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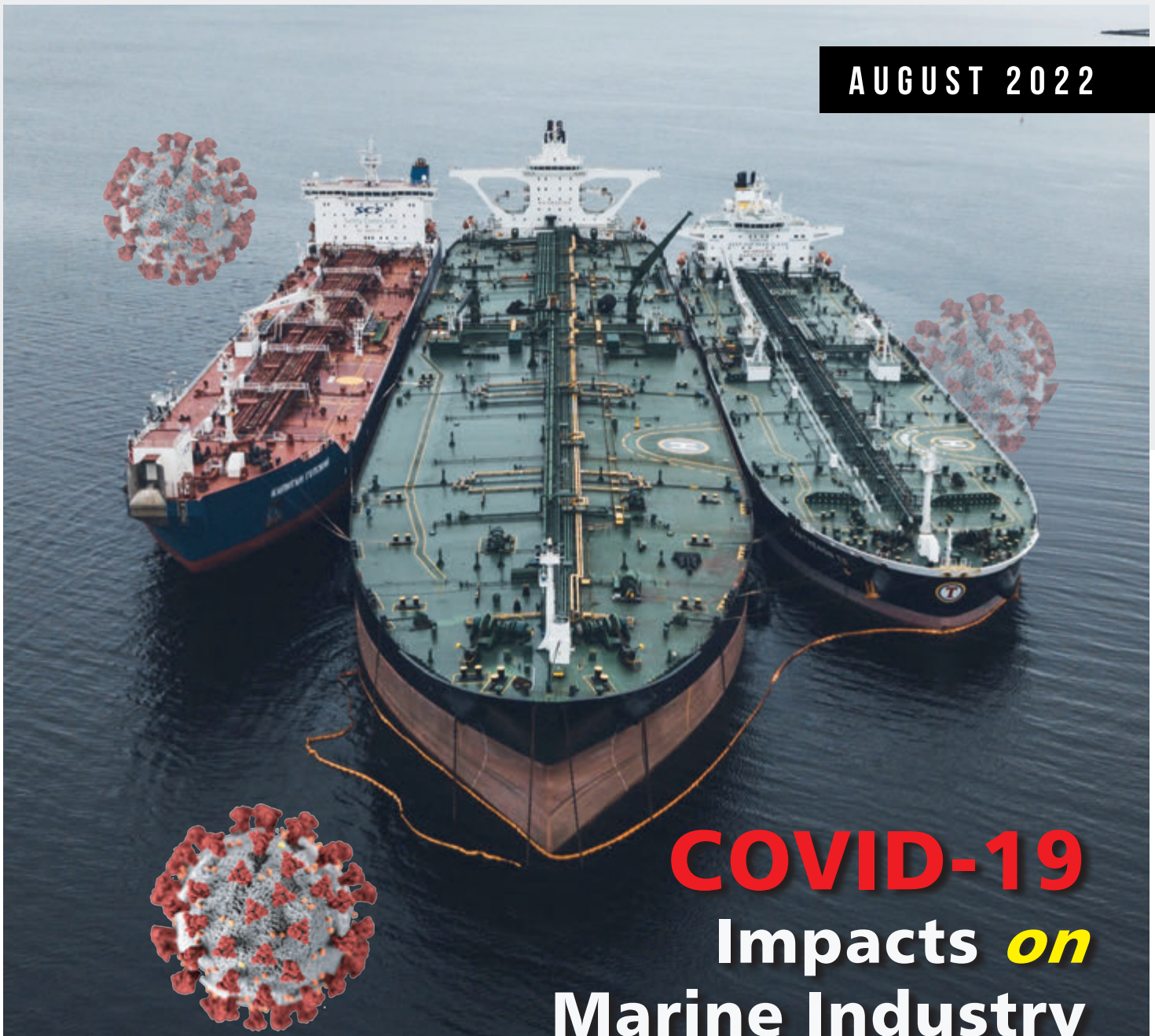

AUGUST 2022

COVID-19 Impacts *on* Marine Industry Sustainability *and* Way Forward

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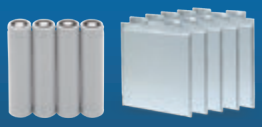

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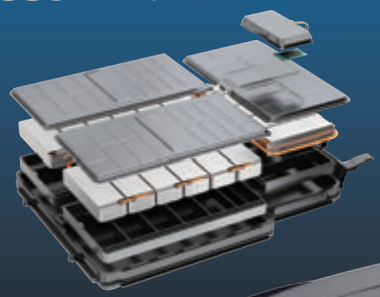

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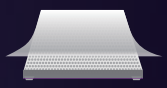

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JURUTERA is published and printed monthly by Dimension Publishing Sdn. Bhd.

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THE INSTITUTION OF ENGINEERS, MALAYSIA (IEM)
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by Ir.Ts. Abdul Malik Hussein bin Abdul Jalil
Marine Engineering & Naval Architecture Technical Division

COVER NOTE

COVID-19: Challenges for Marine Engineering Industry

In 2019, when the World Health Organisation declared COVID-19 a pandemic, it took us all by surprise. We were uncertain about our future, not knowing how the disease would impact our lives. Our first lockdown in March 2020 greatly disrupted our daily routines. After 2 years, many lives and businesses were lost and we also adapted to the new normal.

A significant contributor to the nation's GDP, the Marine Engineering industry had to overcome these challenges to continue to operate safely within the national and international waters. Long months at sea due to difficulties in crew change, getting required spares on board as well as prompt medical attention were some of the challenges we faced as port authorities imposed strict SOPs during this period. While many businesses shut down, others found new opportunities to be sustainable with the implementation of emerging technologies.

This month's theme is COVID-19 Challenges, Opportunities & Pivoting through for Sustainability in the Marine Engineering Industry. Besides experts, we also feature Encik Hazrin Hasan, Vice President of Gas Assets & Solutions Business, MISC Berhad, on the best practices of MISC during COVID-19. ■

EDITOR'S NOTE

Marine Engineering, Merdeka & Malaysia

by Ir. Dr Siow Chun Lim
Principal Bulletin Editor

Do you know that the word "august" is closely associated with dignity and auspicious? What a coincidence it is that Malaysians also celebrate Independence Day on this auspicious and dignified month every year!

As we all know, we are, hopefully, at the tail-end of the COVID-19 pandemic. Yet, the economic aftermath is still deeply felt by the various sectors, including the Marine Engineering industry. Numerous challenges have emerged which have posed a dampening effect on the recovery rate of the industry.

As stakeholders in the industry, it is crucial that we remain steadfast so that we can weather the storms which are hitting us from all directions. To provide some insight into the matter, the Marine Engineering & Naval Architecture Technical Division has lined up a few articles for us to digest.

A nation can only thrive if she has a sustainable economy powered by robust industries which, in turn, are fuelled by engineers like us.

Let us stay strong and resilient together. Demi Malaysia. Selamat Hari Kebangsaan 2022! ■

Selamat Hari Merdeka 2022

MISC: Navigating the Challenging Waves of COVID-19

Encik Hazrin Hasan, Vice President of Gas Assets & Solutions (GAS) Business Division, MISC, talks about how the global maritime conglomerate has navigated through the devastating COVID-19 pandemic and emerged resilient and sustainable.

It has been more than two years since cases of COVID-19 were first reported to the World Health Organisation (WHO) in December 2019 and the world is still reeling from its devastating effects. As of 12 June 2022, according to WHO statistics, the COVID-19 virus had infected 536 million people around the world with 6.31 million deaths (1.17% of cases reported).

The pandemic resulted in an unprecedented impact on the world. Economies suffered massively. Millions of people lost their jobs and struggled to put food on the table. There was a mass collapse of businesses globally, affecting every trade and business, from manufacturing, transportation and logistics to engineering and construction. Even conglomerates such as MISC, were not spared. Nevertheless, MISC has continued to persevere, rising above the challenges and navigating its way through by harnessing ingenuity and agility to ensure its sustainability and to safeguard its resilience.

Established in 1968, MISC has grown from strength to strength to become one of the world's leading providers of energy-related maritime solutions and services. The Group's core businesses comprise Gas Assets & Solutions (GAS), Petroleum & Product Shipping, Offshore Business and Marine & Heavy Engineering. Its other areas of expertise are Maritime Education & Training, Port Management & Maritimes Services and Integrated Marine Services.

According to its Vice President of GAS, Encik Hazrin Hasan, MISC has been monitoring the COVID-19 situation as "health and safety have always been our priority".

He says: "The Group activated strict Health, Safety, Security & Environment (HSSE) advisories to ensure employees were well-informed and able to connect back to the company should they need any advisory support. By February 2020, the situation had worsened globally and we knew this would

impact the global supply chains for basic necessities such as food, fuel and goods.

"Although the pandemic caught us all by surprise, we were able to leverage on our agility and adaptability in responding to the changes affecting our operations and processes. The Group established the Pandemic Response Plan based on guidelines and best practices from WHO and the Malaysian Ministry of Health (MoH).

"The maritime industry plays a vital role as the backbone of global economy as it is responsible for the movement of 80% of international trade. So, it is critical for us to continue our operations to ensure that the flow of critical supply chains is not disrupted. Although there were government-issued SOPs, our Pandemic Response Team went one step further and developed specific SOPs that were relevant to our business and operations. These continue to be in effect even today. We also worked with MoH to ensure that SOPs for our employees at sea and on shore, were well in place."

Encik Hazrin says that MISC's priorities were the safety of their employees across the world and ensuring the Group's businesses remained sustainable even during adversity.

Dealing with the Pandemic

In March 2020, WHO officially declared a pandemic when infection rates hit critical levels and issued guidance on COVID-19 responses. Countries tried to mitigate the outbreak with strict measures, including imposing lockdowns and border closures. Many businesses pivoted their working arrangements, including allowing employees to work from home. Similarly, MISC also allowed its shore staff to work from home.

"We found that we could still be very productive, collaborative and effective even when working from home. However, that was a luxury that could not be extended to our frontliners, including seafarers working at Eaglestar, offshore workers on the Group's floating assets, shipyard workers at MHB, MMS marine technical employees and consultants, inspectors and engineers and even IT staff at the office," says Encik Hazrin.

"As we were regarded an essential business, our frontliners continued to work at site to ensure the continuity of our business and operations. The Group had adapted swiftly and innovatively to alleviate the severe impact of the pandemic and to find novel ways to keep its employees safe. To support our employees at site, we ensured that they were provided with the right care and support such as the Employee Assistance Programme (EAP) to help improve their physical, emotional and mental well-being.

"The challenges during this period did not break us. Rather, it validated our strength and resilience. We continued to take preventive measures to safeguard employee health and safety. For example, before vaccines were available, our crew had to wear the full personal protective equipment (PPE) before boarding a vessel."

Other initiatives included having regular, clear and prompt communication on matters affecting the employees, such as health advisories, working arrangements and business travel, with regular reviews according to the government's directives. MISC's global network of health service providers rendered assistance and carried out testing, contact tracing and quarantine procedures.

In support of the Government's efforts to alleviate the outbreak of COVID-19, MISC donated ventilators, monitors and other patient care medical equipment critically required for use in Intensive Care wards amounting to RM2.44 million to Hospital Kuala Lumpur and several other government hospitals listed to provide the required medical support to COVID-19 patients. In addition, a further sum of RM410,300 for medical equipment needed in Intensive Care wards was also contributed to Pusat Perubatan Universiti Malaya.

Earlier to the contribution of close to RM2.9 million for medical equipment to hospitals, MISC contributed over RM2.1 million to MERCY Malaysia's COVID-19 Pandemic Fund to support the international non-profit organisation's efforts in

mitigating the spread of COVID-19. MISC's contribution to the said fund was to be used primarily for providing medical relief and COVID-19 risk reduction activities for vulnerable communities in the country as part of MERCY Malaysia's COVID-19 Strategic Preparedness and Response Plan.

When COVID-19 vaccination programmes went into full swing, MISC collaborated with the relevant agencies and stakeholders to ensure that its employees at sea and on shore received their vaccines.

Fully vaccinated employees were allowed to return to the office on a staggered basis and they were required to comply with the return-to-work guidelines which included weekly COVID-19 testing. In addition, to ensure workplace hygiene and proper ventilation, MISC installed portable medical grade High-Efficiency Particulate Arrestance (HEPA) air filters at strategic locations in its Malaysian Headquarters as recommended by the Department of Safety & Health Malaysia.

Global Crew Change Crisis

Encik Hazrin, who started as an Engine Cadet, rose through the ranks to Chief Engineer and sailed on MISC's LNG vessels. He was appointed Vice President of GAS Business Division on 1 January 2022.

Optimistic and enthusiastic, the amiable Encik Hazrin is always concerned about the well-being and safety of the employees. According to him, one of the most devastating impacts of the pandemic on the maritime industry is the crew change crisis which has significantly affected seafarers worldwide. Many seafarers were on extended contracts due to the pandemic, unable to disembark from the ships they were working on, while an equivalent number were unable to board ships to work. This caused prolonged exhaustion, stress and anxiety involving hundreds and thousands of seafarers.

Logistics limitations, closure of ports and borders and the high risk of COVID-19 infections resulted in the extended stay of crew members on board vessels. Besides the logistics challenges, the joining and repatriation of crew members were challenging because of constant changes in SOPs issued by different countries.

> "The majority of global ports and terminals handle the transportation of goods but during the pandemic, the crew members were not allowed to disembark, and this resulted in a prolonged stay on board our vessels. This also impacted their mental health. Ports and terminals in different countries had their own COVID-19 SOPs and we did our best to comply with their many requirements."

It became a critical priority for MISC to protect the safety and welfare of its seafarers and the Group's integrated marine services arm, Eaglestar, worked closely with government authorities and agencies to enhance its sign-on and sign-off processes for the crew members. Eaglestar devised robust COVID-19 guidelines on crew change as well as various aspects of vessel operations and each vessel had its own Ship Pandemic Plan. These guidelines successfully minimised the spread of the virus on board its vessels. This was also particularly crucial in assuring its customers that they could rely on MISC to conduct their global trade arrangements securely and expect safe and timely delivery of their cargoes.

In January 2021, MISC and its member companies, AET and Eaglestar, signed the Neptune Declaration on Seafarer Wellbeing & Crew Change, along with over 300 companies and organisations. Signatories of the Declaration came together to resolve the unprecedented crew change crisis.

Last year, Eaglestar successfully conducted crew changes for 10,864 seafarers; this would not have been possible without the support and cooperation of various government agencies, authorities and the international community. As a result, the seafarers were able to efficiently sign-off and return to their families, while those on shore could also sign-on safely.

As the seafarers on board had minimal or almost no physical contact with those on shore, the management and shore employees took action to reduce anxiety among the crew members and to maintain their high spirits through the challenging times. Actions included frequent communication between the top management, shore employees and the seafarers as well as promoting increased interactions through video calls between seafarers and their families at home.

Towards the Endemic Phase

Many sectors improved and adapted to pandemic restrictions, eventually leading to global economic recovery in 2021. By then, COVID-19 vaccine deployment had gained momentum and government's fiscal stimuli helped boost economic activities.

"As we entered 2021, we already had a very clear idea of what to expect, so there were few surprise elements for us. We leveraged on lessons learnt from the year before and supported our people at sea and on shore. Consequently, we managed pandemic-related impacts much better in 2021. We also made a huge and concerted effort to encourage our people worldwide to be vaccinated," says Encik Hazrin.

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BUILDING TRUST

As the world starts to transition into an endemic phase, he feels it may take another year or so for pandemic-related impacts to ease off. In this environment, he believes that harnessing the benefits of digital technologies and upskilling workforces will drive productivity growth through innovation and efficiency gains.

He says challenges ahead include the potential of higher financing costs, heightened financial market volatility, inflation risks driven by rebounding growth and supply-chain bottlenecks as well as ongoing labour shortages. However, he stresses that MISC is in a better position to weather any impact on its projects and operations.

He feels the pandemic has made the maritime industry more agile, resilient and better prepared to face future challenges. It has also brought into sharp focus the critical role of shipping in ensuring the continuity of the global supply chain.

Positive Effects and Opportunities

While the pandemic had caused huge challenges, there were also positive effects, which had given rise to opportunities which could be tapped. The pandemic had taught the people at MISC to be more flexible and to swiftly adapt to using digital tools and virtual platforms to carry out business activities. Recognising the importance of always staying connected, MISC's management ensured that the transition to work from home was done seamlessly and that the digital workflow process was smoothly rolled out by its IT department.

Encik Hazrin is pleased to note that both employees and the organisation have shown resiliency and agility in adapting to these changes. The flexible working arrangements have enhanced productivity and increased the focus on creating a more balanced working lifestyle.

> "We also observed stronger teamwork, support and collaboration at all levels across the organisation. Everyone came together and made collective decisions to ensure that employee health and safety were taken care of."

Also notable was MISC's ability to effectively manage the shorter-term challenges of the pandemic to ensure business continuity and stability, while focusing on the longer-term trends that influenced the Group's business environment.

Towards A Digitalised Future

One of MISC's key strategies moving forward is digitalisation by harnessing the power of the Fourth Industrial Revolution (4IR), the current trend of digitalisation and data exchange, including cyber-physical systems, Internet-of-Things, cloud computing and cognitive computing.

"For the GAS business segment, there are opportunities to commercialise LNG asset-based solutions and we are exploring opportunities in non-conventional solutions. We are looking into operational optimisation via digitalisation and advanced automation technology application and we have concluded a feasibility study on minimum manning operation concept on the LNG Floating Storage Unit (FSU). I am proud to share that we have obtained Approval in Principle for concept implementation by Lloyd's Register Classification Society," says Encik Hazrin.

FSU is part of the LNG-to-Power (L2P) solution, which supports the global energy transition agenda by providing and promoting the use of cleaner fuel, namely LNG, as one of the pathways towards decarbonisation. Digitalisation will enable the FSU to be equipped with remote onshore operation capability.

"To do more, we can collaborate with technology experts, regulators and industry peers to jointly explore future possibilities and breakthroughs in this area. In the last five years, we have looked into more technologies associated with gas. Our focus now is not just on LNG, which is our bread and butter, but we also look for new opportunities such as development and technologies concerning hydrogen and ammonia," he adds.

MISC will continue to leverage on digital technologies and continuously enhance and strengthen its internal capabilities with regards to technology requirements for greater operational efficiencies in order to keep up with the latest market developments and to maintain a competitive advantage. The Group is driving the internal transformation in areas of finance, procurement and document management toward becoming a data-driven organisation. At the same time, MISC is investing in upskilling its entire workforce at sea and on shore to be future-ready and able to operate upcoming new technologies.

Encik Hazrin Hasan (centre) flanked by Ir. Roznan Abdul Rashid, Advisor of Marine Engineering & Naval Architecture Technical Division, IEM (MNATD) (right) and Ms. Maziah Suraya Abd Majid, MNATD committee member (left)

Gas and LNG Future Technology Development

For the next five years, Encik Hazrin says GAS has established its Strategic Focus in diversifying its asset portfolio and developing new technology and solutions. In diversifying its asset portfolio, GAS will pursue L2P projects through integrated approach, aimed at providing cleaner power generation which is aligned with the demands of global decarbonisation plans.

The development of new technology and solutions will include the focus areas of decarbonisation by identifying new and emerging solutions, such as Liquefied Carbon Dioxide (LCO2) carrier, exploring digitalisation and optimisation such as the development of remote operation capability and commercialisation of Floating Storage, Regasification & Power (FSRP) and Floating Storage Regasification Unit (FSRU), which is a vital component required while transiting and transferring LNG through oceanic channels. FSRUs, for instance, can be placed on floating barges in remote areas, such as in Sabah, to serve as plants to produce power.

The Group has successfully navigated the challenging waves of the COVID-19 pandemic and remained strong. The possibilities for GAS and MISC are endless. In the Group's strategy moving forward, MISC is reinforcing the foundations of its business success by incorporating lessons learnt during the pandemic. ■

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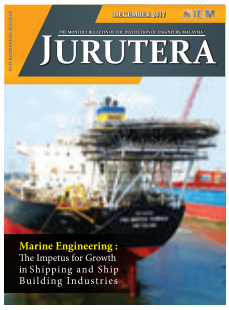

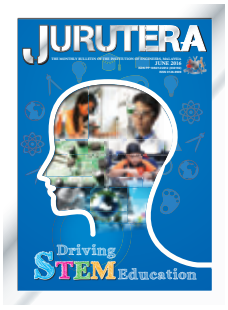

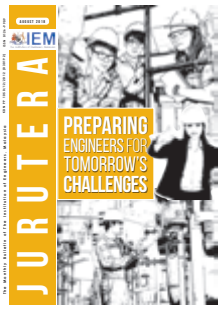

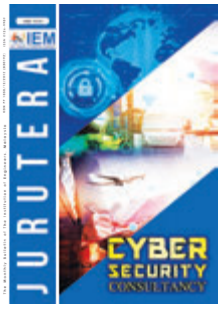

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Impact of Sulphur Cap 2020 on Ship Operations

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Air pollution is one of the world's most pressing environmental issues today. A series of research studies on air pollution from ships emphasises the urgent need for international regulations to be enacted in order to minimise hazardous emissions. Combustion from the main engine of a ship produces pollutants such as Sulphur Dioxide (SO_2), Nitrogen Oxide (NO_X), Carbon Dioxide (CO_2), Greenhouse Gas (GHG) and Particulate Matter (PM). Shipping emissions are easily transported across long distances from the sea to land and between continents. It can be amplified in domestic seas, narrow channels, straits, gulfs and port areas, especially in locations with extensive marine activity, sensitive ecosystems and dense populations. When comparing various types of maritime operations, international shipping accounts for almost 87% of total CO_2 emissions each year.

Malaysian maritime activities produced 250.3 million tonnes of CO_2 in 2018 or 0.7% of world CO_2 emissions. Starting 1 January 2020, the International Maritime Organisation (IMO) executed its own strategy to minimise gas emissions from ships, in line with the Paris Agreement which was implemented by signatory states.

The International Convention for the Prevention of Pollution from Ships (MARPOL) 73/78 Annex VI, which was first adopted in 1997, went into effect in May 2005 to address the problem of air pollution caused by ship exhaust emissions. Annex VI regulates SO_2 and NO_X emissions from ship exhaust, prohibits intentional emissions of ozone-depleting substances and establishes emission control zones where more rigorous laws can be implemented. Annex VI has been ratified by 89 countries, accounting for 96.18% of worldwide merchant shipping tonnage. Chapter III of MARPOL Annex VI describes the following as the major types of air pollution produced by ships:

i. Regulation 12 – Emissions from Ozone depleting substances from refrigerating plants and firefighting equipment.
ii. Regulation 13 – Nitrogen Oxide (NO_X) emissions from diesel engines.
iii. Regulations 14 – Sulphur Oxide (SO_X) emissions from ships.
iv. Regulation 15 – Volatile Organic Compounds emissions from cargo tanks of oil tankers.
v. Regulation 16 – Emissions from shipboard incinerators.
vi. Regulation 18 – Fuel Oil quality.

Vessels with a gross tonnage of 400 tonnes or more are subjected to these laws and must display an International Air Pollution Prevention Certificate (IAPP). For ships with tonnage less than the specified value, the Administration may devise appropriate procedures to ensure compliance with Annex VI.

Despite the fact that nearly all sulphur is released as SO_2, the formula SO_X also applies to Sulphur Dioxide (SO_2) and Sulphur Trioxide (SO_3). Sulphate particles from atmospheric formation resulting from SO_X pollution have a harmful impact on human health, visibility and environment.

Nitrogen Oxide (NO_X) is commonly described as the sum of Nitrogen Monoxide (NO) and Nitrogen Dioxide (NO_2). When NO_X is released into the air, it has a variety of environmental consequences, including acidification and eutrophication. Furthermore, NO_X is linked to the generation of ground-level ozone and secondary

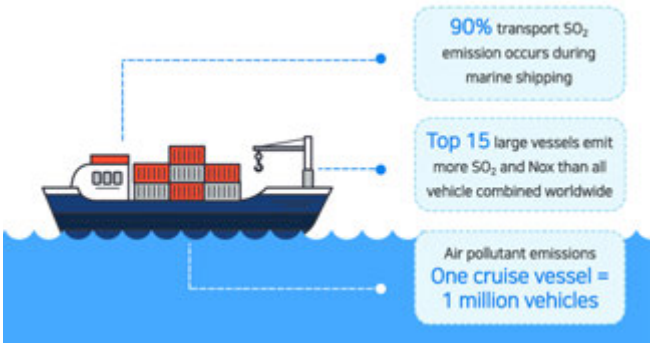

Figure 1: Air pollution from marine shipping

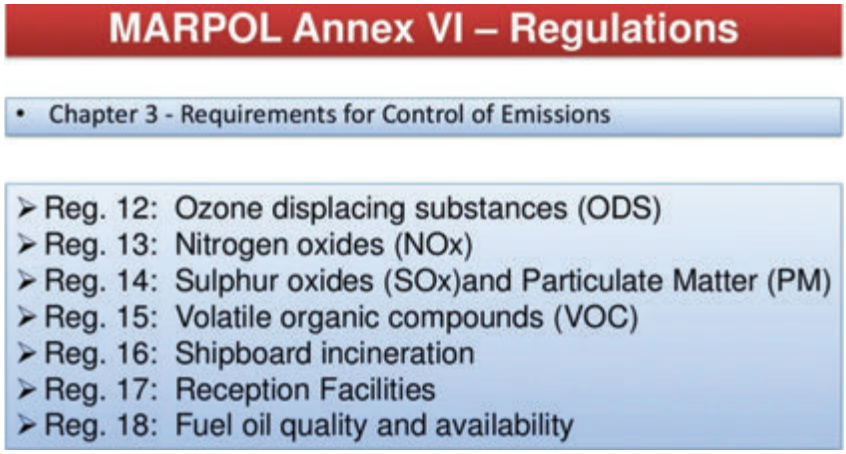

Figure 2: MARPOL Annex VI regulations

particulate matter. Due to the creation of secondary particle matter, NO_x emissions are a direct contributor to the eutrophication of inland and marine waterways, marine ecosystem and compromise human health.

The maritime industry's concerns about GHG pollution were discussed globally through the Kyoto Protocol but these were treated as a separate entity. The IMO has come up with a number of measures aimed at reducing shipping GHG emissions from both technological and operational standpoints. First, the IMO has developed 2 energy quality steps: Energy Efficiency Design Index (EEDI) and Ship Energy Efficiency Management Plan (SEEMP).

EEDI is a target-based technology requirement for new-build vessels and SEEMP requires shipping companies to have a timetable on board each vessel to improve energy efficiency throughout its life-cycle. In addition to MARPOL Annex VI, the IMO has added a new data collecting system regulation, Regulation 22A, which requires ships to track and report their annual fuel usage and other relevant data.

Particulate Matters (PM) emissions are known to be indirectly SO_x-regulated because oxidised sulphur in marine fuel leads to the formation of new particles. It is estimated that PM2.5 makes for around 95% of ship-generated PM emissions. PM from the maritime industry has been linked to cardiovascular disease and lung cancer.

SO_x emissions from ships were first regulated by the IMO in 2005 under MARPOL Annex VI. Since then, the restrictions on sulphur oxides have been gradually tightened. For the area outside Emission Control Area (ECA), the maximum limit was 4.5% m/m before January 2021, which was reduced to 3.5% m/m after January 2012. After January 2020, the new limit was 0.5% m/m.

Inside an ECA, the limit was more stringent. Before July 2010, it was 1.5% m/m and after July 2010, it was 1.0 m/m. After January 2020, the limit was 0.1 m/m.

There are well over 60,000 maritime vessels which are classified as IMO 2020 compliant. To meet the Sulphur Cap 2020 requirements, ship owners, operators and charterers can choose from 3 main methods.

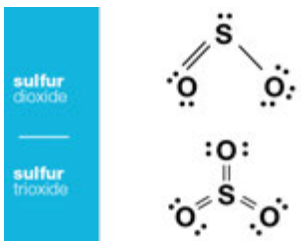

Figure 3: Sulphur dioxide and sulphur trioxide composition

The first is to use compliant fuel oils with a maximum sulphur content of 0.5%, such as Low Sulphur Fuel Oil (LSFO), 0.1% Very Low Sulphur Fuel Oil (VLSFO) or Marine Gas Oil (MGO). The second method is to install an exhaust gas cleaning machine (EGCS) and the third method is to use renewable fuels such as methanol and LNG.

According to Drewry's survey, 33% of respondents had a poor understanding and interpretation of current legislation and 52% were either unprepared or completely unprepared for the impact of current pollution restrictions while 22% of all respondents believed the cost impact to their organisation from the new regulation would be, either significant (16%) or extremely significant (6%).

Heavy fuel oil prices have been relatively consistent, ranging from slightly under US$300 to US$370 per tonne, depending on the bunker port. In terms of pricing, a metric tonne of VLSFO cost around US$740 in the first week of 2020, compared to around US$550 in the first week of December 2019. However, the price dropped to US$570 per metric tonne after the third week of January 2020. Due to the pricing instability, shipping companies are seeing a considerable increase in fuel oil prices, which is expected to have an impact on profit margins and they have little to no room to pass the additional costs on to their customers.

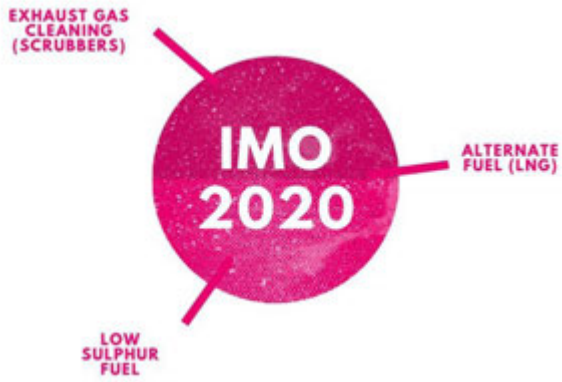

Figure 4: Methods for complying with IMO's Sulphur Cap 2020

According to estimations, the cost will increase by 20-85%, depending on speed, fuel price and ship size.

Even if some shipowners opt to install scrubbers as a solution, many vessels may be unable to do so due to circumstances such as time restriction and shipyard capacity constraints.

Scrubber systems can cost up to US$5 million and take 6-9 months to be installed and commissioned. Large ships may require the installation of several scrubbers and this will add to the cost. Installing such systems entails a significant upfront financial expenditure. The greatest potential outcome for the supply business was to have 1,200 scrubbers installed and operational before the 2020 deadline. Scrubbers allow ships to keep utilising Heavy Sulphur Fuel Oil (HSFO). However, due to the corrosive nature of the gases emitted by scrubbers, it has been reported that these ships require more maintenance than non-scrubber ships.

The IMO has received several reports of FO contamination from ships using MGO and VLSFO. FO contamination was discovered at bunker ports in Texas, Panama and Singapore which affected ship operations, resulting in delays and additional costs incurred for cleaning. The majority of the contamination occurred during bunkering process.

LNG-powered engines can be installed as a main propulsion system or as a hybrid system. However, like scrubber units, installing an LNG system is costly, requires a long lead time and a large amount of space for particular ships, which may not be viable. The availability of LNG and its associated infrastructure to meet rising demand is also in question. Building these infrastructures necessitates large investments which not all investors can afford.

Figure 5: Dewry's Survey on IMO'2 2020 Sulphur Cap Drewry Supply Chain Advisors (2018), Survey: IMO's 2020 Low Sulphur Regulations

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In terms of legal concerns, several ship owners or ship operators are still concerned about the enforcement of the regulation. The uncertainty reflects the fact that a ship can acquire exemptions if it can demonstrate that compatible fuel is unavailable at a port. This shows the ambiguity surrounding the stringent enforcement of the regulation. Inconsistency also exists when it comes to the selection and operation of scrubber systems at specific ports. Some countries, such as Malaysia, Singapore and China, have outlawed the use of open-loop scrubbers. There is no organisation with the authority and the technical capability to conduct high-seas inspections. All fall under the Flag State. The IMO does not have jurisdiction over the high seas and does not have a force capable of conducting inspections. In addition, qualified inspectors are required in Port State Control (PSC) to conduct on-board inspections.

In relation to the impact of the Sulphur Cap 2020 on ship operations, the availability of acceptable fuel oil remains a concern, particularly in smaller ports. There are 400 main ports around the world but 60% of the bunkering market is handled by the top 10 ports on this list. It is reasonable to expect that sufficient compliant fuel will be available at these key ports. The uncertainty rests in the remaining 390 ports, which are considerably smaller. For these, the issue lies in preparing and planning for an uncertain future with no precedent. Brazilian and Indian ports flag states had recorded shortages of the 0.5% VLSFO, according to the IMO's Fuel Oil Non-Availability Reports (FONAR) 2020. Some ships try to avoid small ports in their bid to lower operating costs.

Even though the FO complies with ISO standards, certain ship owners/operators have expressed concern that the VLSFO viscosity, stability or compatibility may not be adequate for older versions of a ship's main engines.

The Sulphur Cap 2020 serves to minimise air pollution from ships and is predicted to have significant health and environmental advantages around the world, particularly for those who live near ports and coasts. Reduced SO_x also helps in the prevention of acid rain and this benefits plants, crops and forests. If the SO_x emitted by ships remains at same levels as before the adoption of Sulphur Cap 2020, more than 570,000 premature deaths are predicted to occur between 2020 and 2025.

Changes in business plans have to be made by ship owners/operators, refiners, port state control and bunker ports to comply with the Sulphur Cap 2020 in order to prepare for a greener maritime industry. It has also accelerated the advancement of technological and infrastructural readiness in order to meet the requirements. Despite the fact that the rule focuses on the maritime industry, the effects have been extended to humans as a result of improved air quality. To ensure that the regulation is upheld by important parties, more improvement, training and regulation enforcement are required. With rising fuel prices, shippers of goods must also be prepared for an increase in freight rates which will also result in a higher selling price to the consumers. ■

REFERENCES

[1] L. Čampara, N. Hasanspahić, and S. Vujičić (2018). Overview of MARPOL ANNEX VI Regulations for Prevention of Air Pollution from Marine Diesel Engines. SHS Web of Conferences 58, 01004 (2018).

[2] H. Saraçoglu, C. Deniz and A. Kilic (2013). An Investigation on the Effects of Ship Sourced Emissions in Izmir Port, Turkey. Hindawi Publishing Corporation the Scientific World Journal Volume 2013, Article ID 218324.

[3] N. Olmer, B. Comer, B. Roy, X. Mao and D. Rutherford (2017). Greenhouse Gas Emissions from Global Shipping, 2013 – 2015. The International Council on Clean Transportation.

[4] BP Statistical Review of World Energy (2019) 68th Edition.

[5] INTERTANKO (2019), 2020 Practical Guide.

[6] Drewry Supply Chain Advisors (2018), Survey: IMO's 2020 Low Sulphur Regulations.

[7] R. Smith (2019). LNG for 2020: IMO Sulfur Limits and the LNG Alternative.

[8] https://www.opisnet.com/product/pricing/spot/global-marine-fuels-report/

[9] K. Saville (2020). Low-Sulfur Fuel Prices Plummet as IMO 2020 Transition Fades.

[10] M. Furuichi and R. Shibasaki (2015). Cascade Strategy of Container Terminals to Maximize Their Quantitative and Qualitative Capacity. International Association of Maritime Economists (IAME) 2015.

[11] Organization of the Petroleum Exporting Countries (OPEC) (2015). World Oil Outlook.

[12] https://www.dnv.com/news/fuel-oil-non-availability-report-fonar-what-you-need-to-know--159146.

[13] A. Slaughter, S. Ray, T. Shattuck (2019). International Maritime Organization (IMO) 2020 Strategies in a Non-Compliant World.

[14] https://www.worldmaritimeaffairs.com/ship-exhaust-scrubber-system-what-is-all about/#:~:text=For%20VLCCs%2C%20the%20cost%20of,million%20(say%20%244.3%20million).

[15] F. Odey and M. Lacey (2018). IMO 2020 – Short-Term Implications for The Oil Market. Schroders Commodities Team.

[16] Britannia P&I (2020). List of Jurisdictions Restricting or Banning Scrubber Wash Water Discharges.

[17] https://safety4sea.com/cm-complying-with-the-2020-sulphur-cap-challenging-issues/

[18] S. Santamoto (2019). LNG for Maritime Transport. Challenges and Prospects.

[19] A. Halffa, L. Younesb, T. Boersmaa (2019). The Likely Implications of the New IMO Standards on the Shipping Industry.

[20] I. Short (2019). IMO 2020 Creates Legal Stress Points.

[21] IMO Marine Environment Protection Committee (MEPC) (2016)

[22] Y. Zhang, S.D. Eastham, A.K.H. Lau, J.C.H. Fung and N.E Selin (2021). Global Air Quality And Health Impacts Of Domestic And International Shipping.

[23] K.Q. Bui (2017). Selecting Technological Alternatives for Regulatory Compliance Towards Emissions Reduction from Shipping: An Integrated Fuzzy Multi-Criteria Decision-Making Approach Under Vague Environment.

[24] https://www.imo.org/en/OurWork/Environment/Pages/Air-Pollution.aspx.

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Maritime Autonomous Surface Ships in the Context of Malaysia

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The global market for Maritime Autonomous Surface Ships (MASS), according to *Markets and Markets*, is predicted to grow at a compound annual growth rate of 9.3%, from an estimated value of US$5.8 billion (RM25.7 billion) in 2020 to a projected value of US$14.2 billion by 2030. According to European Maritime Safety Agency (EMSA), the Maritime Safety Committee of the International Maritime Organisation (IMO) started talking about automated ships in 1964. A practical application of some of the answers to MASS is now possible, thanks to new technological advancements in the fields of information technology, digitisation and machine learning, particularly those backed by research financed by the European Union.

MASS, which need minimal human assistance, are remotely controlled unmanned vessels that travel on the surface of the water, similar to robotics machinery. MASS can operate at sea continuously without exhaustion although humans cannot endure working non-stop for 24 hours each day. Without the need to worry about crew safety, MASS can also be used in risky and challenging environments.

MASS are recognised increasingly for use for several types of tasks such as cleaning up spilled oil, cargo shipment and fishing. MASS have the potential to have "revolutionary" effects on environmental, ethical, technical, economic and societal factors. This presents opportunities and fresh new ideas that can enhance logistics; as a result, it will enhance the total environmental impact of transportation. As a logical outcome, MASS will also need to be addressed from a regulatory perspective. Regulations have traditionally offered a safety barrier but have also occasionally been known to discourage innovation because these have been written at various times.

Statistically, three-quarters of all collisions at sea are a result of human error, and existing collision avoidance technologies are still quite limited. However, collisions can be prevented with the implementation of autonomous ship maneouvering systems. MASS have numerous benefits such as removing human error, improving safety and enabling more effective ship design and fuel management (Figure 1). For instance, sailors and mariners will no longer be exposed to dangers that can result in injury or death on the high seas. Crew costs can be minimised as well. As marine shipping is responsible for roughly 3% of total global emissions, autonomous ships also have the potential to lower emissions by using lighter ships and less fuel, thus reducing the industry's global impact even as demand increases.

Today's younger generation is beginning to view seagoing occupations as undesirable. Mariners will now be able to manage autonomous vessels from shore, monitor the operations and engage in social activities. The International Chamber of Shipping (ICS) and Baltic & International Maritime Council (BIMCO) Manpower Report 2015 predict that by 2025, there will be a shortage of 150,000 seagoing officers worldwide.

Use of MASS can reduce fuel consumption. This allows for the prediction of sea conditions, which helps ship captains modify fuel consumption with the use of AI and machine learning techniques. MASS conceivably result in more effective available space and fuel usage. In a three-year research project, the Maritime Unmanned Navigation through Intelligence in Networks (MUNIN) estimated savings of over US$7 million per autonomous vehicle over a 25-year period in fuel consumption, crew supplies and salaries. In addition, autonomous ships offer considerable safety advantages because human error is responsible

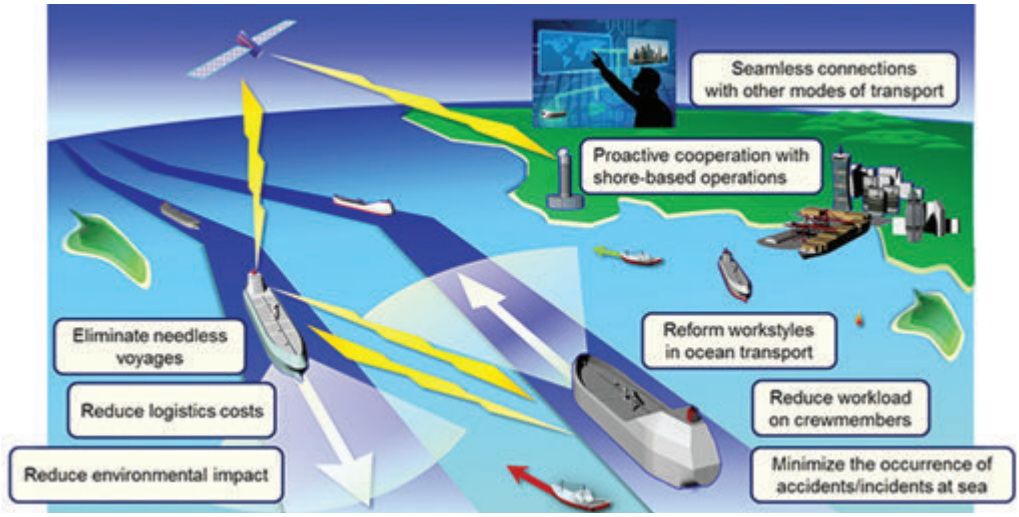

Figure 1: Illustration showing some benefits of autonomous ships (Credit: Mitsui O.S.K. Lines, Ltd.)

for 75% of maritime accidents, with fatigue and attention deficit disorder being the main contributors. Fully autonomous vessels can adopt a slow pace more easily and save on energy and fuel because, without a crew, there is no need for crew change on shore. Unnecessary elements can also be removed from the ship to reduce weight and this results in lower fuel costs and more room for cargo.

Figure 2 illustrates how 92% of the world's population are affected by air pollution. The use of MASS will potentially help reduce carbon dioxide (CO_2) emissions. Global shipping should also be taking part in the IMO emissions to reduce greenhouse-gas emissions to be at net-zero by 2050. Use of MASS assuredly assists more than air travel. Approximately 1.6 metric tonnes of CO_2 equivalents can be reduced annually by eliminating round-trip long-haul flights for the same amount of cargo. It helps to lower the percentage of polluted air. The main time autonomous ships will be maintained is when they are in port. There aren't many moving elements on the ship as its power probably comes from batteries or gas/fuel cells; this also means autonomous vessels will most likely release zero or little pollution into the air and water.

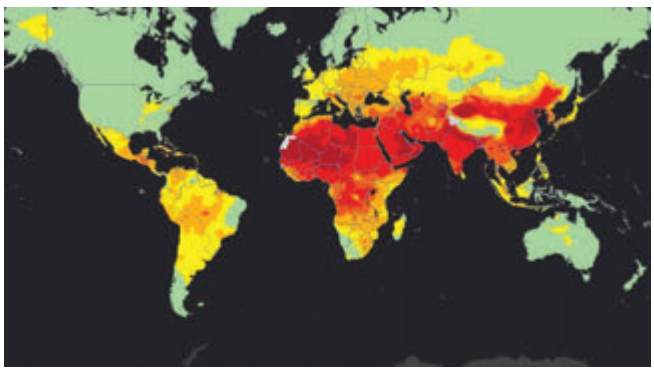

Figure 2: Polluted air affects 92% of the global population (Credit: BBC News)

Marine and aquatic life also have a high impact and influence on our country. Aquatic life such as manta ray, whale shark, dugong, barracuda, lionfish, giant moray eel, sea turtle and sea snake can be found in waters around Malaysia and MASS can contribute to aquatic life safety.

Most incidents at sea are the result of human error. A study by Allianz Global Corporate & Specialty of 15,000 claims for marine liability insurance shows that 75% of the claims are the result of human mistakes. According to EMSA, the major cause of 65% of recorded incidents is improper human action. Several researchers have also looked into the human-system interaction for autonomous ships and observed that the aggregate of incidents will decrease with the introduction of MASS. Malaysia should envisage this aspiration to become a role model in our region by championing MASS technology.

Figures 3 and 4 are examples of vessels that have stepped up to become autonomous ships. The Advanced Autonomous Waterborne Applications Initiative (AAWA) led by Rolls-Royce (Figure 3) is a US$25 million project funded by the Finnish Funding Agency for Technology & Innovation. The first remote-controlled ocean-going ship, according to Oskar Levander, will appear around 2025 and will become widespread by 2030. Kongsberg and YARA from Norway have also presented a wonderful example of how we will view the most widely used technology in the not-too-distant future.

In 2018, YARA Birkeland launched the world's first completely autonomous and electric cargo ship. The ship (Figure 4), named YARA Birkeland, began operations as a manned ship in 2018 to test the new vessel before control was gradually passed over to the AI system. The goal was to have remote operations in 2019 and to be completely autonomous by 2020. Since YARA Birkeland would only be travelling short distances, it would enable training for autonomous operations much easier. This was precisely the type of mission in which the first autonomous ships would be deployed.

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Figure 3: Rolls-Royce (Credit: Safety4sea.com)

Figure 4: Yara Birkeland, the world's first zero-emission container ship (Credit: offshore-energy.biz)

Countries such as China, Denmark, Norway, Finland, Japan, the Republic of Korea, the Netherlands and Singapore have formed a network to overcome issues and to align requirements for the trials and operations of developing MASS. The goal is to make MASS trials more similar to international shipping by validating proposed norms and circumstances for MASS trials, as well as the accessibility of port-based technologies. This enables the network to discover and address any additional difficulty that may arise when MASS are in operation at different ports.

Based on the benefits and examples given, the development of unmanned or minimally supervised autonomous ships will surely have a positive impact on our region and globally. Even if autonomous navigation does not guarantee to lower the frequency of incidents directly, such technology will surely boost maritime safety. The concept of MASS has been developed into reality. Overall, MASS will bring profit and benefits to our economy.

There are also new concepts, including designs, economic feasibility assessments, adaptation to existing transportation networks and laws as well as many other challenges. These bring forward a new concept in the economics of autonomous ships and so far, only a little research has been dedicated to cost-related analysis of unmanned boats and the economic impact of emissions from autonomous ships.

As a maritime nation, Malaysia should participate in the race to be a global player that emphasises on sustainability. By focusing on the benefits of MASS which contribute to sustainable transport, engineering and development, several new reforms may be realised which will change how people can work at sea safely, economically and efficiently. Eventually, ship technology may be able to successfully and efficiently evaluate the immediate environment as well as the state of the vessel itself, thus enabling important decisions to be made based on such information. ■

REFERENCES

[1] Autonomous Ships Market Size, Share. Industry Report (2020-2030) https://www.marketsandmarkets.com/Market-Reports/autonomous-ships-market-267183224.html#:~:text=%5B262%20Pages%20Report%5D%20The%20global,9.3%25%20from%202020%20to%202030.

[2] Callum O. Briem. E-navigation. 21 September 2018. Key Advantages and Disadvantages of Ship Autonomy. Safety4sea https://safety4sea.com/key-advantages-and-disadvantages-of-ship-autonomy/

[3] Crowley. 20 March 2018. Top Five Advantages of Ocean Freight Shipping. Blog.crowley.com https://blog.crowley.com/advantages-of-ocean-shipping

[4] How will Autonomous Shipping affect the Maritime Industry. 26 October 2017. KristLawFirm. https://www.houstoninjurylawyer.com/will-autonomous-shipping-affect-maritime-industry/

[5] Javier Sánchez-Beaskoetxea, Imanol Basterretxea-Iribar, Iranzu Sotés, María de las Mercedes Machado. 2021. Human error in marine accidents: Is the crew normally to blame? ScienceDirect https://www.sciencedirect.com/science/article/pii/S2666822X21000083

[6] Mfame Team. 9 February 2021. Key Advantages of Autonomous Shipping. Mfame.guru https://mfame.guru/how-autonomous-shipping-can-change-the-maritime-industry/

[7] Pete Goldin. 2017. 10 Advantages of Autonomous Vehicles. Itsdigest https://www.itsdigest.com/10-advantages-autonomous-vehicles

[8] Polluted air affects 92% of global populations. 27 September 2016. BBC News-Health https://www.bbc.com/news/health-37483616

Control Methods for Micro AUV and ROV Underwater Vehicle

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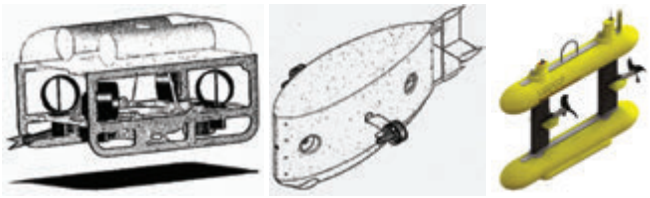
Unmanned Underwater Vehicles can be categorised into the following: Towed vehicle, Remotely Operated Vehicle (ROV) and Autonomous Underwater Vehicle (AUV). In this paper, we will focus on the review of Micro AUV and ROV technologies. AUV and ROV are almost identical in nature and the major difference lies in the automation of the two vehicles.

Autonomous Underwater Vehicle

AUVs come in different shapes as shown in Figure 1 such as ODYSSEY IV class (Desset, Damus, Hover, Morash, & Polidoro, 2005), SQX-1 (Shea, Riggs, Bachmayer, & Williams, 2009) and KOS ROV (Gomes *et al.,* 2005).



(a) (b) (c)

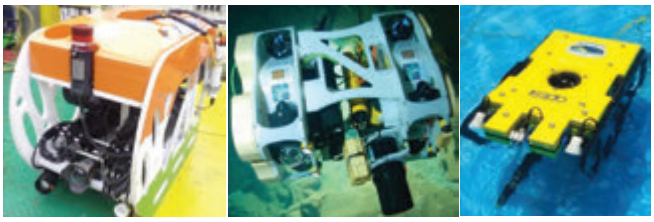
Figure 1: AUV prototypes (a) KOS ROV (Gomes et al., 2005) (b) ODYSSEY IV (Desset et al., 2005) (c) SQX-1 (Shea et al., 2009)

Remotely Operated Vehicle

There are many ROVs design configurations which have been developed such as PROVe (Vedachalam *et al.,* 2015), Ulysse ROV (Lasbouygues *et al.,* 2017) and Kaxan ROV (García-Valdovinos *et al.,* 2014) as shown in Figure 2.

Control Methods for AUV and ROV

There are multiple control techniques for underwater robots such as PID control, optimal control, sliding mode control, time delay control, adaptive control, back-stepping



(a) (b) (c)

Figure 2: UUV prototype (a) PROVe (Vedachalam et al., 2015) (b) Ulysse ROV (Lasbouygues et al., 2017) (c) Kaxan ROV (García-Valdovinos et al., 2014)

control and intelligent control. Each technique has both advantages and disadvantages.

Proportional-Integral-Derivative (PID) Control: PID control is the most used feedback control in process control (Åström, 2002). A PID controller minimises the process errors by providing a control signal depending on the present value, past value and possible future value of the error. Nonetheless, an accurate mathematical model of the AUV needs to be established for accurate controller signals. The determination of the controller parameters can be solved by applying fuzzy control law to tune the parameters of the PID controller based on feedback information of the position error and change of the position error (Hu *et al.,* 2013), among others.

Optimal Control: An optimal controller requires a linear dynamic model of an AUV, similar to a PID controller but is able to provide a minimum performance index (Dorf & Bishop, 2011). There are 3 types of optimal control: Linear Quadratic Regulator (LQR), H-2 and H-infinity controllers. LQR control strategy optimises the motion energy of AUV to stabilise the AUV position and reduce energy consumption. H-2 optimal control is the formulation of linear quadratic Gaussian control as a system of 2-norm optimisation and can be generalised to include frequency-

domain performance specification for robustness to disturbance. H-infinity translates the underwater robot control problem into an H-infinity optimisation problem. The H-infinity norm related to the transfer function between the performance output and disturbance inputs is then minimised by the H-infinity controller which shows robust stability.

Back-stepping Control: Back-stepping is a repetitive design procedure to systematically establish feedback control laws with its associated Lyapunov functions which are widely used, especially for under-actuated AUV (Lapierre, 2009). One drawback is the difficulty in obtaining an accurate modelling of AUV with nonlinear structure and uncertain parameters.

Adaptive Control: An adaptive controller uses predefined parameter adaptation laws to alter the controller parameters according to the pertaining uncertainties and has been used in many underwater robot tracking control problems (Antonelli, Caccavale, Chiaverini, & Fusco, 2003; Z. Li, Yang, Ding, Bogdan, & Ge, 2012; Sahu & Subudhi, 2014). An underwater robot with complicated dynamics requires adaptive control with intensive real-time computing capacity. This can be overcome by using the gravity regressor in the controller to compensate for the uncertain gravitational and buoyance force.

Intelligent Control: Intelligent control does not require a precise AUV and ROV vehicle mathematical model. Fuzzy logic controller, neural network controller and combined neuro fuzzy logic control are some of the intelligent control techniques (Nag, Patel, & Akbar, 2013; Van De Ven, Flanagan, & Toal, 2005; L.-J. Zhang, Qi, Zhao, Jia, & Pang, 2011).

Fuzzy logic controller is a rule-based system where normally the input is the position error and velocity (M. A. Salim, Noordin, & Jahari, 2010). However, the fuzzy logic control design is made complicated because of the trial-and-error method based on human knowledge in obtaining the fuzzy rules. Furthermore, the stability and robustness of the fuzzy logic controller are difficult to analyse because of the linguistic expressions.

A neural network controller is able to estimate various mathematical functions especially high nonlinear functions. Neural network controller can be computationally intensive and time-consuming.

Neuro fuzzy controller provides an interesting mix of techniques. J.S. Wang & Lee (2003) developed a self-adaptive recurrent neuro-fuzzy control system for AUV. For better function approximation, the fuzzy basis functions are incorporated with the multi-layered network structure.

Sliding Mode Control (SMC): Sliding modes phenomenon may appear in a dynamic system governed by ordinary differential equations with discontinuous right-hand sides (Utkin *et al.,* 2009). SMC is fundamentally the outcome of variable structure control systems. The control signal drives the system state error towards a specified surface called a sliding surface and maintains the trajectory of the system state error on this surface. The advantage of this controller is its finite-time convergence. Once in a sliding plane, the order of error dynamic will be reduced (Shtessel *et al.,* 2014).

In an ideal sliding motion, there is a high-frequency switching between 2 different control laws as the system state error trajectory repeatedly cross the sliding surface (Edward & Spurgeon, 1998). However, the "zigzag" motion on the sliding surface causes chattering, resulting in wear and tear to the thrusters and degrades the thruster performance. Some researchers use saturation function and hyperbolic tangent function to avoid chattering by changing the dynamics in a small vicinity of the discontinuity surface (Guo *et al.,* 2003).

A second-order SMC controller has been proposed by García-Valdovinos *et al.* (2014) for ROV position tracking. Hosseini and Seyedtabaii (2016) used for ROV path following. Deng and Ge (2013) used for depth and heading control of a 2 DOF ROV. The second-order SMC controller can lead to continuous control signal without involving any smoothing function. However, this controller converges to zero in longer time than a conventional SMC controller.

Time Delay Control (TDC): TDC control is another robust controller used for many underwater applications. It is a relatively new technique in which a continuous signal over a short time is assumed to be the same. Therefore, the controller can directly use past observations of uncertainties and disturbances. Even in the presence of sensor noise and ocean current disturbance, good performance can be achieved by using a TDC controller (Park, Cho, & Lee, 2009; Prasanth Kumar, Dasgupta, & Kumar, 2007).

In general, a TDC controller consists of a time delay estimator and a linear controller. A time delay estimator estimates the underwater vehicle's unknown dynamic and unexpected disturbances by using the feedback of delayed accelerations and control inputs while the linear controller converges the tracking error to zero. The TDC controller is highly robust against modelling error, parameter variation, and disturbance because it does not use any system model or disturbance model.

However, Xu & Yang (2011) proposed an improved TDC controller with reduced sensitivity to the delay time by changing the direct estimate items and using present acceleration data instead of delayed one. Kim *et.al* (2016) added the integral SMC to the TDC to improve its performance when the data acquisition is at a slow rate. A hyperbolic tangent is used to reduce the chattering phenomenon.

Comparison of Control Methods

The advantages and disadvantages of the underwater control methods are summarised in Table 1.

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Table 1: Advantages and disadvantages of various control method used in underwater environment

Control Method	Advantages	Disadvantages
PID	• Simple control structure • Easy to implement	• Requires linearised model • Depends on model accuracy • Not robust to disturbances
Optimal	• Easily solved using numerical method • Optimal with respect to the designed cost function	• Requires linearised model • Need appropriate choice for the weighing function
Backstepping	• Nonlinear control	• Produces a speed jump in the control signal • Depends on model accuracy
Adaptive	• Require little knowledge about the model • Can adapt to the changes of disturbances and parameters	• Computationally intensive • Poor transient performance • Cannot solve unstructured uncertainties
Intelligent	• Robust to parameter uncertainties, model nonlinearities, and external disturbance	• Computationally intensive • Require large effort on parameter tuning
SMC	• Reduced order compensated dynamics • Robust to parameter uncertainties, model nonlinearities, and external disturbance	• Chattering effect exist is the control signal • Requires upper bound of uncertain parameters and disturbances
TDC	• Simple gain selection procedure • Robust to parameter uncertainties, model nonlinearities, and external disturbance	• Unable to eliminate estimation error that arises due to introduced delay • Oscillations exist in the control signal
Robust filter	• Time invariant • Robust to patameter uncertainties, model nonlinearitie, and external disturbance	• Requires large initial force

Conclusion

There are many available control methods for underwater vehicles including AUV or ROV. The selection of the optimal control method will depend on the type of application, the environment in which the AUV or ROV will operate and whether there will be a certain level of intelligent control in the application. The aim of the control laws utilised is to improve efficiency and completion of the objectives, including efficient power consumption. A viable utilisation will also be affected by the hardware constraints on-board the underwater vehicle and the intensity of computation needed. Some control applications will also require the use of multi-objective control methods and fault-tolerant element. ■

REFERENCES

[1] Shea, D., Riggs, N., Bachmayer, R., & Williams, C. (2009). Prototype development of the SQX-1 autonomous underwater vehicle. OCEANS '09 IEEE Bremen: Balancing Technology with Future Needs, 1–5. https://doi.org/10.1109/OCEANSE.2009.5278141

[2] Gomes, R. M. F., Sousa, A., Fraga, S. L., Martins, A., Sousa, J. B., & Pereira, F. L. (2005). A new ROV design: Issues on low drag and mechanical symmetry. Oceans 2005 - Europe, 2, 957–962. https://doi.org/10.1109/OCEANSE.2005.1513186

[3] García-Valdovinos, L. G., Salgado-Jiménez, T., Bandala-Sánchez, M., Nava-Balanzar, L., Hernández-Alvarado, R., & Cruz-Ledesma, J. A. (2014). Modelling, Design and Robust Control of a Remotely Operated Underwater Vehicle. International Journal of Advanced Robotic Systems, 11(1). https://doi.org/10.5772/56810

[4] Dorf, R. C., & Bishop, R. H. (2011). Modern Control System Book.

[5] Lapierre, L. (2009). Robust diving control of an AUV. Ocean Engineering, 36(1), 92–104. https://doi.org/10.1016/j.oceaneng.2008.10.006

[6] Antonelli, G., Caccavale, F., Chiaverini, S., & Fusco, G. (2003). A novel adaptive control law for underwater vehicles. IEEE Transactions on Control Systems Technology, 11(2), 221–232. https://doi.org/10.1109/TCST.2003.809244

[7] Li, Z., Yang, C., Ding, N., Bogdan, S., & Ge, T. (2012). Robust adaptive motion control for underwater remotely operated vehicles with velocity constraints. International Journal of Control, Automation and Systems, 10(2), 421–429. https://doi.org/10.1007/s12555-012-0222-y

[8] Sahu, B. K., & Subudhi, B. (2014). Adaptive tracking control of an autonomous underwater vehicle. International Journal of Automation and Computing, 11(3), 299–307. https://doi.org/10.1007/s11633-014-0792-7

[9] Nag, A., Patel, S. S., & Akbar, S. A. (2013). Fuzzy logic based depth control of an autonomous underwater vehicle. Proceedings - 2013 IEEE International Multi Conference on Automation, Computing, Control, Communication and Compressed Sensing, IMac4s 2013, 117–123. https://doi.org/10.1109/iMac4s.2013.6526393

[10] Van De Ven, P. W. J., Flanagan, C., & Toal, D. (2005). Neural network control of underwater vehicles. Engineering Applications of Artificial Intelligence, 18(5), 533–547. https://doi.org/10.1016/j.engappai.2004.12.004

[11] Zhang, L.-J., Qi, X., Zhao, J.-M., Jia, H.-M., & Pang, Y.-J. (2011). DRFNN-adaptive output feedback controller for depth tracking of AUV. Proceedings of the 30th Chinese Control Conference, CCC 2011, 272–277.

[12] Salim, M. A., Noordin, A., & Jahari, A. N. (2010). A robust of fuzzy logic and proportional derivative control system for monitoring underwater vehicles. 2nd International Conference on Computer Research and Development, ICCRD 2010, 849–853. https://doi.org/10.1109/ICCRD.2010.187

[13] Wang, J. S., & Lee, C. S. G. (2003). Self-adaptive recurrent neuro-fuzzy control of an autonomous underwater vehicle. IEEE Transactions on Robotics and Automation, 19(2), 283–295. https://doi.org/10.1109/TRA.2003.808865

[14] Vedachalam, N., Ramesh, S., Subramanian, A. N., Sathianarayanan, D., Ramesh, R., Harikrishnan, G., … Atmanand, M. A. (2015). Design and Development of Remotely Operated Vehicle for Shallow Waters and Polar Research. 2015 IEEE Underwater Technology, UT 2015, 1–5. https://doi.org/10.1109/UT.2015.7108319

[15] Lasbouygues, A., Louis, S., Ropars, B., Rossi, L., & Andreu, D. (2017). Robotic Mapping of a Karst Aquifer ⋆. IFAC: International Federation of Automatic Control, Jul 2017, 2438–2442.

[16] Vadim Utkin, Juergen Guldner, J. S. (2009). Sliding Mode Control in Electro-Mechanical System (2nd ed.). Taylor & Francis Ltd , Vol.8(4-5), pp.451-473. https://doi.org/https://doi.org/10.1201/9781420065619

[17] Shtessel, Y., Edwards, C., Fridman, L., & Levant, A. (2014). Sliding Mode Control and Observation (1st ed.). New York, USA: Birkhauser, pp. 1-40: Springer. https://doi.org/10.1007/978-0-8176-4893-0

[18] Edward, C., & Spurgeon, S. (1998). Sliding Mode Control: Theory and Application (1st ed.). CRC Press, pp. 6-10.

[19] Guo, J., Chiu, F.-C., & Huang, C.-C. (2003). Design of a Sliding Mode Fuzzy Controller for the Guidance and Control of an Autonomous Underwater Vehicle. Ocean Engineering, 30(16), 2137–2155. https://doi.org/10.1016/S0029-8018(03)00048-9

[20] Hosseini, M., & Seyedtabaii, S. (2016). Robust ROV Path Following Considering Disturbance and Measurement Error using Data Fusion. Applied Ocean Research, 54, 67–72. https://doi.org/10.1016/J.APOR.2015.10.009

[21] Deng, C. N., & Ge, T. (2013). Depth and Heading Control of a Two DOF Underwater System Using a Model-free High Order Sliding Controller with Transient Process. Proceedings - 2013 5th Conference on Measuring Technology and Mechatronics Automation, ICMTMA 2013, 423–426. https://doi.org/10.1109/ICMTMA.2013.106

[22] Wang, Y., Gu, L., Gao, M., Jia, X., Zhou, J., Liu, J., & Zhou, D. (2013). Depth Control of Remotely Operated Vehicles Using Nonsingular Fast Terminal Sliding Mode Control Method. OCEANS 2013 MTS/IEEE, 1–6. https://doi.org/10.23919/OCEANS.2013.6740989

[23] Park, J. Y., Cho, B. H., & Lee, J. K. (2009). Trajectory-tracking control of underwater inspection robot for nuclear reactor internals using Time Delay Control. Nuclear Engineering and Design, 239(11), 2543–2550. https://doi.org/10.1016/j.nucengdes.2009.07.029

[24] Xu, J., & Yang, C. (2011). An improved time delay controller for underwater robot. 2011 IEEE International Conference on Robotics and Biomimetics, ROBIO 2011, 2307–2311. https://doi.org/10.1109/ROBIO.2011.6181642

[25] Kim, J., Joe, H., Yu, S. C., Lee, J. S., & Kim, M. (2016). Time-Delay Controller Design for Position Control of Autonomous Underwater Vehicle under Disturbances. IEEE Transactions on Industrial Electronics, 63(2), 1052–1061. https://doi.org/10.1109/TIE.2015.2477270

[26] Åström, K. J. (2002). Control System Design Lecture notes for ME 155A. Book, 333.

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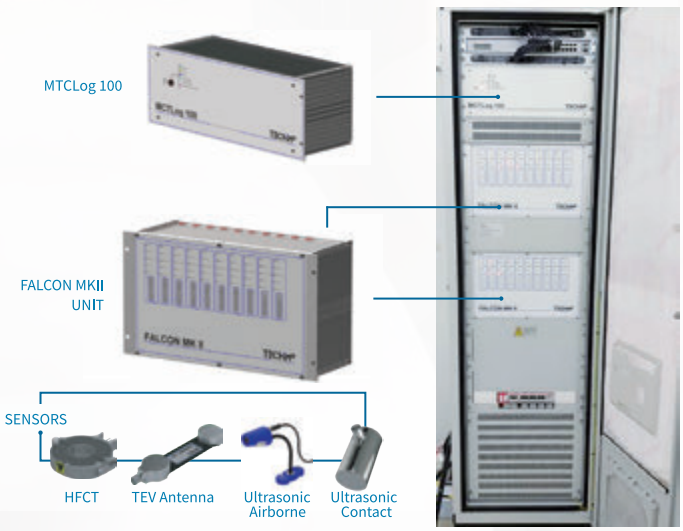

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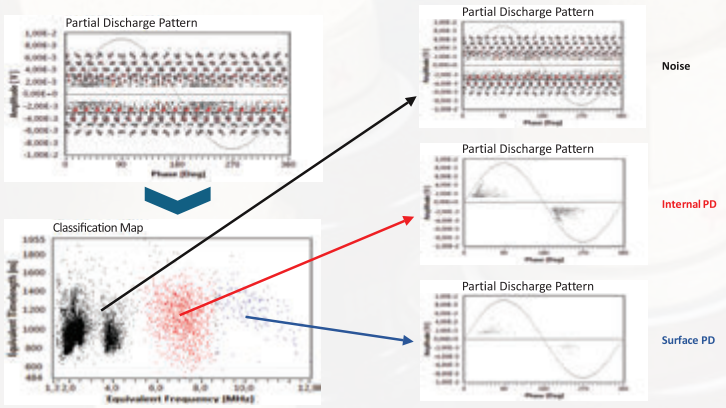

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Penang Bridges: Engineering Marvels

Written and Prepared by:

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Penang Island is physically connected to Peninsular Malaysia by two award-winning bridges, measuring 13.5km and 24km long. Both bridges were constructed and opened to traffic at different times. The first bridge opened in 1985 and, almost 30 years later, the second bridge opened in 2014. The map (Figure 1) shows the location of the 2 bridges.

Figure 1: Location of Penang Bridges

Figure 2: Sultan Abdul Halim Muadzam Shah Bridge with its double S curvy design

The first bridge connects Prai on the mainland to Gelugor on the island and is commonly known as Penang First Bridge. The second bridge is named Sultan Abdul Halim Muadzam Shah Bridge, after the 14th King and links Bandar Cassia (Batu Kawan) on the mainland and Batu Maung on the island.

Both bridges have successfully improved traffic flow and significantly contributed to the growth of industry, logistics and social economy of the Northern Economy Corridor. Innovative engineering methods such as cable-stayed design, deep piling under seabed and high damping rubber bearing have been incorporated into the construction of the bridges to enable them to withstand earthquakes measuring up to 7.5 on the Richter Scale.

Figure 3: Scenic view of Penang bridge at dusk

The design of Sultan Abdul Halim Muadzam Shah Bridge is based on the double S curve for geological reasons. The S curves are also meant to keep motorists alert, avoid over-speeding and eliminate accidents. The S curves are well illustrated in Figure 2 while the important engineering parameters of both bridges are shown in Table 1.

Beside foreign expertise, many local talents like the late Tan Sri Prof. Chin Fung Kee, engineers and contractors were involved in the planning, design and construction of the bridges. Penangites take immense pride in the bridges which are, indeed, engineering marvels. The two iconic structures offer keen photographers the opportunity to snap beautiful evening scenes (Figure 3). ■

Table 1: Important parameters of Penang Bridges

No	Description	Penang First Bridge	Sultan Abdul Halim Muadzam Shah Bridge
1	Total length	13.5 km	24 km
2	Length above water	8.4 km	16.9 km
3	Longest span	225 m	250 m
4	Bridge clearance	33 m	30 m
5	Carriageway	3 lanes in each direction	2 lanes + 1 motorbike lane in each direction
6	Vehicle speed limit	80 km/hr	80 km/hr
7	Construction period	1982 ~ 1985	2008 ~ 2014
8	Primary designer	Malaysian Highway Authority	Malaysian Highway Authority
9	Main contractor	1. Hyundai Engineering & Construction Ltd 2. United Engineer Malaysia Bhd (UEM)	1. China Harbour Engineering Co Ltd. 2. United Engineer Malaysia Bhd. (UEM)
10	Estimated total cost	RM 2 billion	RM 4.5 billion

Technical Introduction to Modelling of Autonomous Surface Vehicles (Boats/Ships) via Artificial Intelligence

Written and Prepared by:

Ir. Ts. Abdul Malik Hussein bin Abdul Jalil

On 24 February 2022, the Marine Engineering & Naval Architecture Technical Division (MNATD) organised a webinar titled A Technical Introduction to the Modelling of Autonomous Surface Vehicles (Boats/Ships) via Artificial Intelligence. The speaker was Assoc. Prof. Dr Ahmad Faisal bin Mohamad Ayob, Associate Professor & Managing Director of Virtual Simulator Group (VSG) at the Faculty of Ocean Engineering & Informatics, University Malaysia Terengganu (UMT), Malaysia. He specialises in Condition-Based Monitoring, Naval Architecture and Intelligent Systems and is currently building a boat simulator under VSG Labs Sdn. Bhd., a UMT start-up company.

The objectives of the talk were to describe the concepts of autonomous transportation and to discuss some technological implementations as well as the advantages and constraints of such implementations for various applications.

Assoc. Prof. Dr Ahmad Faisal began by stating the primary motivation for autonomous transportation and showed a short video demonstration of Roboat by MIT. This initiative was motivated by implementing Low Carbon Shipping regulations in 1992 by UNFCCC, followed by the Kyoto Protocol (1997-2005) and the Paris Agreement (2016). The International Maritime Organisation aims to reduce greenhouse gas emissions from shipping by at least 50% in 2050, compared to the 2008 levels and to phase this out as soon as possible, emphasising a target of zero emissions. Figure 1 shows the typical operational lifespan of ships of 20-30 years.

The different propulsion designs were further described to allow alternative profiles and power sources from engine-centric to software-centric soon. The top reasons for selecting the electrification of ships were further shown based on a survey conducted by Wartsila. The result showed that a significant factor influencing this was the flexibility of the propulsion system. The functions of a digital twin were also further described, a virtual representation of an asset used from early design through building and operation, maintained and easily assessable throughout its life-cycle.

The use of autonomous tugboats by ABB & Keppel at the Port of Singapore was also mentioned. The speaker then described the importance of a data-driven approach in maintenance planning and operations and its advantages over conventional planned maintenance records. Besides creating new job opportunities, the digitally-driven fleet management will allow expert insights, round-the-clock operational support and dynamic maintenance planning. (See Figure 2).

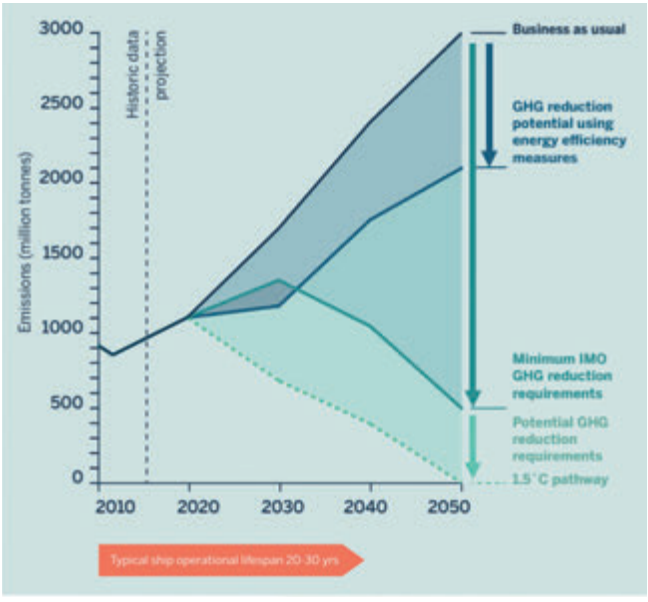

Figure 1: Typical ship operational lifespan for 20-30 years

Assoc. Prof. Dr Ahmad Faisal then talked about autonomous technology by providing a short demo on marine autonomous surface ships and mobile robots. The concept of autonomous technology was presented. As shown in Figure 3, the process starts with the environment in which the autonomous flow will occur. These will be

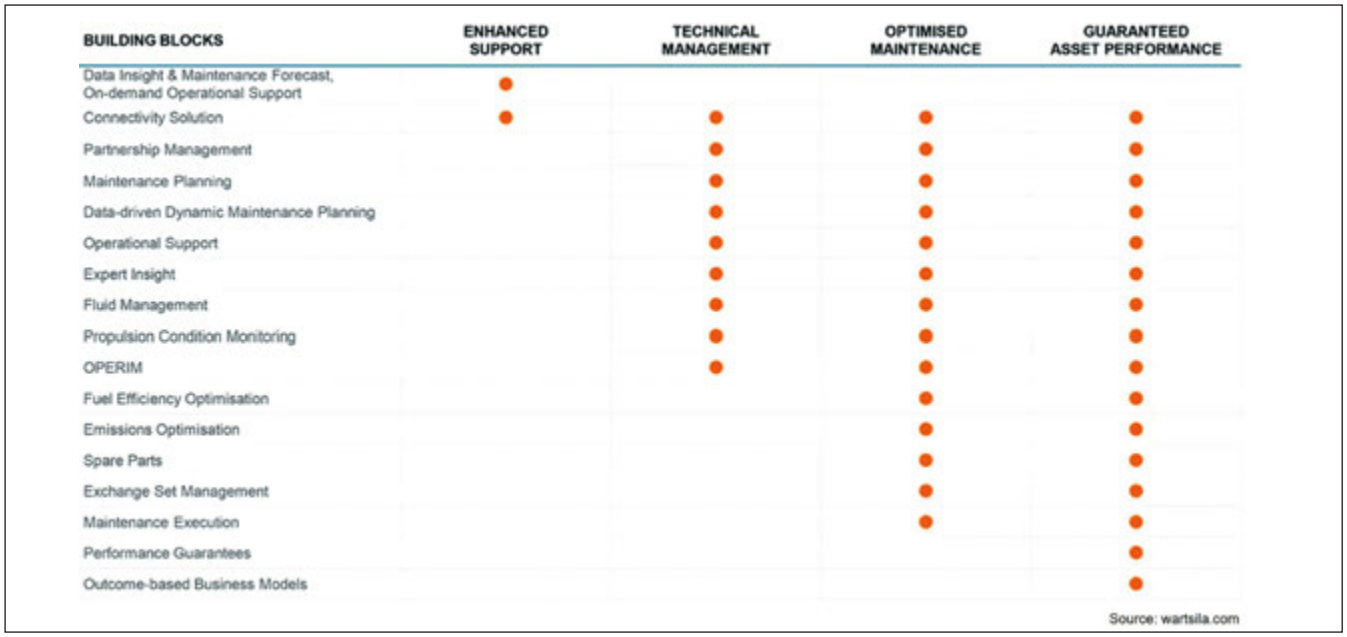

Figure 2: Data-driven fleet management

input to the sensors where the domain will be detected and programmed. Then a genetic algorithm will be placed to process the sensors' action output, such as distance sensor, velocity, etc.

Following this, the output of the genetic algorithm will then be processed by an action input agent such as the steering throttle, which will send signals to the actuators to manoeuvre the vessel. This will be a continuous loop until the destination is reached and achieved.

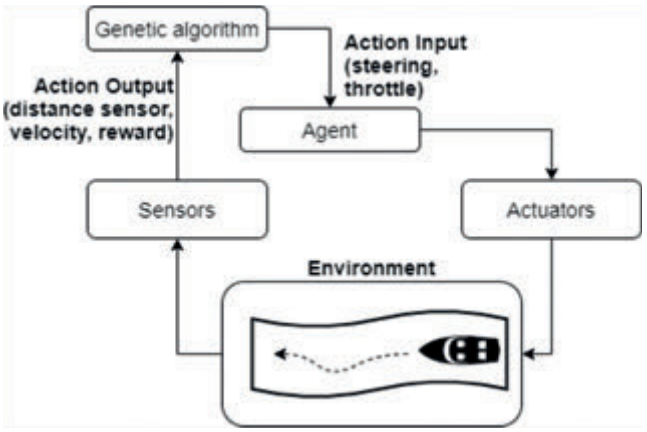

Figure 3: Concept of autonomous technology

Assoc. Prof. Dr Ahmad Faisal also touched on various notable works of literature that can be found in autonomous cars versus autonomous ships. The methodology of ship control using neuroevolution was further described; these consisted of the basics of genetics algorithms, description of agents, and description of tracks. He concluded the demo by showing the actual movements of a vessel through a prescribed route and a discussion on humans vs. robots in manoeuvring situations.

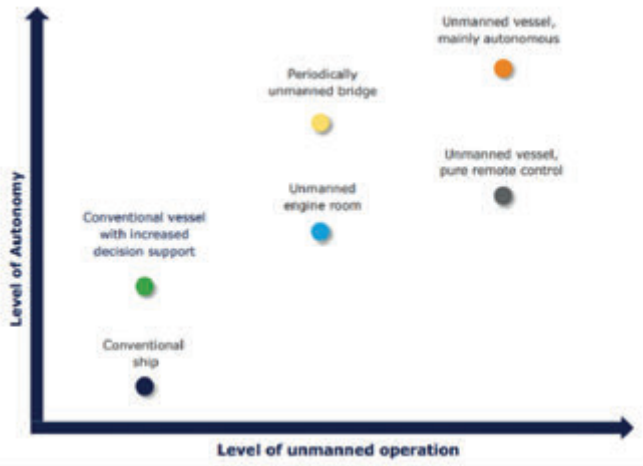

Figure 4: Level of autonomy vs. level of unmanned operation

Figure 4 shows the level of autonomy vs unmanned operation. Autonomous is not equal to totally unmanned. The human presence is required to periodically monitor the autonomous technology and to ensure it is functioning properly. A remote shore-based control centre is necessary to transmit data via satellite when the vessel is in operation. The movement and full autonomy of the ship can be monitored and altered as required. Assoc. Prof. Dr Ahmad Faisal then concluded the talk by describing the role of the International Maritime Organisation on liabilities and maritime regulations on the safe handling of ships and regulatory framework and aspects of moving forward in applying autonomous shipping technology. ■

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#1

1st Malaysia Marine Industry Conference

Written and Prepared by:

Ir. Ts. Abdul Malik Hussein bin Abdul Jalil

The Marine Engineering & Naval Architecture Technical Division (MNATD) organised the 1st Malaysia Marine Industry Conference 2022 (MMIC 2022) recently, with the theme Bridging The Government, Industry & Academia Towards Developing Indigenous Marine Technology. The organising Chairman was Rear Admiral Datuk Ir. Ts. Mohd Shaiful Adli Chung bin Abdullah.

Figure 1: Opening speech by IEM Vice President, First Admiral Dato' Ir. Hj. Ahmad Murad bin Hj. Omar

Recognising that there was a gap between the industry and academia, especially in developing indigenous products, the conference was aimed at creating a platform where the industry and academia could come together to discuss irregularities, challenges and ways forward to promote this collaboration. Besides networking, participants looked forward to listening to and exchanging new ideas by policymakers, the industry and academia to further enhance their presence in the shipbuilding and shiprepair industry in Malaysia.

The event started with an opening speech by the Vice President of The Institution of Engineers Malaysia (IEM), Y.Bhg. First Admiral Dato' Ir. Hj. Ahmad Murad bin Hj. Omar (Figure 1), followed by a keynote speech delivered by the Deputy Chief of Navy, Y.Bhg. Vice Admiral Dato' Abdul Rahman bin Hj. Ayob (Figure 2) and subsequently to officially open the conference (Figure 3).

MMIC 2022 had made a mark in history as, for the first time, the conference gathered major local industry players, government agencies such as the Ministry of International

Figure 2: Vice Admiral Dato' Abdul Rahman bin Hj. Ayob, the Deputy Chief of Navy of Royal Malaysia Navy (RMN), delivering the keynote address

Figure 3: Vice Admiral Dato' Abdul Rahman bin Hj. Ayob receiving a token of appreciation from First Admiral Dato' Ir. Hj. Ahmad Murad bin Hj. Omar

Figure 4: The VIPs at the mini exhibition

Trade and Industry (MITI), Ministry of Science, Technology & Innovation (MOSTI), Marine Department, Science & Technology Research Institute for Defence (STRIDE), Royal Malaysian Navy (RMN) and academic experts from local universities including University Technology Malaysia (UTM), Universiti Pertahanan Nasional Malaysia (UPNM), University Kuala Lumpur (UniKL), University Malaya (UM) and University Malaysia Terengganu (UMT). Although the conference was held on a small-scale with around 150 participants, it was attended by almost all major players in the industry. It acted as a kickstarter for stakeholders to discuss the challenges, opportunities and action plans to ensure the maritime industry in the country would stay competitive and be able to expand, including developing the capability to enter the market in ASEAN nations (Figure 4 and Figure 5).

MMIC 2022 was divided into four main categories with different sub-themes.

1. The first category was for government agencies and policymakers. The presenters were from MITI, Akademi Sains Malaysia (ASM) and the Marine Department.
2. The second category was from related shipbuilding and shiprepair industry, with the sub-theme of promoting the use of indigenous products in the industry. The presenters were from the Association of Marine Industries of Malaysia (AMIM), Sarawak Association of Maritime Industries (SAMIN), Technology Park Malaysia (TPM) and Bureau Veritas (BV).
3. The third category was from academia with the sub-theme of nurturing academia and industry collaboration and had presenters from UTM, UniKL (MIMET), UMT and UPNM.
4. The fourth category, with the sub-theme of utilising indigenous products through relevant industry collaboration, had presenters from RMN and STRIDE.

Relevant issues were brought forward for discussion. Questions were presented to the speakers via the moderators, who ensured the conference progressed smoothly in an orderly manner.

Lastly, I would like to thank the organising chairman, Rear Admiral Datuk Ir. Ts. Mohd Shaiful Adli Chung, and fellow committee members for their efforts in organising MMIC 2022 as well as all sponsors and participants who helped make MMIC 2022 a success. We look forward to engaging with all stakeholders at the next conference. ■

Figure 5: The delegates paying full attention at the conference

INTI Engineering Design Project: Poster Presentation Day

Written and Prepared by:

Ir. Ts. Gerald Victor

On 6 April 2022, INTI International University's Mechanical Engineering Department organised a Mechanical Engineering poster presentation programme involving 28 Year 3 students.

The project was a 2-semester capstone module from August 2021 to April 2022 and was done in collaboration with YDT Automation Sdn. Bhd. (Figure 1). The Managing Director of YDT (Figure 2), Mr. Chan Wah Biao, was a former student of INTI who had previously also enrolled in the same programme which involved the design and building of an Automated Guided Vehicle (AGV) that can self-charge, lift and transfer package loads for use in warehouses. The students, working in 7 teams, applied their mechanical, electronics and programming knowledge to design, analyse and construct a prototype for the intended functions.

Figure 1: INTI students on a visit to YDT Automation Sdn. Bhd. in Shah Alam

Figure 2: Mr. Chan receiving a token of appreciation from Dr Chan Siew Chong, Dean of INTI Faculty of Engineering & Quantity Surveying

Figure 3: Group photo at the end of the poster presentation

The students were commended for having demonstrated their commitment to the project (Figure 3). ■

CONGRATULATIONS

Congratulations to following members on their respective conferments by Tuan Yang Terutama Yang Di Pertua Negeri Pulau Pinang on the occasion of his 73rd birthday on 9 July 2022:

Y.Bhg. Dato' Seri Ir. Haji Mohamad Zulkefly bin Sulaiman (BEM President) on being conferred the Darjah Gemilang Pangkuan Negeri (D.G.P.N).

Y.Bhg. Dato' Seri Ir. Jaseni bin Maidinsa on being conferred the Darjah Gemilang Pangkuan Negeri (D.G.P.N).

Y.Bhg. Dato' Seri Ir. Prof. Dr Kamal Nasharuddin bin Mustapha (Fellow of IEM) on being conferred Darjah Gemilang Pangkuan Negeri (D.G.P.N).

Y.Bhg. Dato' Seri Ir. Lim Kok Khong (Past Chairman IEM Penang Branch) on being conferred Darjah Gemilang Pangkuan Negeri (D.G.P.N).

Y.Bhg. Dato' Ir. Ting Chek Choon (Past Chairman IEM Penang Branch) on being conferred Darjah Setia Pangkuan Negeri (D.S.P.N).

Y.Bhg. Dato' Ir. Rajendran a/l P. Anthony on being conferred the Darjah Setia Pangkuan Negeri (D.S.P.N).

Y.Bhg. Dato' Ir. Zainuddin bin Yusoff on being conferred the Darjah Setia Pangkuan Negeri (D.S.P.N).

Y.Bhg. Dato' Ir. Kamaluddin bin Hj Ibrahim Ali on being conferred the Darjah Setia Pangkuan Negeri (D.S.P.N).

Ir. Teh Siew Yin on being conferred the Pingat Jasa Kebaktian (P.J.K).

Ir. Catherine Sim on being conferred the Pingat Jasa Kebaktian (P.J.K).

Ir. Ts. Wong Kok Nian on being conferred the Pingat Jasa Masyarakat (P.J.M).

Meet & Greet Session with Deputy Minister of Works

Written and Prepared by:

Sabah Branch

Figure 1: YB. Datuk Arthur Kurup (centre) with leaders of Sabah Engineers NGOs, Ir. Tan Koh Yon (SEA, 2nd from left) and Ir. Willy Chin (IEM) and Ir. Razalie Sindong (ACEM) flanking Datuk Arthur

Three engineering associations – Association of Consulting Engineers Malaysia (ACEM Sabah Branch), Sabah Engineers Association (SEA) and The Institution of Engineers Malaysia (IEM Sabah Branch) – had an engagement session recently with Deputy Works Minister Datuk Arthur Kurup to exchange ideas and plans on how to improve the economic activities of the nation, particularly the construction industry in Sabah (Figure 1).

The session at Hyatt Regency started with an introduction of the associations and their roles. This was followed by Datuk Arthur talking about the broader perspectives of his ministry's scope in the construction industry.

Noting the chain reaction effects and the economic values carried throughout the supply chain, Datuk Arthur stressed on the importance of the industry to the nation, especially now that neighbouring Indonesia will be relocating its capital city from Jakarta to Nusantara in Kalimantan.

As both Sabah and Sarawak are located on the island of Borneo together with Kalimantan, Malaysia has to catch up and be infrastructure ready to re-ignite and spur growth for the nation.

The three engineering associations thanked Datuk Arthur for giving them the opportunity to voice out their members' feedbacks and opinions on improving Sabah's economic competitiveness.

The associations will be training more skilled and competent engineering personnel for road infrastructural work for the remainder of the Pan-Borneo Highway packages in Sabah which will be implemented in future.

All three associations pledged to continue to upscale their services and to bring confidence to engineering professionalism in the state. ■

Tarikh: 13 Julai 2022

Kepada Semua Ahli,

SENARAI CALON-CALON YANG LAYAK MENDUDUKI TEMUDUGA PROFESIONAL TAHUN 2022

Berikut adalah senarai calon yang layak untuk menduduki Temuduga Profesional bagi tahun 2022.

Mengikut Undang-Undang Kecil IEM, Seksyen 3.8, nama-nama seperti tersenarai berikut diterbitkan sebagai calon-calon yang layak untuk menjadi Ahli Institusi, dengan syarat bahawa mereka lulus Temuduga Profesional tahun 2022.

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

Ir. Prof. Dr Zuhaina binti Zakaria
Setiausaha Kehormat, IEM

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
MANIVEL A/L ASIAH	BE HONS (USM) (CIVIL, 2000)
TAN CHEE KIAN	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2008)
KEJURUTERAAN ELEKTRIKAL	
MOHD YAZWAN BIN KASIS YASIR	BE HONS (USM) (ELECTRICAL AND ELECTRONICS, 2015)
SHAMSUL ARIFFIN BIN RAHAMAN	BE HONS (UNISEL) (ELECTRICAL, 2009)
SUZLAN BIN YUSUF	BE HONS (UTeM) (ELECTRICAL (CONTROL, INSTRUMENTATION & AUTOMATION), 2014)
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MAT NIZI BIN MAMAT	BE HONS (UiTM) (MECHANICAL, 2001)
MOHAMAD NOR AMALLIL BIN MUSTAFA	BE HONS (MALAYA) (MECHANICAL, 2015)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

Nama	Kelayakan
KEJURUTERAAN AWAM	
MOHD SHAHRUL EFFENDY BIN AHMAD	BE HONS (UTM) (CIVIL, 2008)

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97437	CHUA PENG YANG	BE (UMP) (CIVIL, 2013)
44153	LIOW SYUK CHIN	BE HONS (USM) (CIVIL, 2006)
112826	STRIPRABU A/L STRIMARI	BE HONS (UNIMAS) (CIVIL, 2012) PhD (UNIMAS) (2018)
37252	WONG BAK SHIIUN	BE HONS (UTP) (CIVIL, 2008)
43697	YIP CHUN CHIEH	BE HONS (SWINBURNE) (CIVIL, 2012) ME (UTM) (CIVIL - STRUCTURE, 2014) PhD (UTM) (2018)
113096	YONG CHIAN CHAI	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2017)
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107825	AHMAD FARIS BIN BAHRUDDIN	BE HONS (UNITEN) (ELECTRICAL POWER, 2010)
89544	HO SHUN TEN	BE HONS (UTeM) (ELECTRICAL (INDUSTRIAL POWER, 2014)
79604	OEH ZHE HAN	BE HONS (UNITEN) (ELECTRICAL POWER, 2018)
53021	SEAH EE YEN	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2015)
48635	GANESH DEVAN A/L SUBRAMANIAM	BE HONS (UTHM) (ELECTRICAL, 2013)
KEJURUTERAAN ELEKTRONIK		
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36287	DIANA BINTI CHE LAT	BE HONS (MALAYA) (CIVIL, 2007) MSc (UiTM) (CIVIL (GEOTECHNIQUE), 2013) PhD (UTM) (CIVIL, 2021)
31253	TEH ZHI HUAN	BE HONS (MALAYA) (CIVIL, 2009) ME (UTM) (CIVIL-GEOTECHNICS, 2015)
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56508	MARNI AZIRA BINTI MARKOM	BE HONS (UniMAP) (COMPUTER, 2006) MSc (UniMAP) (COMPUTER, 2009) PhD (UniMAP) (MECHATRONIC, 2018)
KEJURUTERAAN KIMIA		
108128	HEE TIT SHAN	BSc (MICHIGAN TECHNOLOGICAL) (CHEMICAL, 1992)
111794	LAU SWEE LEONG	BE HONS (UTP) (CHEMICAL, 2004)
54324	YA MOHAMMAD NAZIR SYAH BIN ISMAIL	BE HONS (UTM) (CHEMICAL - POLYMER, 2009) MPhil (UTM) (CHEMICAL, 2019)
27972	ZAIRI BIN ZAINUDDIN	BE HONS (UTM) (CHEMICAL, 2000)
KEJURUTERAAN MEKANIKAL		
116165	AFIF BIN ARIFFIN	BE HONS (UPNM) (MECHANICAL, 2014)
54038	GOH HAN JIAN	BE HONS (NOTTINGHAM) (MECHANICAL, 2007)
111172	HO YEE JIAN	BE HONS (MALAYA) (MECHANICAL, 2009)
107596	MOHAMAD MASRIHAN BIN SIBOR	BE HONS (UTM) (MECHANICAL, 2018)
52489	MOHAMMAD FAEIZ BIN ISMAIL	BE HONS (UiTM) (MECHANICAL, 2006) MSc (LOUGHBOROUGH) (LOW ENERGY BUILDING SERVICES ENGINEERING, 2016)
50205	PREMANAND A/L NANU	BE HONS (NORTHUMBRIA) (MECHANICAL, 1997)
89491	PREMKUMAR A/L VENGADASALAPATHY	BE HONS (MMU) (MECHANICAL, 2007)
115181	TAN DAI SHENQ, ADRIAN	BE HONS (SWINBURNE) (MECHANICAL, 2017)
KEJURUTERAAN MEKATRONIK		
93571	CHIA KOK SIANG	BE HONS (UTAR) (MECHATRONICS, 2011)

PERMOHONAN BARU / PERPINDAHAN MENJADI AHLI KORPORAT

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
16392	AMZAH BIN KASMURI	BSc (CALIFORNIA STATE) (ENGINEERING, 1992)
97356	MOHAMAD SHAKRI BIN MOHMAD SHARIFF	BE HONS (UiTM) (CIVIL, 2009) MSc (UiTM) (CIVIL (GEOTECHNIQUE), 2011) PhD (UiTM) (CIVIL, 2017)
KEJURUTERAAN ELEKTRIKAL		
19177	MOHD ISNARI BIN IDRIS	BE HONS (UTM) (ELECTRICAL, 1991)
KEJURUTERAAN MEKANIKAL		
49866	MOHD FAIZ BIN MOHD BOKHADI	BE HONS (UTM) (MECHANICAL, 2010)
25824	SAIFULNIZAN BIN JAMIAN	BE HONS (UKM) (MECHANICAL AND MATERIALS, 1999) MSc (UKM) (MECHANICAL AND MATERIALS, 2002) PhD (NAGOYA) (2012)

Pengumuman yang ke-165

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 Jun 2022 adalah seperti jadual di bawah:

NO.	NO. AHLI	NAMA
1	115746	MR. AHMAD NUR HADI BIN MASHOD
2	116119	MR. PETDRAL CARLOS ANAK RINGIN
3	15086	Ir. WAN THIAM HUAT
4	23635	MR. ZULFAISAL BIN MOHAMED
5	14396	Ir. PHUA FOO YONG

IEM ENGINEERING HALL OF FAME AWARD 2023

The Sub-Committee of Engineering Hall of Fame under the auspices of the Standing Committee on Professional Practice is proud to invite nominations for the IEM Engineering Hall of Fame Award 2023.

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

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

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

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

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

The closing date for receipt of nominations for IEM Engineering Hall of Fame Award is **31 October 2022**.

Please submit nominations to:

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

The nomination form can be downloaded from the IEM website at
www.myiem.org.my
For further details, kindly contact IEM Secretariat at
03-7968 4001/2

IEM AWARD FOR CONTRIBUTIONS TO THE ENGINEERING PROFESSION IN MALAYSIA 2023

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

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

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

NOMINATIONS

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

AWARD

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

The closing date for nominations is **31 October 2022**.

Please submit nominations to:

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

The nomination form can be downloaded from the IEM website at
www.myiem.org.my
For further details, kindly contact IEM Secretariat at
03-7968 4001/2

IEM OUTSTANDING ENGINEERING ACHIEVEMENT AWARD 2023

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

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

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

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

- Bridges, Tunnels, Waterways Structures, Roads
- Telecommunications of national/international character, Power Transmission and Transportation
- Dams and Power Stations
- Ports and Harbours
- Building and Structures
- Airports
- Water Supply, Waste Disposal Projects
- Military projects such as bases, launching units, harbour facilities
- Drainage, Irrigation and Flood Control Projects
- Local design and manufacture of high technology products
- Energy, Heat, Mass Transfer

- Outstanding work in engineering research and development
- Chemical processing of indigenous raw resources such as rubber, palm oil and various other local plants
- Innovative use of local engineering materials
- Outstanding contribution in engineering education
- Original discovery of useful engineering theory

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

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

The closing date for nominations is **31 October 2022**.

Please submit nominations to:

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

The nomination form can be downloaded from the IEM website at
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For further details, kindly contact IEM Secretariat at
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IEM YOUNG ENGINEER AWARD 2023

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

i) in the design and/or construction of an engineering device or system of merit; **or**

ii) in the research and development or teaching of engineering.

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

i) Registered member with the Board of Engineers, Malaysia and under 35 years of age

ii) Malaysian citizens or permanent residents of Malaysia

ii) Graduate or Corporate Members of IEM.

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

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

The closing date for nominations is **31 October 2022**.

Please submit nominations to:

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

The nomination form can be downloaded from the IEM website at
www.myiem.org.my
For further details, kindly contact IEM Secretariat at
03-7968 4001/2

IEM WOMAN ENGINEER AWARD 2023

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

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

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

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

The Award is opened to candidates who are:

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

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

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

The closing date for nominations is **31 October 2022**.

Please submit nominations to:

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

The nomination form can be downloaded from the IEM website at
www.myiem.org.my
For further details, kindly contact IEM Secretariat at
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- ☐ Management (including project/contract/equipment/service/transport district manager, clerk of works, other technical or operating manager)
- ☐ Engineering/Design (including chief engineer, chief designer, civil/highway/mechanical/planning engineer, other engineering/design title)
- ☐ Buying/Purchasing (including chief buyer, buyer, purchasing officer, other buying/purchasing title)
- ☐ Titles allied to the field (architect, consultant, surveyor, research and development professor, lecturer, supervisor, superintendent, inspector or other allied title)
- ☐ Others (please specify) _____

What type of organisation do you work in? *(Tick one box only)*

- ☐ Contractor
- ☐ Sub-contractor specialist
- ☐ Design and build contractor
- ☐ Consulting engineering/architectural/quantity surveying practice
- ☐ Mining/quarrying/aggregate production company
- ☐ Petroleum producer
- ☐ International/national authorities
- ☐ National/regional/local government
- ☐ Public utilities (electricity, gas, water, deck and harbour, other)
- ☐ Manufacturer
- ☐ Distributor/importer/agent
- ☐ Construction department of large industrial/Commercial concern
- ☐ Association/education establishment/research
- ☐ Construction equipment hire/rental company
- ☐ Project/construction management consultancy
- ☐ Others (please specify) _____

What are the main activities of your organisation? *(Tick all that apply)*

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- ☐ Roads/bridges
- ☐ Dams/reservoirs/irrigation
- ☐ Harbours/offshore structures
- ☐ Foundations/tunnels
- ☐ Pipelines/refineries
- ☐ Structures/steel work
- ☐ Building (commercial, industrial)
- ☐ Housing
- ☐ Construction management
- ☐ Deep mining

Manufacturer of:

- ☐ Construction equipment
- ☐ Cement
- ☐ Other construction materials
- ☐ Distribution
- ☐ Construction equipment
- ☐ Construction materials
- ☐ Hire/rental of construction equipment
- ☐ Design
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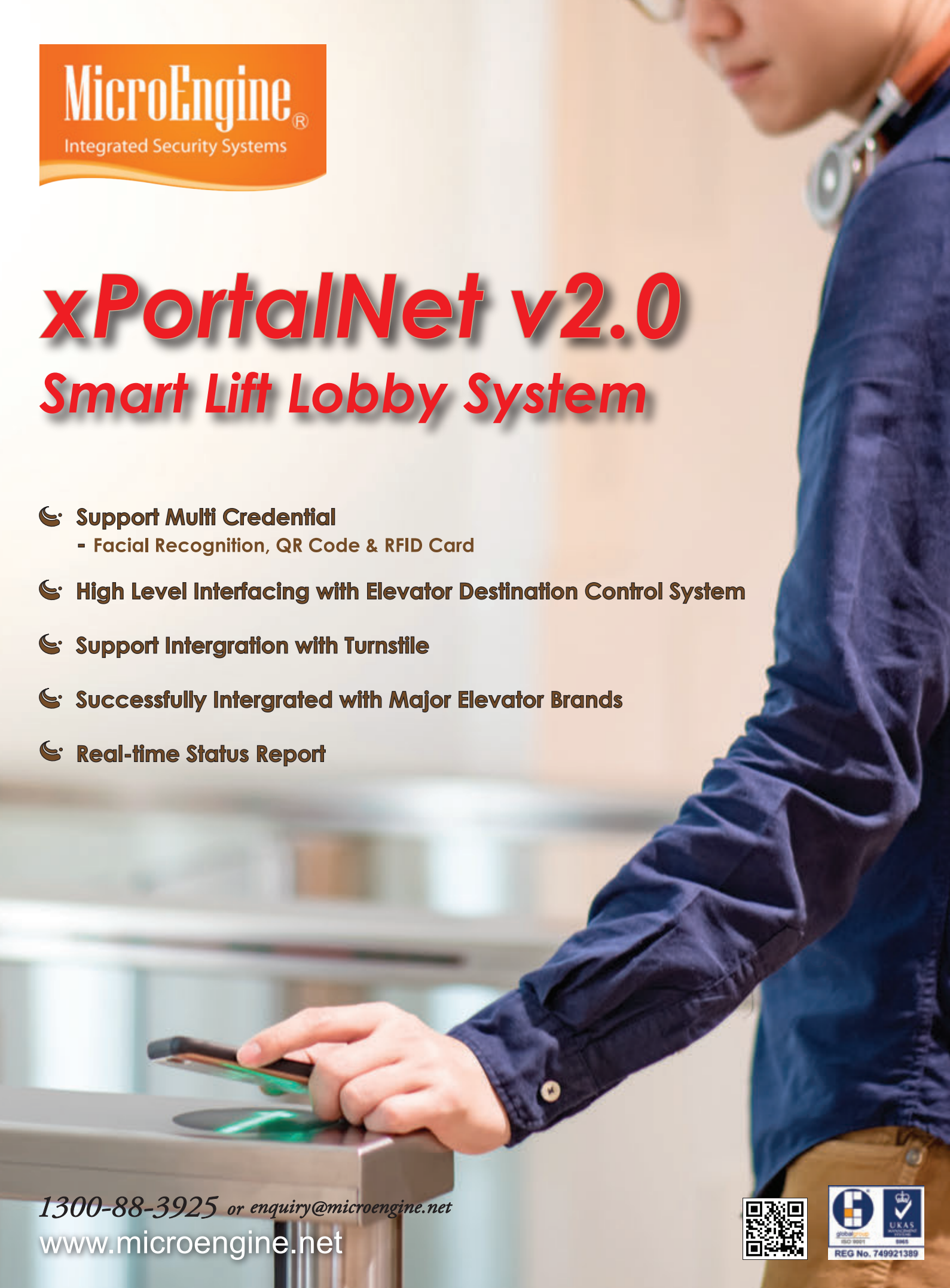

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