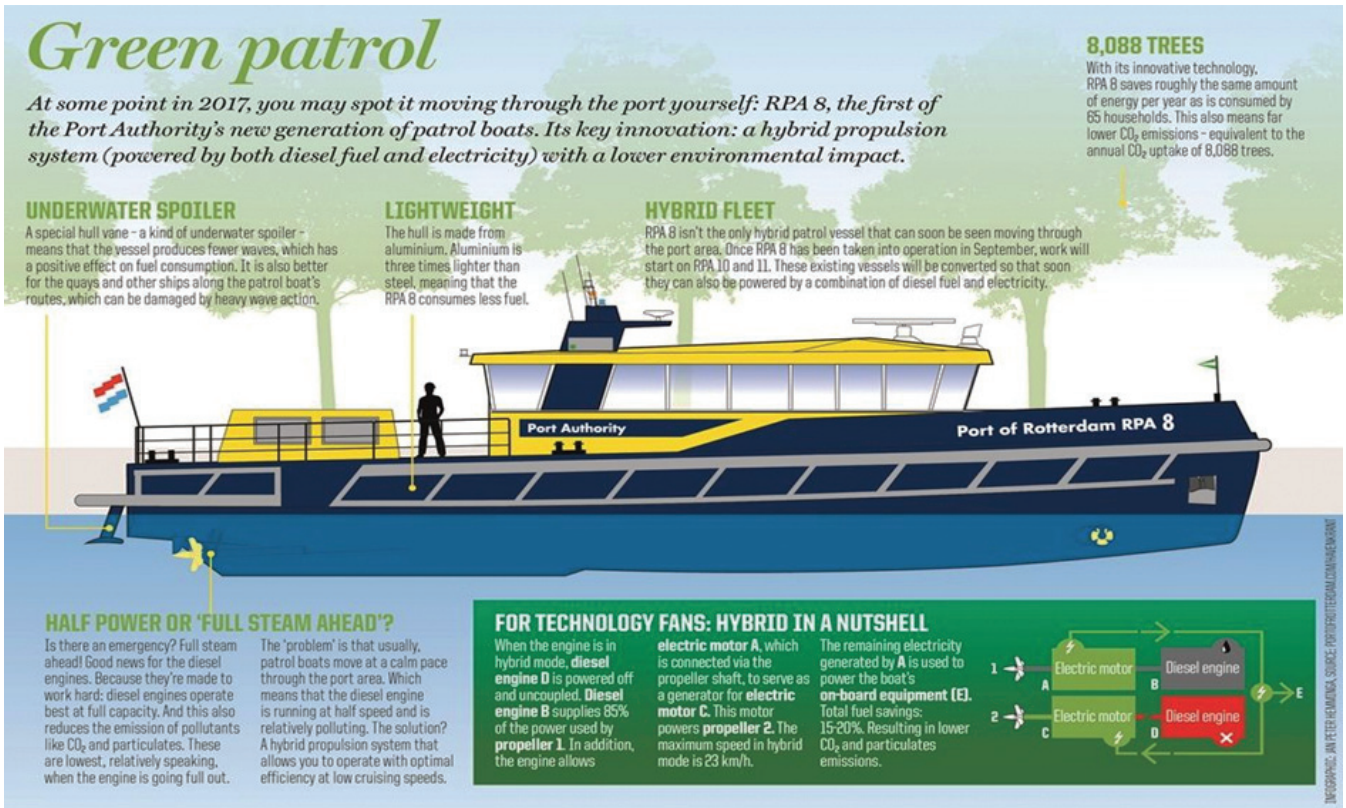
Climate change risks for maritime value change

Likewise, IPCC (2007) defines climate change as "a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer". It also refers to any change in climate over time, whether due to natural variability or as a result of human activity.

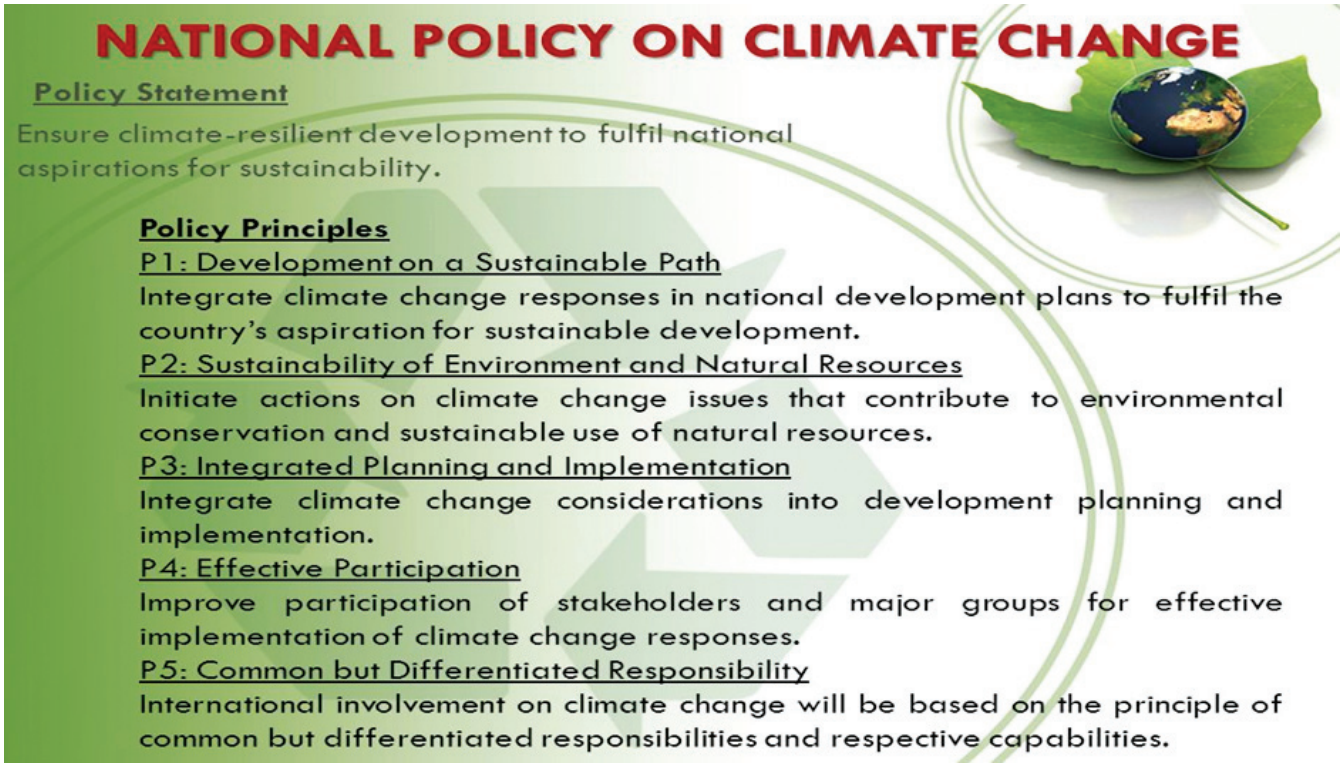
The shipping industry requires fossil fuel for engines and this produces gas and aerosol products such as CO_2 and water vapour, nitrogen oxides (NO_x), VOCs, carbon monoxide (CO) and sulphur dioxide (SO_2) (*Dessens, et al., 2014*). These gases cause ozone layer depletion, global warming and climate changes either regionally or globally as they affect the composition and the balance of the atmosphere. It was reported that nearly 70% of ship emissions occur within 400 km of coastlines, causing air quality problems through the formation of ground-level ozone, sulphur emissions and particulate matter in coastal areas and harbours (*Eyring, et al., 2005*).

1. IMPACT OF CLIMATE CHANGE ON NATION AND PORT OPERATION

In Malaysia, NAHRIM (2006) reported that the national warming trend had increased +0.18°C per decade (1951-1996) and that the sea level was raised about <+1.3mm/year (1986-2006), based on 2 pilot sites in



Green Patrol Technology (Port of Rotterdam Authority)



National Policy on Climate Change in Malaysia

the peninsula. One of the factors that caused the rise in temperature was the high level of carbon dioxide (CO_2) emissions.

Climate changes affect the overall operations of ports in the country as well as their related infrastructure due to changes in sea levels, floods, storms, strong winds and higher temperatures (Gallivan, Bailey, & O'Rourke, 2009). These have a huge impact as ports are located along the coast, in low-lying areas and deltas (UNCTAD, 2011). According to PIANC (2008), sea levels had already risen by 10-20cm in the past century and was projected to continue rising due to the melting of polar ice and mountain glaciers as well as the expansion of warmer sea water.

Any increase in temperature also impacts port operations as it will affect auxiliary port infrastructures such as paved surfaces which may deteriorate faster in hotter conditions. Finally, higher temperatures also affect humans and natural environments as most port employees work in the outdoors. Operational changes may be required to protect these workers from extreme heat and to avoid heat-related health problems (*Gallivan et al., 2009*).

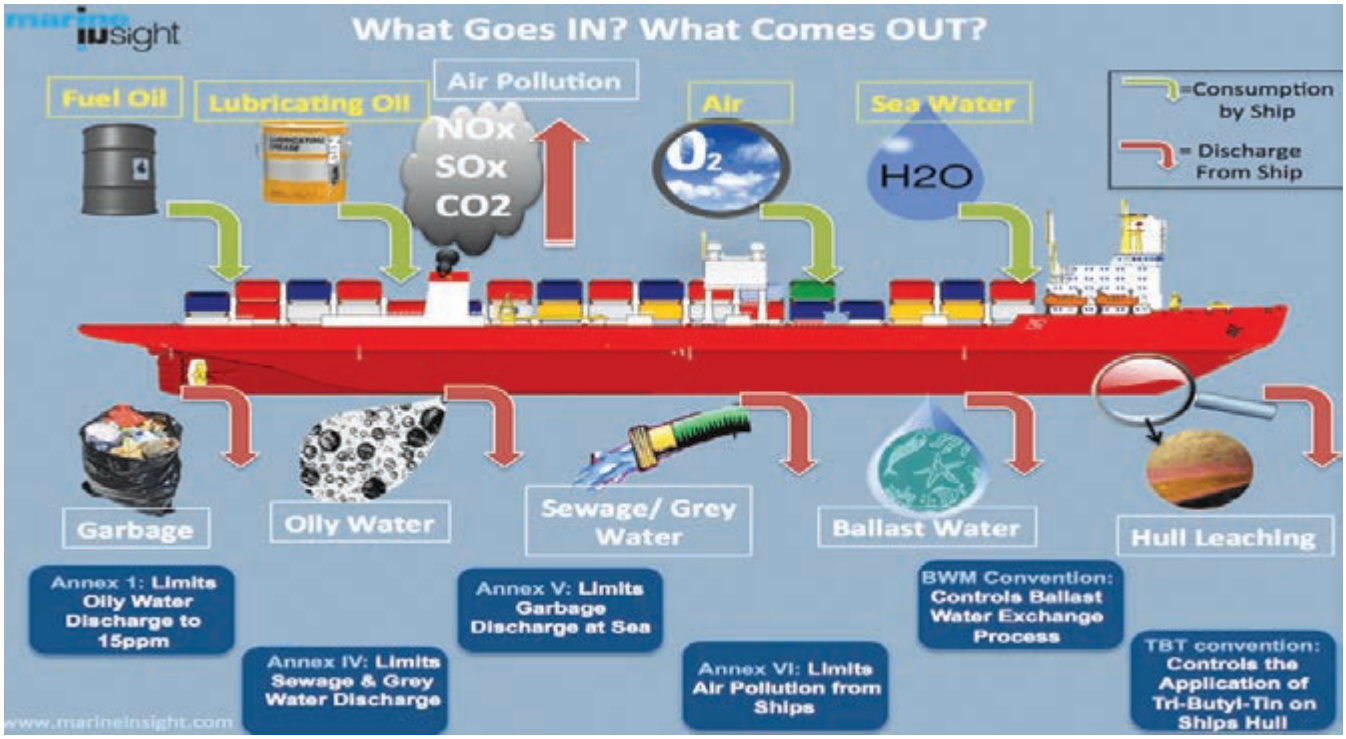
2. MALAYSIAN CLIMATE CHANGE POLICY

At the United Nations Conference on Climate Change in Copen hagen in 2009, Malaysia agreed to reduce its CO_2 emission to 40% by 2020 from 2005 levels, subjected to assistance from developed countries. Our government has approved a policy on Climate Change, aimed at ensuring climate-resilient development to fulfill national aspirations for sustainability (NRE, 2010). The objectives are to strengthen competitiveness and to improve the quality of life, the integration of climate change responses into policies, plans and programmes and the strengthening of institutional and implementation capacities (NRE, 2010).

3. ACTION PLAN CONTROL MEASURES AND INITIATIVES

a) **Vessel Speed Reduction Programme:** The voluntary vessel speed reduction programme has been established for vessels to slow down to 12 knots within 20 nautical miles of the port. For example, it is reported that current compliance is about 95% for Port of Long Beach and 88% for Port of Los Angeles (Kanter, 2006). The objective is to reduce NO_x emissions from ocean going vessels (OGVs) when they slow down as they approach or depart from ports as reduced vessel speed demands less power from the main engine which, in turn, reduces NO_x emissions and fuel consumption.

b) **Vessel Fuel Incentive Programme:** This programme encourages vessel operators to use low sulfur (0.2% sulfur or less) Marine Gas Oil (MGO) or Marine Diesel Oil (MDO) in their main engines during their approach to or departure from ports up to 20-40 nautical miles (CAAP, 2000-2014). For the programme, ports provide funding to cover the cost differential between the cleaner burning low-sulfur fuel and the heavy bunker fuel typically used. To receive the incentive, vessel operators are required to be compliant with the Vessel Speed Reduction Programme speed limit of 12 knots over the distance they wish to receive the incentive (20 or 40 nautical miles) and to use low sulfur fuel in the auxiliary engines while berthed.

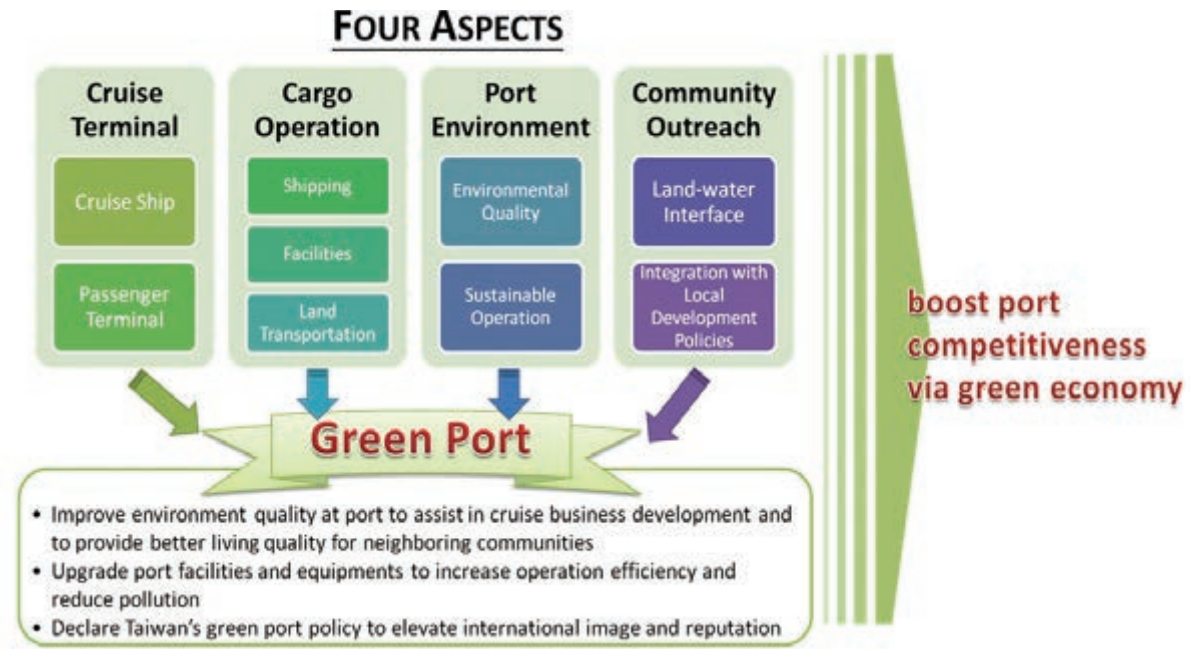


Consumption and discharge processes of a ship
Source: www.marineinsight.com (Sept. 2017)

c) On-shore Power: One effective strategy to reduce emission is to replace the use of a ship's auxiliary engines by plugging them to on-shore power. This is an application of using electrical power for ships at berth rather than diesel-burning engines, a practice called shore power or "cold ironing"; it is reported that on-shore power can reduce air pollution from ships at berth by 95% (POLB, 2014). For instance, the California Environmental Protection Agency (CEPA) regulation and the California Air Resources Board (CARB) in 2007 approved the "Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in Port" regulation.

d) Cargo-handling Equipment: Cargo-handling equipment is considered a major contributor to gas emission as diesel is the fuel used. The standards include:

1. Cleanest available alternative-fuelled engine that achieves maximum reductions in NO_x and reduces particulate matter (PM) to 0.01 g/bph-hr.



Steps for port competitiveness via Green Policy

2. Cleanest available diesel-fuelled engine which achieves maximum reductions in NO_x and reduces PM to 0.01 g/bph-hr.
3. If there are no engines available at the time which can reduce PM to 0.01 g/bph-hr, then the cleanest available engine (either fuel type) should be purchased and retrofitted with the cleanest emission control technology.
4. All cargo-handling equipment engines which have more than 750hp will be equipped with the cleanest emission control technology.

e) Harbour Craft: The Ports Clean Air Action Plan also has developed strategies to reduce emissions from harbour crafts, including:

- All harbour crafts need to meet the Environmental Protection Agency (EPA) Tier 2 Standards or equivalent reductions by 2008.
- All previously repowered harbour crafts will be retrofitted with the most effective NO_x and/or PM emissions reduction technologies by 2011.
- When Tier 3 engines become available, all harbour crafts will be repowered with the new engines within five years.
- All tugs will use shore-power at home fleeting locations (CAAP, 2000-2014).

CHALLENGES IN GREENING MALAYSIAN PORTS

There are many challenges in areas such as regulations, technology, operations, human resources and financing, among others. Adjusting to a low-carbon future requires port managements to cap their carbon emission to address the issue of climate change. To significantly reduce carbon emission within port operations, they must overcome challenges such as lack of resources, weak regulatory frameworks, lack of consensus among stakeholders and technological limitations.

That there are misconceptions among port managements is acceptable, given that port operation is not the key emission culprit. There is a lack of awareness on the part of the associated parties on their contributions to carbon emission and global warming as well as a lack of financing and human capital to procure and operate green technologies.

CONCLUSION

Our country's ports handle a total of 17 million TEU containers and act as pulse points to its economic focus. Two of our ports are on the list of the world's top 20 container ports by volume handled. Due to the expansion of global trade, it is likely that this capacity will be increased in the future. While this leads to the growth of our economic wellbeing, it also contributes significantly to pollution, particularly in CO_2 emissions which has been identified as one of the contributors to climate change.

To support the National Climate Change Policy from the perspective of port operations, one approach to reduce CO_2 emissions is to have Green Port initiatives and our major ports have undertaken efforts to apply Green Port initiatives in their businesses and operations. Their efforts are laudable and should be emulated by other ports in Malaysia. ■

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Author's Biodata

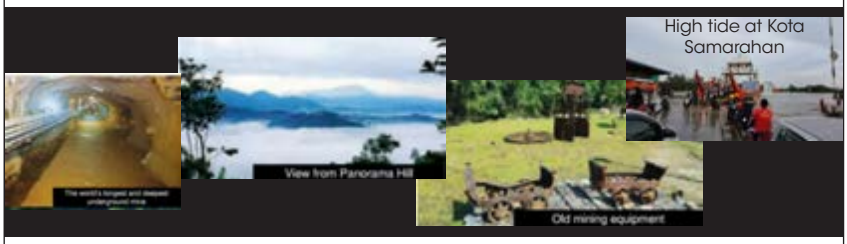
Ir. Prof. Dr Abdul Saman Abd Kader, *is a professor at Marine Technology Centre, Universiti Teknologi Malaysia, Skudai, Johor.*

ANNOUNCEMENT

Dear IEM Members,

The IEM Editorial Board takes this opportunity to thank you for your support of ***JURUTERA***. Over the last few years, we had been striving to improve the quality of ***JURUTERA*** to bring you more reading pleasure. In line with our effort to improve, we will be introducing a new ***JURUTERA*** with effect January 2018, with new layout design and a **PHOTOBLOG Column** branded as **"THROUGH THE EYES OF AN ENGINEER"**!!

We take this opportunity to invite interested members to submit interesting photographs related to engineering – maybe old engineering works or good engineering designs etc, accompanied by captions of 15 – 20 words. It will would be good if the photographs coincide with the monthly themes.

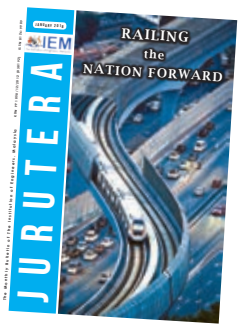


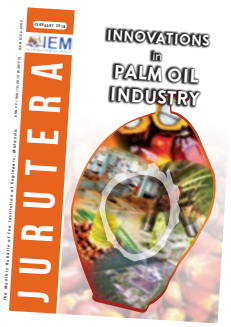
Members are also encouraged to submit articles for the travel column which will also be given a new facelift.

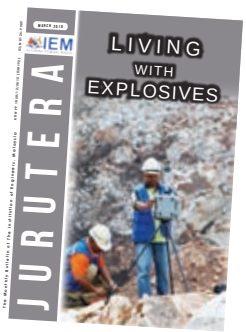
We bring you the themes lined-up for the first six months of 2018:

January	Geosynthetics	April	Women Engineer - Convergence, Inclusion and Diversity
February	Highway and Transportation	May	IEM's 59th AGM and Annual Dinner
March	One Belt One Road Initiative	June	Consulting Engineering

We are also pleased to introduce to you the new design for ***JURUTERA 2018***.







The Editorial Board looks forward to your continued support.
From the Bulletin Editor

Underwater Structure Inspections Using Unmanned Underwater Vehicle

Ir. Prof. Dr Mohd. Rizal Arshad

Song Yoong Siang

As oceans cover two-thirds of the Earth's surface, they have a huge implication on the future of all human beings. Maritime accidents caused by structural failures are significant sources of lost revenue, so periodic preventative inspections of underwater structures are very important to detect typical defective situations such as corrosion, cracks and growth of marine organisms.

Figure 1 shows typical corrosion on a jetty and Figure 2 shows two years of marine organism growth on the starboard bow of a boat. These defects are critical factors which will affect the service lifetime of underwater structures, therefore, any inspection data obtained will be useful in helping to detect such defects in order to schedule maintenance jobs.

Figure 1: Corrosion on a jetty [1]

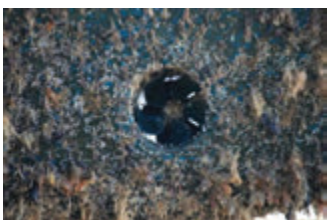


Figure 2: Marine growth on a boat [2]

Underwater inspection technique is also important in maritime archaeology surveys. For example, it can help locate, identify and investigate an unknown shipwreck. Studying shipwrecks such as that in Figure 3, can help us understand the past, connect us to our heritage and teach us lessons on damage caused by environment and human error.

Figure 3: Picture of The Britannic, which sank in the Aegean Sea [3]

LEVELS OF INSPECTION

The levels of inspection are defined according to the effort and intensity required. There are three levels: Level 1, 2, and 3 (4,5), based on the American Society of Civil Engineers (ASCE) Waterfront Facilities Inspection and Assessment Manual.

Level 1: Visual & Acoustic Inspection

This includes acoustic and visual examination of the underwater structure. Level 1 inspection normally covers the entire exterior surface of the structure, whether it is a jacket leg, retaining wall or a ship's hull.

A visual inspection is often used to detect obvious damage or deterioration of the submerged structure. In bathymetric survey, acoustic sounding equipment, such as single-beam echo sounder, multi-beam echo sounder and side scan sonar, is used. This provides information about variations in depth to the seabed or structures on it.

Figure 4 shows a map of the seabed generated by using side scan sonar, the most likely method of finding unknown wrecks due to its large coverage and high surveying speed.

Furthermore, level 1 inspection also indicates the location or the portion of underwater structure which requires more detail inspections.

Level 2: Detailed Inspection with Partial Cleaning

Level 2 inspection is more detailed and requires the underwater structure to be cleaned of marine growth. This level is intended to detect and identify damaged and deteriorated areas which may be hidden by marine growth or corrosion, so partial removal of the biofouling growth or corrosion products is required. Surface cleaning tools like

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MATERIAL:Clean COLORBOND® ULTRA steel

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A member of, green building index

brushes, hydraulic grinder with barnacle buster attachment or a high-pressure water jet gun may be used. During the cleaning process, care should be exercised to prevent damage to the surface of the underwater structure. As Level 2 inspection is expensive and time consuming, it is done on critical location of the underwater structure. Figure 5 shows a Level 2 inspection of a steel pile. The marine growth on the surface of the pile is removed before measuring its length.

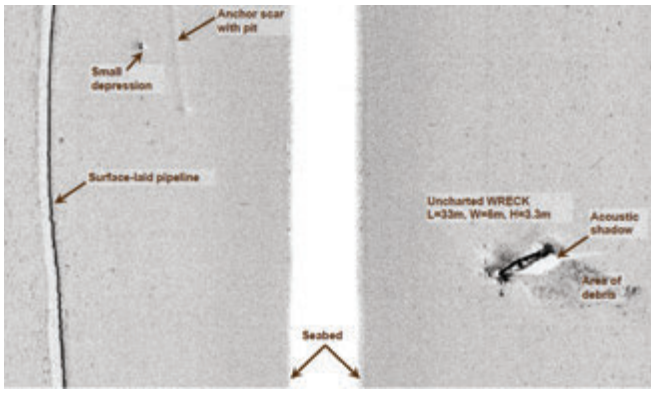

Figure 4: Mapping of seabed by using side scan sonar [6]

Level 3: Highly Detailed Inspection

Level 3 inspection is a highly detailed inspection used to detect hidden or interior damage and to evaluate material homogeneity. It includes extensive cleaning and detailed measurements using non-destructive and partially destructive testing techniques, such as thickness measurement and hardness testing. Figure 6 shows a diver measuring the remaining thickness of a steel pile using an underwater ultrasonic thickness measuring device.

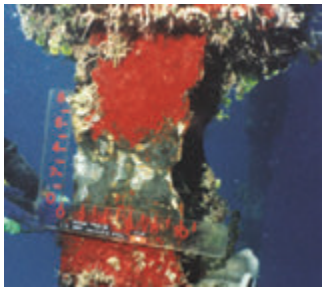

Figure 5: Level 2 inspection on a steel pile [7]

Figure 6: Level 3 inspection on a steel pile using ultrasonic devices [7]

Table 1 summarises the detectable defects and inspection tools for the three levels of inspection. The level of inspection is usually decided early in the planning phase.

There are many international standards available for underwater inspection. This article mentions a few of them. The National Bridge Inspection Standards (NBIS) establishes criteria to determine the level and frequency to which the bridge must be inspected. The periodic inspection of

Table 1: Detectable defects and inspection tools for the three levels of inspection

LEVEL	PURPOSE	DETECTABLE DEFECTS	INSPECTION TOOLS
1.	General visual or acoustic inspection to confirm as-built condition, detect severe damage, and locate position.	Extensive corrosion, major spalling and cracking, broken piles and bracings, and severe mechanical damage.	• Acoustic imaging tools: Single-beam echo sounder, multi-beam echo sounder and side scan sonar. • Visual recording tools: Underwater camera and clear-water box. • Ground penetrating radar for detecting scour holes.
2.	To detect surface defects normally obscured by marine growth.	Corrosion staining, surface cracking and crumbling, loss of bolts and fasteners, coating loss and moderate mechanical damage.	• Dimension measuring instruments: Tape measures, calipers, rule, and graduated scales. • Visual recording tools: Underwater camera and clear-water box.
3.	To detect hidden and imminent damage or to collect more detailed information.	Thickness of material, electrical potential for cathodic protection, thickness of coating, internal voids and cracks and material strength.	• Ultrasonic measuring devices for measuring thickness of steel. • Magnetic particle testing using electromagnetic yoke with magnetic field indicator for detecting surface discontinuities in magnetic structures. • Ultrasonic pulse velocity meter for estimating the strength of concrete structures and locating cracks and voids. • Schmidt test hammer for estimating the compressive strength of concrete structures. • Rebar locator for locating reinforcing steel in concrete structures. • Underwater voltmeter for determining the level of cathodic protection on steel structures.

submerged components of a bridge is vital to determine damage that may have occurred since the previous inspection.

On the other hand, the International Association of Class Societies (IACS) shipbuilding and repair quality standard, IACS REC 47, provides knowledge on the different types of defects and damages that occur on ships or hull structures. This standard provides guidelines and requirements for hull structural and welding preparation and workmanship quality. Besides, NACE International Standard Practice for In-Line Inspection of Pipelines, SP0102-2010 provides requirements for qualification of onshore and offshore pipeline inspection. It is applicable to carbon steel pipeline systems used to transport natural gas or hazardous liquids. It is a performance-based standard, which includes tethered or free-flowing systems for detecting cracks, metal loss, mechanical damage and pipeline mapping. However, this standard does not define how to meet qualification requirements.

CURRENT AVAILABLE UUVS FOR INSPECTION MISSION

As conventional underwater inspection operations using human divers and manned underwater vehicles, are high risk, high cost and require dedicated surface support, Unmanned Underwater Vehicles (UUV) are now often used for the job. UUVs are able to accomplish underwater inspection missions in a cost-effective manner when the underwater conditions prove too dangerous for divers. Today, many UUVs related to underwater structure inspection applications have been developed such as:

1. **Walking Robot:** A walking robot moves on the seabed with crawlers or legs, without making the water muddy. Figure 7 shows the schematic view of a six-legged walking robot inspecting rubble foundation with an underwater camera. Figure 8 shows CR200, a sprawling type underwater walking robot which was used to survey underwater structures and shipwrecks off the coast of the Korean peninsula. A walking robot can maintain a stationary direction and position, thus giving high quality visual inspection data and accurate measurements. However, it is only able to inspect underwater structures which are near the seabed.
2. **Climbing Robot:** A climbing robot climbs along the underwater structure while inspecting it. Normally a climbing robot will make physical contact with the submerged structure to be scrutinised. A pole climbing robot is designed (10) for bridge pier inspections. As shown in Figure 9, this consists of two identical mobile robots moving along opposite surfaces of the pole. Figure 10 shows AIRIS 21, a wall climbing robot which performs inspections on the nuclear reactor pressure vessel shell from the inside. Using two propellers, AIRIS 21 sticks onto the vessel walls and moves along the wall, using one caster wheel. This wall climbing robot can inspect structures at a very close distance, thus providing high resolution data.

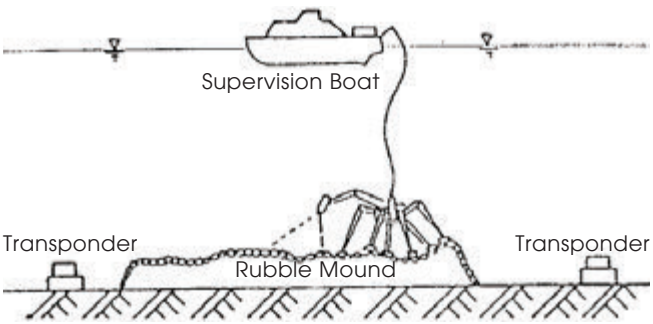

Figure 7: Schematic view of a walking robot inspecting rubble foundation [8]

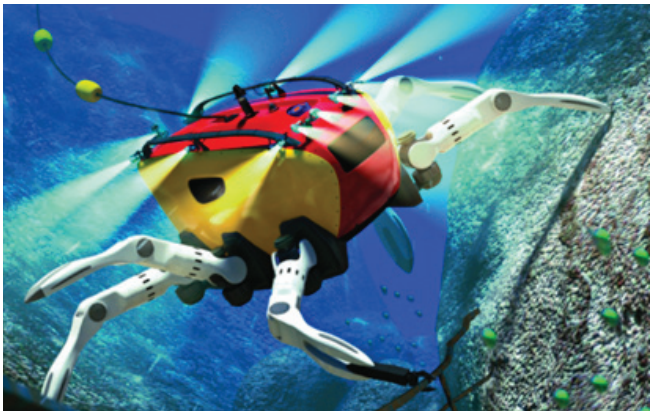

Figure 8: CR200 [9]

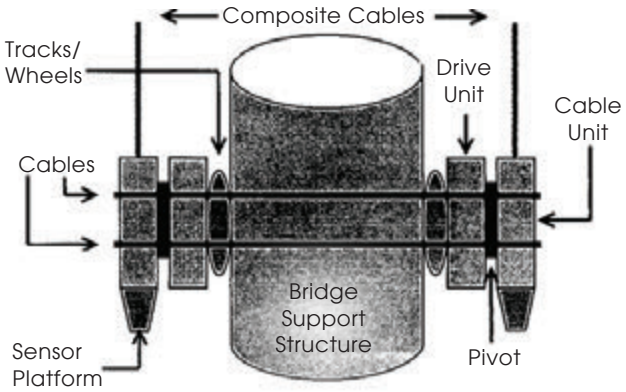

Figure 9: The system concept of pole climbing robot [10]

Figure 10: AIRIS 21 [11]

3. **Remotely Operated Vehicle (ROV):** Many ROV prototypes have been developed to inspect various underwater structures like ship hulls, shipwrecks and wall of port dock. An ROV can inspect an underwater structure without physical contact. Most employed a passive stabilisation system to retain its original vertical axis as vertical without control input needed. Figure 11

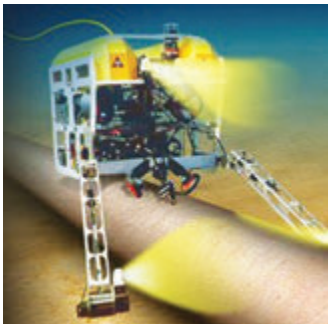

Figure 11: Seaeye Panther inspecting an underwater pipe [12]

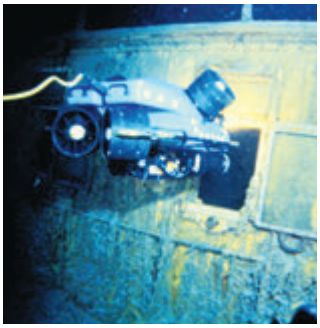

Figure 12: Jason Jr. exploring Titanic in 1986 [13]

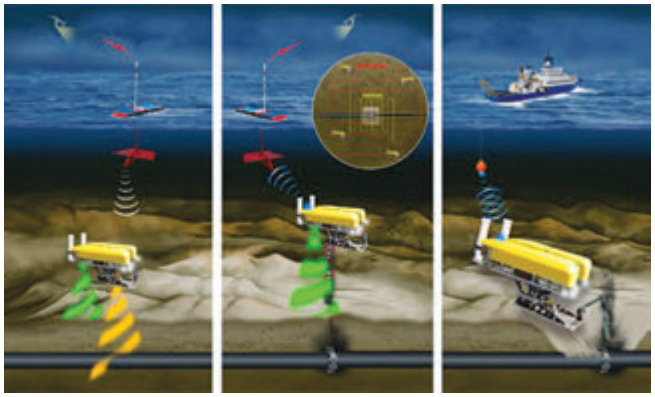

Figure 13: From left: An AUV performing pipeline localisation, leak detection and intervention [14]

shows ROV Seaeye Panther inspecting an underwater pipe using an underwater camera and profiling sonar while Figure 12 shows Jason Jr., an undersea robotic vehicle exploring the sunken Titanic in 1986. An ROV faces serious limitations because of the tether cable which links it to the control station. It cannot go far from the control station without a long tether cable and a long tether cable can easily get stuck.

4. **Autonomous Underwater Vehicle:** This robotic vehicle can travel through the ocean deep without requiring the real time control of an operator. It provides a flexible and economical solution to many underwater inspection tasks such as underwater pipeline inspection and submerged ship hull inspection. Figure 13 shows an AUV performing pipeline localisation, leak detection and intervention.
5. **Towed Vehicle:** A towed vehicle is connected, via an umbilical cable, to a mother ship which provides towing forces and electric signals. Figure 14 shows a two-stage towing arrangement that includes a long primary cable, a gravity depressor and a secondary cable. This arrangement achieves excellent performance in terms of rejection of the disturbances transmitted to the towing system. A towed vehicle can maintain its efficiency even if the current is fast, complex and in the opposite direction. However, this inspection technique is costly because it involves both the submerged vehicle and surface vessel. Figure 15 shows an AUV employed as a towed vehicle for underwater observations in the Tokyo Bay port area (16).

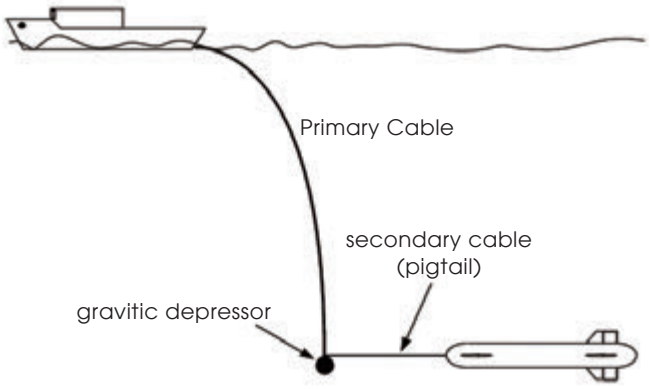

Figure 14: Two-part towing arrangement [15]

Figure 15: AUV that was used as a towed vehicle [16]

CONCLUSION

We have discussed the general overview of inspection levels and UUV platforms used in inspection operations. UUV is an important technology for underwater operations. The advancement of the technology is closely related to the triggered event for the system improvement and development.

The Underwater, Control & Robotic Group (UCRG), Universiti Sains Malaysia (USM), is exploring the realisation of the underwater inspection system using both AUV and ROV platforms.

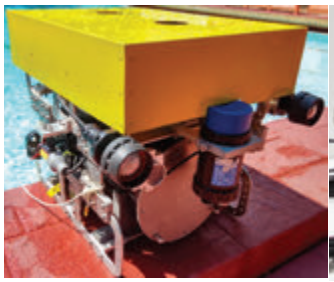

Figure 16. AUV developed by UCRG

Figure 17: ROV developed by UCRG

First, an AUV will visually inspect the entire surface of the underwater structure to find the location of potential damage for more detailed inspection. Then an ROV will be sent to the selected location for cleaning and detailed inspection. Figure 16 shows a box-shaped AUV and Figure 17 shows an ROV developed by UCRG. These have been developed for underwater pole and submerged ship hull inspection application. ■

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Authors' Biodata

Ir. Prof. Dr Mohd Rizal Arshad, *graduated from the University of Liverpool, in 1994 with a B.Eng. in the field of Medical Electronics and Instrumentation. He received his MSc. in Electronic Control Engineering from the University of Salford, in 1995 and PhD in Electronic Engineering, with specialization in robotic vision system in 1996. He is a Chartered Engineer (C.Eng)and a Fellow of IMarEST. His research projects are mainly in the area of underwater robotic platform development, new sensing device and mechanisms, and intelligent control algorithms.*

Song Yoong Siang, *received the B.E. degree in mechatronic engineering from Universiti Sains Malaysia (USM), Malaysia, in 2013. He is currently a PhD student in School of Electrical and Electronic Engineering, USM. His current research interests include robust control algorithms and unmanned underwater vehicle platform development.*

IEM DIARY OF EVENTS

Title: 2-Day Course on The Fundamental Knowledge for Project Managers

18 -19 December 2017

Organised by: Project Management Technical Division
Time : 9.00 a.m. - 5.30 p.m.
CPD/PDP : 14.5

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Behaviour Influencers

by Ir. Shum Keng Yan

Ir. Shum Keng Yan is a chemical engineer and a certified accident prevention and safety practitioner.

Let us revisit the ABCs from the last 2 articles. In order that a desired Behaviour is reinforced, there are 3 factors to consider in the **Consequences**.

1. Significance: Positive (+) or Negative (-)
If a person perceives an act to be positive feeling, the person will repeat it. The reverse is true. Consideration need to be made on the magnitude of the perception.

2. Timing: Immediate (+) / Later (-)
If the impact is Negative and Immediate, the person will not be inclined to carry out the act.

3. Consistency: Certain (+) / Maybe (-)
If the impact is Negative, Immediate and Certain, the person will definitely NOT carry out the act.

On the strongest end of the line are behaviours which are Positive: Immediate: Certain (+++) and Negative: Immediate: Certain (-++). Behaviours with such traits will be easily reinforced.

On the weakest end are behaviours which are Positive: Later: Maybe (+ - -) or Negative: Later: Maybe (- - -) types. There is really no drive to reinforce behaviours at this end.

Thus "Timing" and "Consistency" are essential to drive behavioural change. We will explore the above in our previous Urgent Repair case study in the next article.

Have you ever been told that you have done something wrong months later? Share with me at: pub@iem.org.my. ■

If you see something, say something and do something. Just something I observed.

IEM DIARY OF EVENTS

Title: 1-Day Workshop on Competency Talent Management

11 January 2018

Organised by: Women Engineers Section
Time : 9.00 a.m. - 5.30 p.m.
CPD/PDP : 7

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MARINE ENGINEERING AND NAVAL ARCHITECTURE TECHNICAL DIVISION

reported by

Rear Admiral Dato' Pahlawan Ir. Hj. Jasan Ahpandi bin Sulaiman (Rtd)

IEM organised a technical talk on Outstanding Students' Works in Marine & Offshore Engineering in collaboration with Malaysia Joint Branch RINA-IMarEST.

The principal speakers were Captain Ir. Franklin J. Joseph from RMN and Ir. Khor Yee Shin (Albert). There were 14 participants from IEM and Malaysia Joint Branch RINA-IMarEST at the talk on 9 August, 2017, held in TUS and C&S Lecture Room, Wisma IEM.

Opening speech by Captain Ir. Franklin J. Joseph (RMN)

The objective was to share information on winning Thesis Presentations by undergraduates in marine-related courses from Universiti Teknologi Malaysia, Universiti Pertahanan Nasional Malaysia and Universiti Kuala Lumpur.

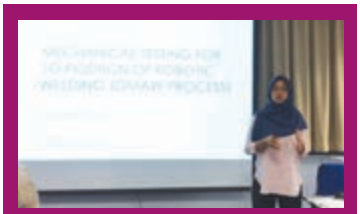
Cik Nur Masitoh Islamiah binti Mustaffa Kamal from Universiti Teknologi Malaysia (UTM) won for her project titled Construction & Testing of Slam Shock Absorber for Small High-Speed Crafts. Based on tests carried out on scale-models of 25m and 7m boats, the shock absorber would significantly reduce the shock for personnel on board such crafts. Cik Nur planned to further pursue the project by testing the models at Towing Test Facilities with wave-generating facilities.

Cik Nur Masitoh Islamiah presenting her project

Cik Nur Nelizza binti Abdul Manaf's project was Emergency Surface Marker Buoy Prototype for Adrift Divers. The certified diver from Universiti Pertahanan Nasional Malaysia (UPNM), found that existing equipment in the market did not function satisfactorily, especially when currents were swift. The existing marker buoys were also too cumbersome to operate, especially for divers facing difficulties. Using components available in the market, her project prototype proved to be more functional. The most significant improvement was the use of carbon dioxide canisters to inflate the buoy instead of the diver's mouth-piece and the use of conical-shaped buoys instead of cylindrical buoys.

Cik Nur Nelizza explaining her project details

Cik Nabila Attiqa binti Abdul Ghani was the winner from Universiti Kuala Lumpur – Malaysian Institute of Marine Engineering Technology (UniKL MIMET). Her project, Mechanical Testing for 1G Robotic Welding of GMAW Process, was on the testing of mild steel plates welded by robots. The currents were varied from 110 amperes to 170 amperes with increments of 10 amps between each specimen. It was found that the weldment with 110 amps was significantly better in terms of hardness and higher tensile strength than the base plates.



Cik Nabila Attiqa presenting her project

The talk offered an insight into research activities carried by universities on marine-related studies. It is hoped that such activities will continue to be carried out and that all universities with marine-related courses will be invited to participate. ■

Dato' Pahlawan Ir. Hj. Jasan Ahpandi bin Sulaiman (Rtd) presenting a token of appreciation to Ir. Khor Yee Shin (Albert).

IEM – ICE Joint Conference on "Future Engineers 2017 Malaysia - Inspiring the Workforce of Tomorrow"

STANDING COMMITTEE ON ACTIVITIES

reported by

Ir. Dr Ooi Teik Aun

On 14 January, 2011, the Institution of Civil Engineers (ICE) held the first Asia Pacific Conference on Infrastructure Development in a Tropical Environment in Petaling Jaya, with over 200 participants. Managed by IEM Training Centre Sdn. Bhd., its success gave ICE the confidence to host a joint conference with IEM this year.

Thus, on 26 October, 2017, two events were held: ICE-IEM Joint Conference on "Future Engineers - Inspiring the Workforce of Tomorrow" and the ICE Presidential lecture-cum-dinner.

This time, IEM Academy Sdn. Bhd. managed both events and was strongly supported by the construction industry and ICE Student Chapters from five universities in Kuala Lumpur. There were 220 participants for the conference and more than 460 people attended the conference dinner.

The conference provided a comprehensive look at the skills, technologies, projects and organisations which will shape the global engineering profession and workforce of tomorrow and which will guide and inspire our fledgling workforce, connecting a diverse group of talent with the career possibilities and opportunities they need to become industry leaders. The partnership between ICE and IEM will

Prof. Broyd presenting IEM President Ir. Dr Tan Yean Chin with the FICE Certificate

Conference participants with ICE President and IEM President

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ICE has had a Country Representative from Malaysia since the 1960s and current CR is Ir. Dr Tan Yean Guan. There are also five ICE Student Chapters at the following universities: UNITEN, UNMC, UTAR, UM and UCSI.

The conference was the first of its kind, in which ICE and IEM joined forces to set new directions for future engineers in dealing with the digital world. There were eight prominent speakers: ICE President Professor Tim Broyd, Mark Enzer (Chief Technical Officer, Mott MacDonald, representing the UK's major infrastructure client organisations), Simon Vaux (Director Digital Engineering, Transport for NSW), Er. Poh Seng Tiok (Director, Planning & Design, Mass Rapid Transit Corporation, Malaysia), Ir. Dr Tan Chee Fai (Practising Mechanical and Manufacturing Consultant), Brian Higgins JP (Business Development Manager, EMEA UK), Dr Khor Cheng Seong (Associate Professor, Xiamen University Malaysia, specialising in mathematical modelling, analytics and optimisation) and Ir. Dr Leong Wai Yie (CEO, SmartBrain Sdn. Bhd., specialising in big data analysis, medical signal processing and telecommunications).

The conference covered ICE-Led Project 13, The Future of Industry: Developing a Strategy for Smart Infrastructure Transformation, Transport for NSW Digital Engineering Strategy, Advances in Engineering Technology and Application in KVMRT Line 2, Emerging Technology and The Need for "Forever Learning", Security Skills and the Need to Build Resilience to Cyber Threats, Incorporating the Systems Approach in Engineering Education Using Modelling and Simulation and Developing the Pie for Industry 4.0.

IEM President Ir. Dr Tan Yean Chin officiated at the opening of the conference and delivered a welcome address. Prof. Broyd also conferred the ICE Fellow (FICE) on Ir. Dr Tan for his contributions and achievements in Civil Engineering.

In conjunction with the conference, a dinner was held in honour of Prof. Tim Broyd who delivered his Presidential Lecture and conferred FICE on four people, including Dato' Sani Abdullah and Er. Poh Seng Tiok. He also presented mementos and certificates of appreciation to the main sponsors, Past ICE Country Representatives for Malaysia, Ir. Dr Ting Wen Hui and Ir. Dr Ooi Teik Aun and UTAR President Dato' Prof. Ir. Chuah Hean Teik, UNITEN Vice Chancellor Dato' Prof. Ir. Dr Kamal Nasharuddin as well as advisors of the ICE Student Chapters. ■

CONGRATULATIONS

Congratulations to

Vice President, Ir. Prof. Dr Norlida binti Buniyamin

for being awarded

Pingat Perkhidmatan Cemerlang (PPC), by the

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on 30 October 2017.

Challenges on Mobility of Engineers in ASEAN and Beyond

ASEAN ENGINEERS REGISTER (AER)

reported by

Ir. Ellias bin Saidin

At the invitation of Pertubuhan Ukur, Jurutera dan Akitek (PUJA) Engineering Division, Brunei Darussalam, Ir. Ellias bin Saidin, the Head Commissioner of ASEAN Engineers Register (AER), flew to Brunei on 20 May, 2017, to give a talk on "The Challenges on the Mobility of Engineers in ASEAN and Beyond".

The talk was one of three held during the morning session at the Ministry of Development Training Centre in Bandar Seri Begawan; the other two talks were on "Challenges in Construction of the Ulu Tutong Dam" and "Sustainable Construction: Use of Bamboo".

Officiating at the opening in the morning was Dr Dayang Nor Imtihan binti Hj. Abdul Razak, Permanent Secretary (Technical and Professional), Ministry of Development Brunei. Over 60 people, including architects and surveyors as well as PUJA members comprising engineers, architects and surveyors, attended.

In his presentation, Ir. Ellias provided some background on the formation of ASEAN Federation of Engineering Organisations (AFEO) and the AER. He also shared information on the potential for business among ASEAN member nations which have a combined population of 600 million people, the 3rd largest population grouping in the world, after China and India.

Then he spoke on current international accords and agreements on the accreditation and competency, describing some of the commonality and differences between the requirements and prerequisites of the groupings.

In the standardisation of competency, which will lead to the mobility of engineers across international borders, the major organisations leading the way are:

1. The International Engineering Alliance (IEA)
2. The European Federation of National Engineering Associations (FEANI).

Within ASEAN, the engineering regulatory bodies of member countries are not common in the membership of the accords described above. This mobility within the context of the "Asean Mutual Recognition Arrangement On Engineering Services", signed in Kuala Lumpur on 9 December, 2005, may pose some challenges due to the accreditation within the accords issue.

At a meeting in Manila on 23 November, 1998, the AFEO Governing Board agreed to the formation of the ASEAN Engineers Register (AER) with the AER Secretariat set up on 3 September, 2002. Its objectives were to promote the recognition of ASEAN engineering team, to safeguard and promote the professional interest of engineers, engineering technologists and technicians, to promote cultural and professional links among members of the engineering profession within ASEAN, to enhance the wealth of ASEAN countries, to provide sufficient data regarding individual engineers, engineering technologists and technicians for the benefit of prospective employers and to encourage a continuous updating of the quality of engineers, engineering technologists and technicians by setting, monitoring and reviewing standards.

The event started with the reception committee at the airport, followed by a sumptuous dinner at the airport mall with a group of PUJA engineers led by Dyg Alice Lim SK.

Finally, members and the committee of PUJA hosted a farewell lunch at the airport lounge restaurant, with VIP Dr Dayang Nor Imtihan in attendance. ■

Ir. Ellias bin Saidin conducting the talk

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Insight Into the World of Building Information Modelling (BIM)

URBAN ENGINEERING DEVELOPMENT SPECIAL INTEREST GROUP

reported by

Ir. Ng Sean Lok

In the quest to meet deadlines, construction projects are often beset with challenges such as unreliable schedules and cost, poor quality, planning errors or inaccurate/ incomplete drawings and the lack of cooperation from the various stakeholders.

Effective communication is the key to meeting deadlines. The future of the construction industry is digital and built on a holistic approach that connects all stakeholders. Today, a sustainable framework in a project must be supported by a robust digitalisation plan such as Building Information Modelling (BIM) which can no longer be viewed just as a nice feature for glorification only.

To introduce BIM to IEM members, the Urban Engineering Development Special Interest Group (UEDSIG) and Civil & Structural Engineering Technical Division (CSETD) jointly organised a talk on 7 September, 2017. The speakers were Ir. Sharifah Azlina Raja Kamal Pasmah (Chief Operating Officer of HSS Engineering Sdn. Bhd. and Chief Executive Officer of BIM Global Ventures Sdn. Bhd.) and Puan Norimah Othman (Manager of BIM Global Ventures Sdn. Bhd).

The talk started with a definition of the BIM process in the lifecycle of a construction project, from its inception and design to the demolition or de-construction of the asset. The benefits highlighted included its role as the key driver for building sustainability and for supporting green initiatives.

From left: Ir. Dr Ng Soon Ching, Ir. Ng Sean Lok, Ir. Sharifah Azlina Raja Kamal Pasmah, Dr Wang Hong Kok and Puan Norimah Othman

The talk also defined the levels of BIM sophistication (Levels 0 to 3), the various BIM dimensions (3D, 4D, 5D, etc.), clash detection & resolution processes and simulation capability.

Also discussed were BIM applications such as space management, asset information management, facility management and tracking asset performance throughout its lifecycle – all in the domain of a built environment. Ir. Sharifah Azlina then touched on the scepticism that came with the idea of transitioning information from AutoCAD to BIM. She pointed out that, uncertainty aside, as with any change from 2D to 3D AutoCad and from there to BIM, a user would run into some challenges along the way, but knowing the difficulties ahead would help one learn from mistakes.

In the long run, a user will be glad to have made the move. A fundamental part of BIM is the ability to check and ensure appropriate specifications are built in accordance with the contractual, code and standard requirements. It also links up reference bid and design documents to construction for verification purposes and a competitive bid can be provided if BIM is adopted as a project delivery tool.

Drawing on her experiences in Cyberjaya Hospital and Banyan Tree Condominium projects, Puan Norimah Othman discussed BIM's curvature capability in avoiding clashes and providing constructability checks. She said the development and implementation of a robust BIM is not quite as straightforward, because it requires an understanding of the entire design and construction processes. However, more effort must be made to raise the awareness and benefits of BIM because it ensures construction budget is spent in the most efficient way. All in all, the additional effort on BIM ensures the design and construction processes will produce a fit-for-purpose project, meeting the client's intended objectives.

Judging from the enthusiastic questions raised from the floor at the end of the presentation, the talk was a huge success. ■

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One-Day Seminar: High Speed Railway – Educate Ourselves on Rail Engineering

ENGINEERING EDUCATION TECHNICAL DIVISION

reported by

Ir. Prof. Dr Vinesh Thiruchelvam

A high-speed rail link between Kuala Lumpur and Singapore was first proposed in the late 1990s but, due to high costs, the proposal was shelved. But the plan was not forgotten and recently, it was announced that the KL-Singapore High Speed Rail (HSR) project would be revived..

At a meeting in Singapore on 19 February, 2013, between the Republic's Prime Minister Lee Hsien Loong and Malaysia's Prime Minister Najib Razak, the two countries officially agreed to build a high-speed rail link between KL and Singapore by 2020.

It would be a top strategic infrastructure project for which planning began in 2010 with completion scheduled for 2026; it would entail a rail network length of 350km and trains would be capable of speeds of up to 320km per hour.

The need to educate ourselves on the expansive field of Rail Engineering became very apparent with the evolution that the HSR project will bring to land transportation.

In line with this, the Engineering Education Technical Division of IEM (E2TD), in collaboration with the Institution of Mechanical Engineers Malaysia Branch (IMechE) and Engineers Australia Malaysia Chapter (EAMC), organised a CPD talk series titled "High Speed Railway – Educate Ourselves on Rail Engineering" on 5 October, 2017, at Wisma IEM. The 88 participants came from various backgrounds but they had one common objective – to get an insight into rail engineering and its common practices.

The talk was chaired by Professor Dr Ir. Vinesh Thiruchelvam, the advisor to E2TD. The first two speakers, Ms. Winnie Wong and Mr. Stephane Mortier, were from MyHSR Corp. Sdn. Bhd. which had been entrusted with delivering the KL-Singapore HSR project through to completion. They were very detailed in their introduction of the project background, the structure of the project, the chronology of events that led to signing of the bilateral agreement in 2016 and the progress of the project so far. The discussions on the challenges and work opportunities attracted so much interest from the participants that the emcee had a tough time drawing the session to a close for the lunch break.

In the afternoon, the seminar continued with Mr. Thomas Baake (E-MAS Sdn. Bhd.) and Ir. Dr Alvin Yap (Asia Pacific University) who spoke on the Railway Maintenance System of the KLIA Express (ERL Maintenance). The session by Mr. Baake was very technical and touched on details of rail maintenance that would only be known to rail engineers in the company. Ir. Dr Alvin spoke about a project to harvest energy from the wind induced by a moving train. This is in line with efforts by the Malaysian government to enhance the capability for innovation in the development of green technology and to promote sustainability in business practices under the National Green Technology Policy. The project is a collaboration between Asia Pacific University (APU) and E-MAS Sdn. Bhd.

The general public may have some knowledge of the MRT system and even travelled aboard the train coaches. Ir. Leo Mak Sek Man (Director of Systems, MMC-Gamuda) talked about the similarities and differences between the MRT and high speed rail systems. He discussed planning, design, technical challenges, infrastructure requirements, testing, commissioning and passenger service operations. All these gave participants the opportunity to grasp the full range of railway technologies, from monorail to high speed rail.

For the final session, Mr. Thomas Dorfner (VP Asia Pacific, Getzner) gave a technical brief on vibration isolation for railway systems using technologically advanced elastomers. The importance of elasticity in railway superstructures may not have been immediately apparent to those without rail background but as Mr. Dorfner discussed the various case studies in depth, it was clear that without elasticity, it would be impossible to guarantee the safety of a locomotive travelling at any speed, what more at speeds exceeding 350km per hour.

The seminar was planned as an interactive, Q&A session to allow participants to seek clarification or information directly from the speakers. The session ended at 4.30 p.m. but many participants continued to have private discussions with the speakers during tea time. It was very evident that the objective of the seminar had been achieved. ■

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Exploration of Upper Sungai Rejang

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.*

Even before the break of dawn, the jetty in Sibu was as busy as a hive of bees. My wife and I joined the queue in front of the ticket counter but were sorely disappointed when told that tickets for the 5.45 ferry for Kapit was sold out; we would have to settle for the second departure at 6.15.

The previous afternoon, an officer of the ferry company had told me that, with the continued lowering of the water level upstream because of the dry spell, the 10.30 ferry this morning from Kapit to Belaga would be the last until the rains came again. As we had to get to Belaga to continue our journey from there, our original plan to stay a night in Kapit could not be followed, so a departure that's half an hour earlier would have given me a little more time to take in the sights of Kapit.

Sg. Rejang is the longest river in Malaysia. Originating from the mountains at the Kalimantan border, it flows 700km across Sarawak to the South China Sea at Sibu. There are many settlements on both sides of the river and the fuselage-like ferries are the only means of transport for most of the people living there.

Our ferry departed on time. The river was calm. Longhouses appeared on the river banks every now and then. There were also individual houses and heaps of timber logs waiting to be shipped away, a clear indication of the once rampant logging activities in Sarawak. The ferry made a number of stops to unload passengers and pick up new ones, as well as to deliver goods. Exactly 3 hours later, the ferry finally docked at the jetty in Kapit, 126km upstream of Sibu.

After buying our tickets for Belaga and settling my wife and our luggage aboard the waiting ferry, I made a dash for the main attraction in Kapit – Fort Sylvia. Luckily this all-timber building is just a short walking distance from the jetty.

Built by Charles Brooke, the second White Rajah of Sarawak in 1880, the fort is rather small and unimpressive by today's standards. Yet it witnessed an important chapter in the history of Sarawak. A memorial in front of the building records that on 16 November, 1924, a ceremony was held in front of the fort in which the headmen of the Kayan, Kenyah, Kajang and Sea Dayak tribes living along several rivers, swore that they would henceforth lay down their blowpipes and knives and stop the practice of head-hunting, or they would die like the pig which was slaughtered as part of the ceremony. This was witnessed by the White Rajah, senior army officers of the Dutch East Indies and other high government officials.

The ferry departed at 10.30 as scheduled. With many stops to make and rapids along the way, it took almost 6 hours to cover the distance of 155km to Belaga. This small town is the furthest upriver along Sg. Rejang that one can reach by regular ferry service.

I first visited Belaga in September 2004 as a participant in IEM's technical visit to Bakun Hydroelectric Dam, then under construction some 60km further upstream on Sg. Balui, one of Sg. Rejang's tributaries.

From Belaga, we would be proceeding to Bintulu by road to continue our exploration of Sarawak. ■

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56548	LAU WENG KIT	BE HONS (UTHM) (CIVIL, 2008)
26625	MOHD FARIZ BIN MANSORUDIN	BE HONS (UiTM) (CIVIL, 2006)
70443	MOHD IDZUAN MAULA ABD RAHMAN	BE HONS (UTM) (CIVIL, 2012)
72180	MOHD KHALIL BIN OTHMAN	BE HONS (UTHM) (CIVIL, 2006)
93907	MUHAMMAD NASHRIQ FARHAN BIN SUPANDI	BE HONS (UTM) (CIVIL, 2007)
33188	NUR HIZARUDDIN BIN CHE AJID	BE HONS (UiTM) (CIVIL, 2010)
24068	ONG TEIK JIN	BE HONS (UM) (CIVIL, 2006)
47844	OOI LER XUEN	BE HONS (USM) (CIVIL, 2012)
30529	PARNAM SINGH A/L MEHAR SINGH	BE HONS (BIRLA INSTITUTE OF TECHNOLOGY SCIENCE) (CIVIL, 1985) MSc (BELFAST) (CIVIL, 1989)
28942	RAFIEE BIN ABDUL RAZAK	BE HONS (UPM) (CIVIL, 2007)
74452	RINI ASNIDA BINTI ABDULLAH	BE HONS (UTM) (CIVIL, 2001) ME (UTM) (CIVIL-GEOTECHNICAL, 2006) PhD (LEEDS) (2012)
25683	SAKINAH BINTI NOORDIN	BE HONS (UKM) (CIVIL & ENVIROMENTAL, 2002) MSc (UiTM) (WATER RESOURCES, 2009)
78896	SHAHRUL NIZA BIN MOKHATAR	BE HONS (UTHM) (CIVIL, 2006) ME (UTM) (CIVIL-STRUCTURE, 2009) PhD (KYUSHU) (2013)
24194	SIM LEE GAIK	BE HONS (UTHM) (CIVIL, 2002) ME (UTM) (CIVIL - ENVIRONMENTAL MANAGEMENT, 2006)
32116	SOH TEK PENG	BE HONS (USM) (CIVIL, 2011)
22161	SUHAILI BINTI HJ SUBOH	BE HONS (UPM) (CIVIL, 2004) ME (UPM) (HIGHWAY & TRANSPORT, 2011)
70444	SYAZANA BINTI RAMLI	BE HONS (UTM) (CIVIL, 2012)
78982	TAN CHAR AI	BE HONS (UTP) (CIVIL, 2005)
52306	WAN MUHAMMAD FAISYAL BIN MOHD NOOR	BE HONS (UiTM) (CIVIL, 2011)
57611	LIEW CHIT WAI	BE HONS (UTM) (CIVIL, 2013)
51825	LIM JUIN KHYE	BE HONS (UTHM) (CIVIL, 2013)
23886	PALANISAMY THANJAGOUNDAN	BE HONS (UTM) (CONSTRUCTION MANAGEMENT, 2001)
KEJURUTERAAN ELEKTRIKAL		
48783	AAIZUDDIN-HUSSAINI BIN NOH	BE HONS (UTHM) (ELECTRICAL, 2013)
80547	AMIR ANWAR BIN SHABUDIN	BE HONS (UNITEN) (ELECTRICAL POWER, 2012)
70627	FARID SHAZWAN BIN MOHD JAFFAR	BE HONS (UiTM) (ELECTRICAL, 2011)
37270	IDERIS BIN HADZIR	BE HONS (UTM) (ELECTRICAL, 2004)
49546	LIEW TECK POH	BE HONS (UTAR) (ELECTRICAL & ELECTRONIC, 2011)
28973	LING TEIK WIN	BE HONS (UTM) (ELECTRICAL-MECHATRONICS, 2006)
38598	MARCUS CHEU TECK SEN	BE HONS (CANTERBURY) (ELECTRICAL & ELECTRONIC, 2008)
86187	MELVIN NISCHOL SINGARAM	BE HONS (WESTERN AUSTRALIA) (ELECTRICAL, 1995)
25369	MOHD AZWAN BIN AHMAD	BE HONS (UiTM) (ELECTRICAL, 2006)
78483	MOHD YUSRI BIN SARDAR ALI	BE HONS (UniMAP) (ELECTRICAL SYSTEM, 2012)
58674	MOHD ZAIM BIN MOHD NAZARI	BE HONS (UTM) (ELECTRICAL-INSTRUMENTATION & CONTROL, 2009)

70385	MUHAMMAD AZFAR BIN MAHAMAD ROHANI	BE HONS (UiTM) (ELECTRICAL, 2013)
64781	NG DIHUI	BE HONS (UNITEN) (ELECTRICAL POWER, 2012)
36946	NISHAL A/L SURESHCHANDRA	BE HONS (UNITEN) (ELECTRICAL, 2010)
75278	NOFRI YENITA BINTI DAHLAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2002) MSc (UMIST) (ELECTRICAL POWER, 2003) PhD (MANCHESTER) (2011)
47544	NORAZLAN BIN JAAFAR	BE HONS (UTM) (ELECTRICAL, 2004)
88768	SARZAMINOR BIN BUKAR	BE HONS (UniMAP) (ELECTRICAL SYSTEM POWER, 2014)
51673	SURIAMURTHY A/L MALAYANDY	BE HONS (UNITEN) (ELECTRICAL & ELECTRONIC, 2008)
54222	TAN KOK HENG	BE HONS (UPM) (ELECTRICAL & ELECTRONICS, 2011)
85922	TAN WEI LUN	BE HONS (UNIMAS) (ELECTRONIC & TELECOMMUNICATION, 2009) CONVERSION (UNITEN) (2016)
85922	TAN WEI LUN	BE HONS (UNIMAS) (ELECTRONIC & TELECOMMUNICATION, 2009)
47609	TEOH BOON KHIM	BE HONS (MALAYA) (ELECTRICAL, 2009)
41817	AHMAD SAFWAN BIN ZULKAFLI	BE HONS (UTeM) (TELECOMMUNICATIONS ELECTRONIC, 2010) CONVERSION (UNITEN) (2014)

KEJURUTERAAN ELEKTRONIK

92362	AHMAD SABIRIN BIN ZOOLFAKAR	BE HONS (UM) (ELECTRICAL, 2001) MSc (LIVERPOOL) (ELECTRONIC SYSTEMS & TELECOMMUNICATIONS, 2003) PhD (RMIT) (2014)
89539	WAN NUR ARINA BINTI WAN MOHD NOR	BE HONS (NEW SOUTH WALES) (ELECTRICAL & ELECTRONIC, 2014)

KEJURUTERAAN MEKANIKAL

94299	AHMAD BIN DAENG	BE HONS (UTM) (MECHANICAL-MANUFACTURING, 2004)
38076	CHEN KIN SEONG	BE HONS (UTHM) (MANUFACTURING & PRODUCTION, 2007)
45320	JOHNNY BOK CHOON WENG	BE HONS (UNIMAS) (MECHANICAL, 2010)
30999	KHOR JO ANNE	BE HONS (UNIMAS) (MECHANICAL & MANUFACTURING, 2010)
24483	MAZLAN BIN A MAJID	BE HONS (UTM) (MECHANICAL, 2002)
34295	MD SYAHRIZAL IZWAN BIN MD. YUSOFF	BE HONS (IIUM) (MECHANICAL, 2006)
57535	MOHD HAFIZ BIN MOSLIM	BE HONS (UTM) (MECHANICAL, 2008)
35851	SHAHIFUDDIN BIN KHAMIS @ ABD HAMID	BE HONS (UTM) (MECHANICAL-MARINE TECHNOLOGY, 2011)
59869	SYAMSUL ARIFFIN BIN KAMARUDIN	BE HONS (UiTM) (MECHANICAL, 2008)
37072	TAN KIAN KOK	BE HONS (MALAYA) (MECHANICAL, 2007)
37605	TAN ZAO QI	BE HONS (MALAYA) (MECHANICAL, 2010)
23235	KUEH MING CHEE	BSc (MISSOURI) (MECHANICAL, 1998)
87072	YUPITER HARANGAN PRASADA MANURUNG	BE HONS (GERMANY) (MECHANICAL, 1998) MSc (OTTO-VON, GERMANY) (PROCESS & SYSTEMS, 1999) PhD (OTTO-VON, GERMANY) (2005)

KEJURUTERAAN KIMIA

43818	LIM FONG NEE	BE HONS (MALAYA) (CHEMICAL, 2008)

KEJURUTERAAN STRUKTUR

78982	TAN CHAR AI	BE HONS (UTP) (CIVIL, 2005)

KEJURUTERAAN PENGANGKUTAN

46756	SANDRA WONG CHANG YAU	BE HONS (UNITEN) (CIVIL, 2005)

PERMOHONAN BARU/PEMINDAHAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
46756	SANDRA WONG CHANG YAU	BE HONS (UNITEN) (CIVIL, 2005)
KEJURUTERAAN PEMBUATAN		
66402	MOHAMMAD YEAKUB ALI	BSc (DHAKA) (MECHANICAL, 1992) ME (ASIAN INS. OF TECH.) (MANUFACTURING SYSTEMS, 1997) PhD (NANYANG) (2002)
KEJURUTERAAN MEKANIKAL		
80199	TAN YONG CHAI	BE HONS (PORTSMOUTH) (MECHANICAL, 2000)
KEJURUTERAAN ELEKTRIKAL		
FADLI HAFIZ BIN AHMAD RUSDI		BE HONS (UniMAP) (ELECTRICAL SYSTEM, 2007) ME (UTM) (ELECTRICAL-POWER, 2015)

IMPORTANT TIMELINES FOR FULL SWITCH-OVER TO ENHANCED PI

New applications for Conventional PI must reach IEM Secretariat by 12.00 noon on 30 December 2017

New Application for Conventional PI – not acceptable from 1 January 2018

1 July 2018 – Full Switch-over to Enhanced PI

Re-sit Candidates under Conventional PI – no longer accepted by IEM from 31 December 2019

PERMOHONAN BARU / PEMINDAHAN AHLI

Persidangan Majlis IEM yang ke-**409** pada **16 Oktober 2017** telah meluluskan sebanyak **1997** 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
Aeroangkasa			1		1				1	3
Pertanian			1		2					3
Bioperubatan					2				5	7
Bangunan							1			1
Kimia			6	2	46				111	165
Awam	2		59	7	119				319	506
Komunikasi					2					2
Komputer					1				1	2
Komputer & Komunikasi					1					1
Pembinaan			1							1
Elektrikal	1		67	1	69	4		1	218	361
Elektronik			21	5	32	2			310	370
Tenaga						1				1
Alam Sekitar				1	6				4	11
Lebuhraya			1							1
Teknologi Maklumat						1				1
Kawalan & Instrumentasi			1						1	2
Pembuatan			2		3				2	7
Marin								1		1
Bahan			3		3					6
Mekanikal	1		33	7	95	2			365	503
Mekatronik			1		9	5			3	18
Sumber Mineral			1		1					2
Petroleum			1		4					5
Polimer					1					1
Struktur			3						1	4
Telekomunikasi			4		2					6
Sumber Air			1							1
Pengangkutan			3							3
Sistem Mekanikal					1					1
JUMLAH	**4**		**210**	**23**	**400**	**15**	**1**	**2**	**1342**	**1997**

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

Ir. Yap Soon Hoe

Setiausaha Kehormat, Institusi Jurutera Malaysia, Sesi 2017/2018

PERMINDAHAN AHLI KEPADA AHLI FELLOW

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
3375	LIEW MUN HON	BE HONS (MELBOURNE) (CIVIL, 1998) ME (RMIT) (ENGINEERING MGMT, 2000) PHD (AMERICAN UNI OF HAWAII) (2003)
20681	ONG EK LEONG, DOMINIC	BE HONS (WESTERN AUST) (CIVIL, 1999) PHD (NUS) (2005)
KEJURUTERAAN ELEKTRIKAL		
16395	LIM PAY CHUAN, PAUL	BSC (MISSISSIPPI) (ELECTRICAL, 1993)
KEJURUTERAAN MEKANIKAL		
19410	MOHAMMAD SHAHRIL BIN OSMAN	BE HONS (LOUGHBOROUGH) (MECHANICAL, 1998) PHD (LOUGHBOROUGH) (MECHANICAL & MANUFACTURING, 2002)

PERMINDAHAN AHLI KEPADA AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AEROANGKASA		
61935	NORILMI AMILIA BT ISMAIL	BE HONS (USM) (AEROANGKASA, 2004)
KEJURUTERAAN AWAM		
38571	ATIQAH BINTI ZAINAL	BE HONS (UTM) (CIVIL, 2011)
86588	BEH CHAI TERNG *	BE HONS (NTU) (CIVIL, 2007)
47953	CHEONG WEI HAO	BE HONS (UTAR) (CIVIL, 2011)
42490	FONG KIM SUN	BE HONS (UTM) (CIVIL, 2000)
57074	GOO KENG JIN	BE HONS (UKM) (CIVIL & ENVIRONMENTAL, 2005)
58631	HOW WIL MIN	BE HONS (MONASH) (CIVIL, 2007)
17232	HUSSAIN BIN OMAR	BE HONS (UTM) (CIVIL, 1990)
44609	KIEW KEOK KHING	BE HONS (UKM) (CIVIL & ENVIRONMENTAL, 2006)
84927	LEONG WEN KAM	BE HONS (UNITEN) (CIVIL, 2006) MSC (NANYANG TECHNOLOGICAL) (CIVIL, 2008)
25436	LIM CHIN SHIN	BE HONS (MALAYA) (CIVIL, 2004)
48868	LIM GEE ZHIONG	BE HONS (UNIMAS) (CIVIL, 2009)
24297	LOUIS HO YENG GEE	BE HONS (UKM) (CIVIL & STRUCTURAL, 2005) ME (UPM) (STRUCTURAL & CONSTRUCTIONS, 2013)
52526	MOHD FAIZ BIN MOHAMMAD ZAKI	BE HONS (UTM) (CIVIL, 2010) ME (UTM) (CIVIL-GEOTECHNICS, 2012)
52479	MOHD MUHIDIN BIN FAHARUDDIN	BSC (CALIFORNIA) (CIVIL, 1989)
49222	NG WEI CHONG	BE HONS (MALAYA) (CIVIL, 2008)
89629	NORDIANA AYU BINTI ABU ZARIN *	BE HONS (USM) (CIVIL, 2002)
49983	ROSANNAH BOLHASSAN	ME HONS (IMPERIAL COLLEGE LONDON) (CIVIL, 2010)
16134	SAZALI BIN HARUN	BSC (WISCONSIN-MILWAUKEE) (CIVIL, 1988)
42643	SHARIL AMRAN BIN AMIR MOHAMED	BE HONS (UTM) (CIVIL, 2010)
18712	STALE ANAK BURI	BSC HONS (WALES SWANSEA) (CIVIL, 1980)
81312	TAN CHYI FUH	ME BE (LEEDS) (CIVIL & STRUCTURAL, 2012)
32076	TAN KAI HONG	BE HONS (USM) (CIVIL, 2011)
28284	TEH CHEU MENG *	BE HONS (USM) (CIVIL, 2009)
43181	TING EE CHUEN	BE HONS (UNITEN) (CIVIL, 2006)
44508	ZAKIAH BINTI RAZAK	BE HONS (UITM) (CIVIL, 2011)
KEJURUTERAAN BAHAN		
61150	CHOO JERN YUE, EDWIN	BE (IMPERIAL COLLEGE LONDON) (MATERIALS SCIENCE & ENGINEERING, 2004)
40703	FAROUQ BIN AHMAT	BE HONS (IIUM) (MATERIAL, 2012)
KEJURUTERAAN ELEKTRIKAL		
88292	AZMIR BIN MOHD YUSOFF	BE HONS (UTEM) (CONTROL, INSTRUMENTATION & AUTOMATION, 2007)
48855	AZREENA BINTI SAADIN	BE HONS (UITM) (ELECTRICAL, 2002)
38602	BALBIR SHAH @ MOHD FADDULLAH	BE HONS (UITM) (ELECTRICAL, 2008) CONVERSION (UNITEN) (2013)

50696	CARLOS JUNG YAN	BE HONS (MULTIMEDIA) (ELECTRONICS, 2008)
51309	CHAN JIUNN YEEP	BE HONS (MALAYA) (ELECTRICAL, 2009) ME (MALAYA) (POWER SYSTEM, 2013)
61147	CHENG WENG SIONG	BE HONS (MONASH) (ELECTRICAL & COMPUTER SYSTEMS, 2008)
42514	DEVENDRA KUMAR KALIAPPAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2008)
80727	KONG SHYANG YAU	BE HONS (UNITEN) (ELECTRICAL POWER, 2006)
58655	LEONG TZIN SIANG	BE HONS (MONASH) (ELECTRICAL & COMPUTER SYSTEMS, 2010)
34101	MD AZWAN BIN MD YASIN	BE HONS (UITM) (ELECTRICAL, 2010)
38329	MD HAJUPERI BIN MD ALI	BE HONS (USM) (ELECTRICAL, 2006)
78422	MOHD ALFITRI BIN ZAILAN	BE HONS (UNIMAP) (ELECTRICAL SYSTEMS, 2010)
70265	MOHD FAIRUS KHAFIZ BIN KHALID	BE HONS (UKM) (ELECTRICAL & ELECTRONIC, 2006)
41113	MOHD FIRDAUS BIN JALALUDDIN	BE HONS (UNITEN) (ELECTRICAL POWER, 2009)
51249	MOHD LUQMANUL HAKIM BIN YAHYA	BE HONS (UTM) (ELECTRICAL, 2009)
79028	MUHAMMAD SAUFI BIN KAMARUDIN	BE HONS (UTM) (ELECTRICAL, 2003) ME (UTM) (ELECTRICAL-POWER, 2005)
32735	NASYRAH BINTI YAACOB	BE HONS (UTM) (ELECTRICAL-ELECTRONICS, 2009)
81489	OTHMAN BIN MOHINDO	BE HONS (UPM) (ELECTRICAL & ELECTRONICS, 2003)
40197	PARVEEN KAUR MALHI A/P HARJEET SINGH	BE HONS (UTM) (ELECTRICAL, 2012)
29822	RAHIMI BIN BAHAROM	BE HONS (UITM) (ELECTRICAL, 2003) MSC (UITM) (ELECTRICAL, 2009)
51699	SUDALLI BIN SABTUAHIM	BE HONS (UMS) (ELECTRICAL & ELECTRONIC, 2009)
19391	TAN HANG KIAK	BSC (MISSISSIPPI STATE) (ELECTRICAL, 1997)
72639	TAN YU QUAN *	BE HON (RMIT) (ELECTRICAL, 2011)
26428	TUNKU MUHAMMAD NIZAR BIN TUNKU MANSUR	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2003) MESC (CURTIN) (2009)
36195	VOON YANN PENG	BE HONS (UTM) (ELECTRICAL, 2012)

KEJURUTERAAN ELEKTRONIK

45796	ABD. KADIR BIN MAHAMAD	BSC (UTM) (ELECTRICAL, 2002)
54210	GO YUN II	BE HONS (UTM) (ELECTRICAL-TELECOMMUNICATIONS, 2002) MSC (UPM) (COMMUNICATIONS & NETWORK, 2005) PHD (MALAYA) (2014)
75279	HABIBAH BINTI HASHIM	BSC (NOTTINGHAM) (ELECTRICAL, 1983) MSC (CNAA-TEESSIDE) (COMPUTER-AIDED, 1986) PHD (UNITEN) (INFORMATION & COMMUNICATION TECHNOLOGY, 2007)
61989	HAZRUL BIN MOHAMED BASRI	DIPL-D'ING (BELFORT-MONTBELIARD) (2008) ME (BELFORT-MONTBELIARD) (2010)
51728	HUZEIN FAHMI BIN HAWARI	BE HONS (USM) (ELECTRICAL & ELECTRONIC, 1999) ME (UTM) (ELECTRICAL-ELECTRONICS & TELECOMMUNICATIONS, 2008) PHD (UNIMAP) (2015)
70424	IRRAIVAN ELAMVAZUTHI*	BE HONS (UTM) (ELECTRONIC, 1989) PHD (SHEFFIELD) (ELECTRONIC, 2002)
64784	MAYA BINTI ABDULLAH MAAMUOM	ME HONS (SOUTHAMPTON) (ELECTRONIC, 2009) MSC (UTM) (BIOMEDICAL, 2016)
90108	MOHD NASIR BIN TAIB	BE (TASMANIA) (ELECTRICAL, 1988) MSC (SHEFFIELD) (1993) PHD (UMIST) (1997)
20377	MOHD RIZAL BIN ARSHAD	BE HONS (LIVERPOOL) (MEDICAL ELECTRONICS & INSTRUMENTATION, 1994) MSC (SALFORD) (ELECTRONIC CONTROL, 1996) PHD (LIVERPOOL) (1999)
79370	NINA KORLINA BINTI MADZHI	BE HONS (UITM) (ELECTRICAL, 1999) PHD (UITM) (2012)
64607	NUR JULIA NAZIM BINTI BULYA NAZIM	BE HONS (UTM) (ELECTRICAL-TELECOMMUNICATIONS, 2003)

KEJURUTERAAN KIMIA

24207	FITROTULHAYAT BINTI RODZI	BE HONS (UKM) (CHEMICAL & PROCESS, 2000) MBA (IIUM) (CONSTRUCTION BUSINESS, 2007)
24787	NGU LOCK HEI	BE HONS (CHEMICAL, 2001)

KEJURUTERAAN MEKANIKAL

38068	AHMAD AZAHARI BIN MOHMMAD	BE HONS (UTM) (MECHANICAL, MARINE TECHNOLOGY, 2007)
49969	AZRUL ASWAD BIN MD ADNAN	BSC (HANYANG) (MECHANICAL, 2007)
54336	BEH JOO LEONG	BE HONS (MULTIMEDIA) (MECHANICAL, 2011)
45800	LOW CHENG YEE	BE HONS (UTM) (MECHANICAL, 2012) MSC (LONDON) (MECHATRONICS, 2004) PHD (PADERBORN) (2009)
25702	MOHD KHAIRULFATIN BIN ZULHAIMI	BE HONS (UTM) (MECHANICAL-MATERIALS, 2008)
81273	MOHD NASIR BIN MOHD ISA	BE HONS (SUNDERLAND) (MECHANICAL, 2012) ME (UPM) (MANUFACTURING SYSTEMS, 2013)
53770	MUHAMMAD FARIZI BIN SAULIUS	BE HONS (UNITEN) (MECHANICAL, 2011)
25463	RAMZANUL AZHIM BIN BORHAN *	BE HONS (MINNESOTA) (MECHANICAL, 2003)
29649	SAMSULHADI BIN MOHAMMAD SHABANI	BE HONS (USM) (MECHANICAL, 1999)
58687	SIVAPRAKASH A/L MUNIANDI	BE HONS (UNITEN) (MECHANICAL, 2004)
28006	YEOH SU HONG	BE HONS (JAMES COOK) (MECHANICAL, 2005)

KEJURUTERAAN PEMBINAAN

64777	YEW BOON KENT	BE HONS (PORTSMOUTH) (CIVIL, 2010)

KEJURUTERAAN PEMBUATAN

26041	ASNUL HADI BIN AHMAD	BE HONS (UTEM) (MANUFACTURING, 2006) ME (UPM) (MANUFACTURING SYSTEMS, 2009)
43839	MOHD FATHULLAH BIN GHAZLI @ GHAZALI	BE HONS (UIA) (MECHANICAL, 2006) MSC (COVENTRY) (2007) PHD (BRUNEL) (2016)

KEJURUTERAAN PERTANIAN

36650	MOHAMAD HAIRIE BIN MASROON	BE HONS (UPM) (BIOLOGICAL & AGRICULTURAL, 2007)

KEJURUTERAAN PETROLEUM

36650	MOHAMAD HAIRIE BIN MASROON	BE HONS (UPM) (BIOLOGICAL & AGRICULTURAL, 2007)

KEJURUTERAAN SUMBER AIR

80784	SITI FATIN BINTI MOHD. RAZALI	BE HONS (UTM) (CIVIL, 2006) PHD (WESTERN AUSTRALIA) (2011)

KEJURUTERAAN SUMBER MINERAL

49585	MOHD HAFIZU BIN MOHD MUSTAPHA	BE HONS (USM) (MINERAL RESOURCES, 2006)

PERMOHONAN MENJADI AHLI KORPORAT

No. Ahli	Nama	

KEJURUTERAAN AWAM

ANDING ANAK UNCHI	BE HONS (UITM) (CIVIL, 1996) MSC (CURTIN) (PROJECT MANAGEMENT, 2013)
AW SER KANG	BE HONS (ADELAIDE) (CIVIL & STRUCTURAL, 2004)
CHUA LEE HWA	BE HONS (UTM) (CIVIL, 2001) ME (UTM) (CIVIL - CIVIL & ENVIRONMENTAL, 2003)
ERNEST LAI HENG WEI	BE HONS (SURREY) (CIVIL, 2003) MSC (SURREY) (2004)
FAIZUL IZUAN BIN SHAIMI	BE HONS (UITM) (CIVIL, 2005)
HANAN BIN ELIAS	BE HONS (MALAYA) (CIVIL, 1984) MBA (OPEN UNIVERSITY) (BUILDING & FACILITY MANEGEMENT, 2015)
LAI LI LING	BE HONS (UTM) (CIVIL, 2007)
LIEW KUET FAH	BE HONS (UTM) (CIVIL, 2002) ME (UTM) (HYDRAULICS & HYDROLOGY, 2006)
MAZMAN BIN MOHAMAD	BE HONS (USM) (CIVIL, 2006) MSC (USM) (ENVIRONMENTAL, 2007)
MEOR ABDUL AZIZ BIN OSMAN	BSC (STRATHCLYDE) (CIVIL, 1982)
MOHAMED IZHAM BIN HAMZAH	BSC (ALBERTA) (CIVIL, 1991)
MOHD SUHAIRI BIN RAMLI	BE HONS (UITM) (CIVIL, 2006)
MUHAMAD SAFWAN BIN PUTEH @ SHAARI	BE HONS (UITM) (CIVIL, 2006)
MUSTAZA BIN ZAWAWI	BE HONS (UTM) (CIVIL, 2000)
NG CHEE HIONG	BE HONS (UMS) (CIVIL, 1999) MSC (UMS) (CIVIL, 2005) PHD (UMS) (2010)
NORAZZLINA BINTI M. SA'DON	BE HONS (UNIMAS) (CIVIL, 2000) MSC (CARDIFF) (CIVIL, 2003) PHD (AUCKLAND) (2010)
ROSILAWATI BTE MAZLAN	BE HONS (UTM) (CIVIL, 2003)
TONG LING SIEW	BE HONS (LIVERPOOL) (CIVIL, 2002) PHD (LIVERPOOL) (2007)
VICTOR LIEW MAJADIL	BE (CITY-LONDON) (CIVIL, 2000)
YUSSAIME BIN AHMAD YUSUF	BE HONS (UITM) (CIVIL, 2006)

KEJURUTERAAN ELEKTRIKAL

CHE KAMARIAH BINTI CHE ISA	BE HONS (UTM) (ELECTRICAL, 2002)
CHIA KA LUK	BE HONS (UPM) (ELECTRICAL & ELECTRONICS, 2002)
HASNOOR KHUZAIRAH BINTI HASIM	BE HONS (UITM) (ELECTRICAL, 2010)
HIDZAR RADZI BIN MOHD HUSIN	BE HONS (UITM) (ELECTRICAL, 2008)
IZHAM BIN ZAINAL ABIDIN	BE HONS (SOUTHAMPTON) (ELECTRICAL, 1997) PHD (STRATHCLYDE) (2002)
KAMARUS ZAMAN BIN AHMAD	BE HONS (UTM) (ELECTRICAL, 2007)
MAISARAH BINTI MAHAMUD SAYUTI	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2009)
MOHAMAD AZMI BIN MD SHAHIT	BE HONS (MALAYA) (ELECTRICAL, 2011)
MOHD FARIZ BIN BACHOK	BE HONS (UITM) (ELECTRICAL, 2005)
MOHD FIRDAUS B. MOHD FAUZI	BE HONS (UITM) (ELECTRICAL, 2009)
MOHD HALIMI BIN MUHAMED WAHAB	BE HONS (USM) (ELECTRICAL, 2008)
MOHD MUZHAR BIN AHMAD TAJUDDIN	BE HONS (UITM) (ELECTRICAL, 2002)
MOHD RIZA ZALMEE BIN MOHD GHAZALI	BE HONS (UNITEN) (ELECTRICAL POWER, 2007)
MOHD RIZAL BIN JOHARI	BE HONS (UTM) (ELECTRICAL, 2007)
MOHD SYAWAL NIZAM BIN SHARIFUDIN	BE HONS (UITM) (ELECTRICAL, 2007) CONVERSION (UNITEN) (2012)
MOHD YUSMANIZAM BIN MOHD YUSOF	BE HONS (UKM) (ELECTRICAL, ELECTRONIC & SYSTEMS, 1999) MSC (MANCHESTER) (ELECTRICAL POWER SYSTEMS, 2009)
MOHD ZULFAHMI BIN WAHAB	BE HONS (UNITEN) (ELECTRICAL, 2010) ME (UNITEN) (ELECTRICAL, 2013)
MUHAMMAD NURSYAM BIN SAPEE	BE HONS (UMP) (INDUSTRIAL ELECTRONIC, 2008)
MUHAMMAD ZULKHAIRI BIN ABDUL GHANI	BE HONS (UITM) (ELECTRICAL, 2005)
NIK MOHD HAZMAN BIN CHE HASAN	BE HONS (UKM) (ELECTRICAL, ELECTRONIC & SYSTEMS, 2004)
NOOR AMALIA BINTI IBRAHIM	BE HONS (UNITEN) (ELECTRICAL & ELECTRONIC, 2009)
NOOR ASIKIN BINTI ARIFIN	BE HONS (MALAYA) (ELECTRICAL, 2010)
NURMADINA BINTI YUSOH	BE HONS (UKM) (ELECTRICAL & ELECTRONIC, 2005)
SHAMSUL AZIZI BIN SHAHUDIN	BE HONS (UTM) (ELECTRICAL, 2005)
TAN WENG SENG	BE HONS (USM) (ELECTRICAL, 2008)

KEJURUTERAAN ELEKTRONIK

FAKHRUL ZAMAN BIN ROKHANI	BE HONS (UTM) (ELECTRICAL-MECHATRONICS, 2002) MSC (MINNESOTA) (ELECTRICAL, 2004) PHD (MINNESOTA) (2008)
NG KOK MUN	BE HONS (UTHM) (ELECTRICAL, 2002)
NIK MOHD ZAITUL AKMAL BIN MUSTAPHA	BE HONS (UTM) (MICROELECTRONIC, 1998)
SUADI BIN WAHAB	BE HONS (UMS) (ELECTRICAL & ELECTRONIC, 2000)
SULAIMAN WADI BIN HARUN	BE (NAGAOKA) (ELECTRICAL & ELECTRONIC SYSTEMS, 1996) MSC (MALAYA) (2001) PHD (MALAYA) (2004)
YEOH KEAT HOE	BE HONS (UTM) (ELECTRICAL-INTRUMENTATION AND CONTROL, 2005) ME (MULTIMEDIA UNIVERSITY) (MICROELECTRONICS, 2010) PHD (UM) (2014)

KEJURUTERAAN ELEKTRONIK

LOW TEONG BENG	BSC (KENTUCKY) (ELECTRICAL, 1995)

KEJURUTERAAN KAWALAN & INSTRUMENTASI

LOW TEONG BENG	BSC (KENTUCKY) (ELECTRICAL, 1995)

KEJURUTERAAN KIMIA

CHUA BOON HOW	BE HONS (UTP) (CHEMICAL, 2010)
LIM LEE FONG	BE HONS (UTP) (CHEMICAL, 2003) MSC (BIRMINGHAM) (BIOCHEMICAL, 2004)
NG HAN TECK	BE HONS (UTM) (CHEMICAL, 2000)

KEJURUTERAAN LEBUHRAYA

RATNASAMY MUNIANDY	BSC (SOUTH DAKOTA) (CIVIL, 1991) MSC (SOUTH DAKOTA) (1993) PHD (UPM) (2004)

KEJURUTERAAN MEKANIKAL

EDMENT FASHAH BIN AHAMAD	BE HONS (UITM) (MECHANICAL, 2008)
HASANUDDIN BIN MOHD IBRAHIM	DIPL-ING(FH-OFFENBURG, GERMANY) (MECHANICAL & TECHNOLOGY, 2009)
JILAN ANAK JENGGI	BE HONS (LONDON) (MECHANICAL, 1990)
JUSTIN CHAN TUCK LEONG	BE HONS (UNITEN) (MECHANICAL, 2010) MSC (UTM) (ENGINEERING BUSINESS MANAGEMENT, 2016)
KHAIRIL ANWAR BIN ABU KASSIM	BE HONS (OKAYAMA) (MECHANICAL, 2000) ME (UPM) (ENGINEERING MANAGEMENT, 2008)
MD FUAD SHAH BIN KOSLAN	BE HONS (UTM) (MECHANICAL-AERONAUTICS, 2001) ME (UTM) (MECHANICAL, 2006)
MOHD NUH BIN MISKAN	BE HONS (UITM) (MECHANICAL, 2005)
MUHAMMAD FADHLI BIN SHUHAIMI	BE HONS (UTM) (MECHANICAL-INDUSTRIAL, 2008)
NIK NAZRI BIN NIK GHAZALI	BE HONS (BRADFORD) (MECHANICAL, 1996)
NORHAYATI BINTI MAT WAJID	BE HONS (PORTSMOUTH) (MECHANICAL, 1997) ME (ROYAL MELBOURNE, INST OF TECH) (SUSTAINABLE ENGERGY, 2009)
PATRICK SIAW TING CHIANG	BE HONS (MALAYA) (MECHANICAL, 1999)
TOK CHYE HOCK	BE HONS (UTM) (MECHANICAL-AUTOMOTIVE) (2006)
VASANTHATHIBAN A/L PERIASAMY	BSC (WICHITA) (MECHANICAL, 2012)
ZURADZMAN BIN MOHAMAD RAZLAN	BE (YAMAGATA) (MECHANICAL, 1993)

KEJURUTERAAN PENGANGKUTAN

NUR IZZI BIN MD. YUSOFF	BE HONS (UKM) (CIVIL & STRUCTURAL, 2002) ME (UTM) (CIVIL-TRANSPORT & HIGHWAY, 2006) PHD (NOTTINGHAM) (2012)

KEJURUTERAAN STRUKTUR

ABDUL RAZAK BIN ABDUL KARIM	BE HONS (UNIMAS) (CIVIL, 2000) MSC (CARDIFF) (STRUCTURAL, 2003) PHD (AUCKLAND) (2010)
TAN LEE PENG	BE HONS (UNITEN) (CIVIL, 2008)

KEJURUTERAAN TELEKOMUNIKASI

MOHD ZAIDFIQRI BIN HARUN	BE HONS (MALAYA) (TELECOMMUNICATION, 2010)
RAJA ZAIMAS ROSDIN BINTI RAJA ROSDIN	BE HONS (MALAYA) (TELECOMMUNICATION, 2011) MSC (MALAYA) (2015)
WONG SHEN YUONG	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2010) ME (UNITEN) (ELECTRICAL, 2011) PHD (UNITEN) (2015)
ZULZILAWATI BINTI JUSOH	BE HONS (MALAYA) (TELECOMMUNICATION, 2002) MSC (MALAYA) (2008) PHD (MALAYA) (2015)

PEMINDAHAN KEPADA 'COMPANION'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
14889	CHOO KWONG HENG	B.E.(UPM)(CIVIL, 1989)
KEJURUTERAAN ELEKTRONIK		
23268	PU CHUAN HSIAN	B.E.HONS.(THE NOTTINGHAM TRENT UNI.) (ELECTRONIC & COMPUTING, 2001) M.E.(MMU) (TELECOMMUNICATIONS, 2005)

PERMOHONAN MENJADI AHLI 'COMPANION'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ALAM SEKITAR		
93772	HO LEE LEE	B.E.HONS.(MALAYA) (ENVIRONMENTAL, 1999) M.E.(UNIMAS) (ENVIRONMENTAL, 2011)
KEJURUTERAAN AWAM		
93769	AHMAD MUZRI ABDULLAH SATAR	B.E.HONS.(UTM)(CIVIL, 2002)
93771	AZAM SYARIFF BIN ZAHAR	B.E.(NAGOYA INST. OF TECH.) (ARCHITECTURE & CIVIL, 2002)
93537	DR UBAGARAM JOHNSON ALENGARAM	B.E.(UNI. OF MADRAS) (CIVIL, 1985) M.E.(BHARATHIAR UNI.) (CIVIL-STRUCTURAL, 1993) PART II (E.C)(1999) PHD.(MALAYA)(2009)
93534	MASYMUL AZAM BIN ISHAK	B.E.HONS.(UTM)(CIVIL, 2002)
93778	MOHD NOREZMI BIN MD ZIN	B.E.HONS.(UTM)(CIVIL, 2004)
93770	RAFIDAH BINTI ITHNIN	B.E.HONS.(UITM)(CIVIL, 2007)
KEJURUTERAAN ELEKTRONIK		
93774	AZNILINDA BINTI ZAINODIN@ ZAINUDDIN	B.E.HONS.(UITM) (ELECTRICAL, 2004) M.E.(UITM)(ELECTRICAL, 2014)
93887	DR NORFISHAH BINTI AB WAHAB	ADV. DIPL.(ITM) (ELECTRICAL, 1992) M.SC.(UITM) (TELECOMMUNICATION & INFORMATION, 2008) PHD.(UITM)(ELECTRICAL, 2015)
93535	MURALI A/L KUPPAN	B.E.HONS.(UTM)(ELECTRICAL-ELECTRONICS, 2001)
KEJURUTERAAN KIMIA		
93885	BALAJI RAGHUNATHAN	B.E.HONS.(UTP)(CHEMICAL, 2003)
93886	MARDHIYAH BINTI MOHD BAKIR	B.E.HONS.(USM)(CHEMICAL, 1999)
KEJURUTERAAN MEKANIKAL		
93775	CHEAH YEOU SENG	B.E.HONS.(UNITEN) (MECHANICAL, 2006)
93538	FARIZAH ABDUL MANAP	B.E.HONS.(UNITEN) (MECHANICAL, 2009) M.E.M.(UNITEN) (ENGINEERING MANAGEMENT, 2011)
93773	MOHAMAD FIRDAUS BIN ZAINAL	B.E.HONS.(MMU) (MECHANICAL, 2008) M.SC.(UKM)(INDUSTRIAL & TECHNOLOGY MANAGEMENT, 2014)
93536	MOHD HAZLEE BIN HAMID	B.E.HONS.(UTP) (MECHANICAL, 2002)
93777	NOR AZMAN BIN SAAID	B.SC.(UNI. OF ABERDEEN) (ENGINEERING, 1996)
93776	NURSUHANA BINTI ALAUDDIN	B.E.(NAGOYA INST. OF TECH.) (MECHANICAL, 2004)

PEMINDAHAN KEPADA AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ALAM SEKITAR		
69595	CHAI CHARANG CHEW, CLEMENT	B.E.HONS.(UTAR KAMPAR) (ENVIRONMENTAL, 2017)
69596	CHEH KIT CHUN	B.E.HONS.(UTAR KAMPAR) (ENVIRONMENTAL, 2017)
68442	LEE CHEAN BANG	B.E.HONS.(UTAR KAMPAR) (ENVIRONMENTAL, 2017)
69601	LIM WAN CHING	B.E.HONS.(UTAR KAMPAR) (ENVIRONMENTAL, 2017)
89423	SANGESWARY A/P HARI KHARAN	B.E.HONS.(UTAR KAMPAR) (ENVIRONMENTAL, 2017)
72531	SEAH KAY SENG	B.E.HONS.(UTAR KAMPAR) (ENVIRONMENTAL, 2017)
KEJURUTERAAN AWAM		
41682	MASLINDA BINTI DAUD	B.E.(UMP)(CIVIL, 2012)
43434	TANG ZING WEI	B.E.HONS.(CURTIN UNI. OF TECH.)(CIVIL & CONSTRUCTION, 2012)
66175	CHONG YEE LING	B.E.HONS.(IUKL)(CIVIL, 2015)
71602	LEE KOK YONG	B.E.HONS.(IUKL)(CIVIL, 2015)
81384	LEE SOON WEI	B.E.HONS.(IUKL)(CIVIL, 2016)
81385	MAHISHVARAN A/L DHARMANANDA	B.E.HONS.(IUKL)(CIVIL, 2016)
71597	MUHAMMAD RUZAINI BIN MD.RUSLAN	B.E.HONS.(IUKL)(CIVIL, 2016)
31188	CHEN FUN CHONG	B.E.HONS.(MALAYA)(CIVIL, 2009)
88458	SANDESH SINGH BHATT	B.E.HONS.(SEGI)(CIVIL, 2016)
52238	WONG TUNG YEW, STEVEN	B.E.HONS.(SWINBURNE UNI. OF TECHNOLOGY)(CIVIL, 2011)
21173	REDZUAN BIN MD YUNUS	B.E.HONS.(UITM)(CIVIL, 2003)
33270	MOHAMAD HAFIZZUDIN BIN NORDIN	B.E.HONS.(UITM)(CIVIL, 2009)
33207	MOHD FAWWAZ NAJMI BIN MOHD FUZI	B.E.HONS.(UITM)(CIVIL, 2010) M.E.(MALAYA)(SAFETY, HEALTH & ENVIRONMENT, 2014)
33188	NUR HIZARUDDIN BIN CHE AJID	B.E.HONS.(UITM)(CIVIL, 2010) M.E.(UTM)(CIVIL-TRANSPORTATION & HIGHWAY, 2012)
44214	EDDY ROHAIZAT BIN ABD HAMID	B.E.HONS.(UITM)(CIVIL, 2011)
44243	IZZUL BADRI BIN MUHAMAD	B.E.HONS.(UITM)(CIVIL, 2011)
44433	NORAFIZAH BINTI ABD RAHMAN	B.E.HONS.(UITM)(CIVIL, 2011) M.SC.(UITM)(CIVIL-GEOTECHNIQUE, 2012)
69068	MUHAMMAD RIDZWAN B. AZMAN	B.E.HONS.(UITM)(CIVIL, 2017)
56668	MOHAMED AZAM ISAM BIN ISA	B.E.HONS.(UITM)(CIVIL-INSFRASTRUCTURE, 2014)
72913	EWE KEE YIN	B.E.HONS.(UKM)(CIVIL & ENVIRONMENTAL, 2016)
41740	CHEE KHONG SIONG	B.E.HONS.(UKM)(CIVIL & STRUCTURAL, 2011) M.E.(UTM)(CIVIL-GEOTECHNIC, 2015)
47245	NURUL HANI BINTI MARDI	B.E.HONS.(UKM-UNI. DUISBURG ESSEN) (CIVIL, 2012) M.E.(UNITEN)(CIVIL, 2015)
81559	TAN CHIN GIAP	B.E.HONS.(UMP)(CIVIL, 2016)
66156	AMIR B. ABAS	B.E.HONS.(UNI. OF ADELAIDE) (CIVIL & STRUCTURAL, 2017)
42380	WONG XUAN YUAN	B.E.HONS.(UNIMAS) (CIVIL, 2013) M.E.(UNIMAS)(CIVIL, 2015)
29899	CHAI TZE CHIN, CYRIL	B.E.HONS.(USM)(CIVIL, 2010)
80377	CHEN JUN KIAT	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
80366	CHENG KAI JIAN	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
80357	GAN KANG CHAN	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)

80335	LEE JOO YEE	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
72323	LIM BENG SERNG	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
80321	LIM DAO YONG	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
77985	LIM KEK WENG	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
66337	LOH LEONG TATT	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
80317	LOW WEI JIAN	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
80279	TAN CHUANG MING	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
72330	TAN WEN JIA	B.E.HONS.(UTAR SG LONG) (CIVIL, 2017)
53434	CHONG JADE CHEUN	B.E.HONS.(UTAR)(CIVIL, 2013)
42665	CHAN YAW YEE	B.E.HONS.(UTHM)(CIVIL, 2011)
61462	AMIR ASYRAF B. AZAULMAY	B.E.HONS.(UTHM)(CIVIL, 2014)
61507	HEM WEN PING	B.E.HONS.(UTHM)(CIVIL, 2014)
54790	LEE YONG KIANG	B.E.HONS.(UTHM)(CIVIL, 2016)
80207	CHAN CHENG LEONG	B.E.HONS.(UTM SPACE) (CIVIL, 2016)
38580	FARIDZUL BIN MOHAMMAD FADZIL	B.E.HONS.(UTM)(CIVIL, 2010)
38584	HERMANIZAH BINTI SA'ADON	B.E.HONS.(UTM)(CIVIL, 2010)
54391	MOHD IZAAN BIN GHAZALI	B.E.HONS.(UTM)(CIVIL, 2012) M.E.(UTM)(CIVIL-STRUCTURE, 2014)
70963	MOHAMED ILYAS BIN MOHAMED HANIFFA	B.E.HONS.(UTM)(CIVIL, 2014)
47903	DR CHAI KOH SIONG	M.E.HONS.(UNI OF NOTTINGHAM)(CIVIL, 2011) PHD.(UNI OF NOTTINGHAM) (2016)

KEJURUTERAAN ELEKTRIKAL

72676	MUHAMMAD JAMILUL NA'IM BIN MOKHTAR	B.E.HONS.(UKM)(ELECTRICAL & ELECTRONIC, 2015)
40851	LAHARAJA BIN LAHADI	B.E.HONS.(UMP) (ELECTRICAL-POWER SYSTEM, 2010)
49187	VASUDEVAN A/L PRABHAKARAN	B.E.HONS.(UNITEN) (ELECTRICAL POWER, 2014)
37426	TUNG SOON SENG	B.E.HONS.(UTAR) (ELECTRICAL & ELECTRONIC, 2009)
57285	CHONG YEW HONG	B.E.HONS.(UTHM) (ELECTRONIC, 2015)

KEJURUTERAAN ELEKTRONIK

66508	TEO YOW CHUAN	B.E.HONS.(MMU) (ELECTRONICS-TELECOMMUNICATIONS, 2016)

KEJURUTERAAN KIMIA

48567	MUHD AMIN BIN MOHAMAD	B.E.HONS.(CURTIN UNI. OF TECH.)(CHEMICAL, 2012)
66060	KHAW WEI CHUEN	B.E.HONS.(TAYLOR'S) (CHEMICAL, 2017)
42833	MUHAMMAD FADZLI BIN MASNAN	B.E.HONS.(UITM)(CHEMICAL & PROCESS, 2011)
73197	TAN YONG CHAI	B.E.HONS.(UMP)(CHEMICAL, 2015)
45884	NURUL DARSANI BINTI AMAT DARBIS	B.E.HONS.(USM)(CHEMICAL, 2013)
72556	CHONG WAI LUN	B.E.HONS.(UTAR KAMPAR) (PETROCHEMICAL, 2017)
61870	LAI WAI SENG	B.E.HONS.(UTAR KAMPAR) (PETROCHEMICAL, 2017)
88021	LIDIA A/P STEPHEN	B.E.HONS.(UTAR KAMPAR) (PETROCHEMICAL, 2017)
88020	PHIN HOR YAN	B.E.HONS.(UTAR KAMPAR) (PETROCHEMICAL, 2017)
87017	KWAN JIA YI, KELLY	B.E.HONS.(UTAR SG LONG) (CHEMICAL, 2017)
72316	PARAMESPARAN PAVITHIRAH	B.E.HONS.(UTAR SG LONG) (CHEMICAL, 2017)
87019	TAN CHIN HOW	B.E.HONS.(UTAR SG LONG) (CHEMICAL, 2017)
81056	VILAASHINI A/P NAGENDERAN	B.E.HONS.(UTAR) (PETROCHEMICAL, 2016)

KEJURUTERAAN MEKANIKAL

74594	LIM CHIN HSIEN, ANDERSON	B.E.HONS.(SWINBURNE UNI. OF TECH.)(MECHANICAL, 2015)
65029	CHOONG PUI YUNG	B.E.HONS.(TAYLOR'S UNI.) (MECHANICAL, 2015)
30468	MUHAMMAD FAISAL BIN ISKANDAR	B.E.HONS.(UITM) (MECHANICAL, 2011)
50289	ABDUL HAZIQ BIN ABDUL MAJID	B.E.HONS.(UITM) (MECHANICAL, 2014)
53510	MOHAMMAD FAIDZ BIN ZALANI	B.E.HONS.(UITM) (MECHANICAL, 2016)
50654	MOHD ZAKUAN BIN ZABRI	B.E.HONS.(UITM) (MECHANICAL, 2016)
67500	MOHAMAD AMIRUL SHAFIQ B. MUDA	B.E.HONS.(UITM) (MECHANICAL, 2017)
67632	MUHAMMAD HANIF B. BAHARUDDIN	B.E.HONS.(UITM) (MECHANICAL, 2017)
50848	CHANG FOO KOON	B.E.HONS.(USM) (MECHANICAL, 2015)
80340	LEE YIN SIANG	B.E.HONS.(UTAR SG LONG) (MECHANICAL, 2017)
80314	LOW YONG CHEN	B.E.HONS.(UTAR SG LONG) (MECHANICAL, 2017)
61266	NG MAN SHING	B.E.HONS.(UTAR SG LONG) (MECHANICAL, 2017)
86997	NG YEONG JIANG	B.E.HONS.(UTAR SG LONG) (MECHANICAL, 2017)
80286	ONG SOON LENG	B.E.HONS.(UTAR SG LONG) (MECHANICAL, 2017)
86992	OOI GUO JIE	B.E.HONS.(UTAR SG LONG) (MECHANICAL, 2017)
53461	MOHAMMAD HELMI BIN JOHARI	B.E.HONS.(UTEM) (MECHANICAL-DESIGN & INNOVATION, 2015)
53459	NUR' SYAFIQAH BINTI ISMUINI	B.E.HONS.(UTEM) (MECHANICAL-DESIGN & INNOVATION, 2015)
58175	TAN CHEE NIAN	B.E.HONS.(UTEM) (MECHANICAL-DESIGN & INNOVATION, 2016)
55928	LAU LEE SIAN	B.E.HONS.(UTHM) (MECHANICAL, 2015)
55120	GOH WEI LOON	B.E.HONS.(UTHM) (MECHANICAL, 2016)
21908	LEE SEE PENG	B.E.HONS.(UTM-SPACE) (MECHANICAL, 2017)
53945	LEE KEAN YOONG	M.E.HONS.(UNI OF NOTTINGHAM)(MECHANICAL, 2015)
45024	YONG HUA NGUON	M.E.HONS.(UNI. OF NOTTINGHAM)(MECHANICAL, 2014)

KEJURUTERAAN MEKATRONIK

57372	FOO BRANDON	B.E.HONS.(APU) (MECHATRONICS, 2015)

KEJURUTERAAN SUMBER MINERAL

57963	RIZAL HAFIZ B. RAZALI	B.E.HONS.(USM)(MINERAL RESOURCES, 2016)

PERMOHONAN MENJADI AHLI SISWAZAH

No. Ahli	Nama	Kelayakan

KEJURUTERAAN AEROANGKASA

94129	YU KOK HWA	B.E.HONS.(USM) (AEROSPACE, 2008) MSC.(USM)(AEROSPACE, 2011)

KEJURUTERAAN AWAM

93801	NOR ARFIAN BIN YUSOF	B.E.(CARLETON UNI.)(CIVIL, 1998)
93836	MOHAMAD SALIHIN SF BIN SALIM	B.E.(TOTTORI UNI.)(CIVIL, 2010) M.E.(TOTTORI UNI.) (MANAGEMENT OF SOCIAL SYSTEMS & CIVIL ENGRG., 2012)
93842	SANGEETHA A/P RAMASAMY	B.E.(UMP)(CIVIL , 2011)
93889	PANG SWEE NGEE	B.E.(UMP)(CIVIL, 2010)
94123	CHING JENN HUA	B.E.HONS.(CURTIN UNI. OF TECH.)(CIVIL & CONSTRUCTION, 2015)
93923	SII CHUNG CHYI, AMANDA	B.E.HONS.(CURTIN UNI. OF TECH.)(CIVIL & CONSTRUCTION, 2016)
94030	GAN LENG LEY	B.E.HONS.(KLIUC)(CIVIL, 2012)
94013	CHONG KIAN MING	B.E.HONS.(KUITTHO(CIVIL-CONSTRUCTION, 2006)
93995	DR. MAZIZAH EZDIANI BT MOHAMAD	B.E.HONS.(KUITTHO) (CIVIL, 2005) M.E.(UTM)(CIVIL-STRUCTURE, 2011) PHD.(UTM)(CIVIL, 2016)
94021	AMNORZAHIRA BINTI AMIR	B.E.HONS.(MALAYA)(CIVIL, 2003)
93994	THO SIEW LIAN	B.E.HONS.(MALAYA)(CIVIL, 2006)
	ZAKRIL SYAFRANI BIN SAMSUDI	B.E.HONS.(MALAYA)(CIVIL, 2009)
93853	TING MUI HENG, JUDE	B.E.HONS.(MALAYA)(CIVIL, 2010)
93897	WONG CHEA HAO	B.E.HONS.(NTU)(CIVIL, 2011)
93930	HO FOOK MING	B.E.HONS.(SWINBURNE UNI. OF TECH.)(CIVIL, 2014)
93929	LAW CHENG YANG	B.E.HONS.(SWINBURNE UNI. OF TECH.)(CIVIL, 2014)
93852	CLIFF JUDE ZEHNDER	B.E.HONS.(SWINBURNE UNI. OF TECH.)(CIVIL, 2015)
94135	CHAN HON CHUIN, EDRIC	B.E.HONS.(THE UNI. OF AUCKLAND)(CIVIL, 2017)
93811	SUHAIZA BINTI MOHD SALLEH	B.E.HONS.(UITM)(CIVIL, 2008)
93807	MOHAMED ALIF BIN MOHAMED ROZNAN	B.E.HONS.(UITM)(CIVIL, 2010)
94127	FARAH SHUHADAH BT MOHD RAMLI	B.E.HONS.(UITM)(CIVIL, 2012)
93856	MOHD RASHIDI BIN BAKLI	B.E.HONS.(UITM)(CIVIL, 2012)
93870	ABDUL AZIM BIN MUSTAPA	B.E.HONS.(UITM)(CIVIL, 2013)
93858	SYAHMIZZI IFWAT BIN AZHARNIM	B.E.HONS.(UITM)(CIVIL, 2013) M.E.SC.(UITM) (GEOTECHNICAL, 2015)
93904	WAN KHAIRUL AZMAN BIN WAN ZAWAWI	B.E.HONS.(UITM)(CIVIL, 2016)
93891	WONG CHOONG LUM, RICKY	B.E.HONS.(UMP)(CIVIL, 2014)
93983	KOH BOON HAO	B.E.HONS.(UMS)(CIVIL, 2014)

Note: *Remaining list of the Transfer Graduate, Graduate, Incorporated, Affiliate and Associate would be published in January 2018. 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-110

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 Oktober 2017 adalah seperti jadual di bawah:

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THE MONTHLY BULLETIN OF THE INSTITUTION OF ENGINEERS, MALAYSIA

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The Institution of Engineers, Malaysia

Circulation and Readership Profile

JURUTERA has an estimated readership of **168,000** professionals. Our esteemed readership consists of certified engineers, decision making corporate leaders, CEOs, government officials, project directors, entrepreneurs, project consultants, engineering consulting firms and companies involved with engineering products and services.

Advertising Benefits

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DISPLAY ADVERTISING RATES

	PRICES PER INSERTION IN RINGGIT MALAYSIA (RM)				
SPECIFIED POSITION (Full Colour Ad)	**1 INSERTION**	**3 INSERTIONS**	**6 INSERTIONS**	**9 INSERTIONS**	**12 INSERTIONS**
Outside Back Cover (OBC)	7,800	7,050	6,750	6,450	6,150
Inside Front Cover (IFC)	7,250	6,650	6,350	6,050	5,750
Inside Back Cover (IBC)	6,750	6,250	5,950	5,650	5,350
Page 1	6,650	6,150	5,850	5,550	5,250
Facing Inside Back Cover (FIBC)	6,150	5,850	5,550	5,250	4,950
Facing Cover Note (FCN)	5,850	5,300	5,100	4,900	4,700
Facing Contents Page (FCP)	5,700	5,150	4,950	4,750	4,550
Centre Spread	11,200	9,500	9,000	8,500	8,000
ROP Full Page	4,900	4,500	4,300	4,100	3,900
ROP Half Page	2,900	2,650	2,550	2,450	2,350
ROP 1/3 Column	2,200	2,000	1,900	1,850	1,800
ROP 1/4 Page	1,950	1,750	1,650	1,600	1,550

Special Position: +15%
Overseas Advertiser: +25% (Full Advance Payment Required)
All prices shown above exclude Computer to Plate (CTP) charges

****Please note that the above prices exclude the 6% GST (Tax rate will be subjected to government changes)***
****The above prices exclude 15% advertising agency commission***

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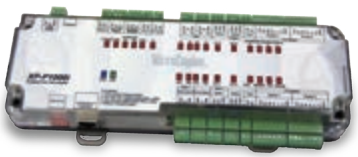

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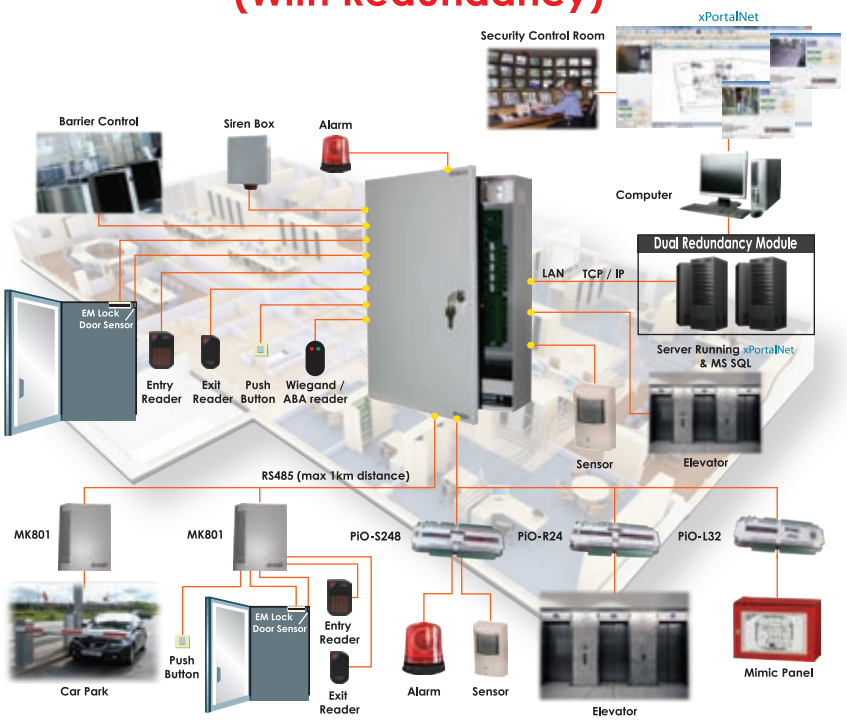

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