

THE
VOL.100
OCTOBER-DECEMBER 2024

INGENIEUR

MAGAZINE OF THE BOARD OF ENGINEERS MALAYSIA



JOURNEY TOWARDS A SMART AND SUSTAINABLE HIGHWAY OF THE FUTURE

PLUS is progressing in the development of resilient highway infrastructure by exploring new technologies and continuous innovation to enhance efficiency in serving the wellbeing and safety of highway users.

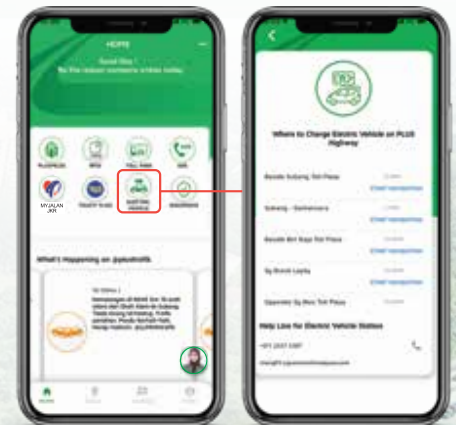


SUICIDE ATTEMPT ALERT SYSTEM

The system, equipped with AI technology cameras, is installed on the Penang Bridge to prevent suicide attempts by providing early warnings to the PLUS Traffic Monitoring Centre (TMC). The information is then relayed to the PLUSRonda team and the authorities for immediate actions.

PLUS APP

Helping highway users plan their journey, obtain emergency assistance via the SOS button and easily retrieve information regarding the PLUS Highway.



PUTRI – VIRTUAL ASSISTANT

PUTRI, Virtual Assistant, featuring language processing based on Artificial Intelligence and Machine Learning, helps users obtain information on traffic conditions, toll fares and general inquiries more quickly and accurately through digital interactions.

OVERSIZED VEHICLE DETECTION SYSTEM

The system leverages advanced LIDAR technology and Automatic Number Plate Recognition (ANPR) cameras to monitor vehicles approaching the Menora-Meru Tunnel. Specifically, it oversees traffic along the stretches from Simpang Pulai-Menora Tunnel to Changkat Jering-Meru Tunnel on the PLUS Highway with unparalleled precision and efficiency.



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2024-2025

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Lembaga Jurutera Malaysia

Tingkat 17, Ibu Pejabat JKR, Jalan Sultan Salahuddin, 50580 Kuala Lumpur.

Tel: 03-2698 0590, 03-2691 2090 Fax 03-2692 5017

e-mail: publication@bem.org.my

website: www.bem.org.my

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VOLUME
100
THE INGENIEUR

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KYODO PIPE STANDARD GALVANISED STEEL CONDUIT

BS 31 CLASS B (SCREWED) / MANUFACTURER'S STANDARD

NOMINAL SIZE	OUTSIDE DIAMETER				WALL THICKNESS				CALCULATED WEIGHT WITH COUPLER			NUMBERS OF THREADS	LENGTH OF THREADS			
	MINIMUM		MAXIMUM		MINIMUM		MAXIMUM						MINIMUM		MAXIMUM	
in	mm	in	mm	in	mm	in	mm	in	kg/m	kg/ft	lb/ft	PER INCH	mm	in	mm	in
¾	18.76	0.7387	19.05	0.7500	1.52	0.060	1.63	0.064	0.713	0.217	0.479	16	12.70	0.5000	14.29	0.5625
1	25.11	0.9887	25.40	1.0000	1.52	0.060	1.63	0.064	0.972	0.296	0.653	16	15.88	0.6259	17.46	0.6875
1¼	31.46	1.2387	31.75	1.2500	1.52	0.060	1.63	0.064	1.240	0.376	0.830	16	17.46	0.6875	19.05	0.7500
1½	37.80	1.4880	38.10	1.5000	1.73	0.068	1.83	0.072	1.680	0.511	1.130	14	19.05	0.7500	20.64	0.8125
2	50.50	1.9880	50.80	2.0000	1.93	0.076	2.03	0.080	2.510	0.765	1.690	14	22.23	0.8750	23.81	0.9375

MS 275 / BS 4568 CLASS 3 (SCREWED) / MANUFACTURER'S STANDARD

NOMINAL SIZE	OUTSIDE DIAMETER		WALL THICKNESS	CALCULATED WEIGHT WITH COUPLER		PITCH	LENGTH OF THREADS	
	MINIMUM	MAXIMUM		MINIMUM	MAXIMUM		MINIMUM	MAXIMUM
mm	mm	mm	mm	kg/m	kg/m	mm	mm	mm
20	19.7	20.0	1.6 ± 0.15	0.643	0.783	1.5	13	15
25	24.6	25.0	1.6 ± 0.15	0.811	0.995	1.5	16	18
32	31.6	32.0	1.6 ± 0.15	1.069	1.301	1.5	18	20

MS IEC 61386-1 / MS 61386-21 CONDUIT SYSTEM FOR CABLE MANAGEMENT

NOMINAL SIZE	OUTSIDE DIAMETER		INSIDE DIAMETER	EXTERNAL THREAD LENGTHS
	MINIMUM	MAXIMUM	MINIMUM	MINIMUM
mm	mm	mm	mm	mm
20	19.7	20.0	1.6 ± 0.15	13
25	24.6	25.0	1.6 ± 0.15	16
32	31.6	32.0	1.6 ± 0.15	18



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sales@kyodopipe.com
604.444.5178 (General Line)
6012.314.9968 (Sales)



Message from Minister of Works

On behalf of the Ministry of Works, I wish to extend my heartfelt congratulations to this momentous occasion of your 100th publication. As we reflect on the journey thus far, I would like to take this opportunity to commend the significant role this publication has played in disseminating knowledge and industry updates to both practising engineers and the general public.

Throughout its past issues, this magazine has consistently provided a platform for sharing innovative ideas, ground-breaking research, and the latest developments in the engineering world. It has fostered a culture of continuous learning and professional growth, ensuring that our engineering community remains at the forefront of technological advancements and sustainable solutions.

By highlighting key projects, industry challenges, and emerging trends, this publication has not only contributed to the growth of the engineering profession but has also enhanced public awareness of the critical role engineers play in nation-building. From infrastructure development to technological innovations, the knowledge shared through these pages has been instrumental in shaping the future of our country.

As we celebrate the magazine's achievements, I encourage all readers, whether seasoned professionals or the young aspiring engineering fraternity, to continue engaging with the insights it offers. Let us all remain committed to the pursuit of excellence, ensuring that our engineering efforts contribute meaningfully to the progress and prosperity of our nation.

Once again, congratulations to the entire team for their unwavering commitment to promoting engineering excellence, and I look forward to witnessing the continued success of this publication in the years to come.

YB DATO SRI ALEXANDER NANTA LINGGI

Minister of Works Malaysia





Message from BEM President

It is with immense pride and gratitude that I extend my warmest congratulations to the editorial committee and all contributors on the remarkable achievement of the publication of the 100th issue of this distinguished engineering magazine. This milestone is a testament to the hard work, dedication, and passion of everyone involved in sustaining the magazine's legacy over the years.

Since its inception, this publication has served as an essential platform for sharing knowledge, best practices, and advancements within the engineering community. The tireless efforts of the editorial team have ensured that each issue delivers valuable insights, providing engineers and industry professionals with the tools they need to stay informed and inspired. I want to acknowledge and thank all past contributors and resource persons for their unwavering commitment, without whom this success would not have been possible.

As we celebrate this landmark achievement, it is crucial to recognise the importance of keeping the magazine aligned with evolving trends and innovations, particularly as we navigate the era of the Fourth Industrial Revolution (4IR) and beyond. The rapid advancements in technology, automation, and digitalisation are reshaping industries, and it is essential for our engineers to remain ahead of the curve.

This publication has a vital role to play in not only documenting these shifts but also providing the thought leadership that will guide the future of the engineering profession. As we move forward, I have every confidence that this magazine will continue to evolve, staying abreast of global trends while remaining an indispensable resource for our engineering fraternity.

Once again, congratulations on this extraordinary milestone. I look forward to seeing the continued success and positive impact of this magazine for many years to come.

Datuk Wira Ir. Roslan bin Ismail

President

Board of Engineers Malaysia



Editorial Note:

APPRECIATION

The Editorial Board of THE INGENIEUR wishes to express its sincere gratitude to all writers, contributors, and readers for your unwavering support as we celebrate the publication of our 100th volume.

We extend a special acknowledgment to:

- Ir. Harbans Singh for his insightful contributions to the "Engineering & Law" series,
- Ms. Choo Hong Keyong for captivating readers with "Engineering Nostalgia," and
- Ms. Pang Soo Mooi for the "Do You Know" series.

Your dedication has been instrumental in our success. We look forward to your continuing support as we embark on the next 100 volumes, striving to deliver even more innovative, informative, and timely content.



CALL FOR ARTICLES

The Ingenieur is published quarterly by the Board of Engineers Malaysia. The following are the themes for the coming issues.

- Vol. 101 January-March 2025
Waste Management
- Vol. 102 April-June 2025
Digitalisation
- Vol. 103 July-Sept 2025
Maritime Engineering

Articles and other contributions relevant to the themes are welcomed, but the decision to publish rests with the Editorial Board.

Advertising inquiries are also welcomed. Please refer to the BEM advertisement on Page 41 for the latest rate card and booking form.

Congratulatory Messages



YBhg. Tan Sri Dato' Ir. Omar bin Ibrahim

I wish to offer my sincere congratulations to the BEM on reaching this milestone of the 100th volume of *The Ingenieur*.

The publication has been a valuable instrument in bringing about awareness of the progress of engineering developments in the country. Learning from the shared articles, more advanced engineering solutions can continue to be sought for future work, which would be beneficial to the country.

Keep up the good work.



YBhg. Tan Sri Dato' Ir. Zaini bin Omar

Syabas to BEM, and particularly the Editorial Board of *The Ingenieur*, for achieving this 100th volume of *The Ingenieur* publication. The magazine has served as a useful source of information to all engineers, especially professional engineers. The current updates in the engineering profession and the BEM guidelines for engineering practice have been well disseminated.

Professional engineers, particularly those in Engineering Consultancy Practice, have benefitted most from the articles in *The Ingenieur*. I sincerely hope that this will continue and request the Editorial Board to keep up the good work they have demonstrated thus far.



YBhg. Dato' Sri Ir. Dr Judin bin Abdul Karim

Congratulations on the 100th volume of *The Ingenieur*! This milestone reflects the dedication and excellence of the Board of Engineers Malaysia and its members. *The Ingenieur* has been a vital source of inspiration and knowledge for our engineering community.

As we face the challenges of the future, I urge BEM to lead in promoting engineers to spearhead the nation's sustainability initiatives. Our expertise and innovation are essential for creating a greener, more sustainable Malaysia. Let's continue to advance engineering excellence while championing environmental stewardship. Here's to many more decades of impactful contributions!



YBhg. Dato' Seri Ir. Mohd Noor bin Yaacob

Heartiest congratulations to BEM for attaining the 100th edition of their publication, *The Ingenieur*. The magazine has proven to be a good communication tool to bring the registered engineers closer to BEM. This has resulted in more responsible and ethical engineers to serve the community. The dedication of the publication team is much appreciated.

Kudos to the Editorial Board for their choice of themes that are timely and current at the time of publication and the selection of relevant articles. I wish the BEM and the Editorial Board to continue their good work and bring the publication to greater heights.



YBhg. Dato' Ir. Hj. Annies bin Md. Ariff

It is with great pleasure that I extend my heartfelt congratulations to *The Ingenieur* on reaching its 100TH edition milestone. This remarkable achievement is a testament to your unwavering commitment to excellence and innovation in engineering. Over the years, *The Ingenieur* has informed, inspired, and united countless engineers, students, and enthusiasts. Your insightful articles and expert analyses have become a cornerstone of the industry. As we celebrate this milestone, I commend the dedication of the entire team. May you continue to lead, inspire, and set new standards of excellence for years to come. Congratulations once again!



YBhg. Datuk Ir. Adanan bin Mohamed Hussain

Praise to Almighty Allah for enabling the Board of Engineers Malaysia to publish regularly *The Ingenieur* magazine over the past three decades and this 100th edition marks a significant milestone in its achievements to disseminate important information, messages and articles on state-of-the-art technology to its readers. Congratulations and well done to *The Ingenieur* Editorial Board for successfully producing such a comprehensive and high-quality publication filled with current content. My ardent hope is that the issuance of this invaluable magazine will continue as it is a great resource for engineers and other engineering enthusiasts in Malaysia.



YBhg. Dato' Sri Ir. Dr Roslan bin Md Taha

I am honoured to contribute to the 100th issue of our esteemed magazine, *The Ingenieur*. While many bulletins have gone digital for obvious reasons, this quarterly magazine continues to be printed, albeit in limited editions. This ensures that we not only offer personalised and dedicated publications for coffee tables but also share knowledge, innovation, and excellence. *The Ingenieur* has indeed been a beacon of information for the engineering community, providing invaluable insights and fostering development. Congratulations!

As a Past President, I look forward to many more editions that will enlighten and inspire the next generation of engineers.



YBrs. Ir. Kamaluddin bin Haji Abdul Rashid

The 100th Volume of *The Ingenieur* is finally here! My sincerest congratulations. Started as BULLETIN LJM in 1991, the successful publication of the 100th volume is indeed an extraordinary accomplishment and deserves the spotlight for celebration.

The accomplishment is yet another step in *The Ingenieur's* continuous efforts to provide authoritative professional information for engineers. It promises to relentlessly publish innovative ways to improve the practice and highlight responses to engineering difficulties. *The Ingenieur's* unique perspective and outlook in reporting is truly an asset and has contributed significantly to the aforesaid success.

My hope is for *The Ingenieur* to push the success even further, taking it in new bold directions, and tackling exciting propositions that are still left unexplored.



YBhg. Datuk Ir. Mohamad Zulkefly bin Sulaiman

Achievements are worth celebrating. Congratulations on reaching the 100th publication of *The Ingenieur*. The determination and focus of BEM and the Editorial Board have resulted in this success. With your dedicated services, the engineering community has gained a lot. *The Ingenieur* has been distributed to all professional engineers, graduate engineers who have subscribed, all Government departments and agencies, institutions of higher learning, and engineering organisations. It has since gone digital and the circulation has widened.

I have closely followed the development of the magazine and it has progressed issue after issue. I am sure that BEM and the Editorial Board will ensure that the quality and timely production of *The Ingenieur* will continue to improve to meet the expectations of the engineering fraternity and well-wishers.



YBhg. Datuk Ir. Ahmad Redza bin Ghulam Rasool

I am proud to congratulate the BEM on the 100th publication of *The Ingenieur*. I have been closely following the issues and I must appreciate the Editorial Board's choice of timely themes and dissemination of the latest updates in engineering practice. *The Ingenieur* has successfully played its role in providing relevant articles and service circulars to professional engineers. The readership of *The Ingenieur* has steadily increased and now includes Government ministries, departments and institutions of higher learning whilst going online.

Once again congratulations for the excellent work done by the Editorial Board and keeping up the image of *The Ingenieur* and BEM.

Key Points from Past President's Messages



YBhg. Dato' Ir. Hj. Zaini bin Omar

Natural Resources

"Our country is blessed with abundant natural resources that have sustained us well throughout our history. From the fish in the seas to tin and oil in the ground, and timber in the forests, we are surrounded by these resources. In our haste to extract these resources, we must remember that we must pursue a philosophy of sustainable extraction so that we do not destroy or irreparably deplete the same resources that have been our sustenance so far."



YBhg. Dato' Ir. Ng Chong Yuen

Geotechnical Engineering

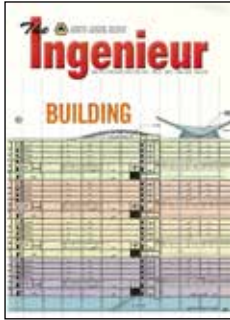
"Engineers, as the professionals entrusted within the task of ensuring the safety of structures and their surroundings, should be reminded of their professional liability towards this task. The questions of the adequacy of geotechnical investigative analysis are best left to their own technical judgement as they are liable for the final safety under the prevailing Building Laws."



YBhg. Tan Sri Dato' Ir. Zaini bin Omar

Environment

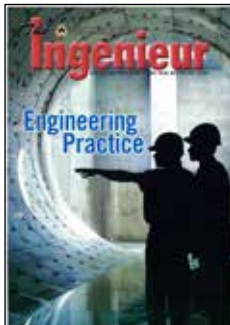
"In the past, engineering in its various fields, be they civil, structural, mechanical, or chemical, would run contrary to the aims and objectives of environmental protection and conservation. Most aspects of engineering would be related to various forms of development and construction that would have potentially lasting and damaging impact on the environment and its resources. However, over the recent years, there is growing realisation that engineering not only has a role to play in environmental protection but also a responsibility to ensure that development does not have long term serious impact."



YBhg. Dato' Prof Dr Wahid bin Omar

Building

"Codes, by themselves, can never be made to guarantee any consistent level of safety so long as there is freedom to choose the form that the building and its parts may take. The designer may also be concerned about the various choices that provide somewhat more than the minimum called for in the Codes. This, in fact, ought to be the normal case, the tolerable probabilities envisaged by the Codes being reached only on occasions when the advantage to be gained by compromising safety in a particular choice is worthwhile. Maximum freedom in design becomes possible only when safety can be included and adequately treated as a design consideration."

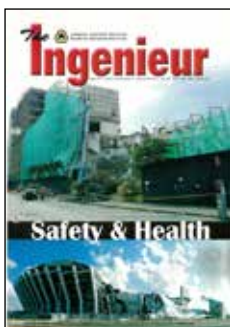


YBhg. Dato' Sri Prof Dr Judin bin Abdul Karim

Engineering Practice

"The BEM, besides being the traditional guardian of public interests over engineered facilities and assets, is further challenged by both domestic and international push-pull factors, among which include the roles of:

- A facilitator to improve the Government public delivery system *vis-à-vis* the CCC policy; and
- An acknowledged authority in the formation of knowledge workers (equipped with engineering, technology and innovation skills) certified and benchmarked to international best practice standards in line with the aspirations of the nation."



YBhg. Dato' Sri Prof Dr Judin bin Abdul Karim

Safety & Health

"The Occupational Safety and Health Act, 1994 (OSHA) makes it obligatory for the designer of buildings as well as plants to ensure that they are safe for use. Safety and health matters encompass almost every aspect of engineering works from the simple electronic assembly factory to utilities, industries and complex construction works. Many shop drawings require sound engineering input on good method statement. Engineers can no longer leave it to contactors alone to ensure work site safety."



YBhg. Dato' Seri Ir. Hj. Mohd Noor bin Yaacob

Moving the masses

"While more iconic transportation construction works are underway, such as the double-tracking rail network and extension to the LRT networks in the Klang Valley, engineers should not lose sight of the needs of disabled persons within terminal buildings and stations as well as their transfer from station to buses, trains and airplanes. The Guidelines of Facilities for Disabled Persons within buildings and outside buildings provide good technical specifications and illustrations for such requirements. A fully accessible terminal reflects the level of the development of a nation."



YBhg. Dato' Ir. Hj. Annies bin Md Ariff

Globalisation

"Greater mobility of engineering professions and cross-border engineering services are imminent. The global trend on value chain and connectivity is well documented in the articles namely APEC Strategic Blueprint for Promotion of Global Value Chains Development and Co-operation and the article APEC Connectivity Blueprint 2015-2025.

Globalisation is not something new, but with the liberalisation of engineering services in place soon on our shores, local professional engineers need to assess themselves in the light of an ASEAN Economic Community with a 610 million population."



YBhg. Datuk Ir. Adanan bin Mohamed Hussian

Water Power

"The year 2015 also marked the end of the UN Water for Life Decade 2005-2015; the new focus will be on the 2030 UN Agenda for Sustainable Development. Taking cognisance of the importance of water, this publication starts the year with the theme 'Water Power'. The power of water can be viewed from the perspective of water as a source of energy, threat of flood, an essential for food production, navigation and in other forms necessary for human survival."



YBhg. Dato' Sri Ir. Dr Mohd Roslan bin Mohd Taha
Engineering Education

"Additionally, Malaysia's signatory to the Washington Accord, Sydney Accord and Dublin Accord under the purview of the International Engineering Alliance has further positioned the country as the centre of excellence in engineering education. The Director-General of the Higher Education Department attributed this international recognition as one of the key factors that has helped Malaysia to attract more foreign students to local universities. This Department aspires to create holistic, entrepreneurial and balanced graduates who are not just job seekers but also job creators."



YBhg. Dato' Sri Ir. Dr Mohd Roslan bin Mohd Taha
Future Energy

"The BP Energy Outlook 2018 predicted that renewable energy (RE) is the fastest-growing energy source, accounting for 40% of the increase in primary energy. The energy mix by 2040 will be the most diversified that the world has ever seen. Meanwhile, MIDF reported that the new Ministry of Energy, Science & Technology, Environment and Climate Change aims to reduce the reliance on imported fuel by aggressively increasing the RE contribution to the generation mix from just 2% currently to 20% in the future."



YBhg. Dato' Sri Ir. Dr Meor Abdul Aziz bin Osman
Aero & Aviation Industry

"The Government's foresight in identifying the aerospace sector as one of the new growth industries under the 11th Malaysia Plan is bearing fruit as Malaysia is currently home to more than 200 aerospace companies, comprising both international and local players. The Malaysian Aerospace Industry Blueprint 2030 is setting its target in making Malaysia the leading aerospace nation in South East Asia and an integral part of the global market by 2030. This will open up opportunities for more professionals in this sector."



YBrs. Ir. Kamaluddin bin Hj. Abdul Aziz
Waste Management

"The formal regulation of solid waste and sewerage in Malaysia can be traced back to 1890 with the establishment of the Sanitary Board of Kuala Lumpur for public health. In spite of the long history of waste management systems in the country, it was only in 2005 that a National Strategic Plan for Solid Waste Management was formulated and adopted. Since then, there have been several reforms in institutional structures, technology adoption and waste minimisation efforts to match global standards in waste management."



YBhg. Dato' Ir. Dr Hj. Mohammad Zulkifley bin Sulaiman

Preserving Our Heritage

“Professor Henry Fraser chose the topic Heritage is Wealth when he spoke on the contribution of physical and cultural heritage to a nation’s economy. Another preservationist views heritage buildings as the physical manifestation and embodiment of memory. As such, if allowed to be demolished, they will be wiped out from one’s memory forever. With this in mind, all professionals, including practicing engineers, should take cognisance of the value of heritage in the built environment that they are involved with. The role of professionals is not limited to the preservation of heritage buildings but also the impact of new development to heritage sites.”



YBhg. Datuk Ir. Dr Hj. Mohammad Zulkifley bin Sulaiman

Digital Economy

“The shift towards greater digitalisation by consultancy firms is gathering momentum. It is interesting to note that the McKinsey Global Institute Industry Digitalisation Index 2015 indicated that the construction industry is among the least digitised. More innovative digital tools such as BIM, IoT and future-proof design and construction are coming onstream. It is thus imperative that engineers keep themselves abreast with these innovative tools to stay relevant in the industry.”



YBhg. Datuk Ir. Ahmad Redza bin Ghulam Rasool

Environmental, Social, Governance

“The Ministry of International Trade and Investment or MITI launched the National Industry Environmental, Social and Governance Framework (i-ESG Framework) in October 2023. Its objective is to accelerate the transition towards sustainable practices among manufacturing companies, with four key pillars – standards, financing, capacity building, and market mechanisms – supported by 17 strategies, 50 deliverables and six key enablers. Meanwhile, Bursa Malaysia also unveiled the Bursa Malaysia ESG Reporting Platform in 2023 for listed companies.”

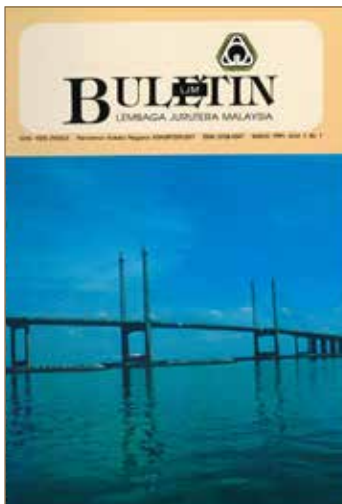
Visit <http://www.bem.org.my/web/guest/the-ingenieur-archives> to view, read and download The Ingenieur magazines.

Journey of The Ingenieur

By Ir. Ashari bin Mohd Yakub

Since its formation in 1972, the Board of Engineers Malaysia (BEM) has occasionally received inquiries from a small percentage of engineers seeking advice on professional practice matters. Recognising the limited communication opportunities and the critical need to keep registered persons informed on professional developments, including updates on rules, regulations, and technological advancements, BEM saw the importance of establishing a regular communication platform. As a result, Buletin Lembaga Jurutera Malaysia was launched in March 1991 as a quarterly bulletin, designed to strengthen communication and provide ongoing updates for registered members.

The inaugural publication, totalling 30 pages, featured the Penang Bridge on its cover. The Honourable Datuk Leo Moggie, who was then the Minister of Public Works, graciously delivered a special message for this first issue, which was featured on page two of the bulletin.



Inaugural publication in March 1991



Scan to see the first Buletin LJM in full

Feature Article

ENGINEERS AND THE LAW: RECENT DEVELOPMENTS*

His Royal Highness Sultan Azlan Shah,

The Sultan of Perak
(Formerly Lord President of the then Federal Court, Malaysia)

I am pleased to be invited by you to deliver the Second 2024 Law of the Engineer's Lecture. I am also honoured to be the speaker for your first Public Lecture. The theme of this year's lecture is "Engineers and the Law: Recent Developments". This is a timely topic, as the engineering profession is becoming increasingly aware of its legal obligations and the need to uphold professional standards.

I am also pleased to be invited by you to deliver the Second 2024 Law of the Engineer's Lecture. I am also honoured to be the speaker for your first Public Lecture. The theme of this year's lecture is "Engineers and the Law: Recent Developments". This is a timely topic, as the engineering profession is becoming increasingly aware of its legal obligations and the need to uphold professional standards.

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of a profession and the conduct of its members. With a focus on these areas, the lecture aims to provide a clear understanding of the legal obligations of engineers and the consequences of non-compliance. It is my hope that this lecture will serve as a valuable resource for all engineers and help them to maintain the highest standards of professional conduct.

I am also pleased to be invited by you to deliver the Second 2024 Law of the Engineer's Lecture. I am also honoured to be the speaker for your first Public Lecture. The theme of this year's lecture is "Engineers and the Law: Recent Developments". This is a timely topic, as the engineering profession is becoming increasingly aware of its legal obligations and the need to uphold professional standards.

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and recent developments in the law of engineering. The lecture will cover a range of topics, including the legal obligations of engineers, the consequences of non-compliance, and the importance of maintaining professional standards. It is my hope that this lecture will serve as a valuable resource for all engineers and help them to maintain the highest standards of professional conduct.

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* Text of the speech by His Royal Highness Sultan Azlan Shah, the Sultan of Perak, at the opening of the Second Public Lecture in support of the Institute of Engineers Malaysia on 22nd March 1991 at Kuala Lumpur.

Buletin LJM, March 1991

Backdrop

A Glimpse into the Implementation of the Registration of Engineers Act 1967

by Ir. Chan Boon Teik

The Engineers' Vacuum

The need for an institution to administer the registration of engineers was felt by the government in the early 1960s. At that time, the engineering profession in Malaysia was largely unregulated, and the government sought to establish a regulatory body to oversee the profession and ensure the quality of engineering services.

Interim Arrangements

In the interim, the government established the Engineering Council of Malaysia (ECM) in 1967 to oversee the registration of engineers. The ECM was a non-statutory body, and its functions were limited to the collection of fees and the issuance of licenses to practice.

Statutory Basis

The Registration of Engineers Act 1967 provided the statutory basis for the registration of engineers in Malaysia. The Act established the Board of Engineers Malaysia (BEM) as the regulatory body for the profession and gave it the authority to regulate the registration of engineers and the conduct of the profession.

Implementation

The implementation of the Registration of Engineers Act 1967 was a complex process that involved the establishment of the BEM and the registration of engineers. The BEM was established in 1967, and the first registration of engineers took place in 1968.

* Text of the speech by Ir. Chan Boon Teik, the then President of the Board of Engineers Malaysia, at the opening of the first registration of engineers on 22nd March 1968 at Kuala Lumpur.

The first published article was adapted from a speech by His Royal Highness Sultan Azlan Shah, the Sultan of Perak, titled "Engineers and the Law: Recent Developments," which spanned 14 pages. In his address, His Royal Highness emphasised that engineers must uphold professional standards by adhering to ethical principles—whether they are universally applicable or specific to the engineering profession. He urged engineers to always strive to serve the community with dignity and integrity.

Ir. Chan Boon Teik authored a brief write-up titled "A Glimpse into the Implementation of the Registration of Engineers Act 1967," outlining the history of the Act's establishment and implementation. Published on page 28, this write-up became a valuable reference for future discussions on the topic.

The Editorial Committee was established in September 1991, with Ir. Dr. K S Kannan appointed as the Chairperson, while Ir. Cheng Kim Hua, Ir. Dr. Gue See Sew, Ir. TA Jegaraj, and Ir. Dr Nordin bin Yunus were appointed as committee members.

In its 178th Board Meeting on 28th January 1994, the Board approved and adopted the first editorial policy and objectives. It also approved two periodical publications, the Bulletin and the Newsletter, to be released at the following interval:

Item	Date of Publication	New Title
Bulletin	January and July 1994	Buletin Jurutera LJM
Newsletter	March, May, July, Sept & November 1994	Berita Jurutera

The committee's name was changed from the Editorial Committee to the Publication Committee. The Board appointed Ir. Dr. K. S. Kannan as the Chief Editor for both Buletin Jurutera LJM and Berita Jurutera. In April 1994, the Board approved engaging Citra Pena to print the bulletin and newsletter.

In June 1994, the Board expressed concern over the decline in students pursuing science courses, which could lead to fewer engineering students. To address this, the Publication Committee initiated the creation of several booklets to promote engineering among school students:

1. Route to Professional Engineer
2. Role and Functions of BEM
3. Procedures and requirements for registration as Graduate Engineers, Body Corporate and Foreign Engineers
4. Classification of Qualification & Qualification Assessment Procedures
5. Directory of Engineers

In March 1995, the booklets were successfully published and distributed.

In July 1994, the Bulletin experienced positive growth with the introduction of advertising space and pricing, allocating seven pages specifically for advertisements. The Board also tasked the Publication Committee with exploring the possibility of privatising the Bulletin to address challenges in securing a publication officer. That same year, in July, Buletin LJM underwent a rebranding process, becoming Buletin Ingenieur to reflect its evolving identity.

As time progressed, with improvements in content quality and an increase in page numbers, the publication was further rebranded. In Volume 25 (March-May 2005), the name was officially changed from Buletin Ingenieur to THE INGENIEUR magazine. This decision, made during the 241st Board Meeting in June 2004, aimed to elevate the magazine's image and prestige.

To encourage article contributions, the Board introduced an honorarium in 2004 as a token of appreciation for authors and writers. The honorarium for feature writers was subsequently reviewed in 2013 and 2018 to further incentivise quality contributions.

To enhance the quality of *The Ingenieur* magazine and strengthen the Board's international standing—particularly as it moved towards leading the ASEAN framework—and to make the publication self-financing, the Board outsourced its production in October 2010. This resulted in *The Ingenieur* being published externally from Volume 49 (April 2011) to Volume 54 (December 2012). However, the outsourcing effort proved unsuccessful, leading the Board to resume direct management of the publication.

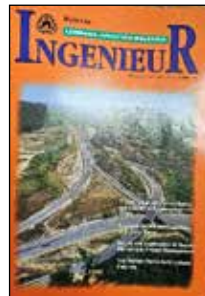
The Changing Face of *The Ingenieur*



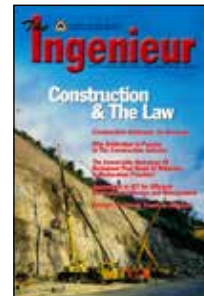
Jan 1994



July 1994



1995



2005



October-December
2024



July-September
2024



2013



2011

Throughout its 33 years of publication, *The Ingenieur* has become an important platform for sharing knowledge and best practices for the advancement of the engineering community. The dedicated efforts of the editorial team have ensured that valuable insights are conveyed in each issue (volume), providing engineers and industry professionals with the medium they need for continuous information and inspiration.

The Ingenieur has undergone a significant transformation, transitioning to full online publication starting from Volume 96, October-December 2023 issue. This initiative is part of BEM's plan to move all its services online and to contribute to reducing carbon emissions. During this transition to a fully online format, BEM printed only 400 hard copies for Professional Engineers (PE) and Professional Engineers with Practicing Certificates (PEPC) who still wish to receive the printed magazine, available on a first-come, first-served basis. ~ Nknar

Past & Present Editors

THE INGENIEUR – PAST & PRESENT EDITORS



**Em. Prof Ir. Dr K S Kannan
(1991-1997; 2000)**

- Spearheaded the transformation of The Ingenieur into its present form. Introduced Buletin LJM, Buletin Ingenieur, and Berita Ingenieur. Established editorial guidelines and policies, introduced honorarium fees for writers, and developed advertisement packages to offset publication costs.
- Led the initiation and oversaw the publication of several key booklets, including:
 - Route to Professional Engineer
 - Role and Functions of BEM
 - Procedures and requirements for registration as Graduate Engineers, Engineering Consultancy Practices and Foreign Engineers
 - Classification of Qualification & Qualification Assessment Procedures
 - Directory of Engineers



Ir. T A Jegaraj (1998-2000)

- Enhanced the publication with exceptional editorial expertise, ensuring continuity and excellence.



**YBhg. Dato' Ir. Fong Tian Yong
(2001-current)**

- Rebranded Buletin Ingenieur as The Ingenieur to align with BEM's vision of achieving international standards for the publication. Introduced the bumper issue and a mini notebook as a year-end souvenir for professional engineers.
- Refined editorial guidelines and honorarium policies, introduced the role of resource persons, and established permanent columns such as *Engineering Nostalgia*, *Engineering & Law*, *Do You Know?*, *As I See It*, and *What Others Say*.
- Led the transition from hard copy formats to a fully online publication, aligning with BEM's initiative to digitalise its services and contribute to reducing carbon emissions.

EDITORIAL MEMBERS (1991-2024)

Em. Prof Ir. Dr K S Kannan

Ir. T A Jegaraj

Ir. Chan Boon Teik

YBhg. Dato' Ir. Fong Tian Yong

Ir. Cheng Kim Hua

YBhg. Dato' Ir. Dr Gue See Sew

Ir. Dr Nordin bin Yunus

Ir. Mazlan bin Ismail Merican

Ir. Dr Lee Say Chong

Ir. Prof. Ishak bin Abdul Rahman

Ir. Prem Kumar A/L M. Vasudevan

Ir. Harbans Singh K.S

YBhg. Dato' Prof Ir. Dr Eric KH Goh

YBhg. Dato' Ir. Dr Ali Askar bin Sher Mohamad

YBhg. Dato' Ir. Ashok Kumar Sharma

Ir. Mohd Rasid Osman

Ir. Dr Zuhairi Abdul Hamid

Ir. Prof Sr. Dr. Suhaimi bin Abdul Talib

Ir. Megat Johari Megat Mohd Noor

Ir. Rocky Wong Hon Thang

Ir. Lee Kwee Lu

Ir. Prof. Ruslan Hassan

Ir. Md Amir bin Kasim

Ir. Mustaza bin Salim

Ir. Nitchiananthan Balasubramaniam

Ir. Koh Poh Wah

Ir. Shahkander Singh

PAST COVER THEMES HIGHLIGHTS



WATER AND MARITIME INDUSTRY

- Rainwater harvesting experience in Bandar Utama – Vol 46 June 2010: Our records show that generally a savings of 30% of water demand can be achieved. However, the sizing of storage capacity has been more ambitious as the average filled capacity is only around 65%.
- Integrated River Basin Management (IRBM) is defined as co-ordinated management of resources in natural environment (air, water, land, flora and fauna) based on river basin as a geographical unit, with the objective of balancing man's needs with the necessity of conserving resources to ensure sustainability – Vol 46 June 2010.
- NAHRIM highlights several locations in the country that have benefitted from its rainwater harvesting system. On a much larger scale, multi-purpose rainwater management in a city could be a proactive and alternative solution for flooding and water supply issues in Malaysia – Vol 57 Jan 2014
- The water footprint of a product is the volume of water appropriate to produce the product, taking into account the volume of water consumed and polluted in the different steps of the supply chain. This concept is now being discussed on a global front and could impact food security in the water scarce regions – Vol 57 Jan 2014
- Effective operational Integrated Water Resource Management (IWRM) requires the understanding of local conditions and its human need (demand and cultural). Community-based management was suggested as an operational model of IWRM because it purports to address the integration of stakeholders – Vol 65 Jan 2016
- The Hashimoto Action Plan III: With water supplies fairly constant and with uneven distribution over the region and different times of the year, the increasing demand owing to population expansion, increasing agricultural demand, industrial use, power generation, etc, the equation between demand and supply is an intricate one.



WASTE MANAGEMENT

- Sanitary landfill: Strategic approach towards Solid Waste Management
 - The federalisation of SWM will enable solid waste to be carried out across state borders.
 - Landfills can be classified into anaerobic and aerobic with forced aeration – Vol 42 June 2009
- A key part of circular economy is to build ‘feedback loops’. Recycling is part of the natural process, and the re-establishing this circularity is a key component of the overall sustainable development. There are limits to recycling, at which point energy recovery needs to be considered – Vol 64 Oct 2015.
- Basel Convention: protocol of control of transboundary movements of Hazardous wastes and their disposal – Vol 64 Oct 2015
- Managing construction waste throughout the building life cycle is intricately associated with many elements. BIM is capable of being used as a complete process for transferring sets of data to achieve interoperability throughout the building life cycle – Vol 82 April 2020



LAW & PRACTICE

- JKR/PWD Forms (rev 2007) – An Overview – Vol 42 June 2009
- PAM Contract 2006 at a Glance – Vol 43 Sept 2009
- Liquidated Ascertained Damages : some recent legal development – Vol 45 Mar 2010
- Differences between Assignments, sub-contracting and Novation -Vol 46 June 2010
- Contingent Payment: The Continuing Saga – Vol 47 Sept 2010
- CIPAA 2012: Will its bite be as good as its bark – Vol 55 June 2013
- Newly Emerging Methods of Contract Procurement in Malaysia : An Overview – Vol 56 Sept 2013
- Indemnities – Vol 65 Jan 2016
- Method Statements – Vol 66 April 2016
- History of UBBL 1984: Owing to the protracted period of its birth, many of the provisions which were valid when they were first introduced have since become obsolete. Thus, it is necessary to ensure that no effort is spared to continually review and update the UBBL.
- CIPAA 2012: The essential steps in practice – Vol 70 April 2017
- Are Liquidated Damages Clauses Useless – Vol 70 April 2017
- Arresting the crisis of confidence in arbitration – A Malaysian perspective – Vol 71 July 2017
- Development of Statutory Adjudication in Malaysia – Vol 72 Oct 2017
- OSHCIM: Every worker has a fundamental right to work in an environment that secures his safety & health. Taking the industry in its widest sense to include all those who construct, clean, repair, maintain, demolish and use buildings as a workplace, the decisions and actions of professionals and designers may touch the lives of thousands of people – Vol 79 July 2019
- BEM functions as a regulator of the professional conduct of registered engineers or ECPs while the court plays the role of overseer to ensure the Board does not exercise its discretion arbitrarily – Vol 98 April 2024





GLOBALISATION

- The different aspects of globalisation stands in a complex, interactive relationships with each other. The size and complexity of the modern global economy, finance, manufacturing and engineering design present a great challenge to politicians, economists and engineers alike – Vol 61 Jan 2015. International trade in services is defined by four modes of supply of the General Agreement on Trade and Services (GATS) as follows:
Mode 1: Cross-border supply
Mode 2: Consumption abroad
Mode 3: Commercial presence
Mode 4: Presence of natural persons
– Vol 61 Jan 2015



GUIDELINES

- Guidelines on Demolition Works – Vol 42 June 2009
- New Code of Practice for Demolition of Buildings MS 2318: 2010(P) – Vol 46 June 2010
- Guidelines on Gated Community and Guarded Neighborhood – Vol 48 Dec 2010
- APEC Services Co-operation Frameworks 2015 promotes global value chain development. Among the four levers is the Internationalisation Strategy that recognises the clear need for internationalisation of service providers to remain competitive and penetrate new markets – Vol 65 Jan 2016
- Revisit to Guidelines on Periodical Inspection of Buildings – Vol 71 July 2017

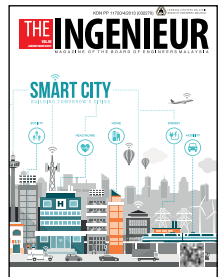


AGRICULTURE ENGINEERING

- The prime objective of agricultural mechanisation and automation is to liberate agriculture from its high dependency on mutual labour, and at the same time significantly increase productivity. In precision agriculture for the open farm system, sensors and instrumentation are incorporated into the machines where many parameters can be measured including soil fertility, monitoring plant health and weather forecasting. Hence, only the right amount of input would be applied – Vol 84 Oct 2020.
- Thermal imaging which is also known as thermography involves the use of infrared cameras to detect and visualise temperature variations on the surface of objects. It is used to detect spoilage and diseases by identifying temperature anomalies caused by microbial activity – Vol 99 July 2024
- The logistical and cost advantage of drones for agriculture include 99% accuracy, the ability to safely complete the task up to 85% faster and costing five times less for project implementation with more deliverables when compared to traditional work practices – Vol 99 July 2024.

INFORMATION COMMUNICATION TECHNOLOGY (ICT)

- The 4IR is characterised by confluence, convergence and fusion of technologies that is blurring the lines between the physical, digital and biological spheres. It is driven by a combination of foundational, enabling and digital transformation accelerators – Cloud, Big Data, Software-defined networks, 5G and IoT – Vol 73 Jan 2018
- Human history is a history of connections. The pursuit of communication promotes the development of connections and the development of connections promotes the development of society. In the 5G era, all things in daily life will be connected and all industries will be transformed through digitalisation – Vol 73 Jan 2018.
- The driver of the digital transformation of the construction industry is BIM. BIM is about creating 3D models of buildings and infrastructures and increasingly ‘linking’ all kinds of data which is recorded in all sorts of data sources during the life cycle of the building – Vol 89 Jan 2022.
- Engineers, designers and architects are combining computational design, additive manufacturing, material engineering and synthetic biology to pioneer a symbiosis between micro-organisms, our bodies, the products we consume, and even the buildings we inhabit – Vol 89 Jan 2022.
- There are many definitions of a smart city. However, there is one common element: they agree that smart cities, at the core, leverage new and disruptive technologies to address a broad range of urban problems. The application of ICT-based technologies and digitalisation has resulted in the transformation of cities by using more efficient and innovative ways of getting things done – Vol 93 Jan 2023



ASSET AND FACILITY MANAGEMENT

- Energy Efficiency, Decarbonisation and Facilities Management
 - FM plays a crucial role in energy efficiency as energy savings through the entire life cycle – Vol. 94 April-June 2023
- Tall Buildings and Elevators: A Review of Technological Advances
 - Efficient vertical mobility is a critical component of tall building development and construction – Vol. 94 April-June 2023
- Issues in Air Conditioning and in Mechanical Ventilation System Design
 - It highlights the design guidelines and best practices for ACMV design with the objectives of reducing design error, omissions and providing ACMV services that better meet the needs of the society – Vol. 71 Jul-Sep 2017
- Heritage Buildings: Sources of Damage and Assessment Methods
 - The history of the country could be seen on heritage sites, some with the origin in traditional Malay timber architecture and others are displaying masonry architectural influences from Portuguese, Dutch and British – Vol. 85 Jan 2021
- Role of Information Technology in Facility Management
 - Explaining the roles of FM in the concept of lifecycle cost of construction project. This paper discusses the function of FM and explores the roles of IT – Vol. 24 Dec 2004 – Feb 2005 – Facility Management.





CONSTRUCTION

- Emerging Technology in Housing Construction: Prefabricated Volumetric Module (PVM) – Vol. 79 Jul-Sept 2019
 - Types of PVM in Housing Construction
 - Design and Construction Process for PVM Housing Construction
 - Manufacturing Process
 - Logistics and Installation
- Prefinished Prefabricated Volumetric Construction (PPVC) for Project Clement Canopy in Singapore – Vol. 79 Jul-Sept 2019
 - In Singapore there is a driven need to reduce reliance on foreign labour. In order to achieve this objective without compromising on quality and speed of construction, the implementation of site PPVC modularisation for construction project, which reduces the environmental impact and enhances workers safety, proves to be a viable solution.
- Requirements for Temporary Amenities and Accommodation for Construction Workers – Vol. 79 Jul-Sept 2019
 - The provision of proper accommodation and amenities, workers' productivity, health and absenteeism.
- Sustainable INFRASTAR: Measuring Sustainability of an Infrastructure Project – Vol. 79 Jul-Sept 2019
 - Sustainable INFRASTAR focuses on assessing the sustainability of an infrastructure project during the design and construction stage.
 - Due to the various types of infrastructure and the complexities of operational functionalities, at the moment there is no generic assessment model for assessing the operation and maintenance stages of a project
- Occupational Safety and Health in Construction Industry Management Guidelines (OSHCIM) – Vol. 79 Jul-Sept 2019
 - The OSHCIM Guidelines ensure safety and health are regarded as an important integral part of a project from the pre-construction phase through to the post-construction phase. It recommends that construction processes are interlinked, with the process being dictated by the design and decisions from the client and the design team.



TRANSPORTATION

- Air Transportation Growth: Global and Local Scenarios – Vol. 74 Apr–Jun 2018
 - Since the implementation of the National Aerospace Blueprint 1997, the aerospace industry in Malaysia has changed dramatically. It has become a substantial contributor to the nation's high-income economy with the MRO and Aerospace Manufacturing sub-sectors being the major contributors.
- Supercar Maker – Vol 74 Apr–Jun 2018
 - Tesla is pushing all the boundaries in car manufacturing. The company is making bigger battery packs to power the new generation of electric cars. It is leading the way in using sophisticated hardware and software to make driving autonomous.
- Why Older Drivers are a Risk Group – Vol 74 Apr–Jun 2018
 - According to the Insurance Institute for Highway Safety (IIHS), Highway Loss Data Institute (HLDI) (2016), a survey conducted on 2,500 drivers aged 65 and older found that drivers with reported impairments in memory, vision, mobility and health conditions such as arthritis or diabetes were more likely than other drivers to self-limit their driving by making fewer trips, travelling shorter distances, or avoiding night driving, driving on interstates or driving in ice or snow.
- Public Transport Perspective in the Klang Valley – Vol. 92 Oct-Dec 2022
 - The 12th Malaysia Plan seeks to encourage a behavioural shift from private to public transport and targets an annual growth rate of 5% for public transport ridership in the Klang Valley. Travel patterns of the population will be continuously analysed to provide appropriate public transport services. These measures will improve national productivity, facilitate economic growth and improve the well-being of the people.
- Challenges of Road Development in Rural Area – Vol. 92 Oct-Dec 2022
 - Government intervention benefits the development of rural infrastructure to provide facilities which entail large investments, beyond the capacity of individuals or private enterprises, in line with the slogan “*Luar Bandar Sejahtera*” by the Ministry of Rural Development to enhance economic growth of rural areas.





BUILDING AND INFRASTRUCTURE

- Penang Transport Master Plan Infrastructure Plans Towards 2030 – Vol 66 Apr-June 2016
 - The Penang Transport Master Plan with an estimated price tag of RM27 billion is an ambitious plan to solve the island's traffic woes. Besides the Pan Island highways and mass transit public transport systems, an undersea tunnel and a skycab between Penang island and the mainland are on the drawing board.
- Asian Highway Development Issues – Vol 66 Apr-June 2016
 - The Asian Highway network is a network of 141,000 km of standardised roadways crisscrossing 32 Asian countries with linkages to Europe. The Asian Highway project was initiated in 1959 with the aim of promoting the development of international road transport in the region. During the first phase of the project (1960-1970) considerable progress was achieved, however, progress slowed down when financial assistance was suspended in 1975. Entering the 1980s and 1990s, regional ????
- High Speed Rail – Vol 66 Apr-June 2016
 - The Project: Once operational, the HSR would serve as the fastest point-to-point mode of public transport travel between Kuala Lumpur and Singapore. The HSR is seen to be in line with the transformation of the nation as it links two urban agglomerations to meet growing demand, catalysing economic growth and enhancing long term economic competitiveness while improving the quality of life of its people. The HSR will connect five intermediate stops in Malaysia to Singapore, following a coastal route.
- Climate Change Vulnerability and Adaptation for the Singapore-Malaysia High Speed Rail System – Vol 66 Apr-June 2016
 - The risks, vulnerability to climate change associated with railway infrastructure in Malaysia and Singapore have not been fully addressed in literature due to the difference in local environmental parameters. On the other hand, the projected growth in Kuala Lumpur (>10 million people by 2020) and Singapore (>6 million people) enormously accelerates business activities between the two cities, including road, aviation, ports and rails. Thus, an effective, reliable and fast alternative like High Speed Rail is one of the most-efficient and environmental-friendly infrastructure.



CAPACITY BUILDING

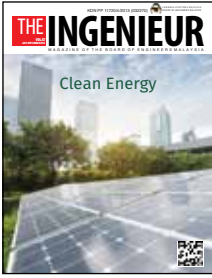
- Malaysia Education Blueprint (2015-2025) Public-Private Collaboration – Vol 63 July-Sept 2015
 - Enhancing public-private collaboration in R & D and TVET will certainly contribute to capacity building of Malaysia's human capital. This is part of the transformation of the higher education system that has been planned in the 11-year Malaysia Education Blueprint. Malaysia now ranks number 52 in the Human Capital Index 2015 covering 124 countries by the World Economic Forum. It needs to move up the ladder because human capital will be the key factor linking innovation, competitiveness and growth in the 21st century.
- Capacity Building of Professionals in Electrical and Railway Engineering – Vol 63 July-Sept 2015
 - Malaysia sorely lacks local expertise and professionals in electrical train systems engineering with a wide knowledge/skill gap covering train traction power systems, train control and signalling and operational software integration systems.
- SEDA Malaysia's Human Capacity Development Programme for the Renewable Energy Industry – Vol 63 July-Sept 2015
 - The Sustainable Energy Development Authority (SEDA) has been charged with the development of renewable energy (RE) in the country through the National Renewable Energy Policy and Action Plan (NREPAP).



FORENSIC ENGINEERING

- Accident Investigation and Reconstruction – Vol. 76 Oct-Dec 2018
 - Accident investigation and reconstruction is the scientific process of investigating, analysing, and drawing conclusions about the causes and events during a vehicle collision. In this field, extensive investigations are conducted to identify the causes and contributing factors in different types of collisions, including the role of the drivers, vehicles, the roadway and the environment. Findings from the investigations are used not only during a representation as an expert witness in a trial but they are also useful in developing recommendations for safer roads and highways, as well as improving safety aspects of motor vehicle design.
- Lessons Learnt from Investigation of Construction Accidents – Vol. 76 Oct-Dec 2018
 - The safety of construction sites is considered a significant challenge in occupational safety and health (OSH). In 2017, 183 people died while working on construction sites – the highest incidence recorded since 1999. The percentage of construction accidents has increased more than 12% between 2016 and 2017, representing 28% of all work fatalities in 2017.





ENERGY

- Hydropower development in Sarawak
 - The power demand in the state of Sarawak is expected to increase rapidly, predominantly because of the on-going development of energy intensive industries in the state via the Sarawak Corridor of Renewable Energy (SCORE). The core of the corridor is the development of energy resources, based on hydropower generation to meet the power demand in Sarawak in the long term.
- Energy Auditing as a tool to achieve excellence in Energy Management
 - Generally, there is considerable scope for improving energy efficiency across all industrial and commercial sectors in Malaysia. Efforts to promote energy conservation works by these sectors could lead to a substantial reduction of their costs of production or services, making them more competitive globally.
- Bakun Hydroelectric Project
 - Bakun HEP is the first of many hydropower projects to be developed in SCORE. It is a step in the right direction to fully exploit the use of renewable and clean resource for power generation and it is in line with the Malaysian Government's Fuel Diversification Policy.



CHEMICAL ENGINEERING

- Chemical Information Management System (CIMS)
 - Despite its limitation, CIMS is the only mandatory national chemical registry with GHS (Globally Harmonised System) classified database and will continue to be an important system in the country with its expansion to include controlling incoming hazardous chemicals at the port of entry. The establishment of CIMS assists in enhancing data collection and data sharing for sound management of chemicals in Malaysia.
- Versatility of Chemical Engineers
 - Chemical Engineering is about converting the less valuable to the more valuable in the most economical and efficient way possible. Chemical engineers do not only take care of the processes in industries but also design it and the equipment in the process. The job of chemical engineers is not restricted to only the process equipment but also the utilities to run that equipment.



BIOMEDICAL ENGINEERING

- Biomedical Engineering shapes Healthcare and Life
 - With each passing day biomedical engineering continues to make remarkable strides, driven by a deep commitment to enhancing human health. The inter-disciplinary nature of this field fosters collaboration, innovation and the convergence of diverse expertise to tackle complex medical issues. From cutting-edge medical devices and imaging technologies to innovative drug delivery systems and tissue engineering, the impact of biomedical engineering is far-reaching and integral to the advancement of healthcare.

ENVIRONMENT

- Plastic Waste Management
 - It is undeniable that both “top-down” and “bottom-up” approaches should synergise effectively to boost plastic waste transition to a circular economy in Malaysia. Although the Government has undertaken many initiatives, the results are still far from expectations. In a nutshell, a plastic economy roadmap has to be in place to address plastic production, consumption, recycling and waste management to keep plastic products and materials circulating in a state of use for as long as possible.
- New OSHA (Amendment 2022) – A paradigm shift for Occupational Safety
 - All organisations and employers should be made aware of the changes in OSHA (Amendment 2022) which will be a new paradigm shift for the occupational safety and health in Malaysia as it defines the role of principal persons and emphasises risk management via prevention through design.



ENVIRONMENT SUSTAINABILITY

- Renewable Energy (RE) gains momentum
 - The National RE Policy and Action Plan (NREPAP) has given a big boost to the RE Power Industry in Malaysia. The only resource with almost no physical limit is solar PV. For solar PV to be considered a serious player in the power industry, storage technologies must play a major part.
- Technical challenges in RE programme in Malaysia
 - The implementation of FiT programme has propelled the growth of RE sources in Malaysia. The initial problems and hiccups during early stage of FiT implementation have provided lessons and feedback to all RE players in Malaysia including TNB and SEDA.
- Sustainable energy – the future is here
 - Climate change is a wake up call for mankind to be better custodians of planet earth. For an ordinary citizen he/she should learn to preserve precious resources (e.g. water, food, energy). Besides unsustainable deforestation and land use, fossil fuel activities are the primary cause of global warming. The future of energy is in sustainable energy, comprising of both renewable energy and energy demand management.
- Going sustainable with urban environment design
 - Urban environment design is a prospering field. Along with the Construction Industry Transformation Plan (CITP) 2016-2020 and the coming plans, sustainability aspects are highlighted on sustainability accreditation, CO₂ emissions, resilient construction and solid waste management. More guidelines will be rolled out while more projects are targeted to meet the sustainability ratings.



Visit <http://www.bem.org.my/web/guest/the-ingenieur-archives> to view, read and download The Ingenieur magazines.

ENGINEERING NOSTALGIA SELECTION

The Ingenieur features two unique columns called *Engineering Feature* and *Engineering Nostalgia* that highlight past engineering innovations. These are written by contributors with historical information on creative solutions and tools of the day. The photos in black and white were captured by contributors themselves while some were sourced from Jabatan Arkib Negara and Jabatan Penerangan Malaysia. A notable *Engineering Feature* example as shown below is one on a motorless ferry, using only the power of river current, to cross the Jerai River in Kuala Lipis in 1994. Many other examples of ingenious engineering innovations are featured in the *Engineering Nostalgia* column. The following ENGINEERING NOSTALGIA SELECTION presents photos showing past innovations, buildings and structures in various parts of the country.

Engineering Feature published in Vol 66, 2016

Motorless Ferry that once plied the Jelai River in Kuala Lipis

By Chin Siew Yin

Kuala Lipis was the capital of Pahang between 1898 and 1953. It was the gold mining centre and had many buildings with British architecture. After the Pahang state capital shifted to Kuantan, it slipped into a sleepy town with numerous structures of heritage interest such as railway viaduct, old shop houses, monuments and religious buildings.

The town is situated on the western side of the Jelai River, with the other side relatively undeveloped until 1994 when a bridge was built to allow access. Prior to the existence of this bridge, there was a motorless boat ferry service to transport passengers and motorbikes across the Jelai River.

I happened to travel from Kuala Lipis to the Felda Kechau area on work assignments in 1994. It would usually take me about one and a half hours to reach Felda Kechau on the opposite side of the Jelai River. There was no bridge then to connect both sides of the river.

On my second trip to Kechau the same year, a local advised me to take a boat ferry from Kuala Lipis to cross to the opposite river bank, which would enable me to reach Felda Kechau in half an hour. That meant saving an hour on my journey.

The boat ferry was owned and operated by the local Chinese Chamber of Commerce that charged 50 cents for each passenger and motor bike.

The idea of the boat ferry is an ingenious one as it uses the power of current, a natural and free



Boatman getting ready to move the boat



Boat being propelled by river current to the opposite river bank



The concrete stump holding the overhead cable that enables the pulley to slide along as the boat crosses the river



Photo taken in 2015 showing tourists visiting the abandoned site with no trace of the once busy ferry terminal

force. It is also an environment-friendly mode of transport, without the use of fuel which emits carbon dioxide and pollutants.

Operating Mechanism

To cross the river, the boat is positioned at 45° to the current to harness the current acting on the

boat to move it in the direction of the resultant force as illustrated in the sketch Fig. 1, i.e, in a traverse direction.

The operative mechanism consists of a high overhead horizontal cable tied between two tall concrete stumps at both sides of the river bank. Both ends of the boat are then tied to a pulley that is attached to the horizontal cable allowing it to slide along the cable freely.

The two cables at both end of the boat are of different length; one slightly longer than the other.

When the boat is ready to move, the boatman will swing the boat's cable in such a way that the longer cable will be at the bow (back) of the boat and the shorter one at the stern(front). In that manner, the boat will drift at a 45° position in relation to the direction of the current with the stern facing the opposite bank. The boatman will then give the boat a jerk with a pole and the boat will move itself towards the opposite bank due to the resultant force of the current as illustrated in the sketch in Fig. 2.

When the boat reaches the opposite bank, the boatman will unload the passengers and motorbikes. Before taking the next load of passengers and motorbikes, the boatmen will then swing the two attached cables turning the boat 180° around resulting the shorter cable at the stern (front) of the boat and the longer one at bow (back). He then takes in new batch of passengers and motorbikes and the cycle is repeated by jerking the boat forward and letting the force of the current move the boat to the opposite river bank.

End of ferry services

There was no record of when the boat ferry services started operating but some local elders put it around 1960s. The boat ferry service met its fate in 1995 when a bridge was built across the Jelai River.

Unfortunately, no proper photographs or records were kept by the operator as it was considered a common sight then. The photographs taken by me in 1994 serves to show the operation of the ferry with the boatman maneuvering the boat at the ramp of the river bank.

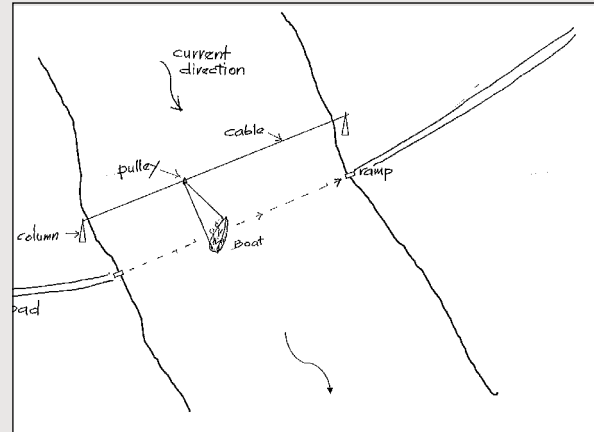


Fig. 1: Kuala Lipis boat ferry - PLAN

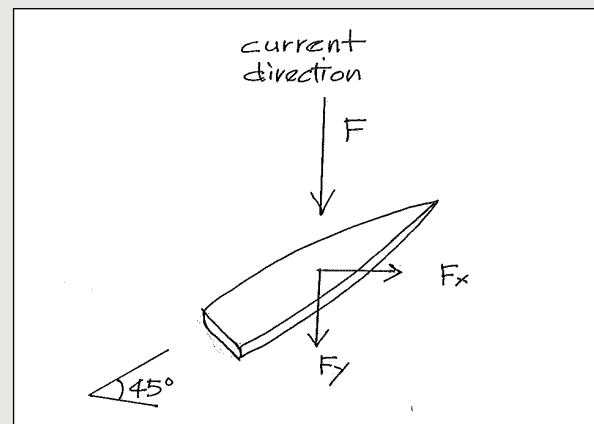


Fig. 2: Resultant force of current: F_x

Revisit in 2015

At the moment, the vertical concrete stumps are nowhere to be seen and the landing ramp site of the river bank is also overgrown with vegetation. While revisiting the site to recollect the innovative mode of transport across the river, I saw some visitors near the old landing site posing for photographs for fond memories. They exclaimed that it should have been kept as a landmark to add to the heritage attractions of this historical town.

As I moved away from the site, I was thinking that it would have been a good research project for engineers to harness the green energy of mother nature. There must be a minimum current strength for the boat to move at reasonable speed. Perhaps someone can use the same principle to design a bigger vessel with vertical fins under water that be tilted at 45° to the direction of the current to propel the vessel.

ENGINEERING NOSTALGIA: Road Construction

Victory Avenue Jalan Raja (Vol. 9, Issue 3, November 2000 – Environmental Management)

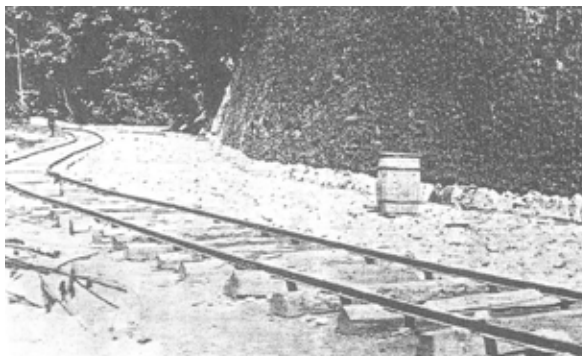


Train used in construction of Victory Avenue. The Federal Court Building in the background constructed with bricks transported by trains from Brickfields.

Cameron Highlands Road (Vol. 10, Qtr 1/4 March 2001 – Alternative Solutions to Low Cost Housing)



Cameron Highlands road construction in the early days. Note the absence of machinery for the construction of Cameron Highlands road and the dress of an engineer in those days.



Earth moving by temporary rail was a common means of transport.

Jalan Birch-Jalan Sultan Hishamuddin Viaduct, KL 1963 (Vol. 75, Issue July – September 2018 - Future Energy)



Jalan Birch – Jalan Sultan Hishamuddin Viaduct, Kuala Lumpur 1963. Cars, carrying VIPs, including the then Prime Minister, Tunku Abdul Rahman and well wishers at the official opening of the Jalan Birch – Jalan Sultan Hishamuddin Viaduct on March 15, 1963.

The Old Bentong Road aka Federal Route 68 (Vol. 63, Issue July – September 2015 – Capacity Building)



Old Bentong Road upgrading works in 1940s using the old method of macadam road construction. Crushed stones of 100 to 150 mm sizes that were manually laid and rolled with steam roller were commonly used in the olden days. Note the cloud of steam generated behind the roller and the small chimney discharging smoke from burning coal.

**Gotong Royong Road Building Works
1966 Kuala Sungai Duan Yan, Kedah
(Vol. 71, Issue July – September 2017 –
Facility Management)**



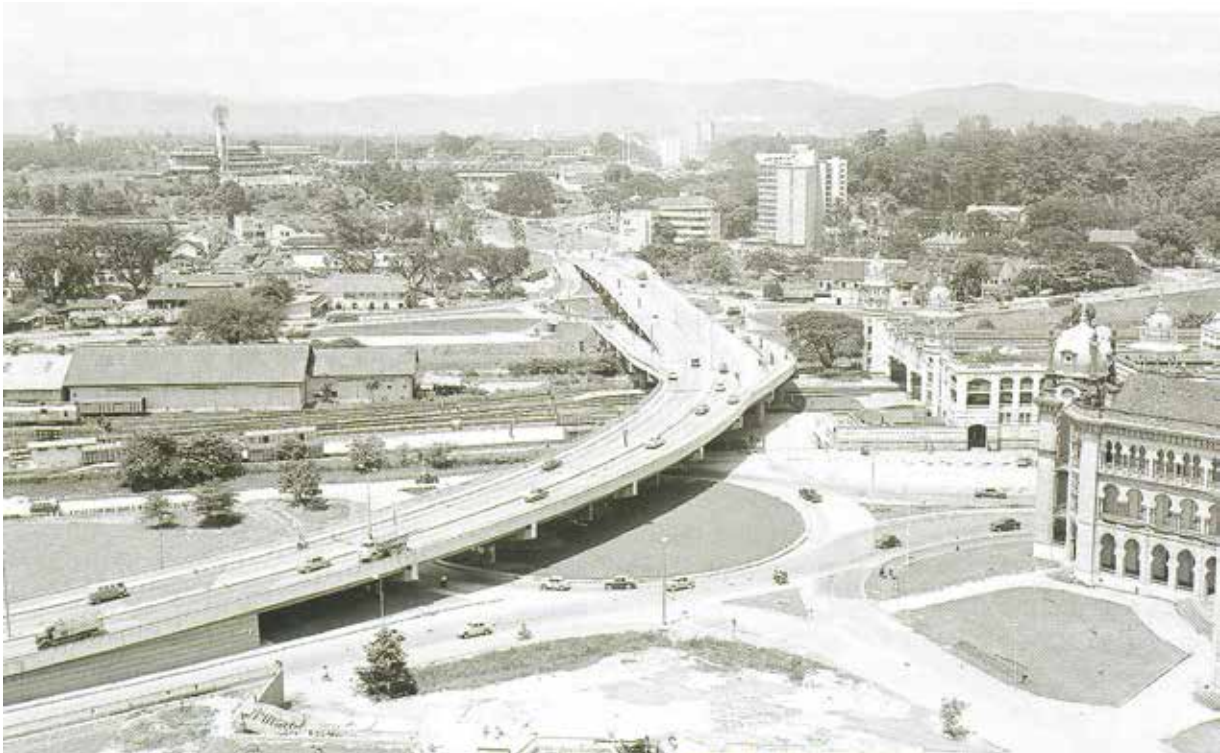
“Gotong Royong” Road Building Works, 1966 Kuala Sungai Duan, Yan, Kedah. Deputy Prime Minister and Minister of National and Rural Development Tun Abdul Razak accompanied by the District Officer of Yan, Kedah, had a close-up look of the villagers at work for the gotong royong road works at Kuala Sungai Duan, Kedah on September 4, 1966.

**Construction of Jln Kuching Dual
Carriageway in 1967 (Vol. 61, Issue
January - March 2015 - Globalisation)**



Construction of Jalan Kuching Dual Carriageway in 1967. The then Minister of Transport, Tan Sri Sardon bin Hj Jubir, who was also Acting Ministry of Works, Post and Telecommunication, inspecting the new dual carriageway carrying four-lane traffic from the Club Road Roundabout to Jalan Duta Roundabout (Segambut).

**Jalan Kinabalu Flyover, 1965 (Vol. 73, Issue January – March 2018 – Digital
Technology Pathway)**



The Jalan Kinabalu Flyover in Kuala Lumpur was the first flyover road in the country built after independence in 1963. It was implemented by JKR initially as the “Kuala Lumpur Through Road Project” but later became part the Kuala Lumpur Inner Ring Road system. Jalan Kinabalu itself was formerly part of the Old River Road.

Raja Laut Road 1967 (Vol. 62, Issue April - June 2015 - Engineering Practice)



The old Raja Laut Road Kuala Lumpur was officially opened by Tan Sri Sambanthan on March 6, 1967. The road was constructed with PWD Department's heavy plants and operators as seen in the background.

Circular Road Flats, Kuala Lumpur 1954 (Vol. 72, Issue October - December 2017 - Engineering Education)



Circular Road Flats, Kuala Lumpur 1954. In the 1950s, the Municipal Council of Kuala Lumpur (now Dewan Bandaraya Kuala Lumpur) was active in development projects and began building low cost housing to solve squatter problems which were prevalent then.

Construction of Sg. Sayong New Village Kluang in Progress (Vol. 25, Issue March - May 2005 - Construction & the Law)



1950: Construction of Sg. Sayong, New Village, Kluang in progress (Courtesy of Mr. Loke Kwee Seng)



Construction of the Gemas-Rompin Road in 1956 (Vol. 65, Issue January - March 2016 - Water Power)



The Gemas-Rompin Road was constructed by a JKR departmental work force and machineries in 1956. During a site tour by the then Minister of Works, Encik Sardon bin Haji Jubir.

Sulaiman Road, Kuala Lumpur 1963 (Vol. 91, Issue July - September 2022 - Green Engineering)



Sulaiman Road, Kuala Lumpur, 1963. Jalan Sultan Sulaiman now links Jalan Syed Putra (formerly Lornie Drive) to Jalan Sultan Hishamuddin (formerly Victory Avenue) with Jalan Tun Sambanthan in between.

Federal Highway - Upgrading in Stages (completion) (Vol. 67, Issue July - September 2016 - Clean Energy)



The completion of the second stage of the Federal Highway in 14.4.1978 viewed from Angkasapuri (Kuala Lumpur) towards Petaling Jaya showing the familiar buildings of Jaya Puri (now the Hilton PJ) and Asia Jaya. The Ministry in charge then was the Ministry of Works and Public Utilities.



Photo taken on 29.9.1958 showing the Minister of Works, Posts and Telecoms, YB Tun Sarbon bin Jubir (with coat and songkok) walking to an engineer on the dual-carriage way construction beginning from Bangsar Road to the Sungei Way traffic roundabout. The road was opened on 14.1.1959 by the Minister of Works, Posts and Telecoms.



The Federal Highway, Kuala Lumpur-Port Swettenham Highway started construction in 1956 and was completed in 1959 at the cost of RM2 million. The highway linked Petaling Jaya and Sungei Way along the route with a designed travelling speed of 60 mph.

Mountbatten Road (Jalan Tun Perak), KL 1960-Gian Singh Building (Vol. 77, Issue January - March 2019 – Emerging Technology)



Mountbatten Road, Kuala Lumpur, 17.5.1960.

Tanjung Malim-Slim River Highway, 1966 (Vol. 83, Issue July - September 2020 – Maritime Industry)



Tanjung Malim – Slim River Highway, 1966 – Malaysia's First Toll Road.

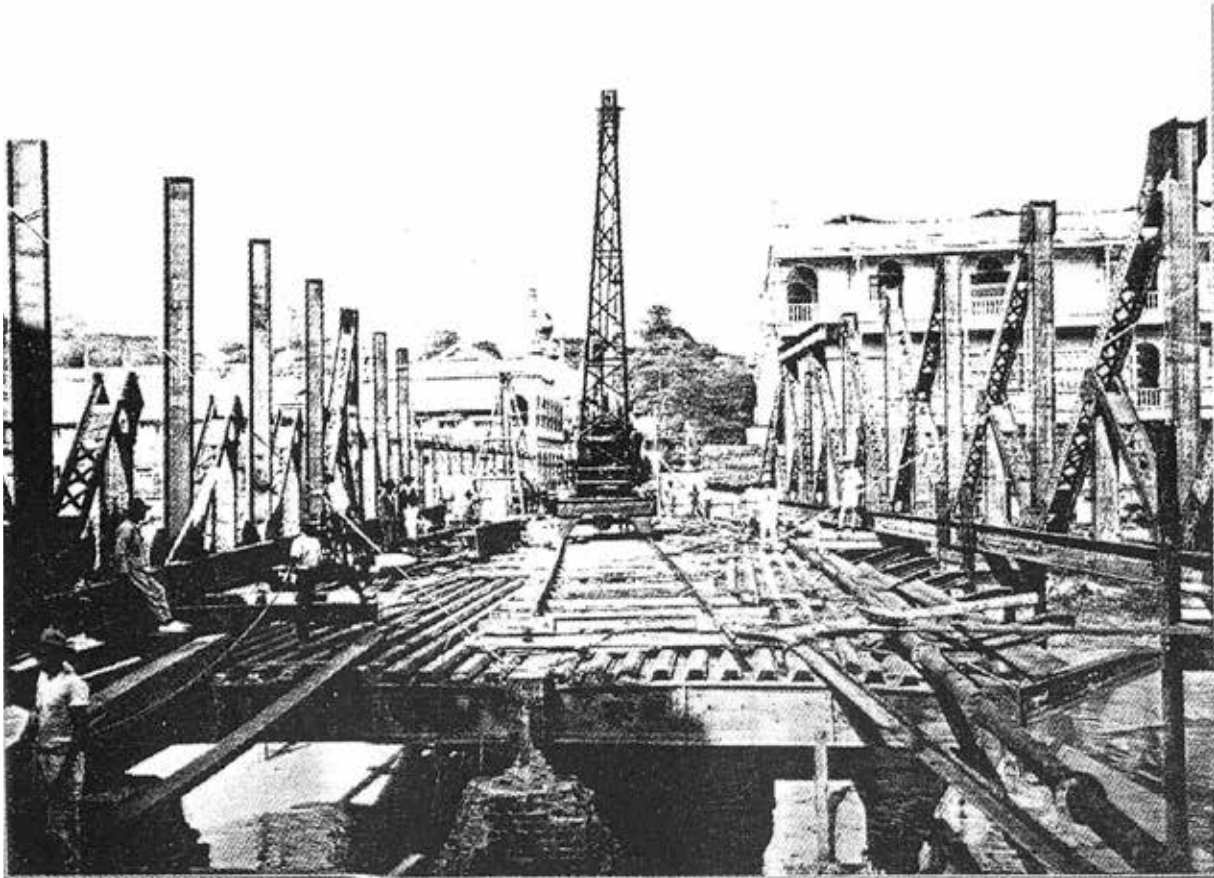
Victoria Avenue and Bluff Road, 1954 (Vol. 85, Issue January - March 2021 – Preserving Heritage)



Victoria Avenue and Bluff Road, 1954. General view of the Kuala Lumpur Secretariat building taken between Victoria Avenue and Bluff Road July 15, 1954. Notice the cars on the road were mainly of continental make such as Austin and Morris Minor.

ENGINEERING NOSTALGIA: Bridge Construction

Market Street Bridge (Vol. 9, Issue 3, November 2000 – Environmental Management)

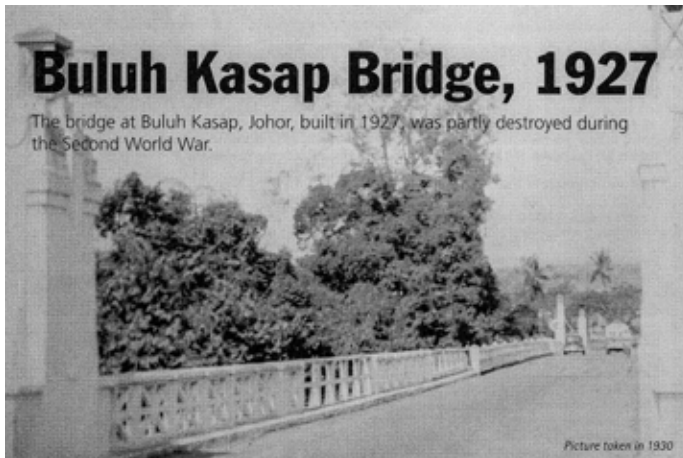


The work on the reconstruction of Market Street Bridge, Kuala Lumpur was started at the end of April 1928 and progressed rapidly with expenditure amounting to \$120,385. The abutments were completed while the steel work from Europe began to arrive, and the work of erection of the new structure with one clear span of 135'0" was completed at the end of the year.



The first Market Street Bridge was constructed in 1883, to replace the felled tree trunk that served as the bridge till then.

Buluh Kasap Bridge 1927 (Vol. 18, Issue Qtr 1/4 March 2003 – Construction)



Buluh Kasap Bridge, 1927. The bridge at Buluh Kasap, Johor, built in 1927, was partly destroyed during the Second World War.



The photo taken in 2002 showed the two pillars at the entrances for placing oil lamps at night to guide the traffic.

The Causeway (Vol. 56, Issue September 2013 – Housing for All)



View of the Causeway taken from the operating cabin showing a passenger train from Singapore on the temporary railway track, December 1923.



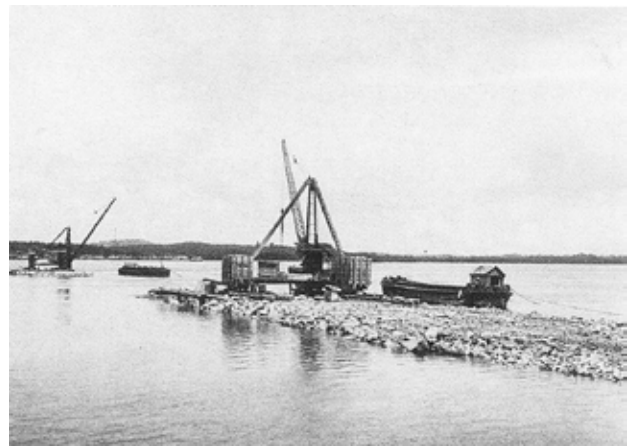
Work in progress to reclaim and widen the Causeway at the Johore end, February 1989.



The Causeway, June 1924. This image was taken from Woodlands, Singapore.



Construction of cofferdam at the east end of the lock and concreting of apron in progress, June 1921. Both locals and Europeans worked together to complete the causeway.



A derrick crane installing culverts at the Johore end of the Causeway



Progress work at south (Woodlands) end of the Causeway in June 1921

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60-year-old Klang Kota Bridge (Vol. 69, Issue January – March 2017 – Transforming the Construction Industry)



60-year-old Klang Kota Bridge – First Double-Decker Bridge in Malaysia Construction of Kota Bridge in progress September 19, 1958.



Inspection by engineers at the construction site of Kota Bridge on September 29, 1958.

Batu Pahat Bridge Under Construction (Vol. 79, Issue July - September 2019 – Engineering & Construction Practices)



Batu Pahat Bridge under construction March 14, 1966

Maran-Jerantut Bridge 1978 (Vol. 88, Issue October - December 2021 – Engineering Practice)



Maran-Jerantut Bridge or Jambatan Sultan Abdullah was built over Sungai Pahang in 1977 and completed in 1978 near a village called Kampung Feri Jerantut. This village was so named as this was the location where the ferry service was provided for movement of vehicles from central Pahang to Maran enroute to Kuantan.

Sultan Yahya Petra Bridge Kota Bahru, 1965 (Vol. 80, Issue October - December 2019 – Aero & Aviation Industry)



Sultan Yahya Petra Bridge Kota Bahru, 1965. Official opening of the Sultan Yahya Petra Bridge, Kota Bahru by the then Sultan of Kelantan, DYMM Tengku Yahya Petra Ibni Almarhum Sultan Ibrahim on April 17, 1965.

Pontoon Bridge in Klang, 1945 (Vol. 82, Issue April - June 2020 – Waste Management)



Pontoon bridge in Klang constructed in 1945.

Pontoon Bridges in Klang, 1945. The Kota Bridge, Klang was built to replace the then existing two pontoon bridges for motorised vehicles and a suspension bridge for pedestrians. The two pontoon bridges were built between 1954 and 1955.

Kota Tinggi Bridge before 1962 (Vol. 93, Issue January - March 2023 – Smart City)



Kota Tinggi Bridge before 1962. The old Kota Tinggi Bridge in Johor was built as a wooden bridge in the early 1900s to cross flood waters during the year-end monsoon period. The bridge spanned across Sungai Johor, the main river in Johor, which is 122.7km long and has a catchment area of 2,636 km².

Marang Bridge in Terengganu under Construction, 1964 (Vol. 94, Issue April - June 2023 – Building Services)

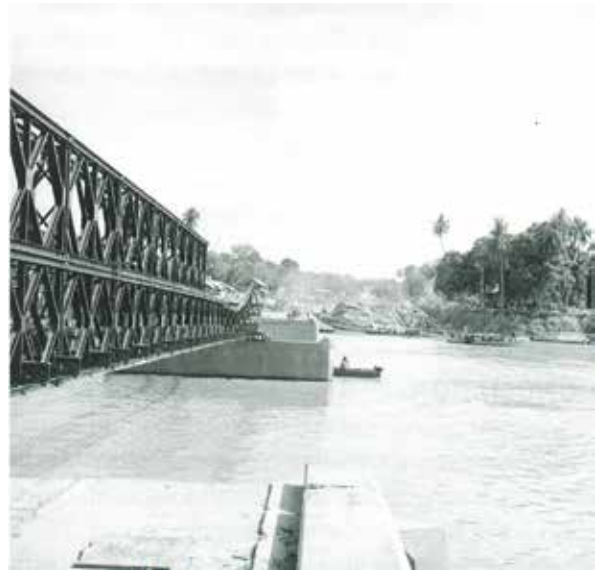


The Marang Bridge was one of the bridges constructed in 1964 by the Public Works Department, or JKR, in Terengganu. This was to replace the ferries operated by them at the Kemaman, Dungun, Losong and Marang districts. The then Marang ferry used a motorised cable pontoon system (see photo). It was the only river crossing on Federal Route 3 running along the east coast of Peninsular Malaysia.

Construction of Bailey Bridge over the Collapsed Temerloh Bridge, 1971 (Vol. 84, Issue October - December 2020 – Agriculture Technology)



Construction of Bailey Bridge over the collapsed Temerloh Bridge, 1971. In January 1971, a severe 100-year annual return interval (ARI) flood inundated many parts of the country. The flood swept away the center spans of the Temerloh Bridge across the Pahang River. The high flood water carrying logs from upstream exerted pressure on the bridge deck until it yielded.



Johor Bahru Causeway, 1960 (Vol. 87, Issue July - September 2021 – Environment)



Johor Bahru Causeway, 1960: Notice the cross-flow current of the balancing culverts in the middle section. Most were later blocked after a series of widening works resulting in stagnant water on both sides of the structures. Notice the vehicles were mainly of continental make such as Volkswagen, Austin, Ford and Vauxhall.

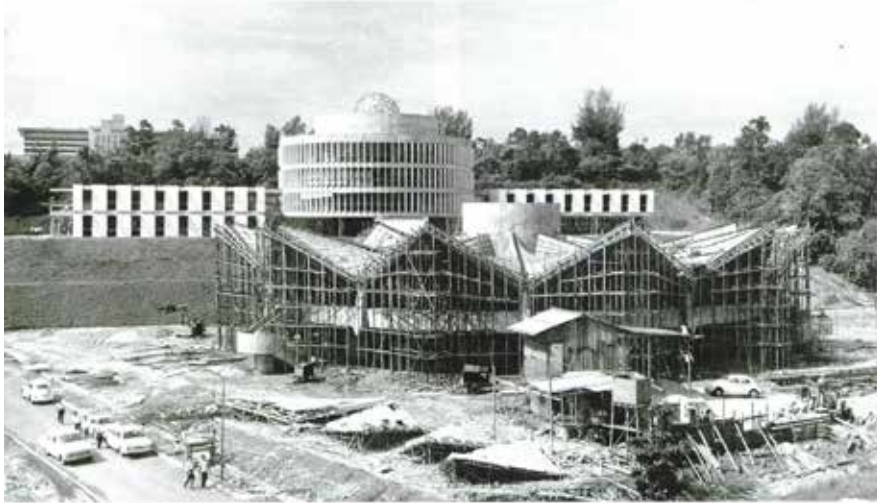
Muar Bridge Opened to Traffic in 1967 (Vol. 78, Issue April - June 2019 – Dispute Resolution)

The Muar Bridge, constructed in 1965 and completed in 1967, was built to replace the ferry services plying between Muar town on one side and Tanjung Aga on the opposite bank. The old ferry services began operation in 1890 using the landing facilities at Penambang Ferry Terminal.



ENGINEERING NOSTALGIA: Building Construction

Faculty of Economics UM in 1968 (Vol. 26, Issue June – August 2005 - Energy)



The Faculty of Economics and Administration, University Malaya nearing completion in 1968.

Police Post (Vol. 26, Issue June – August 2005 - Energy)



Police Post Nixon Hut at Kampung Baru Sri Telemong

Stadium Negara under construction 1961 (Vol. 90, Issue April - June 2022 - Engineering Fraternity)



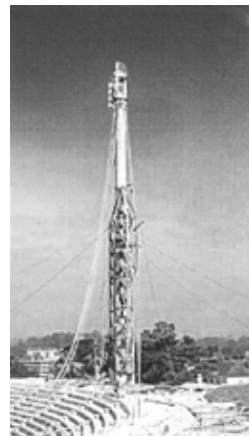
Stadium Negara under construction in 1961. Construction works for the 10,000-seat Stadium Negara commenced in 1960 and was completed in 1962 at the cost of RM34 million. It was the country's first indoor stadium as well as the best indoor stadium in South East Asia then and was listed as a National Monument under the National Heritage Act, 2005.

Muzium Negara in 1962 (Vol. 86, Issue April - June 2021 – Chemical Engineering)



Muzium Negara, under construction in 1962. Tunku Abdul Rahman Putra inspecting the National Museum building under construction in 1962.

Merdeka Stadium 1957 (Vol. 23, Issue September – November 2004 – Environment)



Milestones in Malaysian Engineering: Merdeka Stadium 1957

ENGINEERING NOSTALGIA: Nostalgic Scenes

The Changing Face of Kota Kinabalu (Vol. 44, Issue December 2009 – February 2010 – Sustainable Development)



The changing face of Kota Kinabalu (formerly Jesselton)

Gotong Royong Project Kg Seri Rembau 1952 (Vol. 70, Issue April – June 2017 – Road Safety)



Gotong Royong project of levelling a village road near a bridge by villagers of Kg Seri Rembau, Negeri Sembilan in 1952.

That Which Was (Vol. 22, Issue June – August 2004 – Water Engineering)



Jalan Bukit Bintang - 1950

Jalan Petaling or Jalan Bandar, KL (Vol. 31, Issue September – November 2006 – Building)



Jalan Petaling / Jalan Bandar, KL

Kuala Kangsar in 1967 (Vol. 33, Issue March - May 2007 – Agriculture)



Kuala Kangsar in 1967, floods in the town were common before the construction of the Temengor Dam.

World War 2 Relic in Malim Mawar, Perak (Vol. 40, Issue December 2008 – February 2009 – Environmental)



World War 2 Relic in Malim Nawar, Perak: Leftover after Japanese Withdrawal.

Early Refuse Disposal System in Ipoh - 1978 (Vol. 96, Issue October - December 2023 – Health, Safety & Environment)



Open lorry refuse collector



Covered lorry discharging non-compacted refuse



Closed type of refuse collector using FOCO crane to lift large dustbin

Kuala Lumpur in The 1950s - Jalan Medan Pasar (Vol. 43, Issue September – November 2009 – Safety & Health)



Kuala Lumpur in the 1950s – Jalan Medan Pasar

**The Lumberjack Team of the 60s
(Vol. 34, Issue June – August 2007 – Waste Engineering)**



The Lumberjack Team of the 60s - Loading huge log onto jungle timber lorry side way using pulley and winch system.

**National Monument Turns 50
(Vol. 66, Issue April - June 2016 - Infrastructure – Meeting Future Needs)**



National Monument turns 50

Kajang Town in 1960s (Vol. 47, Issue September – November 2010 – Property Development)



Kajang Town in 1960s

The Old Waterworks of Malacca (Vol. 68, Issue October - December 2016 - Innovation for Growth)



This old-style Malay waterwheel known as the kincha was used for paddy irrigation in Malacca and around Kuala Pilah, Negeri Sembilan in the pre-war.



Undated photo showing a wooden waterwheel propelled by the current lifting river water into the adjacent bamboo channel to be transported to the paddy field nearby.

The Changing Face of Kuala Lumpur (Mountbatten Road) (Vol. 30, Issue June – August 2006 – Minerals)



The changing face of Kuala Lumpur

Culvert Construction in 1906 (Vol. 57, Issue January -March 2014) – Managing Water



In the photographs, you can see a water course constructed in 1906 using the then current method of culvert construction. Notice the quality of craftsmanship employed in laying the bricks which are still in good condition after more than a century. The cool environment of the culvert has attracted swiftlets to build nests at the upper soffit of the culvert. The water course can be found under the main railway line near Bekok Town, Johor.

Logging of the 60s (Vol. 20, Issue December 2003 – Waste Management)



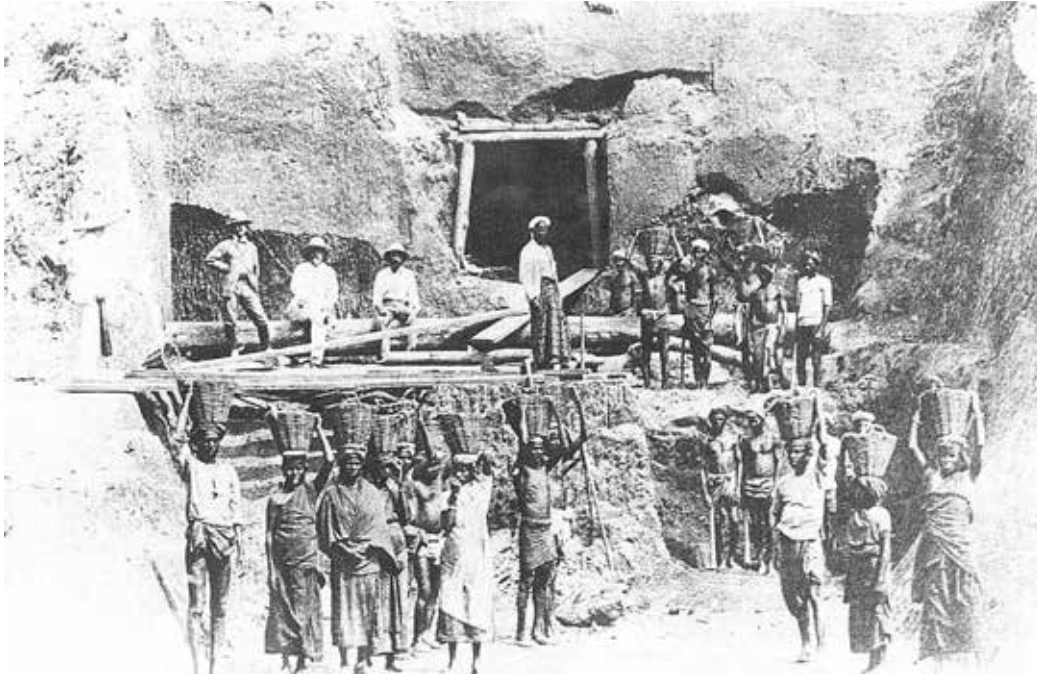
Logging of the 60s – Construction of bridge using timber log.



Transferring log from jungle lorry to trailer.

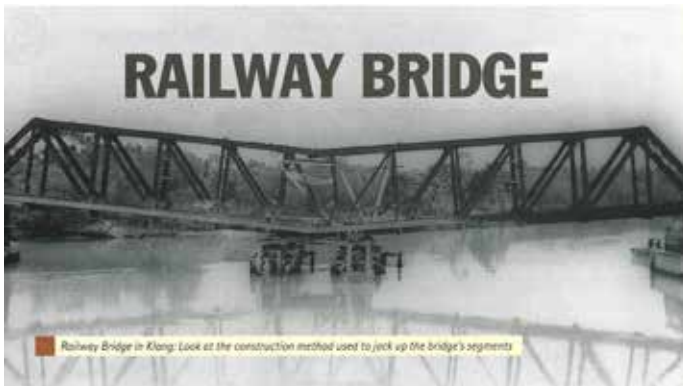
ENGINEERING NOSTALGIA: Railway

Construction of Bukit Berapit Railway Tunnel (Vol. 11, Issue June 2001 - Heritage)



Construction of Bukit Berapit Railway Tunnel near Kuala Kangsar, Perak, early 1900's. Note the cockhats, cangkul, baskets, and Indian labourers.

Railway Bridge - Railway Bridge in Klang (Vol. 16, Issue September 2002 – Asset Management)



Railway Bridge in Klang: Look at the construction method used to jack up the bridge's segments.



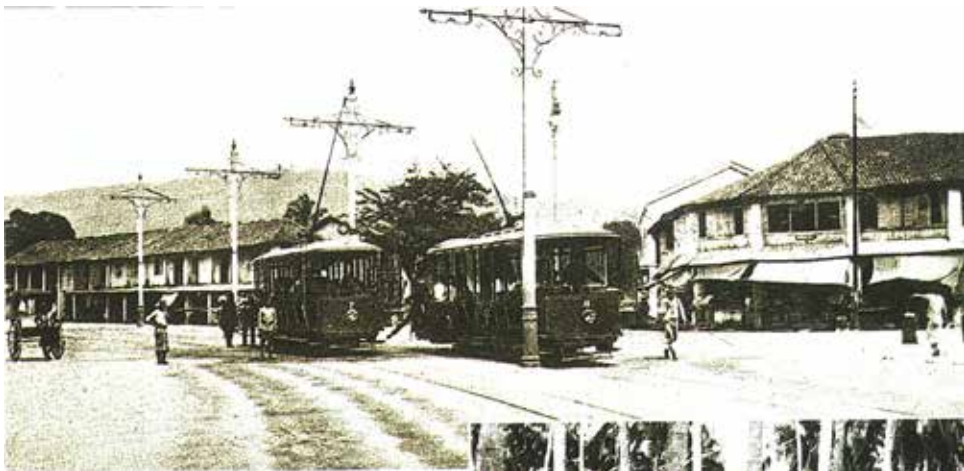
Train passing the railway bridge

ENGINEERING NOSTALGIA: Transportation

Transportation Penang 1900s (Vol. 13, Issue December 2001 - Transportation)



Bullock Cart Station



Electric Trams



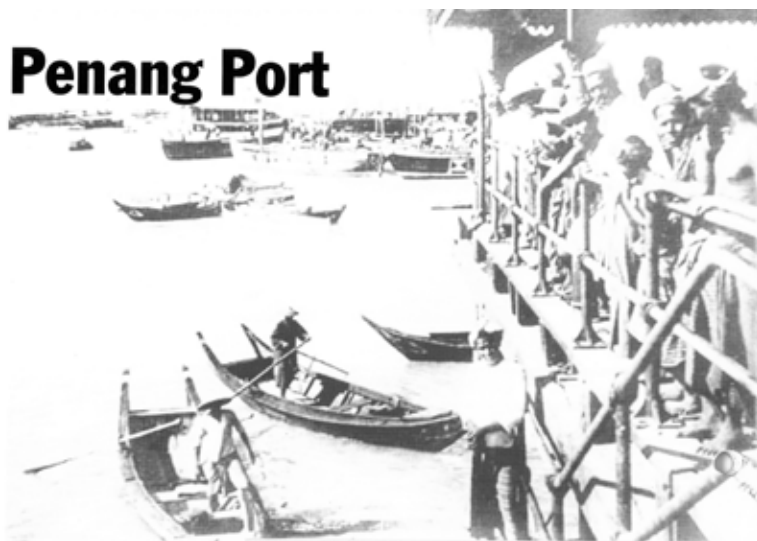
Electric Trams



Motor Cars

Penang Port - Penang Harbour 1900s (Vol. 19, Issue June 2003 – Geotechnical Engineering)

Penang Port



*Penang Port -
Penang Harbour
1900s*

Penang Harbour 1910 - Weld Quay (Vol. 46, Issue June – August 2010 – Water)



Penang Harbour 1910 - Harbour View



Penang Harbour & Weld Quay, 1910

Penang Port 1972 (Vol. 92, Issue October - December 2022 – Physical Connectivity)



Penang Port, 1972

An Old Faithful of Yesteryear
(Vol. 29, Issue March – May 2006
– Engineering Practice)



An Old Faithful of Yesteryear

Winch Excavator during the 1960s
(Vol. 95, Issue July - September 2023
– Biomedical Engineering)



Winch Excavator during the 1960s

Kuala Gula - Ferry Service (Vol. 42, Issue June – August 2009 – Public Amenities)



Kuala Gula / Kurau Village River Crossing – changing with time. Ferry service, 1950 – 2008

ENGINEERING NOSTALGIA: Water-Hydro Construction

Reflection of an Engineer - Transporting Penstock and Transformer (Vol. 44, Issue December 2009 – February 2010 – Sustainable Development)

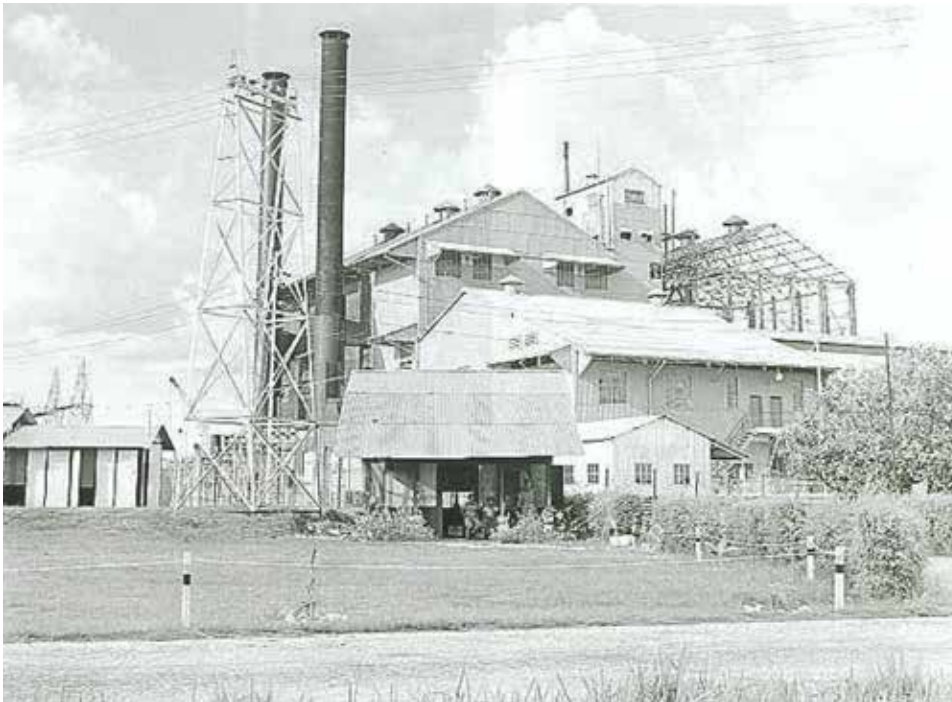


Transporting part of the Penstock from Butterworth to Temengor Power Station for installation. Note the tight escort provided by using heavy armoured vehicles moving in front and behind the transporter.



Transporting Transformer weighing more than 50 tons from Butterworth to the power station for installation. The item was escorted by the armoured vehicles travelling in front and behind the transporter at all time until it had safely arrived.

Batu Gajah Steam Power Station (Vol. 97, Issue January - March 2024 – Environmental Social Governance)



View of Batu Gajah steam power station at Tanjung Tualang taken in 1953. Notice the overhead electric cable connected to the power station through the pylon. A tall chimney was built to emit black smoke from the coal fire boiler to generate steam for electricity generation.

ENGINEERING NOSTALGIA: Mining

Tin Mines (Vol. 15, Issue June 2002 - Victory Avenue)



Tin Mine in Ampang, Kuala Lumpur



Tin mining in Serendah, Selangor

Sg. Lembing Mine, Pahang – 1926 (Vol. 48, Issue December 2010 - February 2011 - Transportation & Safety)



As was in 1926



Transporting rail car into the mine entrance – 1926

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Readers' Perception on *The Ingenieur*

By Ir. Abdul Razak Yakob
Dato' Prof Ir. Dr Eric KH Goh

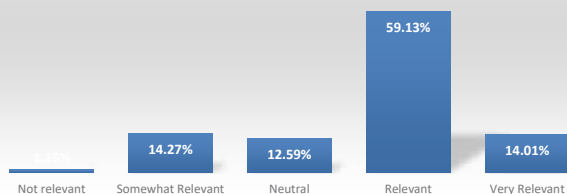
In conjunction with the commemoration of the 100th Issue of *The Ingenieur*, BEM, the Corporate Communications Department and the Editorial Board conducted a special Survey Feedback Project to explore and gauge how enthusiastic readers perceive the magazine's contents, including constructive outcomes on areas for this publication to potentially improve to stay relevant. The prime focus of this challenging yet comprehensive feedback survey is on significant elements such as 'Content Relevance', 'Overall Readership Satisfaction based on Publication Content', 'Favourite Published Sections', 'Technical Content Quality', 'Frequency of Readership' and finally 'Publication format Preference for Readers'.

Review of THE INGENIEUR's Feedback Survey

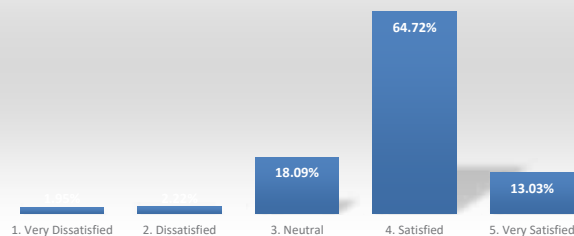
The comprehensive evaluation of all the invaluable information derived from *The Ingenieur's* Survey Feedback project is presented as follows:

- A remarkable 89.46% of the Survey Feedback respondents indicated that *The Ingenieur's* Technical Content is of 'High Quality'; thus, BEM has achieved another landmark success.
- 77.75% of survey respondents strongly supported the opinion that *The Ingenieur* has effectively achieved 'Readership Satisfaction' status based on its Publication Content.
- 73.14% of this Feedback Survey respondents strongly indicated that the content of this BEM publication is 'Relevant' to the professional needs and interests of the engineering fraternity.
- Ardent readers of *The Ingenieur* agree that 'Engineering Innovations' (67.82%), 'Guidelines' (36.08%) and 'Special Reports' (33.24%) are their three most favourite segments.
- 97.44% of fellow engineers still put in the effort to open and read the online published content; with 61.09% of the survey respondents classified as enthusiastic dedicated readers.
- 49.19% of the respondents prefer the 'digital/online format' while 22.83% would rather the 'hardcopy/print format', complemented by the remaining 28.7% of readers who are adaptable to any of the two publication formats.

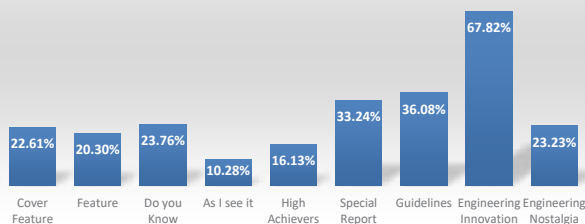
Content Relevance: How relevant do you find the articles and features in “The Ingenieur” to your professional interests and needs?



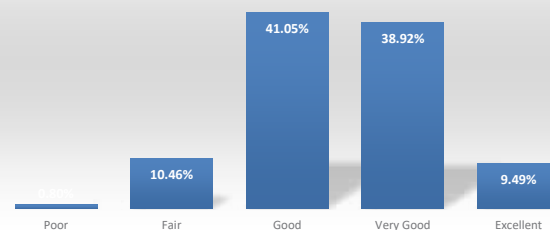
Overall Satisfaction: On a scale of 1 to 5, how satisfied are you with the content of “The Ingenieur” over the past 99 issues?



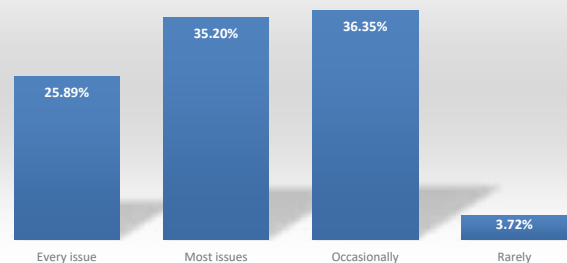
Favourite Sections: Which sections or features of “The Ingenieur” do you enjoy the most?



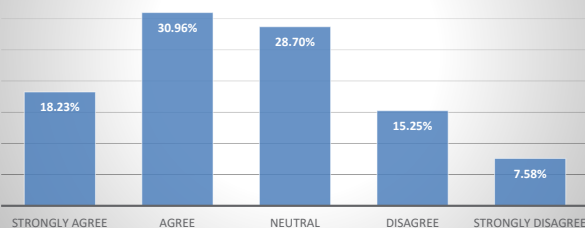
Content Quality: How would you rate the quality of the technical content in the magazine?



Frequency of Reading: How often do you read “The Ingenieur”?



Reading Preference in Digital: I prefer reading THE INGENIEUR magazine online.



Suggestions for Improvement

Survey Feedback Readers provided various suggestions for further improvement. Some of the practical proposals include:

- to include more exclusive content that offers unique insights or expert opinions; investigative reporting on the latest industry trends and technological advancements; in-depth analysis of engineering projects, and cutting-edge industry setups; and practical insights into engineering problems or even innovative case study findings on important engineering issues
- a call for more varied and diversified content that includes interviews with outstanding professionals, case studies and global perspectives on engineering trends
- the need to increase articles focused on current industry challenges and innovations
- to broaden the scope of publication content by expanding the range of engineering disciplines covered to increase relevance for a more diverse readership
- to enhance the technical depth with the publication of deeper, more specialised technical content that addresses complex engineering projects and challenges
- to revitalise underperforming sections through re-evaluation and reformatting these less popular published sections to increase their appeal and impact towards engineering excellence
- to leverage digital platforms by continuing to focus on digital/online publications whilst enhancing Regular Readership Engagement (such as reader's feedback comments) complemented by personalised content notifications to keep readers engaged
- to refresh the overall publication layout design for various recurring engineering themes.

Conclusion

The in-depth evaluation of this special *The Ingenieur* Feedback Survey noted that the readership is looking for a broader and more diversified array of publication content. They want the publication to offer not only technical insights but also to feature human-centric stories, such as interviews and up-to-date industry engineering trends. Creating opportunities for interactive reader engagement and contributions could also help make the publication more dynamic and appealing.

The Ingenieur is in a good position with constructive opportunities to evolve by addressing areas such as publication layout design, contents and the latest modes of interactive reader engagement to enhance its overall value for the engineering community. BEM can thus advantageously build on the already acknowledged strengths of *The Ingenieur* by addressing these relevant areas for improvement. BEM's proactive and positive actions will ensure that this significant publication continues to remain relevant as an invaluable resource and catalyst for information dissemination in support of the diverse expertise of Malaysia's engineers, engineering technologists and engineering technicians while confidently progressing towards further world-class engineering excellence in the years to come.

Tête-à-tête with Prominent Engineering Personalities

By Ir. Mohd Khir bin Muhammad

From the year 2014, *The Ingenieur* introduced a column on interviews with prominent leaders with engineering background including politicians and senior government officials. Here are the highlights from some of these interviews.

TECHNOCRAT CUM POLITICIAN

Datuk Ir. Hamim bin Samuri,
Deputy Minister, Ministry of Industrial Trade and International (MITI)
(May 16, 2013-July 26, 2016)

Issue: Vol 58 (April-June 2014)
Interviewed by: Dato' Ir. Fong Tian Yong
Venue: China World Hotel, Beijing, China



Datuk Ir. Hamim, a civil engineer prior to becoming a full-time politician, shared his experiences and challenges in holding this important position at MITI including his involvement in the Trans-Pacific Partnership Agreement (TPPA), Foreign Direct Investment (FDI), the transformation from labour intensive industries to High-Tech industries, and the liberalisation of services.

Datuk Ir. Hamim also credited his engineering training background in developing his ability to have an analytical mind to evaluate problems and come up with solutions, that gave him an added advantage as the Deputy Minister of MITI.





MOVING MELAKA AHEAD

Datuk Seri Ir. Haji Idris bin Haron,
Chief Minister of Melaka (May 7, 2013-May 9, 2019)

Issue: Vol 64 Oct-Dec 2015

Interviewed by: Dato' Ir. Fong Tian Yong & Dato' Ir. Ali Askar Sher Mohamad

Venue: Chief Minister's Residence



Datuk Seri Ir. Idris is a graduate of electrical engineering from a US university and worked with Lembaga Letrik Negara (LLN) prior to politics.

He was a member of Parliament and served as the Deputy Minister of Ministry of Higher Education (MOHE) before his appointment as Chief Minister of Melaka.

As the first Chief Minister with an engineering background, he focused on waste management, One Stop Center (OSC) and improving the public toilets for the state. He practised the 3E's Approach in problem-solving and decision-making, that is Education, Engineering and Enforcement.

On career choice, he believed in bringing changes, and wanted his presence to be felt within his area of influence. His advice to young engineers was to give emphasis to the foundation and principles of engineering, to serve with integrity and honour, to do things systematically, have structure in organisations, and be in the know of the whole process.



REDESIGNING HIGHER EDUCATION

Ir. Dr Siti Hamisah binti Tapsir, Director General of Higher Education,
Ministry of Higher Education (MOHE)
(January 16, 2017 -November 28, 2019)

Issue: Vol 72 Oct-Dec 2017

Interviewed by: Dato' Ir. Fong Tian Yong & Em. Prof. Dr K S Kannan

Venue: Ministry of Higher Education



Ir. Dr Siti Hamisah was a Professor in civil engineering at a local university prior to her appointment as the Director General of the Higher Education at MOHE.

The interview focused on the present and future trends in engineering education in the country. She explained the aligning of priorities through the Malaysia Education Blueprint

2015-2025 (Higher Education) and the Redesigning Initiatives.

She also explained the emphasis on Technical and Vocational Education Training (TVET) – modular and stackable courses where students can choose the skills sets they desire based on their level of readiness and experience. As a result, the Ministry formed a consortium of four public universities and rebranded them as MTU (Malaysia Technical Universities).

The Ministry also redesigned Malaysian higher education – adopting innovation and transformation to be relevant in the era of technology convergence, i.e. Fourth Industrial Revolution, artificial intelligence, robotics, and big data analysis.

TENURE WITH MANY 'FIRSTS'

Dato' Sri Ir. Roslan bin Md Taha,
President, Board of Engineers Malaysia (January 1, 2017 -April 15, 2019)

Issue: Vol 78 Apr-June 2019

Interviewed by: Dato' Ir. Fong Tian Yong & Em. Prof. Dr K S Kannan

Venue: President's Room, BEM



Dato Sri Ir. Roslan, who was also the Director General of Public Work Department (JKR), shared his many 'firsts' experience in terms of major events and significant developments for the engineering fraternity during his two-year tenure as BEM Board President.

BEM organised the first ever Open Day and participated in the inaugural "Hari Profession Teknikal Negara" (HPTN).

BEM was accepted by the International Engineering Alliance (IEA) as full signatories to the Sydney Accord and Dublin Accord, which allows the registration of Engineering Technologist and Inspector of Works as professionals in their roles and responsibilities in the engineering fraternity and the construction industry.

On the mobility of engineers, more engineers are being registered as ASEAN Chartered Professional Engineer (ACPE) so they can extend their work in the region.

Dato Sri Roslan also spoke on the standard of Malaysian engineers and engineering graduates internationally, and the BEM efforts in ensuring that graduates meet the global standard in engineering education through the roles of Engineering Accreditation Council (EAC) and Engineering Technology Accreditation Council (ETAC).

He advised young engineers and undergraduates in engineering faculties to prepare for the new ICT era with the coming of disruptive innovations and commercialisation in the 4.0 IR.



Major Events Highlights

By **Dato' Prof Ir. Dr Eric KH Goh**
Dato' Ir. Fong Tian Yong
Ir. Dr. Zuhairi Abd Hamid

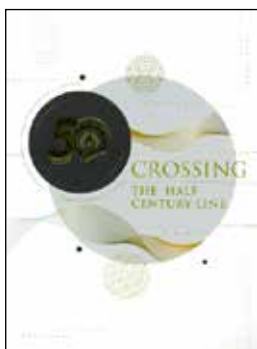
"The journey to elevate BEM's brand continues. The Corporate Communication Committee is dedicated to pushing boundaries and achieving new heights."

Ir. Fam Yew Hin
Chairman
 Corporate Communication Committee, BEM

BEM's Corporate Communication Committee (CCC) was tasked to facilitate many important functions such as defining and branding BEM's corporate image, media releases, publicity and editorial preparation of publications for information transfer on BEM's executive decisions and professional events aimed towards continuous enhancement of engineering excellence. They have successfully completed numerous challenging projects through the years. Another major role of CCC is the establishment of BEM as the key Central Information Depository on all matters related to Engineering. As we begin to recall all the progressive accomplishments of BEM, the list stretches on.

As a special tribute to commemorate the 100th issue of *The Ingenieur*, we highlight their significant projects that especially benefit the engineering fraternity.

50th and 30th BEM Anniversary Commemorative Books



BEM had chosen the theme 'Crossing the Half Century Line' as the focus for BEM's 50th Anniversary Commemorative Book, which was eventually published with the title 'BEM, 50 Years and Counting ...'.

BEM's 30th Anniversary commemorative book is entitled 'Engineers in Nation Building'. These historic books place on official record BEM's successful efforts in enhancing the standard and branding of the engineering profession. BEM's diligent efforts have borne fruit as Malaysia's engineering profession has reached a respected global peak and has earned its place among the international fraternity of engineering professionals such as the prestigious International Engineering Alliance.

These two commemorative works showcased the progressive achievements of BEM since the enactment of the landmark legislation for the engineering profession, namely 'The Registration of Engineers Act (Act 138)' which was passed in Parliament in 1967. They document in detail the initial setup of BEM as a statutory body to regulate engineering practice impartially and to safeguard the public interest and the safety of all parties concerned. The Board of Engineers

Malaysia (BEM) was formed on August 23, 1972. The 50th Anniversary Book noted that BEM's initial registration membership was a humble 70 in 1972; however, it had grown exponentially to an impressive 221,999 in 2022, 50 years later.

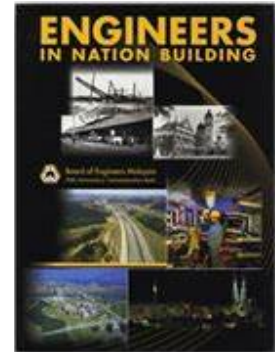
The books also presented the latest registration statistics for the various engineering professionals, namely 'Graduate Engineers', 'Professional Engineers', 'Professional Engineers with Practising Certificate (PEPC)', 'Accredited Checkers', 'Engineering Technologist', and 'Inspector of Works'.

The two publications chronographically documented the milestone achievements of BEM since its inception with notable landmark events such as:

- Amendments to 1967 REA to include Engineering Consultancy Practices;
- Accredited Checkers and Multi-disciplinary Engineering Practices (2002);
- Signing of Mutual Recognition Arrangement on Engineering Services by ASEAN Ministers (2005);
- BEM was prestigiously accepted as Full Signatory for the Washington Accord under the auspices of the renowned International Engineering Alliance (2009) and subsequently for the Dublin Accord and Sydney Accord in 2018; and finally
- Further Enhancements to the Regulations of Engineers Registration (RER) in 2022 with respect to Equity Issues for Engineering Consultancy Practices.

The books also showcased several impressive engineering projects including The Petronas Twin Towers, the North-South Highway, PROTON Car Manufacturing Setup, Design and Development of Putrajaya, Digital Highways, SMART Tunnel, Penang Bridge, and the KLIA International Airport.

The Engineering Education Focus segment highlighted the establishment and benefits of BEM's Engineering Accreditation Council and the Engineering Technologist Accreditation Council, all aimed towards continuous quality excellence for Malaysia's engineering education. The BEM 50th Anniversary commemorative book concluded with BEM's latest success in that Malaysia is now acknowledged as a respected and attractive hub for Engineering Education in the Asia-Pacific region.



THE INGENIEUR

BEM's premier information dissemination medium, *The Ingenieur*, a market leader in engineering publications, having achieved an impressive circulation of 13,000 copies per issue, is Malaysia's key authoritative fount of knowledge for everything Engineering. This sought-after quarterly engineering publication provides a wealth of information such as effective professional practices, Government policies and guidelines, legal issues, engineering innovations, special engineering reports, occupational safety, green engineering, efficient project management and the unique engineering nostalgia segments. *The Ingenieur* also provides useful supplementary information including career and business opportunities necessary for the progressive continuous professional development



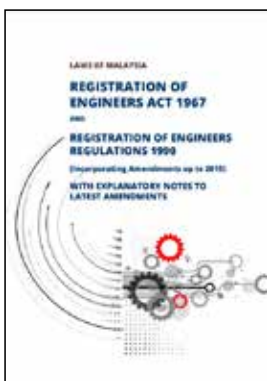
of pro-active practising engineers and related technical professionals. To cater to the needs of our dynamic engineering professionals, *The Ingenieur* is currently published in digital/online format so that this invaluable information medium can be accessed from anywhere worldwide via the BEM official website.

BEM Annual Reports



The BEM Annual Reports are invaluable references for all the major decisions made by BEM, complemented by the strategies and corresponding achievements of the various professional-centred projects successfully carried out by the pro-active BEM Engineering Board and the respective Corporate Governance Committees. The informative writeups include:

- BEM Strategic Plan 2021-2025,
- Annual Achievements and Professional Registration Statistics of BEM,
- Engineering Accreditation Council (EAC) and Engineering Technology Accreditation Council (ETAC) - Ensuring Quality Education,
- Ensuring Competency of Professional Engineers via Professional Assessment/Competency Examination,
- Protocols for Implementation of Code of Conduct/Ethics for BEMs Registered Professionals,
- Amendment to Regulations on Registration of Engineers,
- Code of Professional Conduct Assessment for Engineers with Overseas Professional Qualifications,
- Latest Updates of BEM Circulars and Guidelines to Regulate Engineering Practices, and finally
- the useful Annual List of Accredited Engineering/ Engineering Technology/ Engineering Technician Academic Programmes in Malaysia.



Laws of Malaysia: REA 1967 and RER 1990 Publications

Malaysia is among the first few nations worldwide to introduce legislation governing the registration of the engineering profession. Subsequently, other countries like Singapore and South Africa followed suit.

Another resourceful initiative of CCC is the design, writeup and publication of the book on Malaysia's gazetted 'Registration of Engineers Act 1967 (REA 1967)' and 'Registration of Engineers Regulations 1990 (RER 1990)' with explanatory notes on the latest amendments. This informative 90-page book includes important

content such as in-depth documentation on the 'Registration of Engineers Act 1967 (Revised 2015)' which was subdivided into five parts and complemented by the schedules, corresponding amendments and sections amended. Likewise, the 'Registration of Engineers Regulations 1990 (Revised 2015)' component was showcased in detail in seven parts accompanied by their relevant schedules, corresponding amendments and a list of regulations amended. The 3rd segment of this book, 'Explanatory Notes to the Latest Amendments to REA 1967 and RER 1990' included helpful details and explanations. The final segment encompassed the separate chapters that incorporated the contents of 'Registration of Engineers Act 1967 combining the Amendments up to 2015' and 'Registration of Engineers Regulations 1990 with the relevant Amendments up to 2015'.

International Engineering Alliance 2016 hosted by BEM



This global event hosted by BEM is an important assembly of prominent leaders, expert minds and academic captains of the engineering profession from around the world. The notable Washington Accord, Sydney Accord, Dublin Accord and various Cross-border Engineers Mobility Agreements are all under the auspices of the International Engineering Alliance (IEA). The tagline chosen by BEM for IEAM 2016, "Working together to advance Benchmarking and Mobility in the Engineering Profession", was consistent with IEA's role and objectives and in line with BEM's as well.



The *IEAM 2016* gathering collectively agreed that the engineering fraternity plays an integral role in any nation worldwide that strives for an industrialised, high-income economy and developed nation status. The prime objective of *IEAM 2016* and the distinguished international delegates in further enhancing and transforming engineering standards, professional recognitions and cross-border mobility for the engineering profession was successfully achieved at this forward-looking BEM-IEA event. The global delegates also appreciated the high standards set by BEM's accreditation process with great emphasis on the scholastic standards of Malaysia's engineering academic programmes and outcome competency attributes of aspiring graduate engineers.

BEM's Anniversary First Day Cover 2002 and Commemorative Corporate Stamps 2013

Another memorable and unique project successfully carried out by BEM to further positively promote the image of BEM and the engineering profession is the design, concept writeup and launch of the 'BEM Corporate Stamps and First Day Cover' for BEM's Commemorative Anniversary Celebrations. The objective for these BEM Anniversary historic philatelic collectables was to showcase all the impressive contributions of BEM and the engineering profession as the catalyst and foundation in the design, construction and manufacture of various innovative mega projects, structures, infrastructures and amenities for the enrichment of society, all with the noble aim towards the successful and strategic growth and development of the country. Our fellow engineers have indeed done the nation proud in that Malaysia is today recognised worldwide as a country with world-class infrastructures, facilities and engineering education excellence. A lot of time and effort have been diligently committed to these historic stamps and covers and their launch by Pos Malaysia was on August 9, 2002 (BEM 30th Anniversary), and July 7, 2013 (BEM 40th Anniversary).



From Pioneering Technical Education To Building World-Class Engineering Education Excellence

By Dato' Prof Ir. Dr Eric KH Goh
Dato' Ir. Fong Tian Yong
Emeritus Prof. Ir. Ishak Abdul Rahman

The illustrious historic establishment of early engineering/technical education in Malaysia dates back 120 years when a group of dedicated academic pioneers decided to inaugurate the first unique technical teaching school in 1904. The memorable event is recognised as the first organised establishment of engineering/technical education in the country.

This unique formal technical school, an engineering heritage icon, is the evolutionary catalyst leading to the eventual successful international mutual recognition of Malaysia's present-day accredited engineering, engineering technology and engineering technician education programmes via the Washington Accord, Sydney Accord and Dublin Accord under the auspices of the International Engineering Alliance (IEA).

That one-of-its-kind pioneer technical teaching institution was named the Treacher Technical School; aptly named in honour of the Resident General at the time, Sir William Treacher (1902 - 1904). It was originally located in Jalan Raja Chulan (formerly Weld Road) in Kuala Lumpur. Owing to the resourceful setup and formalisation of the ingenious Government 'Technical Assistant Scheme', various Government Departments such as the then Public Works Department (JKR), Telecoms Department, Survey Department and the Department of Railways all sent their newly appointed apprentices to this technical school for training and certification.

In 1927, it was proposed by the relevant Government authorities that a multi-discipline Technical Training School be established to train all technical personnel not just for the Government (public) sector but also to cater to the needs of the industrial sector. Owing to its renowned academic reputation, aspiring students came from all corners of the country as well from Brunei and Singapore.

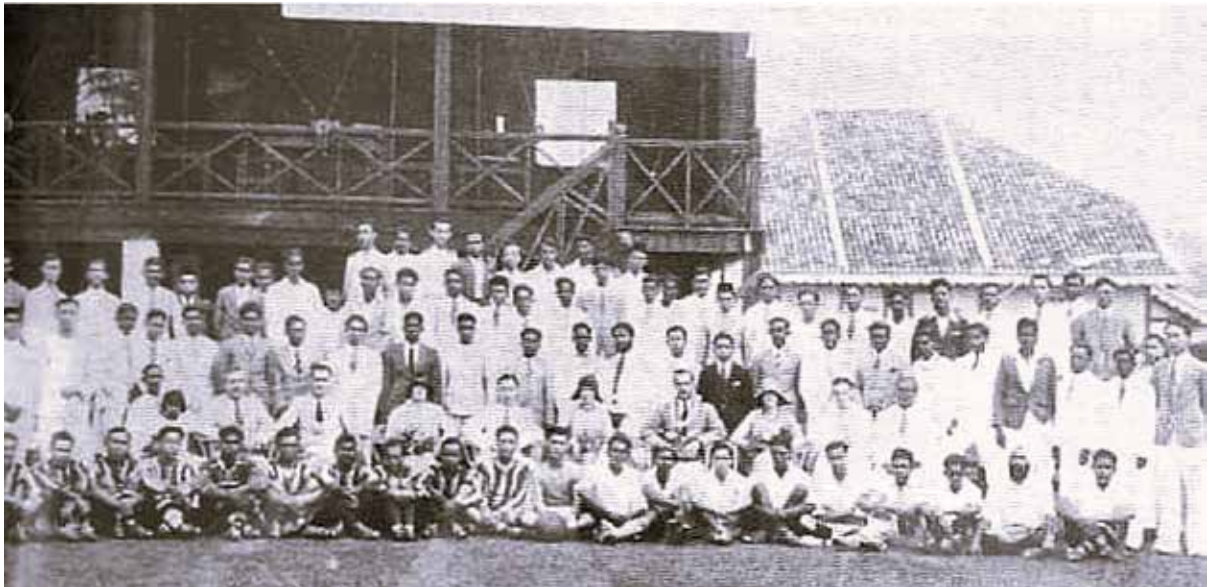
1930 saw the formation of the upgraded multi-discipline Government-sponsored Treacher Technical School which was eventually constructed at Jalan Tun H.S. Lee (formerly High Street), Kuala Lumpur.

In 1947, the significant McLean's Report was endorsed by Sir Alexander Carr-Saunders, the then avant-garde Head of the Commission on University Education (Malaya). The objective of the McLean's Report was strategically aimed towards the

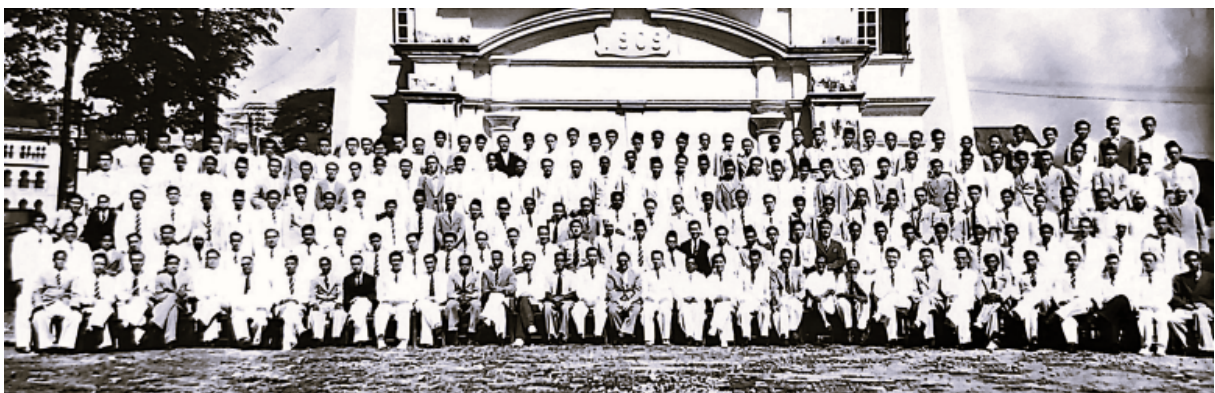




Treacher Technical School, Weld Road Kuala Lumpur, 1929.



Treacher Technical School, Weld Road Kuala Lumpur, 1929.



Treacher school moved to High Street Kuala Lumpur in 1931

continuous enhancement of Academic Standards for Technical Education and the training of competent technical experts for the systematic, progressive, and strategic development of the nation. Subsequently, acknowledging the need for a higher level of technical education, the Carr-Saunders Report recommended the formal setting up of the Engineering Faculty under the auspices of the University of Malaya.

In 1952 the Chairman of the Education Expert Commission, Mr. P.S. Dempsey, made a landmark academic standard recognition decision that the then Technical College Diploma is accepted to be on par with the undergraduate General (Pass) Degree qualification from the University of Malaya.

March 1, 1955, another memorable date, saw the opening of the upgraded Technical College at a new 47-acre site at Jalan Sultan Yahya Petra (formerly Gurney Road). Subsequently, the implementation of the forward-thinking Dempsey Report gave further recognition to the academic excellence of the famed Technical College.

During the 1960s, the time-honoured Technical College was working diligently to upgrade their engineering/technical courses from Diploma-level to Degree-level. All the students at the Technical College then were recognised and had the opportunity to sit for the international professional examinations conducted by well-known Examination Boards such as the Institution of Civil Engineers, Institution of Mechanical Engineers, Royal Institute of British Architects and the Royal Institute of Chartered Surveyors.

In 1972, the renowned Technical College was upgraded to technology university college status as Institut Teknologi Kebangsaan (National Institute of Technology). Eventually, the original Treacher Technical School, with the unceasing strong academic and networking support from the Government, professional institutions and the industry, was elevated to full university status with the celebrated designation as Universiti Teknologi Malaysia (UTM) on April 1, 1975.

The growth of Engineering Education in Malaysia thus benefited immensely from the pioneering establishment of the Treacher Training School. Positive outcomes from the priceless academic experience gained from this 1904 academic initiative subsequently led to the confident creation of several internationally recognised engineering programmes in Malaysia's prominent Institutions of Higher Learning such as Universiti Malaya, Universiti Sains Malaysia, Universiti Teknologi MARA, Universiti Putra Malaysia, Universiti Kebangsaan Malaysia, Universiti Teknologi Malaysia, International Islamic University Malaysia, Universiti Malaysia Sarawak, and Universiti Malaysia Sabah. Accredited engineering programmes were also set up at several leading private universities nationwide, including Universiti Teknologi PETRONAS, Universiti Tunku Abdul Rahman, Multimedia University, and Monash University Malaysia, and complemented other recently established University Colleges and Vocational Institutions nationwide.

The nation's latest landmark success is the international recognition garnered as the regional hub for engineering education, with 80 universities in Malaysia offering engineering degrees and courses. Universiti Malaya, Universiti Teknologi Malaysia and Universiti Sains Malaysia are strongly positioned by international



Technical College, Gurney Road 1955.

independent academic assessor EduRank as the top three best universities for engineering in Malaysia. These international academic accolades are the prime movers in the continuous increase in international students enrolling in Malaysian universities.



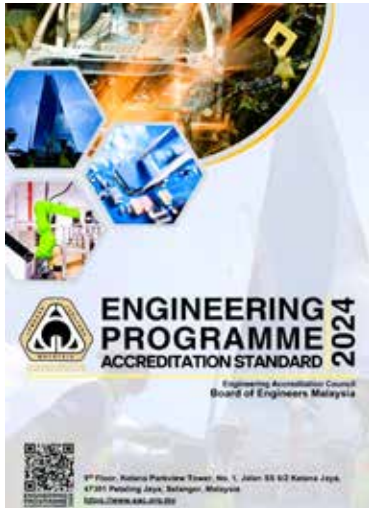
Technical Institute in 1966, Kuala Lumpur

Malaysia's latest landmark milestone towards world-class engineering excellence is the strategic establishment of the Engineering Accreditation Council (EAC) and Engineering Technology Accreditation Council (ETAC).

Based on the Registration of Engineers Act 1967 (Revised 2015), the primary role of the Board of Engineers Malaysia (BEM) is to ensure that the engineering, engineering technology and engineering technician education programmes in Malaysia that are producing engineers, engineering technologists and engineering technicians/inspectors of works graduates all attain the minimum standard comparable to global practices worldwide. Hence the necessity for BEM to audit the engineering, engineering technology and engineering technician education programmes conducted in the respective public and private Institutions of Higher Learning (IHL) nationwide.

BEM established the forward-looking EAC in 2000 and ETAC in 2015. The primary objective of these two renowned Councils is to ensure that, through the unique EAC and ETAC accreditation evaluation processes, the engineering, engineering technology,





and engineering technician academic programmes at the respective IHLs meet the aspirations of international engineering academic and professional standards worldwide.

The International Engineering Alliance (IEA) successfully launched the Washington Accord (WA) for the Engineering Profession in 1989, the Sydney Accord (SA) for Engineering Technologists in 2001, and the Dublin Accord (DA) for Engineering Technicians in 2002.

Malaysia successfully obtained Full Signatory Status in 2009 from WA with subsequent recognition extensions, meaning that BEM-EAC's accredited engineering programmes are now mutually recognised by 25 prominent WA signatories/countries worldwide such as the UK, USA, Russia, China, India, Japan, Australia and Canada.

In June 27, 2018, the IEA officially announced in London (UK) that Malaysia had further attained two high-impact Full Signatory International Mutual Recognition Status: the Sydney Accord (Engineering Technology Education) and the Dublin Accord (Engineering Technician Education).

Highlights of the major quality criteria for international accreditation of the respective IHLs by EAC and ETAC include assessment of their Programme Educational Objectives (PEOs), Programme Outcomes (POs), Comprehensiveness of their respective Academic Curriculum, Attributes and Performance of Students, Quality of Teaching and Support Staff, Standard of IHL Facilities and Effectiveness of IHL Quality Management Systems (QMS). BEM, via EAC and ETAC, also helps to ensure quality assurance via the pro-active motivation of diligent Continual Quality Improvement (CQI) culture in the spirit of Outcome-Based Education (OBE) at the relevant engineering and engineering technology-centred IHLs. BEM's academic accreditation processes are also useful tools to benchmark the respective IHL's engineering/engineering technology/engineering technician scholastic programmes in Malaysia to other prestigious IEA accredited academic institutions worldwide.

The initial setup of the EAC comprised expert representatives from the BEM, The Institution of Engineers Malaysia (IEM), the Malaysian Qualifications Agency (MQA),



Evolution of EAC Standard

and the Public Services Department (PSD). For efficient administrative operations, the EAC is supported by the Engineering Accreditation Department (EAD). Owing to the global mutual academic recognition via WA under the auspices of IEA, Malaysia's BEM-accredited engineering education system is now acknowledged to be at world-class standard, thus on par with many advanced countries around the world.

EAC's accredited engineering programmes are currently benchmarked to international educational standards that emphasise the quality of academic engineering programmes, complemented by the successful attainment of holistic qualities/attributes for IHLs' aspiring graduates. BEM and EAC are fully committed to upholding the high standards of WA and expectations of the global industrial sectors to become the principal leader for engineering progress in Malaysia and the region.

The monumental success of BEM's strategic EAC initiative has thus attracted many foreign universities to confidently set up branch campuses in Malaysia, an invaluable catalyst for Malaysia to attain the prestigious status as an international hub for strategic engineering education excellence.

To cater to the needs of the engineering technologist and engineering technician-centred vocational community, BEM set up ETAC to oversee engineering technology which is a component of the engineering spectrum that requires the application of scientific and engineering knowledge and methods combined with technical skills in support of engineering activities. The engineering technician profession, on the other hand, is more application-oriented via the use of hands-on technical skills to support engineering technology activities.



The ETAC comprises expert representatives from the BEM, relevant learned societies, ministries, Government agencies and industry captains to cater to the requirements of engineering technologists and engineering technicians. ETAC aims to help facilitate any IHL in Malaysia meet the global minimum standard stipulated requirements for the accreditation of their respective engineering technology and engineering technician academic programmes. Optional addendums are also provided by BEM/ETAC via additional requirements for accreditation to facilitate interested IHLs seeking to register their academic course as a Technical and Vocational Education and Training (TVET) programme with the Malaysian Qualifications Agency (MQA).

Malaysia's Director-General of Higher Education acknowledged that the international academic recognition by IEA via WA, SA and DA is a major factor that has helped the engineering academic sector tremendously in attracting more prospective foreign students to register at the respective universities/colleges in Malaysia. These high-impact international mutual-academic recognitions have strongly propelled Malaysia into the global education limelight as a self-assured country able to confidently produce globally-centred, outstanding, high-quality, and competent engineers, engineering technologists and engineering technicians.

The vibrant global engineering-based industrial sectors are recognised as the foundations in the design, construction, fabrication, and manufacture of various innovative structures, infrastructures, amenities, and products—all geared towards society enrichment and progress. These key global economic sectors are thus acknowledged as the vital catalysts and elements of any country worldwide striving for industrialised and developed nation status. The ready availability of world-class BEM-EAC-ETAC certified competent IEA WA-SA-DA recognised engineers, engineering technologists and engineering technician leaders, experts, and workforce would be a great advantage to any global multi-national as these talents can be mobilised overseas to any locality worldwide to manage whichever challenging industrial engineering-centred economic project with confidence. The various engineering programmes instituted throughout Malaysia are thus all diligently and jointly working together with the forward-looking BEM, via the EAC and ETAC, to continuously and confidently further elevate academic and professional engineering excellence in the country to world-class status and beyond.

The Ingenieur – Moving Ahead and Staying Relevant

**By Dato' Ir. Fong Tian Yong
Ir. Dr Zuhairi Abd Hamid
Dato' Prof Ir. Dr Eric KH Goh
Ir. Ashari Mohd Yakub
Emeritus Prof. Ir. Dr K.S. Kannan**



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THE *INGENIEUR*, which commenced circulation as a humble engineering publication in the 1990s, is today still BEM's key professional information transfer link between the Board and fellow aspiring and certified engineers, engineering technologists and engineering technicians nationwide. In conjunction with the publication of the 100th issue of *The Ingenieur*, the BEM Corporate Communication Committee conducted a special 'What Readers Think Survey Feedback Project' to statistically quantify and evaluate how enthusiastic readers perceive this significant BEM publication.

An executive summary of the Survey indicated that a noteworthy 89.46% of respondents indicated that *The Ingenieur's* Technical Content is of 'High Quality', with the majority of the respondents (73.14%) strongly indicating that the articles for the respective issues are 'Relevant' to their professional needs and likewise of interest to the holistic engineering fraternity. The respondents also provided some Opportunities for Improvement (OFI) suggestions.

In this dynamic age of accelerated smart technology advancements, a sizeable number of readers usually choose to access the latest state-of-the-art information not from hard-copy publications as before but by searching for the respective technical writeups in digital format online. Hard-copy printed books are still in demand for readers' in-depth information retention, to remember more details, and as physical backups. Future digital publications thus ought to be very evolutionary due to the rapid development of various smart technologies complemented by the need for adaptability in light of the current and upcoming generation of readership trends worldwide. In this high-tech era of Artificial Intelligence (AI), top-trending technologies, and shifting global readership trends, the six constructive key improvements and enhancements proposed to ensure that *The Ingenieur*, BEM's iconic engineering information-transfer publication, continues to stay relevant for the next 100 issues and beyond are as follows:

1. Publication Content Trends



Predictive Content Generation/Emerging Technologies:

Usage of Artificial Intelligence (AI) to analyse top trending topics, engineering and industry advancements thus allowing this unique BEM publication to stay ahead of the curve. Engineering specialised fields are constantly evolving with new technologies like AI, Blockchain, Edge Computing, Drones, Robotic Process Automation, Digital Reality, and 3D Additive Manufacturing. Ardent readers anticipate in-depth articles on cutting-edge technologies complemented by insights into both current engineering applications and future possibilities.

Sustainability and Green Engineering:

The global shift towards environmentally-conscious industrial practices is influencing every industrial sector worldwide, including engineering practices. Enthusiastic readers thus want *The Ingenieur* to delve into specialised topics such as Sustainable Materials, Renewable Energy Integration, Energy Efficiency Management, Smart Waste Reduction Technology, and Innovative Solutions to Global Environmental Challenges.

Industry Case Studies and Best Practices:

Industrial professionals value real-world applications of engineering concepts and technologies, and thus, the showcasing of Strategic Engineering Solutions through site case studies, project retrospectives, and practical lessons learned can help readers gain enlightening insights.

Cross-Disciplinary Subject Matter:

Many engineering problems today require cross-

disciplinary approaches. Articles that blend the knowledge obtained from Civil, Mechanical, Electrical & Electronics, Chemical, Oil & Gas, Mineral Resources, Software Engineering or even Open Science Principles will resonate well with proactive readers who look forward to expanding their skills and expertise across specialised fields.

Innovative Leadership and Expert Site Analysis:

The inclusion of expert contributions from leading engineers, engineering technologists, engineering technicians, innovators and researchers will enhance readership. Readers can thus obtain expert opinions, future trend predictions and solutions to key industry challenges.

Career and Professional Development:

With engineers always looking to upskill, articles related to successful career development, contemporary certifications, and resourceful leadership solutions in engineering and entrepreneurship management will intensify readership engagement.

Global Engineering Issues:

Addressing global challenges such as climate change, infrastructure resilience and urbanisation issues using engineering concepts can increase the publication's readership via a broader range of audiences in the industry. Highlighting innovative engineers' roles in solving major society-centred issues for international projects would be another hit to increase the existing readership base for *The Ingenieur*.

2. Technological Adaptation

Interactive Digital Content:

Like other publication media, engineering publications need to move beyond static articles. Integrating interactive content like 3D models, simulations, video walkthroughs of engineering projects and Augmented Reality (AR) elements could further enhance learning and readership engagement.

Data Visualisation:

The engineering fraternity appreciates data-rich technical content. The usage of self-explanatory statistical graphs, interactive tables, and data visualisations allows dedicated readers to manipulate or study the data attached to the articles. This segment also enables real-time, interactive data charts or simulations that readers can explore online in real time; thus creating a unique and engaging experience.

Online Interactive Communities and Discussion Forums:

Creation of platforms within this digital BEM publication where readers can engage in discussions, Q & A, and peer networking on the published content will foster stronger engagement.

Engineers like to share insights and seek advice from peers; thus, an engineering publication that encourages active participation will attract a loyal readership.

Artificial Intelligence (AI)-centred Personalised Content Generation:

The leverage of AI to offer personalised tailored recommendations and curated content based on the respective reader's preferences, expertise, profession, interests, and engagement history can increase topic relevance and eventually enhance readership satisfaction. Readers can have, within the published articles, the option and opportunity to use AI-powered tools to simulate, predict, or even solve engineering problems directly.

Podcasting and Video Interviews:

Many engineering professionals now prefer researching content on the go. The offer of podcasts featuring interviews with industry experts, economic and technical analysis of technological trends, and engineering career guidance could cater to engineers who prefer auditory learning.

3. Dynamic Art and Immersive Design Layout Innovations

Simplified Technical Illustrations:

Engineering publications still need clear, accurate diagrams and useful illustrations for explanation of technical concepts. The incorporation of more intuitive, user-friendly visuals (such as animated or interactive 3D schematics) can help readers better understand complex engineering concepts.

Immersive 3D Digital Models via Augmented Reality (AR) & Virtual Reality (VR) Integration:

For digital-centred readers, the integration of

3D Digital Models (AR/VR) can bring project designs to life via the creation of interactive and 3D engineering models. Imagine reading about a new bridge/equipment project and then using an AR/VR app or browser to visualise the unique structure or equipment designs.

Clean, Minimalist Layouts with Bold Imagery:

Aesthetic design plays a key role in reader engagement. Digital engineering publications should balance technical content with clean,

minimalist layouts that emphasise readability whilst integrating bold photographs, graphics, and innovative typography to highlight key points.

Multimedia-Rich and Animated Publication:

The integration of videos, dynamic-based graphics and animations to complement written content for

complicated systems or processes can enhance the understanding of complex engineering topics. Such elements are especially useful in digital editions, where space is not a constraint, with multimedia-rich content that can clearly illustrate intricate engineering systems.

4. Global Readership and Engagement Models

Flexible Subscription Models:

Option of a mix of free and subscription publication content; the Freemium Model can draw the majority of readership from the engineering fraternity. However, when required, Subscription Models can offer exclusive access to premium articles, archived contents, special industry reports, and interactive tools.

Microlearning Modules:

The engineering fraternity usually seeks concise and focused learning opportunities. The amalgamation of Microlearning Content, such as short tutorials, quick engineering tips, or technical insights into this BEM publication can meet the needs of the fast-paced learning habits of modern readers.

Engineering Webinars and Virtual Conferences:

Many readers prefer real-time engagement. BEM can thus host virtual engineering conferences, webinars, or live chats with experts to provide interactive learning and networking opportunities, thus further establishing *The Ingenieur* as a leader in information transfer.

Cross-Platform Content Integration:

It is most useful if readers can access BEM publication content on multiple device platforms, thus allowing the effective creation of seamless, cross-platform experiences (which include print, mobile, desktop, podcast, etc.). Publications must ensure that their content is optimised for multiple formats.

5. Community/Peer-Driven and Collaborative Contributions

Crowd-sourced Content:

Readers/peers are encouraged to contribute and highlight innovative solutions from the engineering community. A Special Feature section is thus proposed to be allocated online where readers can submit their own opinions, challenges encountered, fresh perspectives, on-the-ground insights, or even technical solutions to complex engineering problems from the respective professionals worldwide.

Collaborative Projects:

Writeups on partnership projects with engineering

firms, universities, and respective industrial sectors worldwide which can provide more authoritative content, access to cutting-edge unique research, fresh perspectives, and resourceful technical solutions. Readers thus can benefit immensely from these unique real-time exposures to new engineering trends, the latest global standards, and innovative tools around the world. This option promotes open research where contributors can collaborate on the preparation of technical project proposals or even specialised engineering reports.

6. Sustainability and Ethics

Green and Ethical Engineering Practices:

As industries move towards sustainable practices around the world, readers will want to stay informed on ethical engineering topics, including Environmental Social Governance (ESG) impacts, responsible design, and equitable Smart Technology development.

Socially Responsible Engineering:

Engineering's role in addressing social and environmental challenges such as Natural Disaster Mitigation, Renewable Energy Solutions, and Climate Resilience will increasingly interest readers. The inclusion of coverage on these

topics will appeal to a more socially conscious audience. This BEM publication can also highlight discussions on the ethical implications of emerging engineering technologies with emphasis on their respective sustainability and global impacts.

Inclusivity and Diversity in Engineering:

The focus on Diversity and Inclusivity within the engineering profession is another way to stay relevant. Highlighting the contributions of engineering expertise from diverse global backgrounds and locations with positive societal impacts can broaden the publication's appeal.

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T +603 9173 0355 | **F** +603 9173 0939 | **E** heb@hss.com.my | **W** www.hssgroup.com.my

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