JURUTERA

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CHALLENGES IN REVITALISING MALAYSIAN MINING INDUSTRY

OVERVIEW OF OFFSHORE OIL & GAS FACILITIES

PIPING LEAK MITIGATION VIA COMPOSITE WRAP

NOVEMBER 2024

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JURUTERA Monthly Bulletin

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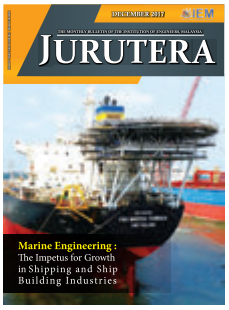

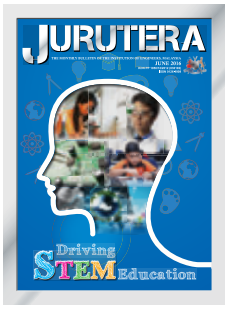

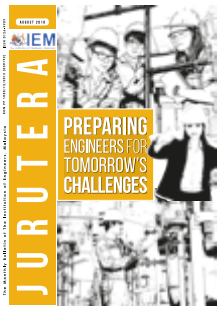

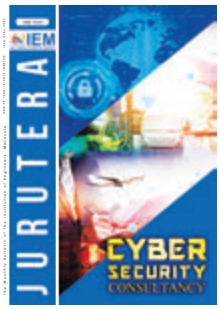

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COVER *Note*

by Ir. Lee Chang Quan
Chairman, Oil, Gas & Mining Technical Division

Mining: Are We Up for The Next Challenge?

Mining activities started in Malaysia more than 150 years ago, slowly and on small scale, excavating for tin and sometimes gold. With the growing population and economic growth, small settlements near the mines soon developed into towns and trading, plantation, factories, logistics and ports flourished.

Mining not only created the variety of economic activities but it also attracted technology that was new to this land at the time, such as hydraulic pumps, steam engines, generators, locomotives and the power grid, just to name a few. Many pioneer engineers also ventured out from mining activities to contribute to infrastructure development. When mining activities declined in recent decades, engineers with skills and knowledge in mining, continued their work in quarries, infrastructure construction, irrigation and oil & gas engineering activities. In view of the escalating prices of minerals such as tin and gold and the interest in rare earth elements mining as well as the potential of remaining minerals deposits, engineering skills will need a rethink and reboot if Malaysia is to venture into mining as one of the new economic growth areas.

In this context, the Oil, Gas & Mining Technical Division (OGMTD) would like to bring about greater awareness through *JURUTERA*, discussions with academics and practitioners (one of the featured interviewees this month is both an engineer and an ex-miner!) of challenges in the revitalisation of the mining industry in Malaysia. We hope this will generate new ideas to spark a constructive development in the future of mining industry in Malaysia. ■

EDITOR'S *Note*

by Ir. Alex Looi Tink Huey
Principal Bulletin Editor

Unearthing the Future: Mining Malaysia's Path Forward

As 2024 draws to a close, we dig deep – literally and figuratively – into one of Malaysia's oldest industries: Mining. This month's theme, Challenges in Revitalising the Malaysian Mining Industry, puts the spotlight on this long-standing sector and its quest for a sustainable, tech-forward resurgence. So how do we bridge the gap between tradition and technology to bring environmental consciousness to an industry known for its heavy footprint?

In this issue of *JURUTERA*, we explore innovative approaches that Malaysian engineers are championing to transform mining and to strike a balance between yield and sustainability as well as economics and ecology.

With just one month left in the year, the push to rethink mining isn't just a goal… it's a necessity for a future-ready Malaysia. Here's to wrapping up 2024 with new ideas, bold moves and a commitment to revitalise our resources responsibly.

Let's unearth some fresh perspectives! ■

Challenges in Revitalising Malaysian Mining Industry

Lack of Skilled Workforce and Technical Professionals in the Mining Industry

Interviewee:
Ir. Yap Keam Min, Ex-miner

In 1985, the tin mining industry in Malaysia was severely hit when tin ore prices fell by almost 50% overnight! The depleting resource of tin mining land also added to the problem. Within a decade, most of the country's tin mines were closed. Malaysia (and formerly Malaya) had been a top producer of tin ore for decades, contributing to half of the total world production; we are still among the top refined tin producers in the world! The industry was in the doldrums for over 40 years and it was a huge problem to try and revitalise the sleeping giant.

Tin miners (meaning the owners and investors, not the workers) had moved on to other industries and many had retired. Most of the large tin mining companies changed their businesses and those listed on the KLSE were sold as shell companies.

Tin mining had always been a "high returns, high risk" venture. It is often said that one needs capital and guts to venture into tin mining. Today, it will require more capital and new technology to open a new tin mine. Only workable grades of tin should be mined using the most efficient mining methods. The main issue though, is to identify land rich in tin ore.

Tin is the metal of the future and demand is continuously increasing because it is a main material of use in this digital age of AI, computers, handphones and plays a big role in batteries. The price of tin will surely go up in the future as many modern products cannot be made without it, according to the International Tin Association, UK.

What critical technical skills and expertise are required to revitalise local tin mines and how does the current deficiency in these areas impact the industry?

The key skills are people, for hydraulic tin mining. (Please note that lode or primary mining is more technical and is not covered here!)

1. The mining engineer. Preferably with experience in tin mining including preparation of mining schemes, the position of the palong and sizes of the tailing ponds, source of water, mining lease approval, location of the tin ore bearing earth and control of tin mining operation according to governance.
2. The kepala or head man: This is the most important manager in a tin mine, especially in alluvial mining. The kepala has the knowledge and skills in all the practical aspects of running a tin mine, such as the design and construction of the palong, water and drainage control, safety of tin mines especially land subsidence, tin ore dressing and, of course, locating the tin ore.
3. The exploration team. Modern mining methods may require constant checking or searching for tin ore deposits.

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Today, tin-bearing earth is commonly carried in trucks to the palong

What innovative approaches or initiatives have been rolled out to address the shortage of skilled workers and technical professionals in the tin mining sector?

There is no initiative at the moment. Maybe some day as tin is the metal of the future, one that the world cannot do without!

How do advancements in technology (automation and digitalisation) impact the skills requirements of the local mining workforce? What training and upskilling programmes are required to adapt to the changes?

This is a difficult question. It is like the chicken-and-egg story! However, I feel that at present, the tin mining activity in Malaysia is too small to talk about digitalisation.

4. Tin ore processor or dressers. This team processes material bearing raw tin ore obtained from the palong or jigs into high concentration tin ore. The process may involve crushing and grinding, floatation method with jigs and shaking tables, magnetic separator, drying and packing. There is premium for efficiency as the purer the ore, the higher the price.

How do mining companies identify and assess the skill gaps within their workforce and what strategies are being implemented to attract, develop and retain technical professionals in key roles?

Workers and mining equipment such as pipes, gravel and water pumps can still be found in Perak as the state used to be the centre of tin mining activities in the world. Although mining activities have slowed down in recent decades, there are still many sand mines. The operations of a sand mine are somewhat similar to that of a tin mine, except for the process to recover the tin ore. In my opinion, the most important man is the kepala and if you can get a good and experienced kepala, he can assemble the necessary workforce.

In the past, the slurry containing tin ore is pumped up the palong

What can the industry do to foster a conducive working environment and to promote career advancement opportunities to overcome manpower challenges?

Unfortunately, the industry is still in the infancy stages of re-mining and there are so many uncertainties where mining profitability is concerned. The main issue is the location of land with rich deposits of tin; most of this land is state land.

Are there any collaborative efforts between mining companies, government agencies, academic institutions and other stakeholders to face the challenges related to the lack of a skilled workforce and technical professionals in the revitalisation of the tin mining industry?

At present, tin mining activity is very lethargic, so I doubt that government agencies are looking to collaborate in such efforts!

Ir. Yap Keam Min

An experienced tin miner whose family has been in the tin mining industry since the 1950s, Ir. Yap Keam Min is a professional civil and structural engineer who graduated from University of Southampton in 1976. He is a fellow of IEM, the Institution of Engineers UK and the Institution of Engineers Australia. He is also a Professional Engineer (PE), C.Eng., C.Eng. (Aust). Ir. Yap was the CEO/technical director of a large tin mine in Puchong from 1980 to 1983. His responsibilities included exploration/production of tin ore, drainage and tailings control as well as safety of the mine. From 1983 to 1985, he managed another tin mine in Chenderiang, Perak.

How do environmental, social and governance (ESG) concerns influence the strategies for revitalising the local mining sector?

Traditionally, mining and environmental concerns do not mix well! ESG is a relatively new concept here and in the past, most tin mining companies were not keen on the idea. There should be guidelines introduced as well as incentives to encourage compliance. In the past, mining activities often caused social problems with the community.

However, the good news is that ESG is possible in tin mining. Recently, the New Zealand Resources Minster was quoted as saying that "mining is no longer a dirty word. Mining equals jobs, regional development, export growth and economic prosperity for the country", in reference to the gold mining activities coming on stream in that country.

Do sustainability issues impact the revitalisation of the mining industry? What steps are being taken to improve the sustainability of mining projects?

Sustainability is another new word for tin miners. Historically, tin mining caused pollution, silting of rivers and ex-mining tailing ponds with slime or soft clay made the land expensive to rehabilitate.

One new mining method which is sustainable and good for the environment is backfilling mining. Here, the mined areas are continually back filled as mining progresses. With more exploration, only workable or tin ore rich land will be mined and this will reduce the volume of tailings waste.

One benefit of tin mining is that it provides sand for the construction industry; today, sand has become more expensive and more difficult to obtain. There have been success stories of rehabilitated ex-mining land which have been turned into housing estates or golf courses. Some ex-mining land in Perak have even been turned into successful oil palm estates. However, these do not benefit the miners.

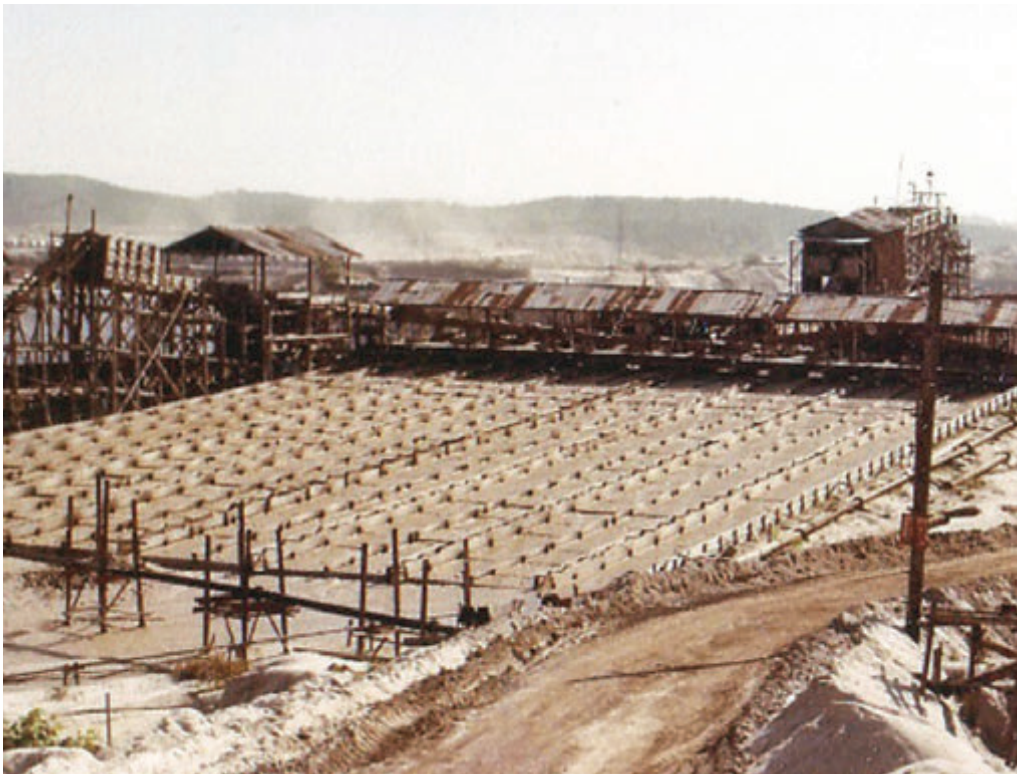
Assuming that Malaysia will invest heavily in tin mining if it is projected to be highly feasible economically in 5 years' time, what skills or technical knowledge do we need to start nurturing now so that engineers can contribute to the new growth?

This is a tough question! There is minimum incentive to train engineers for future possible growth!

At the peak of tin mining, the Camborne School of Mines (CSM) provided many mining engineers (probably 70% or most of the mining engineers I know) for the industry. CSM is the famous mining education centre in Cornwall, England, where commercial tin mining probably started and many mining companies, including the government, sponsored students to study there.

New methods of tin mining have to be efficient, sustainable and yet environmentally friendly. As the largest producer, China has many new and advanced mining equipment and techniques.

However, I believe if rich deposits of tin are found, skills and technology will not be a big issue. ■



The palong is still required today, albeit a shorter version

Benchmarking with established universities can ensure mining engineering programmes offered at USM are up to standard and relevant

Academia and the Mining Industry

Interviewee:
Ir. Assoc. Prof. Dr Syed Fuad Saiyid Hashim

School of Material & Mineral Resources Engineering,
Universiti Sains Malaysia (USM)

What are the recent trends with concerns to students and mining-related courses? What do you think are the reasons behind this (either increasing or decreasing)?

Enrolment in mining-related courses has been declining, not only in Malaysia but also globally. The younger generation considers mining as "archaic and dirty work" and feels it destroys the planet. They may not even be aware that there are mining engineering courses. Students enrolling in college know less about mining engineering than they do about other engineering majors and most are not interested in subjects they know little about.

Trends for students doing mining-related courses in Malaysia are shaped by a combination of economic conditions, government policies, environmental concerns, technological advancements, educational opportunities and regional demand for minerals. These factors collectively influence the attractiveness of mining engineering as a career path for young Malaysians.

What are the key reasons for the lack of a skilled mining workforce and technical professionals in the country?

The key reasons are limited specialised programmes and courses in mining engineering and related fields, leading to fewer graduates with the necessary skills. Insufficient opportunities for continuous professional development and training in new technologies and practices can exacerbate the skills gap. Limited hands-on training opportunities with limited duration through internship and apprenticeship can contribute to the lack of practical skills among graduates. Limited collaboration between the mining industry and educational institutions also results in graduates who are not well-prepared for industry needs.

How can institutions of higher learning and technical vocational programmes address the specific technical skill requirements of the mining sector? What improvements can be made to narrow the gap between academic curricula and industry demands?

We can do the following.

- Update Educational Programmes. Revise and modernise mining-related curriculum to incorporate the latest technologies and industry practices.
- Enhance Industry Perception. Promote the importance of the mining industry and highlight opportunities available, emphasising advancements in sustainable practices.
- Government Support. Implement supportive policies, incentives and funding for mining education and training programmes.
- Continuous Training & Development. Provide ongoing professional development and training opportunities to keep the workforce updated on the latest skills and technologies.
- Strengthen Industry-Academia Collaboration. Foster partnerships between the mining industry and educational institutions to ensure educational programmes align with industry needs.

- Improve Work Conditions. Enhance health & safety standards and improve working conditions to make a career in mining more attractive.

Will technology transfer and knowledge exchange play a role in enhancing the technical capabilities of the mining workforce? How can industry collaboration assist in the acquisition of specialised skills and expertise?

Technology transfer and knowledge exchange can significantly enhance the technical capabilities of the mining workforce by introducing advanced technologies such as automation and AI as well as promoting best practices through training programmes, workshops and seminars.

Industry collaboration plays a crucial role in this process by partnering with educational institutions to develop relevant curricula, offering internship and apprenticeship for hands-on experiences and facilitating continuous professional development and mentorship. Joint ventures, public-private partnerships and participation in global knowledge networks provide access to resources, expertise and the latest technological advancements, thereby addressing skill gaps and improving operational efficiency in the Malaysian mining sector.

Do academic institutions have continuous courses or professional development programmes for the mining workforce to upgrade skills and remain updated on the latest technologies?

Yes, many academic institutions offer continuous courses and professional development programmes for the mining workforce to upgrade their skills and stay updated on the latest industry technologies. These include short-term certificate programmes, professional development courses, online learning platforms as well as workshops and seminars. Institutions also collaborate with the industry to create customised training programmes and offer part-time and executive Master's programmes as well as research opportunities. Universities and institutions such as Universiti Sains Malaysia (USM), Institute of Quarrying Malaysia (IQM) and Human Resource Development Corporation (HRD Corp) provide various programmes to ensure professionals remain competitive and informed on technological advancements. But these are limited and can be further enhanced.

Industrial visits to mines and attending conferences abroad can further enhance the confidence and soft skills of students

Are current policies and regulatory impacts on the reforms streamlined with talent acquisition and recruitment?

Reforms in policies and regulatory framework are essential to streamline talent acquisition and recruitment in the mining industry. Key reforms should focus on addressing skills gaps through aligned educational programmes and continuous training, ensuring regulatory stability to attract investments and expedite permitting processes, promoting sustainable mining practices with strong environmental and social responsibility frameworks, fostering collaboration between industry and academia for curriculum enhancement and research, facilitating labour mobility through flexible immigration policies and providing financial incentives to support capacity building and industry growth.

These reforms aim to create a conducive environment for a skilled and sustainable mining workforce while supporting economic development and environmental stewardship.

What current research is there to manage perception challenges related to environmental impact and safety concerns and how can this contribute to promoting an understanding of sustainable mining practices, environmental stewardship and safety measures?

Current research is increasingly directed towards addressing the complex perceptions surrounding environmental impact and safety concerns by promoting sustainable practices, environmental stewardship and enhanced safety measures. One key area of focus is the development and implementation of green mining technologies, which emphasise the use of renewable energy sources, the reduction of greenhouse gas emissions and the adoption of eco-friendly extraction processes. Efforts in water management are paramount, with innovations in water recycling and treatment technologies aimed at minimising usage and preventing contamination.

Land rehabilitation practices are also evolving, with significant research dedicated to soil remediation and reforestation techniques which restore mined land to natural or improved states. The industry is also investing in advanced monitoring systems and impact assessments to predict and mitigate environmental impacts proactively. Safety measures are being revolutionised through the automation of hazardous tasks and the application of virtual and augmented reality for training purposes.

Promoting the understanding and acceptance of these practices involves active community engagement, transparent communication and the inclusion of local communities in decision-making processes.

Educational programmes are being developed to inform the public about sustainable mining practices and the importance of environmental stewardship.

Through these efforts, the mining industry aims to reshape public perceptions by building trust, demonstrating transparency & accountability and positioning itself as a forward-thinking, responsible sector. These initiatives not only meet global mineral demands but also significantly minimise environmental impacts and enhance the safety of the workforce, thereby promoting a more sustainable and responsible approach to mining.

How can IEM assist academic institutions in addressing the lack of a skilled workforce and technical professional challenges in the revitalisation of the Malaysian mining sector?

Engineering institutions can help by collaborating with academic institutions on developing industry-relevant curricula, offering hands-on training and organising workshops and certifications. They can support joint research projects, provide funding and facilitate industry-academia partnerships by involving experts as guest lecturers and mentors. Additionally, they can promote structured internship programmes, organise technical competitions and launch awareness campaigns about career opportunities to ensure students are trained in the latest technologies and are prepared for the industry demands. ■

Ir. Assoc. Prof. Dr
Syed Fuad Saiyid Hashim

A senior lecturer in the School of Material & Mineral Resources Engineering, Universiti Sains Malaysia (USM). He graduated in B.Eng. (Hons) Mineral Resources Engineering from USM in 1996 and obtained his PhD in Minerals Engineering from University of Queensland, Australia in 2004. His research interests are in mathematical modelling of mineral processing system, mining and resources recycling. He is President of the Institute of Mineral Engineering Malaysia (IME) as well as a member of IEM and Society of Mining Professors.

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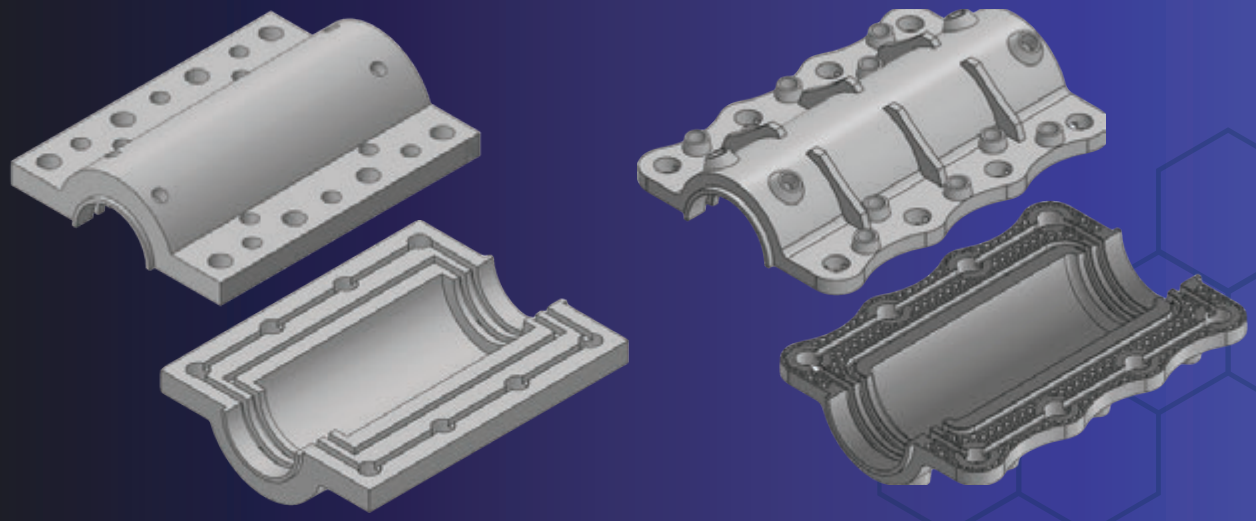

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3D Printing Clamp

ProClamp® Features	Conventional	AM 3D Printing
Lug Thickness	17 mm	8 mm
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Cavity Height	10 mm	5 mm
Studbolt Size	5/8"	1/2"
Weight (Per Part)	**4.82 kg**	**1.79 kg**

- Reduce Carbon Footprint
- Improve reliability of obsolete parts
- Less inventory
- Less energy consumption of manufacturing
- Support lattice structure via Ai-driven Technology
- Reduce material waste

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Composite Wrapping

a Cost-Effective Solution for Pipeline Repair

Pipeline Integrity is essential in ensuring safe and reliable transport of hydrocarbons and other critical materials. With pipelines being exposed to harsh environmental conditions and operational stress, maintaining their integrity becomes challenging. This article discusses the common pipeline integrity issues and solutions using composite wrapping for pipeline repairs and rehabilitation. This can also serve as a valuable example of industry case studies demonstrating the effectiveness of composite wrapping solutions and pipeline integrity strategies.

Pipeline systems are the backbone of the oil, gas and water industries. These systems, however, are constantly exposed to factors such as corrosion, external damage and environmental stress, which compromise their structural integrity. Ensuring the reliability and longevity of pipelines is essential to avoiding leaks, failures, and significant operational risks.

Maintaining pipeline integrity typically involves regular inspection, pressure monitoring, and repair of damages. Historically, maintaining pipeline integrity involved traditional repair techniques such as welding, clamping, or steel sleeves. While effective, these methods can be time-consuming, costly, and labor intensive. Over the past few decades, the advent of advanced materials has revolutionized the pipeline repair industry. One of the most promising materials is composite wrapping. Composite wrapping has emerged as a cost-effective and durable alternative for pipeline repair and rehabilitation. ASME PCC-2 Part 4 and ISO 24817:2017 are the international standard design code for composite wrapping.

Overview of Composite Wrapping (iWrap®)

iWrap® is a composite wrapping system developed by IO Setia Ventures Sdn. Bhd. (IOSV), showcasing advanced engineering and materials science. This innovative system integrates several key elements, all of which have undergone rigorous qualification testing to ensure optimal performance and reliability.

iWrap® materials utilized glass fiber reinforcements embedded in a thermoset polymer matrix. This combination not only enhances the structural integrity of the repaired components but also provides excellent resistance to environmental factors and mechanical stresses.

Table 1 - iWrap® product range

Series	Maximum Design Temperature (°C)
iWrap® UW	150
iWrap® 100N	100
iWrap® HT200	230
iWrap® HT400	400

Defect Assessment and Repair Design Calculations

IOSV was called to rehabilitate a buried 24" hydrocarbon pipeline with severe dent defect due to environmental induced stresses (soil subsidence). The dented pipeline section was identified using a camera crawler and confirmed upon excavation. The pipeline owner was concerned on the potential leak and catastrophic failure if left unattended. A total of five defect locations were identified, each exhibiting varying defect sizes and characteristics. This defect is categorized as Type A (Non-Leak) defect where the defect is within the substrate, not through-wall and not expected to become through-wall within the repair design lifetime of the repair system, thus requiring structure reinforcement only.

Based on the analysis of these defects, repair design calculations according to ISO24817:2017 were performed to determine the repair parameters, specifically the minimum repair laminate thickness, t_{min} and the axial length of repair. These calculations are crucial in ensuring the integrity of the pipeline is restored effectively.

According to the ISO 24817: 2017 – 7.5.4.2 Limited by allowable strain in the repair laminate. For buried pipeline, the repair is applied at zero internal pressure, $p_{live} = 0$ where the formula used for minimum repair laminate thickness follows Formula 7, $t_{min} = \frac{D}{2\varepsilon_C E_c}(p_{eq} - p_s)$ and the formula for total axial length of repair, l is given by Formula 20, $l = 2l_{over} + l_{defect} + 2l_{taper}$.

Example of defect

Repair design summary

iWrap® 100N composite wrapping repair system

Application of Composite Wrapping to Restore Pipeline Integrity

IOSV had successfully applied composite wrapping system iWrap® 100N to strengthen and restore the integrity of the pipeline. Material recovery compound (MRC) was applied to the defect area prior to the composite wrapping application to restore the pipe circular shape, enhances adhesion bonding between the repair material and the substrate, improves the load transfer, bond strength and overall integrity of the composite wrapping repair. This is to ensure the repair system performs as intended under operational and environmental loads.

Inspection Methods for Composite Wrapping

The primary inspection method for composite wrapping is visual inspection, which is conducted post-installation to assess the overall condition of the applied composite material. This method allows for the immediate identification of any visible defects, such as surface irregularities, improper bonding, or signs of delamination.

Once the composite wrapping has cured at the desired temperature, a Hardness test (Shore D) is commonly conducted to measure the hardness of the composite wrapping material. This test confirms the cured composite laminate has achieved the desired mechanical strength and durability.

Another NDT method used to detect delamination within the composite wrap is the Coin tap test. This method involves striking the surface of the cured composite laminate with a lightweight object, such as coin, to listen for variations in sound. Areas of delamination or voids will produce a hollow sound compared to the solid, crips sound emitted by well-bonded sections.

Advance non-destructive testing NDT shall be performed to determine the integrity of the composite wrapping upon finding of abnormalities, determined by the nature and severity of the defects. Microwave, laser shearography, dynamic respond spectroscopy (DRS), computed radiography testing (CRT) and several other NDT methods can also be used to check integrity of composite-substrate.

Conclusion

Composite wrapping is highly effective for pipeline repairs and rehabilitation. It offers a cost-effective solution, fast turn-around without hot-work, excellent material strength and durability. Composite wrapping proved to be an effective choice for repairing and rehabilitating pipelines.

General overview of pipeline with composite wrapping system (iWrap® 100N)

IOSV

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SS600 SPLIT SLEEVE

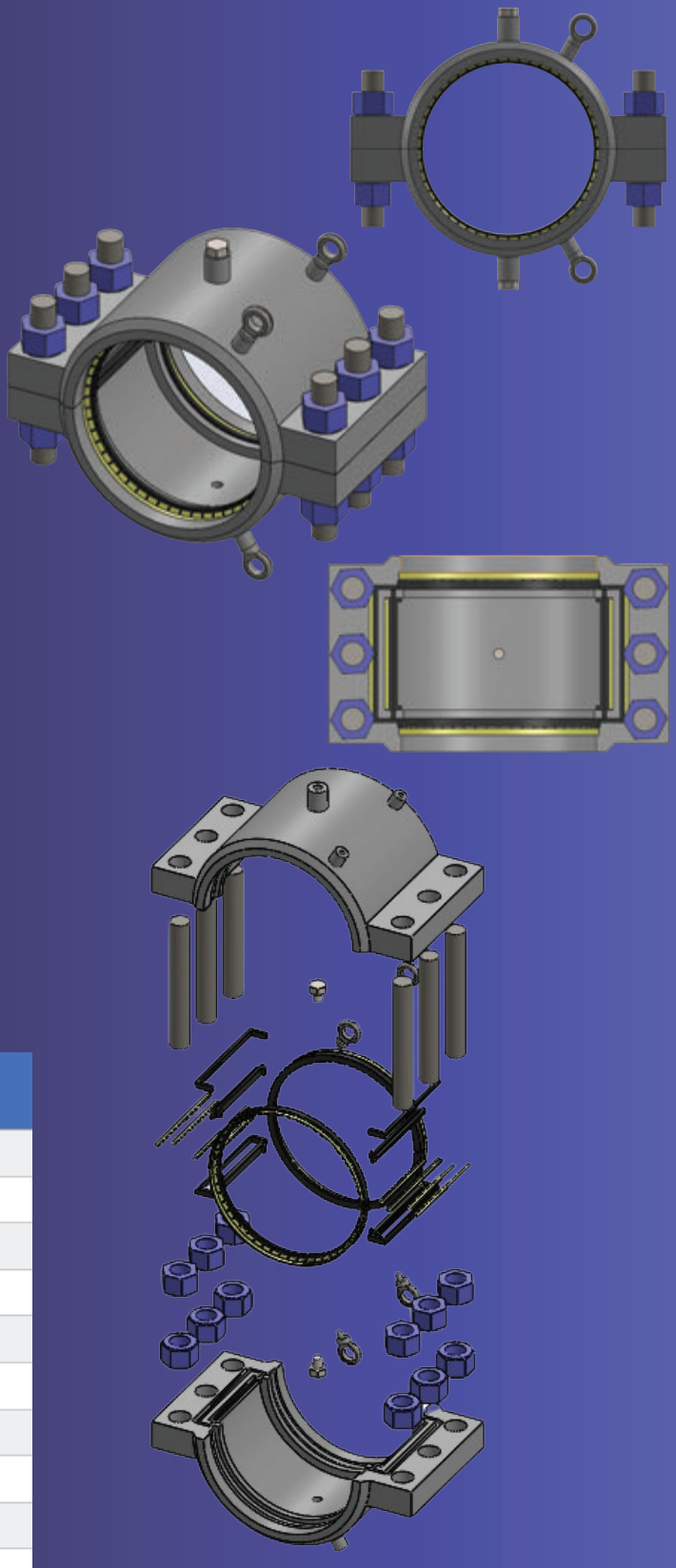
SPLIT SLEEVE CLAMP – SS600

INTRODUCTION
Split Sleeves SS600 are used to repair a wide range of high and low-pressure, high and low-temperature pipelines, including oil, water, gas, steam, and chemical process pipelines

SAFETY
Hydrostatically tested to 1.3 times the rated working pressure (as per ASME Section VIII Div.1 clause UG-99) All Split Sleeves are equipped with a 1/2" NPT vent port.

INSTALLATION & MAINTENANCE
All Split sleeves-SS600 are designed to be installed with the most common tools available and are readily field repairable, including full seal replacement.

ECONOMY
Optimization of design techniques and materials, resulting in lower weight, reduced bending tendencies, reduce the dependable for time curing sealent and a more economical.



MATERIAL – STANDARD CLAMP COMPONENTS	
Body (Shell)	A516 Gr.70
Stud Bolts	A913 Gr. B7
Nuts	A914 Gr. 2H
Gasket/Seal	VITON/NBR/PTFE
Coating	Epoxy + Glass Flake + Aliphatic

API Pipe Size	INSIDE Diameter "A" Inches	Sealing Length "B" Inches
6	7 1/8	5 1/4
8	9 1/8	5 1/4
10	11 1/4	5 1/4
12	13 1/4	5 1/4
14	14 1/2	8
16	16 1/2	8
18	18 1/2	8
24	24 1/2	8
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Human Capital at the Crossroads: Reversing the Losses in Mineral Resources Engineering Field

Prepared by:

Ts. Dr Ku Esyra Hani Ku Ishak

Lecturer in USM School of Materials & Mineral Resources Engineering and chairperson of Strategic Mineral Niche Research Group.

Mineral resources engineering is a multidisciplinary field encompassing geology, mining, mineral processing and environmental management. It combines scientific knowledge, engineering principles and sustainable practices to ensure the responsible and efficient utilisation of mineral resources while minimising the environmental impact.

Mineral resources engineers play a pivotal role in meeting the growing global demand for raw materials required for various applications. However, this field has faced a growing shortage of skilled professionals in recent years. This shortage threatens the ability to meet increasing global demands for essential minerals, which are crucial for a wide range of applications, from renewable energy and clean technologies to electronics, construction materials and various industrial processes. Without a sufficient pipeline of skilled professionals, the minerals and mining industries struggle to keep up with the growing need for such critical raw materials which underpin modern society and the transition to a sustainable future.

Human Capital Shortage

The declining number of graduates in these fields is one of the primary factors behind the current shortage of skilled professionals. In the past decade, enrolments have declined significantly, resulting in fewer graduates entering the industry. The decline can be attributed to several contributing factors. One of these is perception: Mining is often perceived as dirty, dangerous and environmentally destructive. This negative image, influenced by outdated practices and incidents in the past, discourages potential students. Many still view mining as an industry of the past rather than as a forward-looking sector with exciting opportunities, such as developing automated mining systems, using renewable energy in operations and implementing eco-friendly mining techniques.

The other contributing factors include the lack of awareness about the diverse and rewarding career paths in mining, as well as the cyclical nature of the industry. All these give rise to job insecurity concerns among students. Many students and their families are unaware of the technological advancements and sustainability initiatives that have transformed modern mining and mineral processing practices. This lack of awareness extends to educational institutions, where minerals and mining engineering is not promoted as viable and exciting career paths. For example, many secondary school career advisors are not familiar with the diverse career opportunities in the minerals and mining industry, so they steer students towards more well-known engineering fields such as civil or mechanical engineering.

In addition, university career fairs and recruitment events often do not prioritise the presence of minerals and mining companies, leaving students unaware of the potential to pursue a career in this sector. The absence of active promotions and the visibility of mining engineering as a rewarding career choice also contributes to the continued lack of awareness.

Another contributing factor is the outdated curricula in many academic programmes. Many minerals and mining engineering programmes have not kept pace with the rapid technological advancements and changing industry needs. For example, the curricula do not adequately cover topics such as automation, data analytics and sustainable mining techniques that have become increasingly important in modern industries.

The lack of hands-on training with the latest technologies and software used in the field can also create a disconnect between what students learn and the skills that employers seek. This gap between academic training and industry requirements can discourage students from pursuing these programmes, as they feel unprepared for the realities of the modern mining workplace.

The industry's ability to innovate and improve productivity is directly tied to the availability of skilled engineers and technicians. Mining companies struggle to fill critical roles, resulting in operational challenges and increased reliance on less experienced workers, which can compromise safety, productivity and overall operational efficiency. This shortage also puts additional pressure on existing staff, leading to burnout and higher turnover rates. Furthermore, the scarcity of qualified professionals drives up labour costs as companies compete to attract and retain talent, impacting the profitability of mining operations and the affordability of raw materials. Higher labour costs reduce the competitive edge for mining companies, especially in global markets.

Collectively, these factors discourage new entrants and contribute to the ongoing decline of workers in this vital industry.

Reversing the Trend: Strategies for Attracting & Retaining Talent

A multifaceted approach is required to address the human capital crisis in this field. A critical first step is to rebrand the industry. Efforts should be made to rebrand the industry, emphasising its role in driving technological innovation and sustainability. Highlighting the contributions of the minerals and mining industry to renewable energy, electric vehicles and other green technologies can help shift public perception by showcasing its role in driving technological innovation and sustainability.

Collaboration between universities and the various industries can play a key role in changing public perception. For instance, organising educational visits to operational sites will allow students to explore and experience the work environment firsthand. Such programmes, which involve collaboration between industry and educational institutions, aim to change the poor public perception of the industry by enhancing Environment, Social and People (ESP) initiatives which focus on community, education, social and human aspects.

Additionally, showcasing rehabilitated mining sites which have been repurposed as tourist destinations can further demonstrate the industry's commitment to environmental stewardship and its potential for sustainable development. This will not only change public perception but will also generate new economic opportunities. For example, the Tanjung Tualang Tin Dredge No. 5 has been turned into a tourist attraction, showcasing the history and technology of tin mining. Similarly, Sunway Lagoon, once a tin-mining wasteland, has been developed into a popular theme park. This example of a former tin mining site transformed into a booming tourist attraction showcases the industry's commitment to sustainability and environmental stewardship. Promoting such success stories and highlighting the industry's role in repurposing former mining sites can help change public perception and demonstrate the industry's potential for sustainable development. These activities can also contribute to the economy while showcasing diverse career opportunities, technological advancements and sustainability initiatives within the mining industry.

Another key strategy to attract and retain talent is modernising educational curricula. Academic programmes must be updated to reflect current industry practices and technological advancements. Incorporating topics such as automation, data analytics, sustainable mining and modern mineral processing practices can make these programmes more attractive and relevant.

Institutions should also revise their curricula regularly, for example every five years, to keep pace with industry changes and to ensure graduates are well-prepared for the job market. Collaboration between academic institutions and industry professionals can ensure that curricula are aligned with the latest industry standards, better preparing graduates for the job market. For example, offering practical experiences such as blasting camps and specialised courses can provide students with hands-on experience and skills that are highly valued in the industry. Organising events such as Minerals Camps where students gain practical, hands-on experience in geology, mining and processing, can further enhance their readiness for the modern mining industry. These initiatives demonstrate the commitment to equipping students with the necessary skills and the knowledge to succeed in their careers.

Another key strategy to attracting and retaining talent is to enhance awareness and outreach. Industry stakeholders, academia and the government should engage in programmes to educate students, parents and the public about the opportunities and advancements in the industry. Offering scholarships to students in relevant programmes will attract more students to this industry. Internships and industry-sponsored events will provide students with hands-on experience and exposure to modern mining and mineral processing technologies, sparking their interest in the field. Continuing education and professional development opportunities can also help current mining professionals stay updated with technological

advancements and industry trends, enhancing job satisfaction and career longevity. Flexible learning options, such as online courses and part-time programmes, can accommodate working professionals, ensuring they have access to ongoing education and skill development.

Other than that, promoting diversity and inclusion is also crucial to addressing the human capital crisis in the minerals and mining industry. This will help tap into a broader talent pool, bringing different perspectives and innovative solutions. This is particularly important in Malaysia, where women, minorities and other marginalised groups have traditionally been under-represented in the mining engineering field.

To foster diversity, initiatives such as mentorship programmes can provide guidance and role models for aspiring mining professionals from diverse backgrounds. Furthermore, creating inclusive work environments with policies that promote equity and belonging is essential for retaining a diverse workforce. By embracing diversity, the Malaysian minerals and mining industry can strengthen its resilience and drive progress in areas like sustainability and technological innovation, as seen in examples of success in other countries.

From tin-mining wasteland to Malaysia's first theme park built below ground level
Picture source: Sunway Group website

Case Studies & Best Practices

Global initiatives and programmes are making headways in addressing the mining industry's human capital challenges. For example, Australia's Mining Education Initiatives have boosted enrolment and graduation rates in mining-related disciplines through collaborations between universities and the minerals industry. The country has implemented several initiatives to strengthen mining education and workforce development. The Minerals Tertiary Education Council works with universities to enhance mining engineering programmes, offering scholarships and industry placements for students. These efforts have resulted in increased enrolment and graduation rates in mining-related fields.

Another example is Canada's Mining Industry Human Resources Council (MiHR) which has launched programmes such as Mining Essentials and Gearing Up to increase the participation of under-represented groups such as indigenous communities, in the mining workforce. Mining Essentials provides training and employment opportunities for indigenous communities, while Gearing Up supports work-integrated learning for students. These programmes have successfully increased the number of under-represented groups in the mining workforce.

South Africa's Skills Development Programmes offered by the Mining Qualifications Authority have helped build a more skilled and diverse mining talent pool. These initiatives address the shortage of mining professionals by supporting students pursuing mining-related degrees through bursaries, leadership and internships. The result is the development of a more skilled and diverse mining workforce.

Another example of promoting diversity and inclusion in the mining industry is Indian Zinc's Female Mining Engineers Programme, which has launched several efforts to encourage and support women in mining engineering. This includes scholarships, mentoring programmes and recognition of female mining engineers on platforms such as the International Women in Mining Day. These initiatives have successfully increased the representation of women in the mining sector.

By learning from these global best practices and implementing similar targeted programmes, our mining industry can work to address its human capital challenges and build a more diverse, skilled and sustainable workforce for the future.

Future of Mining Education & Workforce Development

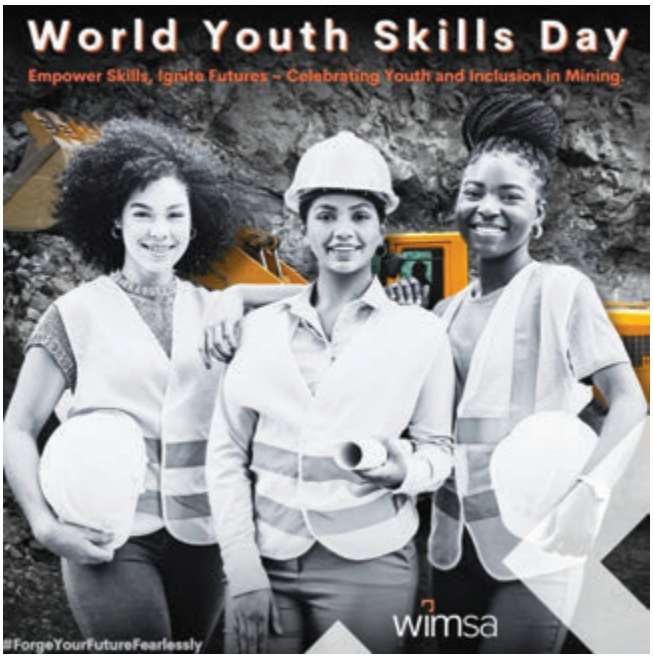
The future of mining education and workforce development lies in cultivating a dynamic and adaptable talent pipeline to meet the needs of the evolving industry. Key trends shaping this future include the growing emphasis on sustainability, the integration of digital technologies and the demand for cross-disciplinary skills.

Integrating technology and digital skills is crucial to staying competitive. As the industry increasingly adopts technologies like automation, artificial intelligence and data analytics, mining engineering programmes must incorporate these digital skills into the curricula. This will prepare students for the high-tech nature of modern mining operations. Collaborations with tech companies can provide students access to cutting-edge tools and platforms.

As the mining industry faces growing demands for sustainable practices, educational programmes must adapt the curricula to equip the next generation of mining professionals. With a focus on Sustainability & Environmental Stewardship, these programmes should incorporate topics such as environmental impact assessment, resource conservation and mine rehabilitation. This will ensure that future mining professionals are equipped to address critical environmental challenges. Case studies and field projects on sustainable mining can further enhance student learning and understanding of these crucial issues.

Global collaboration and knowledge sharing is essential to address the mining industry's human capital challenges. This approach can help the industry leverage best practices and to address common mining education and workforce development challenges. Such collaborations include international research partnerships, student exchange programmes and global conferences. Platforms for virtual collaboration can further expand access to knowledge and resources. There is a growing recognition of the need for greater global engagement in the mining sector.

Industry groups and academic institutions should seek to forge more international partnerships to share expertise and insights. For example, establishing ties with different countries to facilitate knowledge exchange on effective workforce development initiatives can be beneficial. Additionally, exploring student exchange opportunities with leading global institutions will expose students to diverse mining practices and innovations, better preparing them for the evolving needs of the mining industry.



Programme by Women in Mining South Africa (WiMSA)

Conclusion

The mining industry is at the crossroads, facing a critical shortage of skilled professionals in mineral resources engineering. Addressing this human capital crisis requires a concerted effort from academia, industry and government to rebrand the industry, enhance awareness, modernise curricula, promote diversity and strengthen collaboration. By implementing these strategies, the industry can reverse the losses in human capital, secure a robust talent pipeline and continue to drive innovation and sustainability in the extraction and management of the Earth's mineral resources. It is time to invest in human capital and ensure that the mining industry remains a vital and dynamic sector for generations to come. ■

Tin Mining Revisited

Prepared by:

Ir. Yap Keam Min, *FIEM, FICE, FIEAust, P.Eng, C.Eng, C.PEng NER Apec Engineer IntPE (Aust)*

Civil and structural engineer, he is a fellow of IEM, a fellow of the Institution of Engineers UK and a fellow of the Institution of Engineers, Australia. He was the CEO/ technical director of a tin mine in Puchong (1980-1983) and managed a tin mine in Chenderiang, Perak (1983-1985).

"*Tin is called the 'spice element' because a little of it is present everywhere in ways that are essential to our quality of life. Tin is currently used in a wide variety of products, including cars, houses and electronics.*"
– The International Tin Association

The high demand for tin has caused the price of tin to soar to record highs, coming close to US$50,000 per ton in 2022, causing great excitement in the tin mining industry. The intention of this paper is to give a brief review of the industry from a former tin miner's perspective. Is there tin at the end of the rainbow?

The age of artificial intelligence (AI) and the advancement of computer and communication technology have rapidly changed our world. Computers, electronic equipment, handphones, electric vehicles and batteries point to the need for one particular metal – tin! Yes, tin that comes from our mines which we all know about but yet, many may have forgotten!

Do you know that the main use of tin is for soldering in electrical components and circuit boards? Tin is commonly associated with the canning industry, so not many people realise that handphones have a bit of tin in them as the metal is used for soldering in the circuit boards of the handphones. The other main uses for tin are in the coatings of the casings of dry cell batteries and as an additive coating in the anode of batteries used in electric vehicles; demand for these will definitely increase as more countries switch from using petrol cars to electric vehicles.

Brief History of Tin Mining in Malaya

The development of canning for the preservation of food in the mid-19th century saw the rapid growth of the tin industry in Malaya. With the discovery of large, rich tin fields in Perak and Selangor, Malaya became the world's biggest producer of tin in the late 20th century and we produced as much as 50% of the world's production. However, the country accounts for less than 1.5% of world production today. The main reason was the collapse of the world tin industry in October 1985 when the price of tin fell by 50%. The other factor was that no new tin fields were discovered.

The magnificent mining machine the dredge, working in Selangor

Methods of Mining

Alluvial tin mining: The two most common methods of mining alluvial tin ore are gravel pump and dredging.

1. Gravel pump

Gravel pump is the most common method of tin mining. Tin-bearing earth is broken down by high pressure water jets known as monitors and the resultant slurry is washed to a sump in the pit floor. The ground is kept steep so that the slurry slides down to the sump by gravity. A gravel pump pumps all the material up to an elevated palong (a huge wooden sluice box to trap and save the tin ore).

A newer method is the dry method, where tin-bearing earth is carried by dump trucks to a collection pit in front of the palong. Here monitors are used to break, loosen and agitate the materials which then flow to the palong via gravity. This has proved to be highly effective as large volumes of tin-bearing earth can be treated.

The modern method of recovering the ore is to use jigs, shaking tables and even spiral concentrators. However, palongs are still used as these can treat large volumes of tin-bearing earth, which is a main criteria in tin mining.

2. Dredging

Dredges are highly efficient mining machines which can operate practically nonstop for 24 hours, with labourers working on shifts. Earth with lower grade deposits can be profitable because of the high yardage of materials treated. The dredge is essentially a floating mine where mining and tin ore dressing are done on board. After the ore-bearing earth is dug up by chain buckets and broken down by monitors, jigs are used to wash the tin ore. Dredges are expensive and unless large pieces of land with rich deposits of tin are found, it is doubtful that dredges will be re-introduced.

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Lode mining: Lode mining is carried out where the tin ore is found in lodes or veins in rock and boulders. Most of the tin ore mined in Malaysia were alluvial or placer ore which was relatively easier than lode mining.

Open cast primary tin: In areas where tin ore is found in rocks and boulders, the ore-bearing materials are dug by excavators and transported by dump trucks to a collection pit. The rocks are then crushed and go through a separation process. If the ore deposits are deeper, dynamite blasting is often used to extract the ore. At present there are a few such tin mines in operation at Pengalan Hulu in north Perak.

Underground mining: The other method of lode mining is underground mining. As its name implies, mining is carried out underground through tunnels and shafts. Underground mining requires high capital costs and higher technology. Even exploration works for primary tin are high capital investment and high risk. The most famous underground tin mine in Malaysia was in Pahang.

Workforce Technical Skills & Expertise Required to Revitalise Tin Mining

The industry has been in the doldrums for over 40 years and it will not be an easy task to revitalise this sleeping industry. Most of the tin miners (meaning the owners and investors, not the workers!) have moved on to other industries and some have even retired. Most large tin mining companies have changed their businesses and those listed on the KLSE were sold as shell companies.

Tin mining has always been a possible high return but high-risk venture. It has often been said that one needs capital and guts to venture into tin mining. To start a new tin mine today will require a huge capital and new technology.

The key skills people needed for hydraulic tin mining are as follow:

1. The mining engineer who is experienced in tin mining, including the preparation of mining schemes, the position of the palong and sizes of tailings ponds, the source of water, locating the tin ore bearing earths and control of tin mining operation according to governance.
2. The kepala (or headman) is the most important manager in a tin mine, especially in alluvial mining. He has the skills and knowledge of all the practical works in running a tin mine such as the design and construction of the palong, water and drainage control, safety of tin mines especially land subsidence, tin ore dressing and, of course, locating the ore.
3. The exploration team: Modern mining may require constant checking or searching for tin ore deposits.
4. Tin ore processor or dressers. The team that processes the raw tin ore-bearing material obtained from the palong or jigs into high concentration tin ore. The process may involve crushing and grinding, floatation method with jigs and shaking tables, magnetic separator and drying and packing. There is a premium for efficiency as the purer the ore, the higher the price.

Tin mining workers can still be sourced from Perak, previously the centre of tin mining activities in the world. Although activities have been slow over the decades, we are blessed with many sand mines. Sand mining operations are similar to that of tin mining except for the process to recover tin ore. Mining equipment such as pipes, gravel and water pumps can be sourced in Perak. The most important person is the kepala and it is very important to be able to get a good, experienced kepala who can assemble the required workforce.

New methods of tin mining have to be more efficient, sustainable and environmentally friendly; China, as the largest producer today, has many new and advanced mining equipment and techniques.

Environment & Tin Mining

Traditionally, mining and the environment do not mix well! Environmental, social & governance (ESG) is a relatively new concept in Malaysia but unfortunately, many tin mining companies were not keen on ESG in the past. Mining activities often cause social problems for mines and the community. But the good news is that ESG is possible in tin mining and in many countries, this is a condition for the granting of a mining licence.

Sustainability is another new word for most tin miners. In the past, tin mining caused pollution and the silting of rivers. Ex-mining tailing ponds with slime or soft clay also made the land expensive to rehabilitate.

One new method that is good for the environment and has proved sustainable is backfilling mining where areas that are mined are continually backfilled. Also, with more ore exploration, only workable grades of tin-bearing earth are mined which will reduce the cost and the volume of tailings waste.

It had been proven that mining and conservation of the environment can co-exist as the rehabilitation of some mines has shown impressive results. For instance, oil palm has been successfully planted on ex-mining land. Construction on ex-mining land has also been carried out successfully and lots of ex-mining land have been turned into housing estates. Ex-mining pools are also being used for recreation purposes, such as golf courses and water sanctuaries.

For many years, tin mines provided sand for the construction industry. Malaysia is fortunate that some large mining pools have been turned into landfills. Ex-mining pools are also used for flood control (e.g. the SMART project).

Future Prospects

Much of our tin came from alluvial deposits and, for the last few decades, tin ore was mined from dredged out areas, old mines, the leftovers of the boundaries between two old mines and reworking of the tailings. Most of the known tin ore areas are of low grades.

There is a need to find new tin deposit land and the mother lode. Mining the mother lode will require a very large investment and the cost of production will be high.

Perhaps the government can play a role in facilitating the conversion of land, e.g. agricultural, etc., for mining, where land will be returned to the landowner to be used for other purposes after mining has ceased. The tin should be extracted before any development is carried out or the tin ore will be lost forever.

Some large alluvial reserves are located beneath developed towns and cities, making them obviously difficult to mine. For instance, the town of Gopeng in Perak is said to be sitting on very rich tin reserves. There was also an attempt to relocate the town for mining. Perhaps some day when the world tin reserves are very low, one can do underground mining in these towns.

Conclusion

High prices and the growing demand for tin is causing a huge interest in the industry. Tin is the metal of the future because of its high usage in the computer and electronic age, especially as world reserves of the metal are depleting and the demand will continue to increase. Traditionally, solders were made of a tin and lead alloy. But the new trend to use lead-free solders will increase the demand for tin. Hence there is a great future in tin mining.

The government may have to open up land for prospecting. The future of tin is probably in mining primary deposits but even exploration work for primary tin is a high capital investment with high risks. ■

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Overview of Offshore Oil & Gas Facilities Piping Leak Mitigation via Composite Wrap

Prepared by:

Ir. Teo Eu Jin

A Corporate Member of IEM, registered Professional Engineer and ASEAN Chartered Professional Engineer with the Board of Engineers Malaysia, he works as an Integrity Engineer at a multinational O&G corporation.

A piping system is widely used for the transfer of liquid or gas. Since all works of engineering constructions have a certain design life-cycle, piping systems also encounter wear and tear, eventually leading to pipe leaks. A worst scenario happens when offshore oil & gas (O&G) platforms experience a leak in the critical piping system, causing the loss of millions of ringgit in production as well as seriously affecting the facilities, safety, health and environment. O&G platforms are usually in isolated locations, so in view of the logistic constrains, proper responsive mitigation needs to be in place.

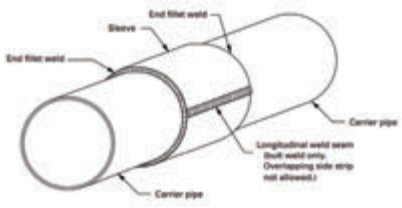
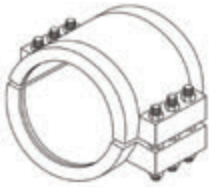
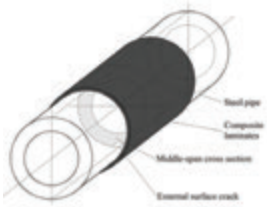
Pipe Leak Mitigation Options

Any product utilised to mitigate leaking pipes needs to undergo proper evaluation in terms of safety, quality and technical aspects. An industrial recognised reference is the American Society of Mechanical Engineers, Repair of Pressure Equipment and Piping (ASME PCC-2), where pipe leak mitigation is categorised into Welded Repair, Mechanical Repair and Non-Metallic & Bonded Repair.

The Composite Wrap is part of the Non-Metallic & Bonded Repair, whereby another standard BS EN ISO 24817, Petroleum, Petrochemical & Natural Gas Industries – Composite Repairs for Pipework – Qualification and Design, Installation, Testing and Inspection, can be used for cross comparison. This article will consolidate both ASME PCC-2 and BS EN ISO 24817 for discussion purposes.

Composite Wrap was actively explored in O&G offshore facilities in Malaysia around the beginning of the 21st century. In theory, a composite wrap can restore the integrity of pipe material that has undergone external corrosion, external damage, internal corrosion and erosion, crack-like defects as well as strengthen local areas. Nonetheless, internal corrosion and erosion will continue even after wrapping, while the others can

Table 1: Pipe leak mitigation sample per ASME PCC-2

Welded Repair	Mechanical Repair	Composite Wrap
		
Example of Welded Pipe Sleeve (Photo Source: Reference 1)	Example of Mechanical Clamp (Photo Source: Reference 1)	Example of Composite Wrap (Photo Source: Reference 3)
Since hot work is involved, any combustible residue inside the pipe should be removed prior to welding. Relatively longer work duration due to customised modifications. Quality is skill dependent (welder).	Fast and easy to install. Suitable for relatively high temperature service on straight pipe and not for complex configuration (e.g., elbow, tee), unless custom made. Fairly high inventory to cater to various pipe sizes.	Flexible to cater to complex configurations (e.g., elbow, tee). Needs specific control process such as material shelf-life and quality is skill dependent (wrappers) etc.

Remark:
- For safety reasons, nearly all leaking pipes need to be properly isolated, drained and depressurised before any mitigation can be executed (except for mechanism designed for online leak repair).
- Per ASME PCC-2 clause 101-3.7, the standard does not classify repair method as permanent or temporary. In other word, it depends on the end user to decide the duration of the repair.

be mitigated without further deterioration, provided a good quality wrap is executed. To ensure the composite wrap is of acceptable quality, a few criteria need to be considered, such as repair system qualification, enquiry stage, design of repair, installer training, installation of repair and inspection and maintenance of repair.

Composite Wrap Qualification Test: (Repair System Qualification, Enquiry Stage, Design of Repair)

In ISO 24817, not through-wall defect (e.g., wall lost below design criteria) and through-wall defect (e.g., leak) are termed Type A and Type B respectively. Also, the composite wrap design lifetime in calculation ranges from 2 years (min) to 20 years (max). Alternatively, a degradation factor may be used to substitute the design life in ISO. Some end users treat composite wraps as a temporary measure to buy time for a more permanent repair. Moreover, the repair class is segregated into Class 1, 2 and 3 (Table 2). Basically, the owner should confirm that the repair system proposed by the supplier had been tested as part of due diligence, meeting the standard with sufficient documentation and preferably with third-party verification.

Note: During the actual application, the owner needs to furnish the vendor with data for a proper wrap design. If there are changes in the piping system associate to the composite wrap in terms of pressure and/or temperature and injection of certain chemicals (acidic or alkaline), subsequent technical evaluation needs to be performed and when required, to take necessary action including decommissioning the composite repair.

Table 2: Example of Composite Wrap Repair Class

Repair Class	Typical Service	Design Pressure	Design Temperature
Class 1	Low specification duties, e.g. static head, drains, cooling medium and sea (service) water	<2 MPa	<40 °C
Class 2	Fire water/deluge systems	<2 MPa	<100 °C
Class 3	Produced water and hydrocarbons, flammable fluids, gas systems. Class 3 also covers operating conditions more onerous than those described above.	Limited to repairs designed in compliance with this document and of a thickness equivalent to <D/12	Defined in 7.5.3 (Clause in ISO 24817)

Remarks:
1. Class 3 repair is recommended to be more stringent at inspection and revalidation (refer Table 7).
2. Most owner will opt to prepare for Class 3 for worst case scenario.

Source: ISO 24817 (2017), Table 2, Repair Class

Composite Wrap Mock-Up Test: (Part of Design of Repair whereby Supplier shall demonstrate the repair system to be satisfactory)

Since ISO 24817 states that the supplier shall demonstrate the repair system to be satisfactory, some organisations may request proof testing (mock-up). There is a different strategy for approaching this mock-up test, where it is common to split the said test into phases.

The first phase comprises core testing on all relevant carbon steel piping components to verify the theoretical calculation (i.e., pipe, tee, etc.). Higher pipe geometrical changes may elevate the stress intensification which may need to be overcome by increasing the composite wrap thickness. Subsequent mock-up test phases may be extended to other materials (e.g., stainless steel 316L, duplex stainless steel) where required, to ensure the established calculation principle is still valid. More importantly, the end user needs to be confident with the product.

Table 3: Sample Composite Wrap Calculation Formulae

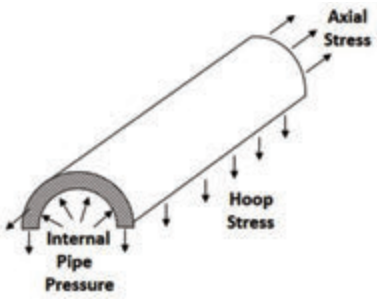
<table>
<tr><th colspan="2">Dimension of Composite Wrap Required per ASME PCC-2 (2015)</th></tr>
<tr><td colspan="2">Type A Defect: Minimum repair laminate thickness</td></tr>
<tr><td>For Hoop Stresses:
$$t_{min} = \frac{D}{2s} \cdot \left(\frac{E_s}{E_c}\right) \cdot (P - P_s)$$
For Axial Stresses:
$$t_{min} = \frac{D}{2s} \cdot \left(\frac{E_s}{E_c}\right) \cdot \left(\frac{2F}{\pi D^2} - P_s\right)$$
(Note: The greater thickness determined shall apply)</td><td> 
</td></tr>
<tr><td>Type B Defect: Minimum repair laminate thickness (for a circular or near-circular defect)</td><td>Legends (Refer to ASME PCC-2, Article 4.1 for more details)</td></tr>
<tr><td>$$P = fsf\sqrt{\frac{\gamma_{LCL}}{\frac{(1-\nu^2)}{E_{ac}}\left(\frac{3}{512t_{min}^3}d^4 + \frac{1}{\pi}d\right) + \frac{3}{64G_{31}t_{min}}d^2}}$$</td><td rowspan="4">D = component outside diameter, m (in.)
d = diameter of defect or leaking region, m (in.)
E_a = tensile modulus for the composite laminate in the axial direction, N/m2 (psi)
E_{ac} = $(E_a \times E_c)^{0.5}$, N/m2 (psi)
E_c = tensile modulus for the composite laminate in the circumferential direction, N/m2 (psi)
E_s = tensile modulus for substrate material, N/m2 (psi)
F = sum axial tensile loads due to pressure, bending, and axial thrust, N (lbf).
f = service factor for Type B repairs
f_T = temperature derating factor
G_{31} = composite laminate shear modulus, N/m2 (psi)
P = internal design pressure, N/m2 (psi)
P_s = Maximum Operating Pressure, N/m2 (psi)
s = Specified Minimum Yield Strength, N/m2 (psi)
t = nominal wall thickness, mm (in.)
t_{min} = minimum repair thickness, mm (in.)
t_{repair} = design repair thickness, mm (in.)
Y_{LCL} = toughness parameter lower confidence limit
ϵ_a = allowable axial strain
τ = lap shear strength, N/m2 (psi)
ν = Poisson's ratio for the composite laminate in the circumferential direction</td></tr>
<tr><td>Axial length of the repair</td></tr>
<tr><td>Length of the wrap should be:
$$L = 2L_{over} + L_{defect} + 2L_{taper}$$</td></tr>
<tr><td>whereby,
$$L_{over} = \max.\left(2.5\sqrt{Dt/2} \text{ or } \frac{E_a \epsilon_a t_{repair}}{\tau}\right)$$
A minimum taper of approximately 5:1 ratio (Example: 5x composite wrap thickness)</td></tr>
<tr><td colspan="2">Alternative shorter repair length</td></tr>
<tr><td>$$L_{over} = 2.5\sqrt{Dt/2}$$
This is permitted provided mock-up demonstrated is done.</td><td>Note:
ISO 24817, Clause 7.5.8 states that the minimum L_{over} of 50mm may be taken into consideration.</td></tr>
<tr><td colspan="2">Remarks:
a. The above reference formulae are from ASME PCC-2 Part 6 meant for consideration only.
b. Moreover, the formulae in ASME PCC-2 may be slightly different with ISO 24817.
c. The value of the variables is obtained during composite wrap system qualification test.</td></tr>
</table>

Table 4: Sample Composite Wrap Application (Photo courtesy of Maxxun Engineering Sdn. Bhd.)

Basic Steps Application of Composite Wrap on Through-Wall Defect (Type B)		
Check Steel Pipe Surface Preparation 	Prepare the In-fill Compound 	Seal the Hole with In-fill 
Temporary Compress the In-fill Compound 	Saturant to the Fibre Wrap 	Apply the Primer (Interphase) on the Pipe 
Apply the Saturated Wrap on the Pipe 	Massage the Composite Wrap 	Compress the Composite Wrap with Plastic 
Perforate the Plastic 	Wait till fully cured and then verify the hardness 	Remarks: Pressure test the sample coupon according to the desired pressure rating.

Table 5: Common Corrosion Damage on Composite Wrap

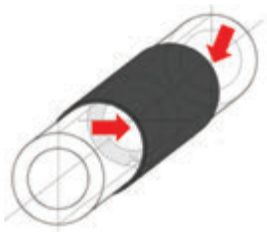
	Remarks: Red arrows on the left indicate common corrosion areas of a carbon steel pipe after a composite wrap application. Damage on the edges create an opening for water ingress and the trapped water causes accelerated corrosion underneath the wrap. Refer to ISO 24817 Table 16, 17 and 18 for more information on visual inspection.
Safety, Health & Environmental (SHE) Tips: In the case of chemical substances (including composite substances) sent to O&G offshore facilities, the latest Material Safety Data Sheet (MSDS) must be reviewed upfront as part of safety precautions. Moreover, the MDSD will also contain other useful information such as storage condition, First Aid treatment, etc.	

Table 6: Composite Wrap Overview in reference to ISO 24817 for Consideration

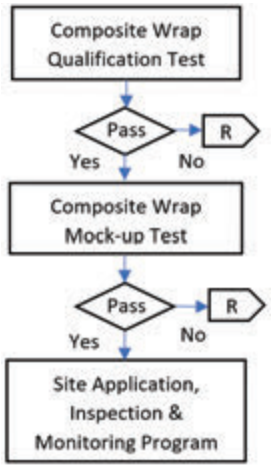
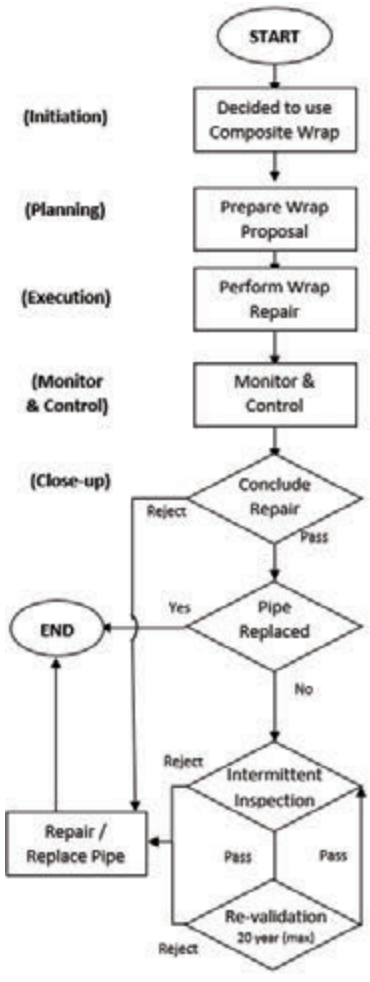
Flow Chart	Ownership	Explanation
	Supplier or Vendor	Supplier needs to do the necessary pre-requisites to ensure the product complies to the industrial standard (e.g., testing and calculation). The end user should verify this information during upfront discussion.
	Supplier and End User	Information stated in supplier document may not be the actual case at site. Therefore, end user is advised to perform due diligence by conducting mock-up test to ensure the product is fit-for-use.
	End User	Refer to Table 7, the composite wrap will be applied at operating facilities which falls under end user custodian. Hence, end user has the responsibility to track and record the composite wrap from cradle to grave.
Remark: If "R", either supplier must improve or end user must reject/look for an alternative.		

Table 7: Sample Flow-Chart of Composite Wrap Site Application in Reference to ISO 24817 (Cradle to Grave Concept)

Flow Chart	Description
	<u>New Composite Wrap</u> • Leak or defect detected on the pipe spool in the facilities. • Evaluate the defect and determine whether composite wrap repair is the best way forward with alignment from stakeholders. • Conduct engineering calculation to determine the wrap length and thickness required to mitigate the finding, including necessary information and instruction (e.g., repair steps) for reference. • Apply composite wrap by competent person (trained); crew to refer to the established procedure to ensure quality of the work is achieved. • Ensure necessary surface preparation and hardness test verified prior to system back online. This stage is best done with sufficient site supervision. • If leak is not observed after system is back online, then this composite wrap can be considered acceptable for the time being. Make proper tracking and record for traceability purpose. <u>Maintenance of Existing Composite Wrap</u> • Depending on the company strategy, some organisations allow composite wraps to be used long-term while other will not. However, it is wise to take precautions on composite material degradation. • Composite wraps ought to be inspected at reasonable intervals to ensure their integrity is maintained via visual inspection. However, for Class 3 repairs, ISO 24817 mentions inspection considerations to check the condition of pipe beneath the repair via RT and eddy current to ensure no defect growth and no delamination (Type A > 2 years and Type B per risk assessment). • Re-validation or extend the lifetime by redesigning the repair with the latest data (e.g., defect size, pressure, temperature, etc.) which may lead to thicker new composite repair. Moderate lifetime extension is recommended for composite wrap lifetime > 20 years with increment ≤ 5 years.

Site Application, Inspection and Monitoring Programme: (Installer Training, Installation of Repair, and Inspection and Maintenance of Repair)

Generally, correct installation will determine the success of composite wrap repairs. So it is crucial that the repair installer/wrapper is well trained. Some offshore O&G owners will directly engage repair installer personnel on an ad-hoc basis, while others may train their regular offshore crew members.

ISO 24817 recommends 10 wraps per year for the qualification to be valid or else undergoing requalification annually is required. Since composite wraps are not impervious to defect, it is wise to have an inspection plan (with photo) in place based on risk level and timeline. In fact, there are cases of composite wrap failures, such as interfacial delamination, external physical damage and bulges.

Conclusion

Some may argue that welding and clamping are better than composite wrap. That may be true in some sense. But though a composite wrap may fail, the associated risk is reduced as the consequence typically changes from uncontrolled rupture failure of substrates (without wrap) to controlled leak or dripping (with wrap). For now, the inspection of composite wraps is limited to visual, radiographic testing (RT), eddy current and other relevant techniques (e.g., tapping to determine delamination). Basically, RT is a feasible way to assess the pipe beneath the composite wrap (especially after visual finding) but the execution window for RT is limited on offshore O&G platforms. Too many composite wraps may lead to an inspection backlog. Therefore, end-users ought to establish pipe repair strategy to optimise the advantages of a composite wrap. ■

REFERENCES

[1] The American Society of Mechanical Engineers, ASME PCC-2 (2015) "Repair of Pressure Equipment and Piping".

[2] BSI Standard Publication, BS EN ISO 24817 (2017), "Petroleum, petrochemical and natural gas industries – Composite repairs for pipework – Qualification and design, installation, testing and inspection".

[3] External Surface Cracked Offshore Pipes Reinforced with Composite Repair System: A Numerical Analysis, Theoretical and Applied Fracture Mechanics, Elsevier, Vol 117, Feb 2022, by Zongchen Li, Xiaoli Jiang, Hans Hopman.

NOTICE ON NOMINATION PAPERS FOR COUNCIL ELECTION SESSION 2025/2026

A notice inviting nominations for the Election of Council Members for Session 2025/2026 will be posted on the IEM Notice Board and IEM website by 1 November 2024 for the information of all Corporate Members of IEM. Following the close of nominations on 7 December 2024, the election exercise will proceed. All Corporate Members residing overseas are requested to take note of the requirements of the Bylaw, Section 5.17, as shown below.

The voting paper (in hardcopy or electronic form) shall, not less than twenty-eight (28) clear days before the date of the Annual General Meeting, be sent by post or in electronic mail or message to all Corporate Members. The voting paper (in hardcopy or electronic form) shall be returned or submitted online and in turn notified to the Honorary Secretary in a sealed envelope or electronically encrypted format so as to reach him by a specified date not less than seven (7) days before the Annual General Meeting.

Electronic Ballot Papers will be sent to all Corporate Members by **3 March 2025**.

Thank you.
Election Officer, IEM

Visit to Selinsing Gold Mine, Pahang

Prepared by:

Ir. Ahmad Rafidi Mohayiddin

Encouraged by the hospitality of the Selinsing Gold Mine team during technical visits in the years prior to the COVID-19 pandemic lockdown, the Oil, Gas & Mining Technical Division (OGMTD) once again organised another technical visit to the mine in Kuala Lipis, Pahang, on 23 June 2024.

Participants pose for a group photo with SGMMSB team

The mine had always been a key visit location on OGMTD's list of activities due to requests by its members and public interest in the commodity in recent years.

The Selinsing Gold Mine, operated by Selinsing Gold Mine Manager Sdn. Bhd. (SGMMSB), is located in Bukit Selinsing near Sungai Koyan, approximately 65km north of Raub and 30km west of Kuala Lipis. The 26 participants comprising OGMTD members and non-members, left in a chartered bus from Wisma IEM at 7.45 a.m. and we reached our destination after a 2.5-hour journey.

We were received by Encik Zaidi Haron, Senior Vice President of SGMMSB, and his team. The visit started with a warm welcome by Encik Zaidi Haron who also gave us a short history of the site. Then there was a safety briefing for the participants before we went to the mine. Most participants had brought along their own personal protective equipment (PPE) but SGMSSB had also prepared extra equipment such as safety vests.

We learnt that the Selinsing deposit occurs along the north striking Raub, Bentong Suture and a major tectonic feature that runs through Peninsular Malaysia. The deposit is hosted by a series of auriferous quartz veins and stockworks of quartz veinlets in a package of sheared calcareous epiclastic sediments. Gold mineralisation at Selinsing is associated with high grade quartz veining and associated sericitisation and silification within a major shear zone. Encik Zaidi Haron then talked about the process of extracting gold deposits and the ongoing activities.

A SGMMSB team member explaining the mining operation in the field

The participants went to the mine in a few pick-up vehicles. The first stop was the open mine blasting and drilling area. There, they had the opportunity to view one of three new pits where blasting and drilling were being carried out. There were heavy machineries and we saw trucks carrying loads of crushed rocks and trucks carrying waste to collection areas. Selinsing Mine also has its own laboratory for analysing the quality of deposits in the rock samples.

Panoramic view of one of the mining pits

The next stop was the area where crushed rocks were collected. Participants disembarked from the pick-up vehicles for a closer look at the crushed rocks and to listen to further briefings on visual assessment of various features seen on the rock surface.

On the ride to the next collection area, participants passed by tailing dams where the waste was stored and treated. At the next stop, the collected rocks were further crushed before being loaded into the crusher and refined further prior to being fed into the new Sulphide Floatation Plant.

We were informed that SGMMSB no longer produced raw gold bars but relied on this plant to treat sulphide ore in three stages of a cleaner flotation process which eventually resulted in a thickened slurry of a gold concentrate cake. This cake was shipped to overseas buyers for the gold to be extracted.

The participants had a group photograph taken in front of the plant before they returned to the canteen for a sumptuous lunch. After bidding adieu, the bus left the mine at 2.30 p.m. with participants having gained valuable insights and new knowledge in gold extraction from the team at SGMMSB. ■

NOMINATIONS FOR ELECTION TO FILL VACANCIES FOR THE COUNCIL SESSION 2025/2026

The IEM Council at its 442nd meeting on 15 July 2024 had decided to fill Council vacancies for the Session 2025/2026 in accordance with Article 5.2 of the Constitution. An election programme had also been approved by the Council for implementation.

The following Council vacancies will arise for Session 2025/2026 as a result of Council members retiring at the end of Session 2024/2025.

Office	No of Vacancies	Term of Office
Vice President	Four (4)	2 sessions (2025/2026 and 2026/2027)
Honorary Secretary	One (1)	1 session (2025/2026)
Honorary Treasurer	One (1)	1 session (2025/2026)
Council Member – Other Discipline	One (1)	3 sessions (2025/2026, 2026/2027 and 2027/2028)
Council Membe – Ordinary Representative	Ten (10)	3 sessions (2025/2026, 2026/2027 and 2027/2028)

Notice inviting nominations for the Election of Council Member for Session 2025/2026 will be posted on the IEM Notice Board and on the website on 1 November 2024 for the information of all Corporate Members.

Nomination Forms may be obtained at the IEM Secretariat or downloaded from the IEM website *www.myiem.org.my* on and after **1 November 2024**.

All Nomination forms, duly completed, shall be sent in a sealed envelope marked "***Confidential: Nomination Paper for Session 2025/2026***" to: -

The Honorary Secretary
The Institution of Engineers, Malaysia
BangunanIngenieur, Lots 60/62, Jalan 52/4
P.O. Box 223 (Jalan Sultan)
46720 Petaling Jaya, Selangor DarulEhsan
Tel: 03-79684001/2

and to reach her not later than 12.00 noon on **Saturday, 7 December 2024**.

Dato' Paduka Ir. Hj. Keizrul bin Abdullah
Election Officer 2024/2025

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WE IEM Conference 2024: Platform for ESG & Diversity

Prepared by:

Ir. Prof. Dr Zuhaina Zakaria

The 2nd annual WE IEM Conference 2024 was held at the Kuala Lumpur Convention Centre on 21 September 2024. Organised by the Women Engineers Section in conjunction with ENGINEER 2024, it focused on the integration of Environmental, Social & Governance (ESG) principles with global talent and diversity to drive sustainable development.

The event brought together 100 participants from various sectors, including engineering, business and academia. The theme for this year, ESG: Leveraging Global Talents & Diversity, was built on the success of last year's conference, which focused on women empowerment and leadership.

Opening Remarks

The event began with welcoming remarks by Ir. Prof. Dr Zuhaina Zakaria, the Organising Chair of the conference. She said diversity and global talents are key drivers in developing innovative and equitable solutions to the challenges of today's world. This was followed by a speech from IEM President Ir. Prof. Dr Jeffrey Chiang Choong Luin who expressed gratitude for the continued support of the Women Engineers Section. He then reinforced the importance of integrating ESG into the engineering profession.

Ministerial Address

The keynote address was delivered by YB. Dr Zaliha Mustafa, Minister in the Prime Minister's Department (Federal Territories). She talked about the importance of leading Malaysia towards a more inclusive and sustainable future, touching on several key areas such as:

- Global Talents & Diversity: Dr Zaliha underscored the importance of leveraging global talents and diversity to address the complex challenges of ESG, stating that diversity drove innovation and opened pathways to more inclusive solutions.

Dr Zaliha Mustafa delivering her keynote address

- Inclusive Engineering: She introduced the concept of inclusive engineering, encouraging practices that considered not just technical aspects but also social impact, equity and environmental sustainability. She urged IEM to lead the charge in promoting this approach.
- Malaysia's Role in ESG: She affirmed that Malaysia was well-positioned to become a leader in integrating ESG principles into national development, citing the country's diverse talent pool and commitment to sustainability as our key strengths.

Dr Zaliha concluded her speech by calling for greater collaboration between government, industry and academia to set new standards in promoting inclusivity and innovation.

Participants of the IEM WE Conference 2024

Distinguished Speakers

The conference featured three distinguished keynote speakers who shared their expertise on ESG and diversity:

1. Datuk Ir. Rosaline Ganendra: The founder of Ganendra Ahmad & Associates Sdn. Bhd. Talked about how integrating ESG principles into engineering practices could foster accountability, transparency and innovation.
2. Dato' Ir. Nor Hisham Mohd Ghazali: The Director of SK Water Consult Sdn. Bhd. discussed water management within the context of ESG, highlighting the critical role that sustainable water resource strategies play in environmental stewardship.
3. Dato' Prof. Dr Noraini Idris: The President of the National STEM Association focused on the role of STEM education in achieving ESG goals, stressing the need to cultivate future leaders who could address sustainability challenges through innovation.

Forum Highlights

The two forum sessions at the conference centred on leadership, diversity and ESG:

- **Forum 1.** Diverse Leadership in ESG: Shaping the Future Together

This session explored the importance of diverse leadership in driving ESG initiatives. The panellists shared practical insights and real-world examples of how inclusive leadership models could enhance decision-making and innovation.

The panellists were Ir. Sharifah Azlina Raja Kamal Pasmah, Encik Shahrul Nizam Md. Nur and Ir. Augusta Lee, with Ir. Rusnida Talib as moderator.

- **Forum 2.** Addressing ESG Targets in STEM through Diversity

The second session focused on how diversity in STEM fields could accelerate progress toward ESG targets, particularly through innovation and collaboration.

The panellists were Ir. Ts. Dr Khor Jeen Ghee, Dr Eu Poh Leng, Ms. Ong Jee Lian and Ms. Hooi E-Wen. The moderator was Ir. Assoc. Prof. Dr Syuhaida Ismail.

Conclusion

The conference concluded with a speech from Ir. Assoc. Prof. Dr Syuhaida Ismail, Chair of the IEM Women Engineers Section. She thanked all the participants, speakers and sponsors for their contributions and encouraged everyone to carry forward the insights gained from the conference into their respective fields.

The WE IEM Conference 2024 successfully highlighted the importance of integrating ESG principles with diverse talents to create a more sustainable and equitable future. The event provided a platform for exchanging ideas, fostering collaboration and exploring innovative solutions to today's challenges. The insights shared during the conference will continue to inspire and drive progress in promoting diversity and sustainability within the engineering sector.

The organising committee would like to extend its heartfelt gratitude to all the keynote speakers, panellists, attendees and sponsors for their support and participation. Special thanks are extended to YB. Dr Zaliha Mustafa for her inspiring keynote address and support for the event. ■

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Pulau Selakan, Semporna

While attending CAFEO 24 in Kota Kinabalu, Sabah, from 22-24 October 2024, several IEM members took the opportunity to visit Semporna for a brief dive session. The dive base was Selakan Island, a location recognised for its vibrant underwater ecosystem. The group enjoyed a unique communal experience which reflected the close-knit island lifestyle and had meals prepared by local residents.

During the dive, they were thrilled to document a juvenile cryptic frogfish; this marked only the second sighting of this species in Semporna and the first around Selakan Island. The discovery was made with the help of the dive guide, Nathan, whose expertise in spotting rare marine life added a special highlight to the experience. ■

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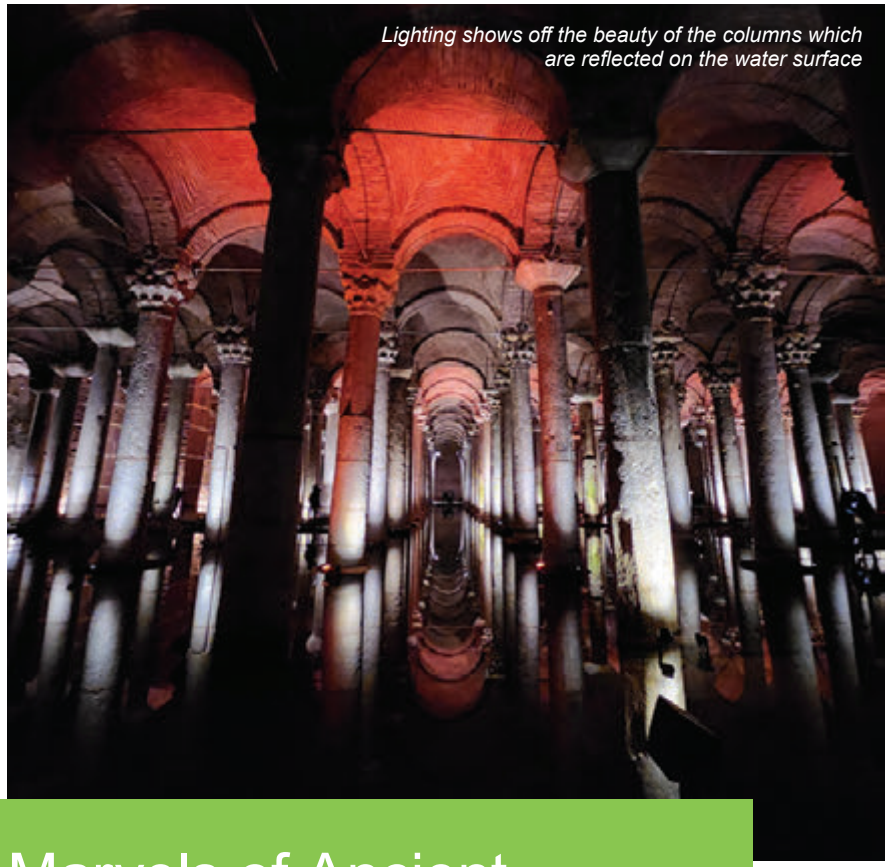


Lighting shows off the beauty of the columns which are reflected on the water surface

Marvels of Ancient Engineering: Basilica Cistern, Turkiye

Prepared by:

Ir. Ts. Nur Azhani Mohamad Rosli

Graduated from Universiti Teknologi PETRONAS with a Bachelor's dregree in Electrical & Electronic (Instrument & Control) Engineering and a Master's degree in Asset Maintenance & Management Engineering.

Are you familiar with rainwater harvesting tanks or storage used for landscaping, flushing and other non-potable purposes? Let's take a look at an ancient engineering marvel, a cistern. This was a storage system buried underneath a city for holding water and as part of stormwater management for the Great Palace, nearby bathhouses and the surrounding community.

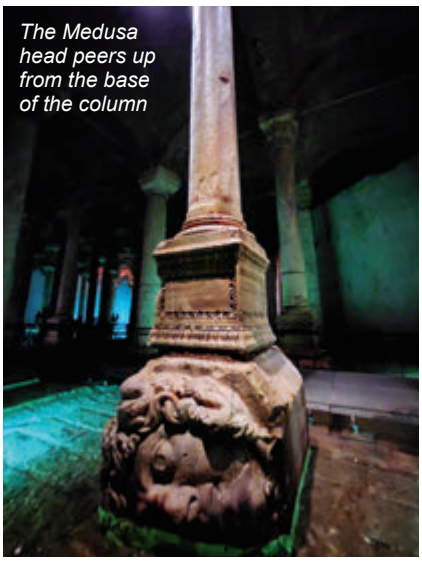
The Basilica Cistern, one of the largest ancient cisterns built in the 6th century AD during the Byzantine Empire, is still standing today as a historical and engineering wonder of Istanbul, Turkiye. Located in the district of Balat, this famous landmark has been open to tourists since 1987. Forget the typical small-scale rainwater harvesting tanks or storage tanks made from concrete, plastic, fibreglass or metal; visiting the Basilica Cistern is an eye-opening journey.

Able to store 80,000 cubic metres of water, the Basilica Cistern measures 138m by 65m and stands at 9m in height (about that of a 3-storey building). This underground reservoir is supported by 336 marble and granite columns rising majestically from the floor to the ceiling. They are arranged in 12 rows of 28 columns spaced 5m apart to evenly support the weight of the structure. These architectural elements ensure structural stability even during earthquakes. Many of the columns are said to have been reused or repurposed from older ancient structures or ruins. The most famous column, which is supported by a Medusa head at the base, is believed to have originated from Roman structures.

The uniqueness of ancient engineering lies in reliable and functional structures with aesthetic features. One of main elements of water or material engineering is the lining or waterproofing used to preserve the integrity of the structure and to maintain water storage quality. Sufficient water is still being kept in the cistern to protect the structure and to provide moisture for its walls. Water scarcity and quality had been an issue since ancient times and such an engineering solution provided the water storage solution.

The Basilica Cistern is strategically placed in the centre of communities, designed to catch rainwater as well as freshwater flowing from the distant hills in Istanbul to the Black Sea. Furthermore, the cistern also provides a natural water filtration and purification system to ensure a reliable clean water supply even during the drought seasons. We can learn from such ancient engineering innovations which remain a mystery today. The Basilica Cistern is more than just a reservoir; it is an adventure into the impressive ancient engineering of the Byzantine Empire's water system and its legacy continues to inspire wonder today.

Note: What's the difference between a well and a cistern? A well collects groundwater, while a cistern collects rainwater. Both are important for a water management system. ■



The Medusa head peers up from the base of the column

Date: 22 October 2024

To all Members,

LIST OF CANDIDATES ELIGIBLE TO SIT FOR THE PROFESSIONAL INTERVIEW FOR THE YEAR 2024

The following is a list of candidates who are eligible to sit for the Professional Interview for the year 2024.

According to the IEM Bylaws, Section 3.8, the names listed below are published as eligible candidates to become Insitution Members, provided that they pass the Professional Interview in 2024.

If there are any Corporate Members who have objections against any candidate deemed unsuitable to sit for the Professional Interview, a letter of objection can be submitted to the Honorary Secretary, IEM. A letter of objection must be submitted within one month from the date of publication.

Ir. Prof. Dr Tan Chee Fai
IEM Honorary Secretary

NEW APPLICATION

NAME	QUALIFICATION
ELECTRICAL ENGINEERING	
SYAHNUR FITRI BIN MOHD HILMI RAJA	BE HONS (UITM) (ELECTRICAL POWER, 2018)
MECHANICAL ENGINEERING	
ABDUL HAADI BIN ABDUL MANAP	BE HONS (SYDNEY) (MECHANICAL, 2013) MSc (USM) (MECHANICAL, 2015) PhD (USM) (2022)

MEMBER TRANSFER

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74824	LIEW ZHENG JIA	BE HONS (UTM) (CIVIL, 2018)
28090	LEONG WEI BOON	BE HONS (USM) (CIVIL, 2007)
57098	RAMES KUMAR A/L SHANMUGAM	BE HONS (UTHM) (CIVIL, 2010) MSc HONS (UTM) (CONSTRUCTION MANAGEMENT), 2015)
68987	MOHAMED EMIERUL QAZZARUL BIN KHIR JOHARI	BE HONS (UITM) (CIVIL, 2015) MSc HONS (USM) (STRUCTURAL ENGINEERING), 2017)
96098	CHUA KAR KEI	BE HONS (UNIMAP) (CIVIL, 2018)
CHEMICAL ENGINEERING		
49370	LIEW SHAN QIN	BE HONS (UTAR) (CHEMICAL, 2011) MSc. HONS (UPM) (BIOPROCESS & FOOD ENGINEERING, 2015) PhD (UM) (2019)
ELECTRONIC ENGINEERING		
121620	ALDIL YATI BINTI YUSOF	BE HONS (UTM) (BIOMEDICAL, 2009)
ELECTRICAL ENGINEERING		
127540	NUR AINNA SHAKINAH BINTI ABAS	BE HONS (UITM) (ELECTRICAL, 2017)
87149	MOHD FARHAN BIN ABDUL RAHIM	BE HONS (UTM) (ELECTRICAL, 2009)
MECHANICAL ENGINEERING		
127189	MOHD HISHAMUDDIN BIN MAT YASHIM	BE HONS (UKM) (MECHANICAL & MATERIAL, 2005)
MARINE ENGINEERING		
116222	SARAVANAN VENKADASALAM	DIP (POLITEKNIK UNGKU OMAR) (MARINE, 2001)

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MEMBERS NO.	NAME	QUALIFICATION
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62165	MICHELLE CHUA YEE WEN	BE HONS (TASMANIA) (CIVIL 2010)
MECHANICAL ENGINEERING		
81424	TENG WENG SERN	BE HONS (UTAR) (MECHANICAL, 2011)
90110	MOHD RAZALI BIN PAIMIN	BSc HONS (COLORADO) (MECHANICAL, 1998)
31324	HAFIZ BIN MOHD YUSOF	BE HONS (UITM) (MECHANICAL, 2010)
MECHATRONICS ENGINEERING		
116616	AHMAD JAZLAN BIN HAJA MOHIDEEN	BE HONS (UIAM) (MECHATRONICS, 2009) MSc HONS (UIAM) (MECHATRONICS, 2012) PhD (WESTERN AUSTRALIA) (2016)

Pengumuman yang ke-192

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2	30536	Mr. Mohd Dalias bin Awi
3	36347	Mr. Hiew Fong Poh
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116083	LAU YUNG CHIN	BE TECH HONS (UTHM) (CIVIL, 2020) ME (UKM) (CIVIL, 2022)
74827	LIM PEI SHIH, FELICIA	BE HONS (UTM) (CIVIL, 2018) ME (UTM) (STRUCTURE, 2019)
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65770	MOHAMAD RADZI BIN ZAIDI	BE HONS (UiTM) (CIVIL, 2014)
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83265	MOHD HELMI CHUA BIN MAHADY	BE HONS (UTHM) (CIVIL, 2018)
33080	MOHD SAIFUL BAHRI BIN MOHD ARIFFIN	BE HONS (UiTM) (CIVIL, 2008)
71168	MUHAMAD AKRAM BIN ABD KADIR	BE HONS (UTM) (CIVIL, 2019) ME (UPM) (HIGHWAY AND TRANSPORTATION, 2022)
52126	MUHAMMAD FARABI BIN ABDUL ROPA	BE HONS (UNIMAS) (CIVIL, 2016)
95655	MUHAMMAD HASIF BIN CHE AWANG	BE HONS (UNITEN) (CIVIL, 2022)
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88457	NUR ATIQAH BINTI HALIM	BE HONS (UiTM) (CIVIL - INFRASTRUCTURE, 2018) ME (UPM) (HIGHWAY & TRANSPORTATION, 2020)
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92372	HAZWANI QISTEENA BT MORSIDI	BE HONS (UM) (ELECTRICAL, 2019)
107448	LAU LEE YANG, BEN	BE HONS (SWINBURNE) (ELECTRICAL & ELECTRONIC, 2022)
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101942	MOHD HELMIE BIN SUFARDI	BE HONS (UiTM) (ELECTRICAL & ELECRTONIC, 2021)
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194974	CHAI CHUN WEI	BE HONS (UTAR) (ELECTRONIC, 2023)
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118624	JEREMIAH JAMES BERNARD	BE HONS (INTI INTERNATIONAL) (MECHANICAL, 2023)
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86122	MOHAMMAD FAHRUL NIZAM BIN SUHAIMI	BE HONS (UTHM) (MECHANICAL, 2019)
90801	MOHAMMAD SYAHIR BIN SAZALI	BE HONS (UTP) (MECHANICAL, 2019)
77623	MOHD HELMI BIN RASHID	BE HONS (UNIMAS) (MECHANICAL & MANUFACTGURING, 2018)
80013	MUHAMMAD ARIF BIN LUKEMAN @ OTHMAN	BE HONS (UNITEN) (MECHANICAL, 2019)
94472	MUHAMMAD ARSYAD BIN AZIZI	BE HONS (UKM) (MECHANICAL, 2021)
74671	MUHAMMED MUSTAQIM BIN ROSLY	BE HONS (UiTM) (MECHANICAL, 2019)
88538	SZE CHEE SHIANG	BE HONS (UTS) (MECHANICAL, 2019)
97047	TAN YIAW CHONG	BE HONS (KOLEJ UNIVERSITI TUN HUSSEIN ONN) (MECHANICAL, 2020)
107439	VOON WU QIAN, EDEN	BE HONS (SWINBURNE) (MECHANICAL, 2022)

KEJURUTERAAN MEKATRONIK

88588	CHEW JIE CHYEAN	BE HONS (A.P.U) (MECHATRONICS, 2020)
97003	LEE JIA FEI	BE HONS (TARC) (MECHATRONICS, 2020)
62114	MUHAMMAD AWAIS BIN FAROOQI	BE HONS (APU) (MECHATRONIC, 2013)
85166	NURFARAH DIANA BINTI MOHD RIDZUAN TAN	BE HONS (USM) (MECHATRONIC, 2019)

KEJURUTERAAN PEMBUATAN

102761	HARRESH A/L ANMPALAGAN	BE HONS (UTeM) (MANUFACTURING, 2022)
86918	NURSAHIRAH BINTI ZAKARIA	BE HONS (UKM) (MANUFACTURING, 2016)

PERMOHONAN MENJADI AHLI SISWAZAH

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AEROANGKASA		
124135	JAYA UGIPRASHAANT A/L RAVINDREN	BSc HONS (IOWA STATE UNI. OF SCIENCE & TECHNOLOGY) (AEROSPACE, 2020)
123857	JOSEPH AROKIASAMY	CAAM (DCAM PART 66 CATEGORY C HOLDER) (AIRCRAFT, 2021)
124134	SULAIMAN BIN KAMARULAZIZI	BE HONS (UPM) (AEROSPACE, 2008)
123852	YUGENDHRAN A/L KANASON	CAAM (DCAM PART 66 CATEGORY C HOLDER) (AIRCRAFT, 2022) MBA (CARDIFF METROPOLITAN UNI.) (2018)
KEJURUTERAAN ALAM SEKITAR		
124681	ASWARYA A/P PANIR CHELVAM	BE HONS (UNIMAP) (ENVIRONMENTAL, 2017)
124120	NGAN CHUN SANG	BE HONS (UM) (ENVIRONMENTAL, 2019)
KEJURUTERAAN AWAM		
124712	AHMAD FAIZ BIN CHAYED	BE HONS (UPNM) (CIVIL, 2012)
124112	AHMAD HAZWAN BIN ABDUL MUAAIS	BE HONS (UTP) (CIVIL, 2011)
123878	AHMAD MUHSEEN FIRDAUS BIN MOHD FIRDAUS	BE HONS (UTP) (CIVIL, 2020) MSc (USM) (CIVIL, 2023)
124660	AMOS WONG SHENG MIN	BE HONS (CURTIN) (CIVIL & CONSTRUCTION, 2020)
124691	ANAND RYAN THURAIRAJAH	BE HONS (UMS) (CIVIL, 2021)
124669	CHAI CHEE YONG	BE HONS (BRADFORD) (CIVIL & STRUCTURAL, 2003) MSc (NEWCASTLE UPON TYNE UNI.) (GEOTECHNICAL, 2014)
124666	CHEW HUI KIAT, JORDAN	BE HONS (UMP) (CIVIL, 2023)
123655	CHIN JOON FUI	BE (UMP) (CIVIL, 2013)
124659	CHIN ZHAO DA, BENJAMIN	MSc (COVENTRY.UNI) (CIVIL, 2019)
124695	CHONG SENG FAH	BE HONS (INTI INTERNATIONAL UNI.) (CIVIL, 2015)
124670	CHUA SUANG THENG	BE HONS (UNIMAP) (CIVIL, 2020)
123882	CHUNG WAI LIAM	BE (UTP) (CIVIL, 2003)
123874	DANELLE LEEZONG JINIVON	BE HONS (UMS) (CIVIL, 2021)
124156	DING KEN HAN, JOEL	BE HONS (SWINBURNE) (CIVIL, 2022)
124679	DR. CHAN YON SIN	BE HONS (UM) (MECHANICAL, 2018) PhD (MONASH) (MECHANICAL, 2023)
123858	Dr. LEE YONG SIANG	BE HONS (UNIMAS) (CIVIL, 2013) PhD (USM) (CIVIL, 2020)
124155	DR. NORHANA BINTI ABDUL RAHMAN	BE HONS (UiTM) (CIVIL, 2010) ME (UiTM) (CIVIL, 2012) PHD (UiTM) (CIVIL, 2019)
123910	EU CHAI NIE	BE HONS (UTM) (CIVIL, 2022)
124674	FU CHYN NUM	BE HONS (UTAR) (CIVIL, 2016)
124729	GOH CHUNG WEI	BE HONS (UTAR) (CIVIL, 2022)
124713	HAJJAR BINTI HUSEIN	BE HONS (UMP) (CIVIL, 2016)
124107	HARIGARAN A/L SUPERAMANIAM	BE HONS (UNIMAP) (CIVIL, 2019)
123909	HENG WEI KIONG, ROBERT	BE HONS (UTM) (CIVIL, 2005) MSc (UTM) (CONSTRUCTION CONTRACT MANAGEMENT, 2010)
123907	HEW CHOON YOW	BE HONS (UCSI) (CIVIL, 2019)
124694	HO PEI CHI	BE HONS (INTI. INTERNATIONAL UNI.) (CIVIL, 2023)
124108	HO PIN SIN	BE HONS (UPM) (CIVIL, 2014)
123883	ISMAIL BIN ALI	BE (UTM) (CIVIL, 1996)
123871	KHADIJAH BINTI YUSOFF	BE HONS (UTM) (CIVIL, 2022)
124661	KHOMISAJIE BIN JAAFAR	BE HONS (UiTM) (CIVIL, 2005)
123890	KUEH SYN YEE, CRYSTAL AVERY	BE HONS (SWINBURNE) (CIVIL, 2022)
124150	KWONG KIEN CONG	BE HONS (UNIMAP) (CIVIL-CONSTRUCTION, 2017) ME (UTM) (CIVIL, 2021)
124136	LAW LIK KIING	BE HONS (MIU) (CIVIL, 2016)
124687	LEE MIN HUI	BE HONS (HARBIN INSTITUTE OF TECHNOLOGY) (CIVIL, 2023)
124723	LEE SHU JUINN	ME HONS (NOTTINGHAM) (CIVIL, 2023)
123860	LIEW CHIN LEE, KELVIN	BE HONS (SWINBURNE) (CIVIL, 2021)
124708	LIEW YU VOON	BE HONS (UNIMAS) (CIVIL, 2010)
124148	LIM YEONG SEONG	BSc HONS (SOUTH DAKOTA STATE) (CIVIL, 1996)
123872	LOW AIK HONG	BSc (I-SHOU) (CIVIL & ECOLOGICAL, 2019) MSc (I-SHOU) (CIVIL & ECOLOGICAL, 2020)
124100	MAI SARAH BINTI MOHD RAMLI	BE HONS (UTM) (CIVIL, 2017)
124102	MOHAMAD SYAHIRAN BIN MOHAMAD RAFEE	BE HONS (UTM) (CIVIL, 2016)
124115	MOHD AZWAN BIN SALLEH	BE HONS (UiTM) (CIVIL, 2014) MSc (UiTM) (GEOTECHNICAL, 2017)
123899	MOHD KHAIRUL AKMAL BIN MD ZAHIR	BE HONS (USM) (CIVIL, 2022)
124143	MUAID ABDULKAREEM ALNAZIR AHMED	BE HONS (SWINBURNE) (CIVIL, 2013) MSc (UTAR) (SCIENCE, 2017)
124686	MUHAMAD SHARDIQ BIN MOHD SHUKRI	BE HONS (UTM) (CIVIL, 2018) ME (UTM) (FORENSICS, 2020)
124700	MUHAMMAD AUF BIN ABD. RAZAK	BE HONS (UiTM) (CIVIL, 2021)
124140	MUHAMMAD FIKRY BIN RADZALI	BE HONS (USM) (CIVIL, 2014)
123863	MUHAMMAD REZA BIN RAKLAN ALHADAD	BE HONS (UTM) (CIVIL, 2022)
124680	NAJWA MAISARAH BINTI MOHD RADOAN	BE HONS (UMP) (CIVIL, 2022)
123886	NASROL RAHMAN BIN ISMAIL	BE HONS (UMP) (CIVIL, 2022)
123898	NOR AINI BINTI MOHD YUNUS	BE HONS (UTM) (CIVIL, 2012)
124104	NOR DIANA BINTI SAMSURI	BE HONS (CARDIFF) (CIVIL, 2014) MSc (SURVEY) (INFRASTRUCTURE & MANAGEMENT, 2016)
124721	NOR IMRAN BIN NOR AZLAN	BE HONS (UTHM) (CIVIL, 2019)
124677	NORHASNIYATI BINTI MAT HUSSIN	BE HONS (UNITEN) (CIVIL, 2014)
124153	NUR AMIRA BINTI MOHD ANUAR	BE HONS (UTM) (CIVIL, 2016) ME (UTM) (GEOTECHNICS, 2021)
124101	NUR AMIRUL AINA BINTI AB RAHMAN	BE HONS (UTM) (CIVIL, 2021)
123912	NUR ANIZA BINTI BAKAR	BE HONS (UiTM) (CIVIL, 2010)
123888	NUR AZURA BINTI CHE MAT SALWI	BE HONS (UiTM) (CIVIL, 2021)
123903	NUR HAIZAN BINTI ALIAS	BE HONS (UMP) (CIVIL, 2018)
123900	NURFARRAH AIN BINTI SHAMSUDDIN	BE HONS (UiTM) (CIVIL, 2012)
124676	NURLISA FAIZZARA BINTI MOHD RASHID	BE HONS (UiTM) (CIVIL, 2018)
123868	PAVIN A/L RAVI	BE HONS (UKM) (CIVIL, 2021)
124707	RAJDEEP SINGH A/L RANJIT SINGH	BE HONS (UCSI) (CIVIL, 2016)
123864	RICKEY A/L SANTHANASAMY	BE HONS (UTP) (CIVIL, 2020)
124724	ROBIN ANAK PETER EMPANG MALANG	BE HONS (UTM) (CIVIL, 2013)
123880	SARNIYA A/P KESAVALOO	BE HONS (UNITEN) (CIVIL, 2017)
124154	SHARIFAH 'ATIKAH BINTI SYED BASHIR	BE HONS (UiTM) (CIVIL, 2021)
124138	SIEW WEI CHING	ME HONS (NOTTINGHAM) (CIVIL, 2021)
123896	SITI NAJIHAH BINTI YAAKUP	BE HONS (UMP) (CIVIL, 2018)
124728	SITI SAKINAH BINTI SABRI	BE HONS (UKM) (CIVIL, 2021)
123861	SITI SYAFATIN NAJIHAH BINTI MOHD TALIB	BE HONS (UPM) (CIVIL, 2018)
124130	SOO XIAO CHIANG, VINCENT	BE HONS (UTAR) (CIVIL, 2017)
123876	SUZALINNI BINTI SULAIMAN	BE HONS (USM) (CIVIL, 1997)
123893	SUZLYANA MARHAIN BINTI MASIZAN	BE HONS (UNITEN) (CIVIL, 2021)
124114	TAN JING NING	ME HONS (NOTTINGHAM) (CIVIL, 2018)
124699	TAN KAH BENG	BE HONS (USM) (CIVIL, 2012)
123866	TAN THIAN ZE, DANIEL	ME HONS (UNI. OF LEEDS) (CIVIL, 2023)
124693	TANG NGA LIN, SALLY	BE HONS (UMS) (CIVIL, 2012)
124672	TSANG LI XIN	BE (HARBIN INSITTUTE TECH.) (CIVIL, 2021)
124671	TZE TUNG TAN	BE (MELBOURNE UNI.) (ENVIRONMENTS, 2016) ME (MELBOURNE UNI.) (CIVIL WITH BUSINESS, 2018)
124697	WEE KANG XIANG, JONATHAN	BE HONS (UNIMAS) (CIVIL, 2012)
124125	WONG JING QUN	BE HONS (INTI.INTERNATIONAL UNI.) (CIVIL, 2023)
124110	WONG JIUN HAO	BE HONS (UCTS) (CIVIL, 2021)
124682	WONG REX ZAU	BE HONS (SOUTH CHINA UNI. OF TECHNOLOGY) (CIVIL, 2021)
123879	WONG SU ANN	ME HONS (NOTTINGHAM) (CIVIL, 2023)
123892	WONG ZHENG HAO, MELVIN	BE (QUEENSLAND) (CIVIL & CONSTRUCTION, 2016)
124727	WONG ZI HAO	BE HONS (UTP) (CIVIL, 2019)
124705	LIM CHEN YOONG	BE HONS (UNSW) (CIVIL & ARCHITECTURE, 2021)
124149	PNG YIK SZE, EMILY	BE HONS (SWINBURNE) (CIVIL, 2022)
124718	TUNG ZHI XUAN	BE HONS (UTM) (CIVIL, 2022)
124720	ZAKI BIN ZULKIFLI	BE HONS (UTM) (CIVIL, 2022)
KEJURUTERAAN BIOMEDIKAL		
124133	DR. MOHD RIDUAN BIN MOHAMAD	BE HONS (UM) (BIOMEDICAL, 2008) ME (UM) (BIOMEDICAL, 2011) PhD (STRATHCLYDE) (BIOMEDICAL, 2016)
KEJURUTERAAN ELEKTRIKAL		
124684	AHMAD FADHIL BIN YAHYA	BE HONS (UTM) (ELECTRICAL, 2018)
124158	AHMAD SYARYEL BIN AHMAD SHAH	BE HONS (UMS) (ELECTRICAL & ELECTRONICS, 2008)
124701	AIMAN HAQEEM BIN ALIAS	BE HONS (UNITEN) (ELECTRICAL POWER, 2023)
116239	CH'NG CHEE WEI	BE HONS (CURTIN) (ELECRTICAL & ELECTRONIC, 2023)
123894	CHOO JIA YEN	BE HONS (SWINBURNE) (ELECTRICAL & ELECTRONIC, 2020)
123869	CHUNG KWOK CHOONG, AERON	BE HONS (UTAR) (ELECTRICAL & ELECTRONIC, 2016)
124151	DR. TAN SWEE TIAM	BE (NANYANG TECHNOLOGICAL) (ELECTRICAL & ELECTRONIC, 2003) PhD (NAMYANG TECHNOLOGICAL UNI.) (ELECTRICAL & ELECTRONIC, 2007)
124146	HEW JUN HENG	BE (DUNDALK INSTITUTE OF TECHNOLOGY) (ELECTRICAL & ELECTRONIC SYSTEMS, 2017) MSc (LEEDS) (ELECTRICAL & RENEWABLE ENERGY SYSTEMS, 2020)
123875	HO WAN CHUAN, PATRICK	BE HONS (UTAR) (ELECTRICAL & ELECTRONICS, 2009) MSc (NOTTINGHAM) (ELECTRONIC COMMUNICATIONS & COMPUTER, 2013)
124106	IFFAH SYAHFINA BINTI ABDUL RAZAK	BSc (WESTERN ONTARIO) (ELECTRICAL, 2021)
124099	INDIRAN A/L KAMALAN	BE HONS (MMU) (ELECTRONICS, 2011)
124141	KENTHRA KANNAN A/L VARATHARAJAN	BE HONS (UNITEN) (ELECTRICAL POWER ENGINEERING, 2022)
124127	MOHAMAD SYAFIQ BIN ABDULLAH	BE HONS (UiTM) (ELECTRICAL & ELECTRONIC, 2017)
124678	MOHD FARID BIN MOHD ADNAN	BE HONS (UNIMAP) (ELECTRICAL SYSTEMS, 2014)
124119	MUHAMMAD IKMAL BIN MOHD SAED	BE HONS (UPNM) (ELECTRICAL & ELECTRONIC, 2019)
124683	MUHD FIKRI BIN OMAR	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2012)
124157	NGU SIE YOONG, ERIC	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2018)
124142	NOR ASYIKIN BINTI ROS AZMAN	BE HONS (UNIMAP) (ELECTRICAL, 2021)
124726	SAFFUANDI BIN JUNAIDI	BE HONS (UNISEL) (ELECTRICAL, 2022)
124662	SHAZRAIN ASYRAF BIN SUHAIMI	BE HONS (UiTM) (ELECRTICAL, 2016)
124689	TAN JIN HUI, PATRICK	BE HONS (UNITEN) (ELECTRICAL & ELECTRONIC, 2008)
123905	TEH JIA KEE	BE HONS (UTAR) (ELECTRICAL & ELECTRONIC, 2021) ME (UTAR) (ELECTRICAL, 2023)
124121	VIGNES RAO A/L SUBRAMANIAM	BE HONS (UNITEN) (ELECTRICAL & ELECTRONIC, 2019)
123908	WAN ZULKIFLI BIN WAN IBRAHIM	BE HONS (UTM) (ELECTRICAL, 2019)
124688	WONG KING UNG, FRANCIS	BE HONS (UKM) (ELECTRICAL & ELECTRONICS, 2009)

123902	GAN JIAN JIE	BE HONS (UKM) (ELECTRICAL & ELECTRONIC, 2021)
123887	MOHAMAD BIN DURI	BE (UTM) (ELECTRICAL, 1991)
123891	MUHAMAD FIRDAUS BIN SHAHARUDDIN	BE HONS (UNIKL) (ELECTRICAL, 2019)
124137	NOOR HIDAYAH BINTI SHAARI	BE HONS (UNIMAP) (ELECTRICAL, 2021)
123901	NORFADILAH BINTI ZULKEFLI	BE (UMP) (ELECTRICAL - POWER SYSTEMS, 2012)
123889	NUR FARAHIN BINTI ZULKARNAIN	BE HONS (UTP) (ELECTRICAL & ELECTRONICS, 2015) MSc (UTP) (ELECTRICAL & ELECTRONICS, 2018)
124145	TING WAN SHIN	BE HONS (SWINBURNE) (ELECTRICAL & ELECTRONIC, 2013)

KEJURUTERAAN ELEKTRONIK

124111	CHEW POH KANG	BE HONS (SOUTHERN UNI. COLLEGE) (ELECTRONIC, 2023)
123895	KAMALESWARAN A/L SELANTHAMILAN	BE HONS (UNITEN) (ELECTRICAL & ELECTRONICS, 2011)
124715	LIM YEONG WEY	BE HONS (UTAR) (ELECTRONIC, 2023)
124716	LING KAH HONG, ERIC	BE HONS (UTAR) (ELECTRONIC, 2023)
124123	NEO EN XIN	BE HONS (UM) (BIOMEDICAL, 2021)

KEJURUTERAAN KIMIA

124164	BOH CHUANG JYHE	BE HONS (UTAR) (PETROCHEMICAL, 2023)
124162	CHAN JUN QUAN	BE HONS (UTAR) (PETROCHEMICAL, 2023)
124161	EWE WEI NIAN	BE HONS (UTAR) (PETROCHEMICAL, 2023)
124160	LIAW SI JIAN	BE HONS (UTAR) (PETROCHEMICAL, 2023)
124668	MOHAMAD SAIFULLAH BIN ABD HAMID	BE HONS (UiTM) (CHEMICAL, 2021)
124126	NURUL NABILA BINTI ABDULLAH KASSIM	BE HONS (UiTM) (CHEMICAL & PROCESS, 2017)
124719	TA SU QING, CELINE	ME HONS (NOTTINGHAM) (CHEMICAL & ENVIRONMENTAL, 2023)
124128	TAN RU QIAN, GLADYS	BE HONS (SWINBURNE) (CHEMICAL, 2023)
124159	WONG YI XUAN	BE HONS (UTAR) (PETROCHEMICAL, 2023)
124710	AIDIL MOKHTARUDDIN BIN MOHD TARMIZI	BE HONS (MASSEY) (CHEMICAL & BIOPROCESS, 2019) BE HONS (UNIKL) (CHEMICAL, 2016)
124706	ANG JIA CHUN	ME HONS (NOTTINGHAM) (CHEMICAL, 2022)
124717	CHUA SIEW HWEE	BE HONS (UTAR) (CHEMICAL, 2023)
124692	DR. LEE SIEW PEI	BE HONS (UTM) (CHEMICAL-BIOPROCESS, 2009) PhD (UTM) (CHEMICAL, 2020)

KEJURUTERAAN MARIN

123904	AZIZAN BIN ISMAIL	COC MARINE CLASS 1 (AKADEMI LAUT MALAYSIA) (2003)
124673	DHARMENTHRAN A/L SANNASY	COC CLASS 1 (AKADEMI TENTERA LAUT) (2018)

KEJURUTERAAN MEKANIKAL

123911	AHMAD FADHLIN BIN AHMAD JAAFAR	BSc (HANYANG) (MECHANICAL, 2023)
124147	AL AMEER BIN MASHAL	BE HONS (UNITEN) (MECHANICAL, 2008)
124124	AMIRAH HUSNA BINTI MOHD SALEH	BE HONS (UNITEN) (MECHANICAL, 2022)
124122	CALVIN SOO SHUI ZHEN	BE HONS (TAYLOR'S) (MECHANICAL, 2021)
124711	CHONG JIN YANG	BE HONS (UNITEN) (MECHANICAL, 2023)
124664	DAVANNENDRAN CHANDRAN	BE HONS (NOTTINGHAM) (MECHANICAL, 2010) MSc (UTM) (MECHANICAL, 2023) PhD (NOTTINGHAM) (MECHANICAL, 2017)
124702	DHIVENDRA A/L VESVANATHAN	BE HONS (UTP) (PETROLEUM, 2017)
124105	GAUTHEMAN KURUP A/L RAVI	BE HONS (UOW-KDU COLLEGE) (MECHANICAL, 2020)
124113	GRANNIL DING SIMON A/L GABRIEL PETER	BE HONS (UNITEN) (MECHANICAL, 2018)
124129	HINTHUJAH SUNTHARAM	BE HONS (MIU) (MECHANICAL, 2019)
123877	HUANG SHOUREN, JEREMY	BE HONS (SWINBURNE) (MECHANICAL, 2021)
123856	JARETH ANAK JACK	BE HONS (SWINBURNE) (MECHANICAL, 2020)
124132	KHAIZURAN IZZAT BIN KHAIRUDDIN	BE HONS (UTP) (MECHANICAL, 2019)
124709	KUMARAVELU A/L SANMUGAM	BE HONS (USM) (MECHANICAL, 2010)
123867	LIM CHEN CHENG, ALISTER	BE HONS (MMU) (MECHANICAL, 2016)
124698	MOHAMAD ALIF BIN OMAR	BE HONS (UNITEN) (MECHANICAL, 2022)
124704	MOHAMAD HAFIZ IKHWAN BIN MOHD AMIR	BE HONS (UTeM) (MECHANICAL - AUTOMOTIVE, 2014) MSc (UPNM) (MECHANICAL, 2017)
123854	MOHAMAD SYAZWAN BIN MOHD ZAIN	BE HONS (UM) (MECHANICAL, 2020)
124165	MOHD AL FADIL BIN MOHD SALLEH	BE HONS (UTM) (MECHANICAL, 2003)
123853	MUHAMAD AMINUDIN BIN CHE MANSOR	BE HONS (UTM) (MECHANICAL, 2018)
123859	MUHAMAD SUWAID BIN SAAD	BE HONS (ITM) (MECHANICAL, 1998)
123906	MUHAMMAD DANIAL BIN SULAIMAN	ME HONS (SEGI) (MECHANICAL, 2012) ME HONS (SHEFFIELD) (MECHANICAL, 2015)
123855	MUHAMMAD FIRZLAN BIN AZILAN	BE HONS (UTM) (MECHANICAL PRECISION, 2020)
124696	NABIL IMRAN BIN BASRI JOHAN JEET	BE HONS (WOLLONGONG) (MECHANICAL, 2020)
124725	NGO CHIN CHUAN, ALEXANDER	BE HONS (UTAR) (MECHANICAL, 2009)
124103	NOLIA BINTI HARUDIN	BE HONS (UTM) (MECHANICAL-INDUSTRIAL, 2008)
124690	NUR HAPINDER BINTI ABDULLAH	BE HONS (UTAR) (MECHANICAL, 2021)
124139	NUR MAISARA BINTI MOHAMED YUSOFF	BE HONS (USM) (MECHANICAL, 2019)
124131	NURUL FATEHA BINTI ABD KADIR	BE HONS (UNITEN) (MECHANICAL, 2017)
123881	ONG SHU ZHEN	BE HONS (SUNDERLAND) (MECHANICAL, 2016) ME (UM) (MECHANICAL, 2022)
124144	TAN KOK JIN, JONATHAN	BE HONS (TAYLOR'S) (MECHANICAL, 2022)
124117	TENGKU MOHAMMED HANAFI BIN TENGKU ABU BAKAR	BE HONS (KOLEJ UNIVERSITI TUN HUSSEIN ONN) (MECHANICAL, 2006)
123873	THAYALAN A/L GUNASEKRAN	BE HONS (UNITEN) (MECHANICAL, 2016)
124675	WONG JIA YI, JOSHUA	BE HONS (USM) (MECHANICAL, 2018)
124703	YEN HAN WAY	BE HONS (TASMANIA) (MECHANICAL, 2022)
123897	ZIEERWAN BIN ZAINAL	BE HONS (UTP) (MECHANICAL, 2011)

KEJURUTERAAN MEKATRONIK

124118	CHAN CHAO SHIUNG	BE HONS (UMP) (MECHATRONICS, 2016)
124663	LEE JIA YANG, NICHOLAS	BE HONS (MONASH) (MECHATRONICS, 2020)
123862	SIM MENG HONG	BE HONS (SWINBURNE) (ROBOTICS & MECHATRONICS, 2011)
123884	Dr. RABIATULADAWIAH BINTI ABU HANIFAH	BE HONS (IIUM) (MECHATRONICS, 2011) MSc (IIUM) (MECHATRONICS, 2015) PhD (IIUM) (ENGINEERING, 2020)
123870	MUHAMMAD NUR AMIN BIN HAMID	BE HONS (UNIMAP) (MECHATRONIC, 2018)

KEJURUTERAAN NUKLIER

124665	ILYAS MOHD RUSLI	BE HONS (UTM) (NUCLEAR, 2020)

KEJURUTERAAN PEMBUATAN

123885	GUNALAN A/L ILANGOVEN	BE HONS (UMP) (MANUFACTURING, 2020)
124109	MOHD FAIZ BIN ABDUL AZIZ	BE (MELBOURNE) (MECHANICAL & MANUFACTURING, 2013)
124685	MUHAMMAD FARHAN BIN KHUTUBU RUBBANI	BE HONS (IUT TOULUN VAR, UNIVERSITE DE TOULAN) (MECHANICAL & MANUFACTURING, 2017) ME (UTBM) (ERGONOMICS, DESIGN & MECHANICAL, 2020)
124116	NURUL AIDA MOHD MORTAR	BE HONS (UNIMAP) (MANUFACTURING, 2015) MSc (UNIMAP) (MATERIALS, 2019)
124722	SHAFINAZ BINTI DAUD	BE HONS (UKM) (MANUFACTURING, 2018)
124714	TING KAI ZIN	BE HONS (UTAR) (INDUSTRIAL, 2023)

KEJURUTERAAN PERLOMBONGAN

123865	CHIONG ZHAO JIE, STANLEY	BE HONS (QUEENSLAND) (MINING AND GEOTECHNICAL, 2022)

KEJURUTERAAN PETROLEUM

124667	NAQIB NUR IMAN BIN ZAKARIA	BE HONS (UNSW) (PETROLEUM, 2020)

KEJURUTERAAN SUMBER MINERAL

124152	MUHAMMAD DZAFIR BIN MOHD ZAILANI	BE HONS (USM) (MINERAL RESOURCES, 2017)

PERMOHONAN KEPADA AHLI SISWAZAH TEKNOLOGIS KEJURUTERAAN

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
123946	CHIENG KIONG UNG	BSc (UTM) (CONSTRUCTION, 2008)
KEJURUTERAAN ELEKTRIKAL		
123922	MUHAMMAD AFIQ BIN RASLAN	BTECH HONS (UTEM) (INDUSTRIAL POWER, 2019)
KEJURUTERAAN INTEGRATED		
124731	SIA JIA HAO	DCAM PART 66 B1 HOLDER
KEJURUTERAAN MEKANIKAL		
123947	TRACY GIOVINA ANAK UNJA	BE HONS (SUNDERLAND,UK) (MECHANICAL, 2015)

PERMOHONAN MENJADI AHLI 'INCORPORATED'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN AWAM		
123851	CYNTHIA DEBBY HERIYANI	B.E. (UNIVERSITAS ATMA JAYA YOGYAKARTA) (CIVIL, 2017)
KEJURUTERAAN PEMBINAAN		
123949	LING SEOW LING	B.TECH.HONS. (IUKL) (CONSTRUCTION MANAGEMENT, 2019)
KEJURUTERAAN ELEKTRONIK		
123948	LOGANATHAN A/L SIVAPRAGASAM	B.E.HONS. (LIVERPOOL JOHN MOORES) (ELECTRONIC & CONTROL SYSTEM, 2010)
KEJURUTERAAN ELEKTRIKAL		
124415	CHUAN DEIK SHAWN	B.E. TECH. HONS. (UNIMAP) (ELECTRICAL INDUSTRIAL POWER, 2021)

PERMOHONAN MENJADI AHLI 'ASSOCIATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN ELEKTRONIK		
123951	TAY KENG YUE	DIP. (TUNKU ABDUL RAHMAN COLL) (ELECTRONIC, 2003)
KEJURUTERAAN MEKANIKAL		
124413	FOO SIANG MING	DIP. (POLI KUCHING, SARAWAK) (MECHANICAL, 2006)
124414	MOHAMMED ABDULLAH	DIP. (SHANMUGA POLYTECHNIC,THANJAVUR) (MECHANICAL, 2003)

PERMOHONAN MENJADI AHLI 'AFFILIATE'

No. Ahli	Nama	Kelayakan
KEJURUTERAAN KIMIA		
123950	TEO CHEE LOONG	BSc (UTM)(INDUSTRIAL BIOLOGY, 2012) PhD (UTM) (BIOPROCESS ENG, 2015)

ADMISSION TO THE GRADE OF STUDENT MEMBER

No. Ahli	Nama	Universiti
KEJURUTERAAN ALAM SEKITAR		
124453	CH'NG PEI WEN	UTAR KAMPAR
123843	DARIEN LIM JING XUAN	UTAR KAMPAR
KEJURUTERAAN AWAM		
124630	ABDURRAHMAN ATIQULLAH BIN MOHD MAHYILDDIN	PUO
123773	ABRAHAM TSUYOSHI ANAK LAINUS	UNIMAS
124325	AHMAD FAIZ ZUHAIREE BIN AHMAD FAKHRUL-DIN	UTHM PAGOH
124631	AHMAD HARITH JAFRI BIN AHMAD JAFRI	PUO
124620	AHMAD RAFIQ KAMIL BIN RAZALI	PUO
124629	AHMAD ZUFRI BIN ZAINUDIN	PUO
124562	AIMAN ASYRAAF BIN ANUAR	UiTM PERMATANG PAUH
124356	AKMAL IKHWAN FIKRI BIN ROSLAN	UTHM PAGOH
124231	ALBERT HII WEI JIAN	UTM
124196	AN HUI YEE	UTM
124183	ANG WEI LIANG	UTM
124223	ANG ZHONG XIAM	UTM
124486	ANUSHRI A/P BATUMANATHAN	UTM
123804	ANWAR JEFRI BIN SUPANDI	UNISEL
124621	ARLENE MICHELLE ANDREWMUS	PUO
123772	AYU MAISARA BINTI SAMARAYAU @ LATIP	UNIMAS
124625	AZHAD AZZAD BIN AZIZAN	PUO
124335	BUKALENDHI A/L THARMANESAN	UTHM PAGOH
124087	CALVIN KHO KA YIN	UPM
124624	CARL WAINER BAILON	PUO
124246	CHANG SUAN NYEE	UTM
124255	CHIA YIAN YE	UTM

124064	CHIN MAN WEI	UM
123801	DAYANG NUR SYUHADA BINTI ABDUL AZIZ	UTM
124177	DENNIS WONG TECK WEI	UTM
124364	DHURGASHINI DEWI A/P BALA	UTHM PAGOH
124198	DYLAN TAY WANG AN	UTM
124431	ELIEZER NEVALL ANTHONY	UMS
124465	EMILYNN KRISTINA LO	UTM
124593	FATIN NAJIHAH BINTI MUHAMMAD FERDAUS	PUO
124430	FLORENCE LIM JIA SHIAN	UTM
124071	HARIS KUMAR A/L PARAMASIVAM	UNISEL
124256	HENG QIAN WEN	UTM
124375	IELY MAISARA BINTI IBRAHIM	UTHM PAGOH
124476	JAMES MICHAEL CHU HERNG TECK	UTM
124213	JESSY ANG EE CHYI	UTM
124617	JIVENTHRAN DR A/L DEVADASAN	PUO
124069	JONATHAN YAP ZIQIN	IMPERIAL COLLEGE LONDON
123842	KANKANALA HARSHITHA REDDY	UCSI
124194	KEK JIA CHING	UTM
124592	KESAVARMAN A/L GUNARAJAN	PUO
124227	KURBY HIU CHEN KANG	UTM
124493	KWEK YONG QI	UTM
123825	LAWANIA D/O SELORAGE	UTM
123831	LEE CHEE YANG	UTP
124190	LEE CHUN HOE	UTM
124504	LEE SAM WAI	UTM
124222	LIEW QI FONG	UTM
124188	LIEW YEONG CHYI	UTM
124191	LIM HONG JIE	UTM
124548	LIM KIAN LONG	UTM
124249	LIM XIN RU	UTM
124193	LIM ZHENG HONG	UTM
124186	LIOW YONG SHENG	UTM
124578	MATTHEW LAU KAI LOK	UM
124610	MEOR MOHAMMAD HAZIQ BIN MEOR MOHAMMAD LOKMAN	PUO
124200	MIA EDLYNA BINTI EKO SUNARYO	UTM
124608	MOHAMAD FAKHROL AZIM BIN MOHAMMAD AZMI	PUO
124628	MOHAMAD SYAHMI BIN MOHAMAD ZUBIER	PUO
124609	MOHD ABDUL HALIM BIN SUBAKRI	PUO
123771	MOHD ARASH ROSHAN BIN ROSLIE	UNIMAS
123961	MUHAMMAD AFIQ AIMAN BIN HILME	UTM
124622	MUHAMMAD AFIQ BIN MASRIZAL	PUO
123823	MUHAMMAD AFIQ HILMI BIN ARSAM	UTM
124459	MUHAMMAD AFIQ IRHAM BIN ABDULLAH	UTM
124607	MUHAMMAD AKMAL BIN JAILANI	PUO
124089	MUHAMMAD AMMAR BIN NOR MOHAMAD ZAZALI	UiTM SHAH ALAM
124627	MUHAMMAD ASYRAF BIN MOHD ZAINI	PUO
124597	MUHAMMAD FAIZ BIN RAMLI	PUO
124065	MUHAMMAD FIRDAUS BIN ZULKIFLI	UM
124326	MUHAMMAD HAKIMI BIN MOHD HELMI	UTHM PAGOH
124611	MUHAMMAD IQMAL ALIF BIN ARSHAD	PUO
124616	MUHAMMAD LUQMAN HAKIM BIN ZAN	PUO
124434	MUHAMMAD MU'AZ BIN MAZLAN	UTM
123817	MUHAMMAD SAZWAN EMIR BIN MAT SAAD	UiTM SHAH ALAM
124377	MUHAMMAD SHARIF BIN MOHAMED MUBARAK ALI	UTHM PAGOH
124602	MUHAMMAD SYAFIQ AIMAN BIN RAMLAN	PUO
124598	MUHAMMAD SYAZWAN HAFIY BIN NOOR HISYAM	PUO
124360	MUHAMMAD TAUFIQ BIN ABU BAKAR	UTHM PAGOH
124614	MUHAMMAD THALHA BIN HAMDAN	PUO
124605	MUHAMMAD ZHARFAN BIN KAMARUDIN	PUO
124376	NASYA IZZANI BINTI MOHD YUSOF	UTHM PAGOH
124451	NELSON NAWIN ANAK MAJANG	UTM SPACE
124061	NG SHE CHIN	UM
124511	NG XUN YI	UTM
123957	NICHOLAS CHIENG KAI LIANG	UTM
124612	NIRSHAAN SERVAI A/L BAALACHANTHER	PUO
124383	NUR AISYAH JAMILAH BINTI ALIAS	UTHM PAGOH
124527	NUR AMALIN QISTINA BINTI ABDULLAH	UTM
124603	NUR ARISYA AMANI BINTI AZMI	PUO
124619	NUR FATIMAH ADRIEANA BINTI NORALIAS	PUO
124088	NUR SYAMIMI BINTI NORISMAN	UiTM SHAH ALAM
124596	NUR SYAZANA BINTI SHAMSURI	PUO
123965	NURSYAAKIRAH BINTI AMIR	UTM
124600	NURUL ANIS AFIQAH BINTI MOHD NOOR	PUO
123781	NURUL ATHIRAH BINTI MANSOR	UiTM SA
124623	NURUL HUDA AFIQAH BINTI ZAMBRI	PUO
124618	NURUL HUDA HAYATI BT ROSLI	PUO
124604	NURUL IZZAH BINTI EMRAN	PUO
124613	NURUL JULIANA BINTI SYAKRIAL	PUO
124230	ONG CHUN SIANG	UTM
124179	ONG ZE CHENG	UTM
124250	ONG ZI QING	UTM
123760	RAVINDER SINGH A/L BACHAN SINGH	UNITEN
123954	SHAIFUL ZIYAD BIN SHAIFUL ZAHREIN	UTM
123770	SHARMILLA FARRAHIN BINTI ABDULLAH ISKANDAR YUSUF	UNIMAS
124169	SIA JIA JUN	UTM
124551	SIM WEN CONG	UTM
124358	SITI NAJIHAH UMAIRAH BINTI NGATALIN	UTHM PAGOH
124594	SITI NUR IZZATI BINTI MOHAMAD NOOR	PUO
123806	SITI NURAISHAH BINTI ARIFFIN	UTM
124601	SIVANNESWARAN A/L ELLAKOVAN	PUO
124189	TAN KAR HUI	UTM
124240	TAN WEI KIT	UTM
124192	TAN WILSON	UTM
124206	TAN YEE KAI	UTM
124216	TARAN TATLEENDER KAUR A/P SALINDER SINGH	UTM
124195	TAY JUN XIANG	UTM
124168	TENG KOK MING	UTM
124550	THIA YIK HAO	UTM
124215	THIVNASHDEWI A/P MUTHUSAMY	UTM
123841	TIEW KAO CHEN	UTAR KAMPAR
124400	VEDDHESH A/L KANAPATHY	UTHM PAGOH
124332	VEEMAL A/L SURESH	UTHM PAGOH
124606	WAN AMEERUL EIMAN BIN WAN AINOL AMIR	PUO
124248	WILLIAM ONG JUN JIE	UTM
123769	WONG TUNG CHI, SIMON	UNIMAS
124208	WONG VOON PING	UTM
124220	WONG ZI YI	UTM
124626	YAP CAI FONG	PUO
124519	YEOH CHUN HUNG	UTM
124498	YONG HOW KING	UTM
124057	YOOGAN A/L PUSPANATHAN	UNISEL
123768	ZAAFIRA HAZELL BINTI MOHAMMAD JEFFERY	UNIMAS
124079	ZAIDEL IKHWAN BIN ZAINAL ABIDIN	UTHM
124073	ZALFEERA SOFEA BT ZAINURMALLAL	UNITEN

KEJURUTERAAN BAHAN

124060	HAMZAH ABDUL MAJID	UTP

KEJURUTERAAN BIO-PERUBATAN

124235	ANG XIN YI	UTM
124187	ANGEL LEE YEE ZHEN	UTM
124500	BRANDA LING CI YU	UTM
124205	CHEANG DUN HUI	UTM
124525	CHIA SHAROL	UTM
124424	CHIN WUN ANN	UTM
124238	EMILY SOH JING YUAN	UTM
124456	GOH YI XUAN	UTM
124635	ISMA DANIAL BIN AHMAD NASIR	UM
124652	KUAN WEI JIE	UM
124207	LEE LER YAO	UTM
124236	LEE YI WEI	UTM
124579	LIM HUI QI	UM
123794	LIM KAI YI	UTM
124062	LOH WEI LING	UM
124436	LOO JIA TONG	UTM
124586	NA RISU	UM
124068	OOI OW WEN	UM
124180	TAN JIE LIN	UTM
124228	TAN YUN TING	UTM
124182	TAN ZI YI	UTM
124457	TEH CAI YING	UTM
123758	TEH YEW WEI	UTAR SG LONG
124063	TOH KA PENG	UM
124532	UGENDRABABU A/L NOOKARAJU	UTM

KEJURUTERAAN ELEKTRIKAL

123829	ABDUL KARAF BIN MAT TAJUDIN	UiTM SHAH ALAM
124392	AFIQ DANISH BIN ZALIMAN	UTHM PAGOH
124346	AHMAD AQIL HAIKAL BIN MOHAMAD AZWAN	UTHM PAGOH
123967	AHMAD AZIMIE ADHA BIN AHMAD ASHRAFF	UiTM DUNGUN
124387	AHMAD FAHMI IMAN BIN NOR FADZIL	UTHM PAGOH
123985	AHMAD NABIL BIN MD IDRIS	PTSN
123836	AHMAD WILDAN BIN MUZAHA	UiTM DUNGUN
124288	AINA BATRISYIA BINTI SAHRIN	UTHM PAGOH
123814	AKHILESH NAIR A/L DEVAN	UTM
123988	AKMAL HAZIQ BIN MOHD FAUZI	PTSN
123941	ALVIN SOO QWAN ZHOU	MONASH
124314	AMIRA HANI BINTI MOHD KHADZIR	UTHM PAGOH
124570	AMIRUL ASYRAF BIN MOHD RAFI	UiTM SA
124285	AMIRUL IMAN BIN MOHD AMIN	UTHM PAGOH
124204	ANG YI QING	UTM
123980	AZARINA ZAFIRAH BINTI MOHD ARIFFIN	PTSN
124336	AZRIF ISKANDAR BIN ROSLI	UTHM PAGOH
124365	BENEDICT P'NG ZI HAO	UTHM PAGOH
124433	BENJAMIN LIM SHI HERN	UTM
123996	BRENDAN BRIEL	PTSN
124298	CALEYBRENNA HENRY	UTHM PAGOH
123952	CHAN ANNE SZE	UM
124487	CHAN YI RONG	UTM
124559	CHEE XI CONG	UM
124464	CHEW YU BIN	UTM
124560	CHIANG CHANG ZEE	UM
124508	CHIEW YEE JE	UTM
123981	CHRISTINA BINTI JEITOL	PTSN
124317	DAMIA DAYANA BINTI AHMAD AZLAN	UTHM PAGOH
124385	ETHAN JOASHPILLAI A/L ELVIN SELVADASAN	UTHM PAGOH
123984	FAIQ IRFAN BIN SHAARI	PTSN
123966	FAIZUL MUSTAQIM BIN MOHD YUSRI	UiTM DUNGUN
124443	FAREENA JASLYNN BINTI FARID WAJIDI	UTM
123915	FARIS AIZZAT BIN PAUZI	UiTM DUNGUN
123972	FARIZ ZUHDY BIN MAFIZAL ZAHRI	PTSN
124280	FELICIA TANG BING YING	UTHM PAGOH
124485	GABRIEL DING BUO KHANG	UTM
124481	GAN MING WEI	UTM
124394	GARETH IVAN HO	UTHM PAGOH
123813	GOH CHEER GUAN	UTM
124229	HARISH DANIAL BIN HAIRUL	UTM
123990	HASYA HAZIRAH BINTI AHMAD NAZRI	PTSN
124333	HAZIQ FARIEHIN BIN HERMAN	UTHM PAGOH
124518	HENG HAO YAN	UTM
124393	HISYAM RAMZI BIN MANSOOR	UTHM PAGOH
124585	HO YUN HONG	UM
123796	HOH CHEW WEN	UTM
124210	HONG TZE HERNG	UTM
124584	ILYAS YAHYA NGU SOOK - AN	UM
123811	IRSYAD AIMAN BIN MOHD KAMARUZAMAN	UTM
123944	ISAAC TERENCE DOLINTING	MONASH
124023	IZZUL HANIF BIN HASBULLAH	UiTM DUNGUN
124403	JASON TEO CHANG CHENG	UTHM PAGOH
124539	JAVIER POH JUNXI	UTM
123987	JEFF CHANG DUN QUAN	PTSN
123940	JOHN TEOH CHER YAN	MONASH
124395	KAVIENDRAN A/L TAMIL VANAN	UTHM PAGOH
124496	KEE SHI SHENG	UTM
124037	KHAIRUNNAJLAA BINTI ZAMRI	UTHM PAGOH
124350	KINWANAH BINTI ABDULLAH	UTHM PAGOH
124341	KISHEN RAJ A/L MURUGIAH	UTHM PAGOH
123795	KONG CHENG YU	UTM
123976	KONG JIA YIN	PTSN
124542	LAU SHAO XUAN	UTM
124178	LEE SHENG QUAN	UTM
124094	LEE YUE QI	UM
124442	LIAN JIA YUN	UM
124203	LOH JIE ENN	UTM
124580	LOW JIA QI	UM
123792	LOW JIE YING	UTM
124286	MEYLIESA A/P EE SOM	UTHM PAGOH
124323	MICHAEL MATTHEW A/L ALBERT	UTHM PAGOH
124384	MOHAMAD AMMAR BIN MAT SOFI	UTHM PAGOH
124386	MOHAMAD ARIFF BIN MOHD FAISAL	UTHM PAGOH
123975	MOHAMAD HAIKAL BIN MD ASRI	PTSN
124391	MOHAMAD HAZIM BIN MOHD ISA	UTHM PAGOH
124637	MOHAMAD IZZAT BIN MOHD ZU	UiTM DUNGUN
124378	MOHAMAD SYAFIQ AIMAN BIN ZALI	UTHM PAGOH
124380	MOHAMAD SYAMIL BIN SABRI	UTHM PAGOH
123834	MOHAMMAD SHARIFUL ISLAM	UiTM SHAH ALAM
123995	MOHD AIMAN BIN MOHD ADNAN	PTSN
123994	MUHAMAD DANISH SAFWAN BIN SARIF	PTSN
124370	MUHAMMAD AFHAM BIN ZANUDIN	UTHM PAGOH
123982	MUHAMMAD AFIQ ADHAM BIN NASIR	PTSN
124328	MUHAMMAD AFIQ BIN MOHAMMAD RAZIF	UTHM PAGOH
124275	MUHAMMAD AIMAN BIN ABDULLAH @ MOHD SHUKRI	UTHM PAGOH
123991	MUHAMMAD AKMAL HAKIM BIN MD JAIS	PTSN
124347	MUHAMMAD ALIFF DANIEL BIN MOHD AZHAR	UTHM PAGOH
123992	MUHAMMAD AMIR AKMAL BIN MOKHTAR	PTSN
124359	MUHAMMAD AMIRUL AQIL BIN AZMAN	UTHM PAGOH
123997	MUHAMMAD AMMAR HARIDZ BIN YUHAFIZ	PTSN
123780	MUHAMMAD ANAS BIN MOHD RUSDI	UiTM SHAH ALAM
124590	MUHAMMAD ARIFUDDIN BIN ROSDIN	UiTM SA
124355	MUHAMMAD AZRI HAIKAL BIN AZENAN	UTHM PAGOH
124283	MUHAMMAD DANISH HAIQAL BIN AMRAN	UTHM PAGOH
124547	MUHAMMAD DANISH QAYYIM BIN FAZLI	UTM
123974	MUHAMMAD EZZAT IZZUDDIN BIN MOHAMMAD SUKRI	PTSN
124368	MUHAMMAD FAIQ MUGHIS BIN MOHD JAIS	UTHM PAGOH
124633	MUHAMMAD FAIZ BIN AZUKI	UM
123993	MUHAMMAD FARIS BIN ABD LATIP	PTSN
123989	MUHAMMAD FIKRI ALIMI BIN ISNAZLI	PTSN
124319	MUHAMMAD FIRDAUS BIN MOHD ROSDIE	UTHM PAGOH
124297	MUHAMMAD HAFIZ BIN ABD RAZAK	UTHM PAGOH
124304	MUHAMMAD IDZHAM HAIRI BIN MOHD FADHIL HAJAZI	UTHM PAGOH
124432	MUHAMMAD IHSAN BIN IDRUS	UM
124318	MUHAMMAD IQBAL BIN ABDULLAH	UTHM PAGOH
123977	MUHAMMAD KHAIR HAFIFI BIN MOHD KHAIRIL	PTSN
124320	MUHAMMAD KHALIS BIN AZANFARIZAL	UTHM PAGOH
123759	MUHAMMAD KHALISH BIN KHAIRUL ASMAN	UNITEN
124349	MUHAMMAD LUQMAN BIN ISMAIL	UTHM PAGOH
124327	MUHAMMAD NAFIS BIN ISMAIL	UTHM PAGOH
123998	MUHAMMAD NAQIUDDIN BIN NASSHARUDDIN	PTSN
124589	MUHAMMAD NAZMI BIN AZMAN	UiTM PERMATANG PAUH
123986	MUHAMMAD SHAFIQ BIN SHAHRULNIZAN	PTSN
124634	MUHAMMAD SHAHZUA BIN MOHD SHARAFIE	UiTM DUNGUN
124428	MUHAMMAD SYAFFIQ AIMAN BIN SULAIMAN	UiTM DUNGUN

124501	MUHAMMAD SYAFIQ FIRDAUS BIN MOHD SHABIR	UTM
124373	MUHAMMAD YUSUF BIN SUKRI	UTHM PAGOH
124343	MUHAMMAD ZULKARNAIN BIN JUNAIDI	UTHM PAGOH
124369	MUTHISWRAN A/L JAYA SHANKAR	UTHM PAGOH
124316	NADIAH NUR QISTINA BINTI ZULAINI	UTHM PAGOH
123943	NG QIAO YAN	MONASH
123939	NG SHIEN MING	MONASH
124388	NOOR AWAN CHIK BIN NORZELI	UTHM PAGOH
123835	NOR SAHASNA SYABILLA MOHAMAD IZLAN SAH	UiTM DUNGUN
124639	NORFARHANIS BINTI NORHISHAM	UiTM DUNGUN
123978	NUR AFIQAH BINTI AHMAD AZLI	PTSN
124367	NUR AIN SHAHEERA BINTI ZAKARI @ AWANG	UTHM PAGOH
124342	NUR AINA SYAFIQAH BINTI AZMI	UTHM PAGOH
124313	NUR ALYA BATRISYA BINTI MOHAMMAD TARMIZI	UTHM PAGOH
124353	NUR ASYILAH SYUQAIRAH BINTI LAURONG @ HARUN	UTHM PAGOH
124334	NUR DINI DAYANA BINTI AHMAD KHOMEINI	UTHM PAGOH
124078	NUR INSYIRAH BINTI MD ASMAWI	UiTM DUNGUN
123983	NUR NADHIRAH BINTI MAT ZAIDI	PTSN
124269	NURUL FATIHAH BINTI MOKHTARAZI	UTHM PAGOH
124338	NURUL HUSNA ADILA BINTI IKRAM SYAH	UTHM PAGOH
124289	NURUL IZZATI BINTI MOHD SHAHRIZAN	UTHM PAGOH
124390	NURUL NABIHAH BINTI ASHAR	UTHM PAGOH
124389	NURUL SAIYIDAH BINTI MOHD NIZAM	UTHM PAGOH
124460	OOI JING YING	UTM
124480	OOI ZHEN WEI	UTM
124090	OOI ZHI XIAN	UNiMAP
124264	RABIATULADAWIYAH BINTI NOOR LATIF	UTHM PAGOH
123999	SAFWAN HANIF BIN SAIFUL AZWAR	PTSN
123979	SEBASTIAN NGAU STEPHEN	PTSN
123808	SESSHARTAN GANESAN	UTM
124352	SIVAMALINE A/P SINNAKARUPAN	UTHM PAGOH
124348	SOFEA HUMAIRA	UTHM PAGOH
124507	TAN QING YING	UTM
123934	TAN ZONG YU	MONASH
124324	TANESH A/L KATHIRESAN	UTHM PAGOH
124569	TEO VERN YI	UM
123973	THEEPAN RAJ A/L MUTHUSAMY	PTSN
124576	VERONICA WANG WEI	UM
124404	WAN AMIRAH BALQIS BINTI WAN MADZLAN	UTHM PAGOH
124587	WAN SADRUDDIN HAZIQ BIN WAN SUHAIMI	UiTM SA
124067	WONG HONG LIEN	UM
124479	YAN ZHENG SHEN	UTM
124423	YOUNG ZULKHAIRY BIN YOUNG ZAIDEY	UTM

KEJURUTERAAN ELEKTRIKAL & ELEKTRONIK

124021	AIMAN KHAIRFUL IKHWAN BIN SULAIMAN	UiTM DUNGUN
123847	CALVIN JOHN JALONG	UNIMAS
123767	CHING ZHEN YUAN	UNIMAS
123766	CYPRIAN CORGEDO	UNIMAS
124085	DANNY MUSTAQIM BIN MOHAMMED JAYRAMIE ENG	SEGI
123777	HUONG YEW SIING, ROY	UNIMAS
123779	MUHAMMAD SYUKUR BIN ABDUL RAHMAN	UNIMAS
123765	MUHAMMAD ZAKWAN BIN SUHAIMEE	UNIMAS
124354	MUHAMMAD ZARUL IRFAN BIN MOHD NASIR	UTHM PAGOH
124055	NANDHANA SHANKARA A/L THAMIL SELVAN	UMP
124086	NATALIE CHU WEN YI	NOTTINGHAM MSIA
123778	NURHUSNA BINTI WAHID	UNIMAS
123815	ONG ZHE	XIAMEN
123784	SAIFUDDEEN WAEL MUHAMMAD	UTM
124095	SAMUEL BENJAMIN MARENGO	APU
124083	SHANTHI THANAPALAN	SEGI
124446	SITI NOR ATIQAH BINTI MOHARAM	UMS
123846	SUREKHA KARTHIGESU	NANYANG TECH UNI
124091	TAN LIK FUN	NOTTINGHAM MSIA
124074	WONG WENG TI	TAYLOR'S UNI

KEJURUTERAAN ELEKTRONIK

124276	AIDIAZLIN BIN MOHAMAD ARIFIN	UTHM PAGOH
124299	AQILAH BINTI ABD HALIM	UTHM PAGOH
124491	CHAN CHUN KHANG	UTM
124300	CHE AQIL ZULHAZIM BIN CHE HASSAN	UTHM PAGOH
124513	CHIAM YI KAI	UTM
124171	CHOW CHAN HOE	UTM
123812	GOH ZEE XIN	UTM
123837	KENT ROLAND	UMS
124472	KHOH YAN KAI	UTM
124461	KOH MING KEAT	UTM
124515	KOK YU JIE	UTM
124535	LAI WEN LIN	UTM
124495	LEE JIA QI	UTM
123844	LEE YAN SHEN	UTAR KAMPAR
124537	LEE ZHE SHEAN	UTM
124440	LIM HUI LING	UTM
124226	LIM JUN NING	UTM
124554	LIM WEI QUAN	UTM
124517	LIM YUAN QING	UTM
124555	LOO IX SHEN	UTM
123793	LOO LE KOON	UTM
124438	MARCUS CHAI JIA CHER	UTM
124271	MOHAMAD ALIF BIN ISMAIL RANI	UTHM PAGOH
124279	MOHAMAD AZIZUL ISMAN BIN ABD AZIZ	UTHM PAGOH
124561	MOHAMAD ZAQUAN HAIKAL BIN ENCHE IBRAHIM	UTHM
124305	MUHAMAD EDHAM ADHA BIN OSMAN	UTHM PAGOH
124293	MUHAMAD FITRI BIN SALIM	UTHM PAGOH
124301	MUHAMMAD HAIKAL BIN AMRAN	UTHM PAGOH
124371	MUHAMMAD IRHAM BIN KHALID	UTHM PAGOH
124273	MUHAMMAD IZZAT BIN JAMIL	UTHM PAGOH
124267	MUHAMMAD NABIL FIKRI BIN JAMALUDIN	UTHM PAGOH
124374	MUHAMMAD SHAFIQ BIN MOHD KAMARULZAMAN	UTHM PAGOH
124302	MUHAMMAD SYAZANI BIN ZAINI	UTHM PAGOH
124268	NAVENKUMAR A/L SELVAM	UTHM PAGOH
124212	NG CHIAN TUNG	UTM
124266	NIK MUHAMMAD IMAM BIN NIK ABDUL KHALID	UTHM PAGOH
124483	NYAM YI MEI	UTM
124540	OMAR SALAH SAYED MAHMOUD	MMU
124470	OOI CHUN JIE	UTM
124477	OOI YE CHENG MELVYN	UTM
124490	PANG HUNG YI	UTM
124058	PANG YONG JIAN	SOUTHERN UC
123787	SAMUEL LOW YU HANG	UTM
123807	SHIVEE PRAKKAASH A/L SURIYA NARHAYHANEN	UTM
123953	TAN WEI KANG	UTM
124056	TEH CHUN KIT	SOUTHERN UC
124237	WONG QIAO YING	UTM

KEJURUTERAAN KIMIA

124221	ABDUL AMIR KHAN BIN NURUL RAHMAN	UTM
124488	ABDUL HISHAM BIN SOBRI	UTM
124175	AHMAD FAIZ BIN RAMELI	UTM
124340	AHMAD FAREEZ ZULHAQEEM BIN AHMAD ZAHADI	UTHM PAGOH
123776	AHMED AQIL BIN MOHAMAD TAHA	UNIMAS
124416	AIDA SOLEHAH BT ISMAIL	UM
124260	ALVIN OWEN MIHARIL	UTHM PAGOH
124092	ALVYNE RENNO ANAK STEPHEN	UNIMAS
124426	AMISH NAIR	MANIPAL
124575	AMNI BINTI ABD MUTALIB	UiTM SA
124234	ANG YANG	UTM
124557	AZRAI FAZLISHAM BIN AB HAMID	UTHM PAGOH
124174	BATRISYIA ALIAH BINTI MUHAMAD AMIN	UTM
124247	CEDRIC TEOH JUN XIAN	UTM
124448	CHAN YEK FUNG	UTM
124173	CHAN YI JIE	UTM
124499	CHANG QING YIU	UTM
124184	CHEN KE NEE	UTM
124536	CHEONG WEI XIN	UTM
124516	CHETSADA A/L ISOT	UTM
124514	CHIN JO ANN	UTM
124530	CHLOE BONG YUN JIE	UTM
124072	CHONG XIAN ZHUANG	SUNWAY
124181	CHONG XIN JING	UTM
124427	CHOY WAN YI	UTM
124241	CHUA SHIRENE	UTM
124357	DACHAINI MUTHALYAR A/P SUTHAKARAN	UTHM PAGOH
123798	DARSHINI KUMARI A/P MOORUHAYA	UTM
124524	DARSSHAN A/L RAMAN	UTM
124546	DENNIS LEE WEN JIE	UTM
124233	DONG CYEE YANN	UTM
124224	E SHAO YUAN	UTM
124295	ELVIRA KIU	UTHM PAGOH
124170	GAN YEE CHIAN	UTM
123936	GOH PUAY KHENG	MONASH
124484	GOH SIN RU	UTM
124219	GOH WEN JIAN	UTM
124254	GRACE LING FANG YEE	UTM
124471	HOOI JIE MIN	UTM
124081	HOOI SOONG LING	SUNWAY
124642	IRFAN FAHMI BIN IMRAN	UiTM BUKIT BESI
124545	IVY LING TSAE HWA	UTM
124544	JASMINE LEE	UTM
124543	JESLYN NGO JIA YIN	UTM
124243	JOAN HIING XIAO YUAN	UTM
124549	JOANNE LIZA DE GRACIOUS	UTM
124505	JOSHUA LEE JUNN JINN	UTM
124474	KELLY NGU SHU YI	UTM
124556	KELVIN CHUNG JUN KET	UTP
124270	KEMIILY KEREYHANE LABIUS	UTHM PAGOH
124541	KESAVAN A/L MURALEY	UTM
124502	KEW CHIA HSING	UTM
124176	KHOO ZI QI	UTM
123783	KIEW YAN QIN	UNIMAP
123832	KIRTHANASHREE A/P MOHAN	UNIMAP
124185	KUAN SIAW WEI	UTM
124512	LAI WEI QIAN	UTM
124225	LAKSHMI A/P SUBRAMANIAN	UTM
123935	LEE JOO HONG	MONASH
124257	LEE QIAO ER	UTM
124473	LEOW YING KEE	UTM
124244	LIEW XIN HUI, JOANNE	UTM
124520	LIM CHEE JIE	UTM
124553	LIM CHUN XI	UTM
124239	LIM CONG KAI	UTM
124469	LIM PEI SHUEN	UTM
124650	LING DAO JIE	UPM
124258	LOH WOON YING	UTM
124253	LOI JING YEE	UTM
124351	LYDIA PRASHANTHINI A/P SUNDARAN	UTHM PAGOH
124437	MARCUS YU JUN KAI	UTM
123802	MELSON JONES	UTM
124564	MOHAMAD FIRDAUS AZRIE BIN ABDULLAH	UTHM PAGOH
124272	MOHAMAD HAZIQ IMRAN BIN MOHD MUFID	UTHM PAGOH
123960	MUHAMMAD ALIF SYUKRI BIN ROSMADI	UTM
123775	MUHAMMAD HAFEEZUR RAHMAN BIN ISMADI	UNIMAS
124080	MUHAMMAD HAFIZ ASYRAF BIN SHA'ARI	UiTM BUKIT BESI
123848	MUHAMMAD IRFAN BIN AZAHARI	UNIMAS
124265	MUHAMMAD IZZAT FARHAN BIN IZHAM	UTHM PAGOH
124646	MUHAMMAD LUQMAN AL HAKIM BIN MOHAMAD NIZAM	UiTM BUKIT BESI
123790	MUHAMMAD ZULHILMI BIN MOHD IBRAHIM	UTM
124054	NABILAH BINTI YUHASLIZE	UiTM BUKIT BESI
124345	NADIA NATASHA BINTI AFANDI	UTHM PAGOH
124466	NG CHEONG YI	SUNWAY
124533	NG JING YEE	UTM
124197	NGAN YI LING	UTM
123830	NOOR A'IN SYAHIRAH BINTI NORZARIS	UiTM BUKIT BESI
123774	NOR FARADIBA BINTI AHMAD	UNIMAS
124649	NORFITRIAH SHAKIRIN BINTI CHE HASSAN	UiTM PERMATANG PAUH
124277	NUR FARAH ATHIRAH BINTI MOHD NOH	UTHM PAGOH
123914	NUR HUSNINA BATRISYIA BT ROSNI ZAMUDDIN SHAH	UiTM BUKIT BESI
123945	NUR IRDINA IZZATI BINTI ZAKARIA	UMP
124344	NUR IZZATI SYAMIMI BINTI MOHAMAD AZMI	UTHM PAGOH
123916	NUR SYAHIDA SYAFIQAH BINTI NORALIMI	UiTM BUKIT BESI
124281	NUR SYAKINAH BINTI SABRI	UTHM PAGOH
124041	NURDINA ADLINA BINTI MOHD SUZAIMI	UiTM BUKIT BESI
124421	NURSHAMIMI AZIRA BINTI MASRAN	UM
124282	NURUL AIN NATASAH BINTI ABDULLAH	UTHM PAGOH
124303	NURUL NATASHAH BINTI MD SHAHROM	UTHM PAGOH
124503	ONG HUI WEN	UTM
123819	PAPICHAYA NG	NOTTINGHAM MSIA
124311	PUTRI NURUL MISHAH BINTI SHAHJAHAN	UTHM PAGOH
124294	RAJA NUR DALILAH BATRISYIA BINTI RAJA ZAINAL	UTHM PAGOH
124429	RUTH TAY SOONG YI	UTM
123937	SANJEEVAN RAVINDRAN	MONASH
124287	SHAHIRAH NURAIN BINTI RAZALI	UTHM PAGOH
124284	SITI AISHAH LIYANA BINTI ROSLEE	UTHM PAGOH
123786	SITI ALFINA BINTI DARWIN @ DARWING	UTM
123849	SITI HAJAR BINTI MOHD PODZI	UNIMAS
124552	SO JIA XIN	UTM
124252	STANLEY SOO TECK KEONG	UTM
124467	TAA QI HANG	SUNWAY
124232	TAI CHEE SHEN	UTM
124217	TAM YEE BONG	UTM
124167	TAN HOOI LING	UTM
124435	TAN JING WEN	UTM
124242	TAN WAN QI	UTM
124439	TEH XIONG SIANG	UTM
124209	TEOH SWEE TAT	UTM
124494	THAANUSH A/L MURALY	UTM
124382	THARESHINI A/P SUPRAMANIAM	UTHM PAGOH
124296	THIVYA A/P TAMILVANAN	UTHM PAGOH
123785	TING ZHI ZHANG, JOHN	UTM
124455	TRESA AU WEN XIN	SUNWAY
124251	TSAI JIA YUH	UTM
124526	WAI CHUN KEN	UTM
124492	WAN MUHAMMAD IRFAN BIN WAN SALEHUDIN	UTM
124452	WONG YEN CHAI	UTM
124449	YAP SIANG CHEE	UTM
124458	YONG FUNG YEE	UTM
124218	YONG ZHENG ZHAO	UTM

KEJURUTERAAN KOMPUTER

124558	ARNOB RIZWAN AHMAD	UTM
124096	GREGORY DYLAN SCOTT PANAGARY	APU
123933	KOE RUI EN	MONASH
124528	YAP EN THONG	UTM

KEJURUTERAAN KOMUNIKASI

123782	TASNEEM BINTI SOFRI	UNIMAP

KEJURUTERAAN MEKANIKAL

123822	ADLI ADHAM BIN ABDUL HAKIM	UiTM BUKIT BESI
124076	ADRIEL WONG JENKIN	TAYLOR'S UNI

124006	AHMAD ARMAN BIN ABDULLAH	UniKL MIAT
123968	AHMAD HAQQAN YAQIN BIN ZAKARIA	UiTM DUNGUN
124040	AHMAD IRSYAD BIN MOHD YUSOF	UniKL MIAT
124003	AHMAD SAFWAN BIN MOHAMAD	UniKL MIAT
124020	AHMAD UZAIRI BIN DAHISHAM	UniKL MIAT
124005	AHMAD WAFIQ DANIAL BIN MOHD SHUKRI	UniKL MIAT
124337	AHMAD ZAHIN BIN ZAINAL RASID	UTHM PAGOH
123800	AIEMAN IFFAN BIN HUSIN	UTM
123828	AINA NAJWA BT NIZARIMI	UPM
123969	AKIEF HAKIMI BIN MOHD YUSRI	UiTM BUKIT BESI
123764	ALBERT ANAK MEWAN	UNIMAS
124509	ALVIN LEW WAI CHUN	UTM
124214	AMBOK MUHAMMAD FIRDAUS BIN IMRAN	UTM
124035	AMIRUL ASHRAF BIN SUZAIMI	UniKL MIAT
124445	ANAS BIN MAZLAN	UiTM SA
123839	ANDERSON SEAN ANDERIAS	UMS
123763	ANDREASON ANAK DALUN	UNIMAS
124024	ANIS ATHIRAH BINTI MUHAMMAD AZMI	UniKL MIAT
124599	ANNA FARHANA BINTI MUHAMAD ZAIDI	PUO
123821	ARAVINTHARAJ PARAMSOTHY	MONASH
124615	ARMELLA ANNE A/P MANIMARAN	PUO
124029	ASMA KHAIRUNNISA BINTI MAT YATYA	UniKL MIAT
124310	AZAFIKA BIN KHAIRUDDIN	UTHM PAGOH
124574	BAIDRIEFDI SHAH BIN BAIHAKHI	PUO
123850	CHAN JUN WEI	UTAR SG LONG
124420	CHAN ZHI TING	UTM
124648	CHE WAN ADAM UMAIR BIN MUHAMMAD SHAHAFUDIN	UiTM BUKIT BESI
124166	CHEE DE ZHENG	UTM
123962	CHOW MING FONG	UTM
123942	CHUA QI YAN, ADRIAN	MONASH
124001	DANIAL ADAM BIN AZAMI	UniKL MIAT
124312	DANIAL ZIKRY BIN MAHIRAN	UTHM PAGOH
124331	DARSHAN A/L CHANDRAN	UTHM PAGOH
124022	ELISA MUNIRAH BINTI MOHD FAUZI	UiTM DUNGUN
124093	ETHAN ANAK LINCOLN	UNIMAS
124025	FARAH ADLIN BINTI AHMAD	UniKL MIAT
124274	FARID AIMAN BIN ABDUL SAMAD	UTHM PAGOH
124339	FATIHAH ZULAIKHA BINTI AHMAD FAUZI	UTHM PAGOH
124278	GOH SIAK PENG	UTHM PAGOH
124521	GOO JIA HONG	UTM
124028	HASAN SOBRI BIN HASAN	UniKL MIAT
124419	HWANG SHI XIAN	UTM
124000	IMAN BAIHAQIE ISYRAQ BIN ISRUL	UniKL MIAT
124011	KAMAL FARID BIN KAMARUL HASNAN	UniKL MIAT
124199	KATELYN SUPHISCA A/P TEW AH WAH	UTM
123820	KAYDEN YEOH YAN XIN	NOTTINGHAM MSIA
124315	KHAZRUL FARIHIN BIN KHAZRUL ARIFFIN	UniKL MIAT
124462	KUA LUO HONG	UTM
124381	KUHAN A/L PARSERAMAN	UTHM PAGOH
124529	LAWRANCE SIM LIP WE	UTM
124538	LEE KE ZHEN	UTM
124263	LEE ZHENG KAI	UTHM PAGOH
124566	LEOW JING BANG	UM
124418	LIAN CHEE YING	UTM
124468	LIM CHUAN YOU	UTM
124444	LIM JIA YAN	HERIOT WATT MSIA
124582	LIM SHU TING	UM
124478	LIN JOON QY	UM
124399	LITESH NAIDU A/L PERUMAL NAIDU	UTHM PAGOH
124475	LOUIS TAN SOON SENG	UM
124291	MAK ZHEN WEI	UTHM PAGOH
124070	MARIE AMANDINE REBECCA LAURENT	SEGI
124643	MARISSA ADEELA BINTI AHMAD JAMAL A NASIR	UiTM BUKIT BESI
124053	MELLVIN RAAJ SANDANASAMY	SEGI
124017	MOHAMAD AIMAN DZIKRI BIN MOHAMAD DZAKIR	UniKL MIAT
124027	MOHAMAD AMIRUL IZZAT BIN HABI AIL-BAKHRI	UniKL MIAT
124048	MOHAMAD NASRUL HAKIMI BIN ROMLI	UniKL MIAT
124647	MOHAMMAD SHAHED KHAN BIN GUL FARAZ KHAN	UiTM BUKIT BESI
124015	MOHD AIZUDDIN AQIFFITRI BIN DIPUNGANG	UniKL MIAT
123803	MOHD RASYDAN BIN RUSLIB	UiTM SHAH ALAM
124033	MUHAMAD AFIQ AMSYAR BIN MOHAMED KHAIRUDDIN	UniKL MIAT
124595	MUHAMAD IRFAN BIN MOHD SHAHIR	UiTM BUKIT BESI
123805	MUHAMAD MUZZAMMIL BIN NASARUDIN	UTM
124506	MUHAMMAD ADAM BIN AHMAD IZIR	UM
124052	MUHAMMAD ADLI AIMAN BIN MAZLAN	UniKL MIAT
124563	MUHAMMAD AKMAL BIN ROZLAN	PUO
124046	MUHAMMAD ALIF BIN MOHD ZAKI	UniKL MIAT
124397	MUHAMMAD ALIF BIN SABARUDIN	UTHM PAGOH
124308	MUHAMMAD ALIFF BIN ABDUL RAHMAN	UTHM PAGOH
124640	MUHAMMAD AMIER IKHWAN BIN AMMAR	UiTM BUKIT BESI
124645	MUHAMMAD AMIR ARIF BIN HAIROLZAHARI	UiTM BUKIT BESI
124641	MUHAMMAD AMIR IMRAN BIN MOHD YATIM	UiTM BUKIT BESI
124038	MUHAMMAD AMIR IQBAL BIN MOHD ZAIN	UniKL MIAT
124309	MUHAMMAD AQIL BIN RAMLAN	UTHM PAGOH
124644	MUHAMMAD ARIFF SHAM BIN ABDUL MANAH	UiTM BUKIT BESI
124031	MUHAMMAD ASLAM JUWAIDI BIN SHODDERI	UniKL MIAT
123833	MUHAMMAD AZRI FIRDAUS BIN ISMAIL	UiTM BUKIT BESI
124026	MUHAMMAD DANIELHAZIQ BIN MOHD YAZID	UniKL MIAT
124361	MUHAMMAD DANISH IRFAN BIN MOHD AMIRUL AZLI	UTHM PAGOH
124019	MUHAMMAD DARWISY IRFAN BIN SANUSI	UniKL MIAT
124306	MUHAMMAD EIRFAN BIN MOKHZAMANY	UTHM PAGOH
124013	MUHAMMAD FADLY BIN MALIK	UniKL MIAT
124039	MUHAMMAD FAKHRULLAH WAFIUDDIN BIN SUKHAIRI	UniKL MIAT
124066	MUHAMMAD FATHU RAHMAN BIN MOHAMMAD SIRAUJUDIN AMIR	UTEM
124009	MUHAMMAD FATHUL IMAN BIN AHMAD KHAIRI	UniKL MIAT
124050	MUHAMMAD FIRDAUS BIN MOHD YA'COB	UniKL MIAT
124454	MUHAMMAD HAKIM HAS-YUN BIN MOHAMAD ZAINUDDIN	UTM MJIT
124636	MUHAMMAD HAZIQ IQBAL BIN ADNAN	UM
124463	MUHAMMAD HAZIQ LUQMAN BIN MUSANIEF	PUO
124016	MUHAMMAD ILYAS BIN SHAIFUL EFFENDY	UniKL MIAT
124573	MUHAMMAD IQBAL IHSAN BIN IQBAL GANI	PUO
123810	MUHAMMAD IRFAN BIN SUROR	UTM
124045	MUHAMMAD IRSYADUDDIN BIN ABDUL SALAM	UniKL MIAT
124018	MUHAMMAD IZMEER BIN RAIDZUAN	UniKL MIAT
124632	MUHAMMAD MARWAN BIN YUHASLIZE	UiTM BUKIT BESI
124043	MUHAMMAD NABIL BIN HASHIM	UniKL MIAT
123959	MUHAMMAD NAIM BIN ZULFAKHA	UTM
124522	MUHAMMAD RAYAN BIN ABDUL RAZAK	UM
124014	MUHAMMAD SAKHAWI BIN MANSOR	UniKL MIAT
123791	MUHAMMAD SHAMSUL IMRAN BIN AWALLUDDIN	UTM
124638	MUHAMMAD SYAAMIL DANISH BIN MOHD SYARUL	UiTM BUKIT BESI
124577	MUHAMMAD SYAFI AMIRUN BIN SAIFUL ANUAR	UiTM SA
123958	MUHAMMAD SYAFIQ BIN RAZALI	UTM
123838	MUHAMMAD SYAFIQ MIRZA BIN MUSA	UM
124049	MUHAMMAD SYAHMI BIN ZAINAL	UniKL MIAT
124002	MUHAMMAD YASSIN BIN MOHAMAD CHA ANU	UniKL MIAT
12407	MUHD LUQMAN HII BIN ABD QAYYUM HII	TAYLOR'S UNI
124034	NADZIM AIZAT BIN MOHAMED ADZNOR	UniKL MIAT
124047	NAIF BIN MASH'AL	UniKL MIAT
124004	NAJMI MUBAARAK BIN ZULKIPLI	UiTM BUKIT BESI
124398	NAVEENDRAN A/L MAIL WAGANAM	UTHM PAGOH
124583	NAZRAN RAFID BIN M HAZREEN	UM
123762	NELSON ROLAND ANAK VICENT	UNIMAS
124290	NG PEI YEE	UTHM PAGOH
124534	NG XIN PEI	UTM
124044	NIK FARID FARIZUDIN BIN NIK AZIZI	UniKL MIAT
123971	NOR 'AISYA AYUNI BT MASJIDI	UiTM BUKIT BESI
124075	NUR AIMAN YASMIN BINTI KHAIRUL RIZAL	UTM
124042	NUR AL IZZ IZZELDA BINTI SHAHRUL AZHAR	UniKL MIAT
124396	NUR HANISAH BINTI ZULKIFLI	UTHM PAGOH
124572	NUR ILLAH BINTI AHMAD	PUO
124363	NUR MIZA AFIQAH BINTI MOHAMMAD MOHSEIN	UTHM PAGOH
124008	NUR NADIA ALIA BINTI HASHIM	UniKL MIAT
123809	NUR NADZMI BIN NORUDIN	UTM
123789	NUR SALSABILA BINTI MA'RIBI	UTM
123761	NUR SHAFEEKA BINTI OTHMAN	UNIMAS
124422	NUR SHAMIRA BINTI SAIFULDIN	UiTM BUKIT BESI
124261	NURFILDZAH ARDINA BINTI IZAMRIN	UTHM PAGOH
124450	NURUL AMYRA BINTI MOHD HISHAMUDIN	UiTM PERMATANG PAUH
124262	NURUL ASMA AQILAH BINTI ROSLI	UTHM PAGOH
124082	NURUL HANANI BINTI ZULKEPLI	UTM
124417	PAH YOU FOO	UTM
124012	PENGIRAN MUHAMMAD BAZIL BIN PENGIRAN ZAINUL SHAM	UniKL MIAT
124322	PEVITERAJ SINGH A/L GURMIT SINGH	UTHM PAGOH
123956	PHANG JIE CHENG	UTM
124567	PHIFIA TAN QIAN LU	UM
124523	PHOON HON CHUN	UTM
124402	PHUA ZHI HENG	UTHM PAGOH
123955	PIRAGALATHAN A/L THIRUNAVUKKARASU	UTM
124591	PRAVIN A/L MOORTY KUMAR	MANIPAL
124379	PUVENTHIRAN A/L R.GOPAL	UTHM PAGOH
124482	QUENTIN HONG	UTM
124051	RAFIQ SYAHMI BIN RUZAIDI	UniKL MIAT
124330	RHISHWAN A/L VADIVELU	UTHM PAGOH
124588	RISHINTIRAN	MANIPAL
124007	SHAHMI NASRAWI BIN SHAHARUDIN	UniKL MIAT
124329	SHAKIR AIMAN BIN SAYFULIDHAM	UTHM PAGOH
123970	SITI HANUM BINTI ZAINI	UiTM BUKIT BESI
124307	SITI NUR AQILAH BINTI JUMMARY	UTHM PAGOH
124292	SOR JUN KANG	UTHM PAGOH
124651	SRI RAAM NAIDO A/L MOHAN	UNISEL
124372	SRIRAAM PRABAKAR	UTHM PAGOH
124321	SURIAGAJAN A/L SIVANESAN	UTHM PAGOH
124489	TAN TIEN EN	UTM
124531	TANG WENG KEAT	UTM
124568	TEH XIAO HE	UM
124441	TENGKU IDRIS SYAFI BIN TENGKU AHMAD RIDHAUDIN	UNIKL MFI
124036	TINA BINTI MOHD ANUAR	UniKL MIAT
124497	TING CHU WANG	UTM
124030	UMAR AKHYAR BIN NORAZMI	UniKL MIAT
124571	UMI KHAIRUNNISA BINTI MUHAMMAD ASRI	PUO
124366	UZMA NUR HUDA BINTI MUHAMMAD NAZRY	UTHM PAGOH
124581	VICKY TAN	UM
124362	WAN MUSYRIF BIN WAN MOHD NASIR	UTHM PAGOH
124405	WONG NYUK CHENG	UTHM PAGOH
124510	YEAP ANN CHYI	UTM
124401	YEO YONG JIA	UTHM PAGOH
124565	YOGESWARAN PILLAI A/L MUNIANDY	PUO
124201	YONG WEI KEONG	UTM
123818	YOUSEF KASSAB	SEGI UNIVERSITY
124010	ZEK MOHAMAD AIMAN BIN ROSLAN	UniKL MIAT
124032	ZULHAKIM BIN ZA'ABA	UniKL MIAT

KEJURUTERAAN MEKATRONIK

123816	ABDIRISAK MUBARIK MUHUMED	UCSI
123827	AHMAD AMIRUL AIMAN BIN MOHAMAD ASLAN	UMP
124172	CHONG ZHI SHENG	UTM
123826	CHUNG HUI YUI	UTEM
123797	GOH BEE LEE	UTM
124202	RAMALAKSHMI A/P ARUNACHALAM	UTM
124447	SAW KE XIN	TAR UMT
123938	TAN WEI SHAW	MONASH
123963	WONG JIA YING	TAR UMT

KEJURUTERAAN NUKLEAR

123799	CHIN LOK SHENG	UTM
124211	HENRY KAM MENG TUNG	UTM

KEJURUTERAAN PEMBUATAN

123964	HARREITHSA BIN MANSOR	UiTM PERMATANG PAUH
123845	NORMIZA NASYRAH BT BAHARUDDIN	UIAM

KEJURUTERAAN PERTANIAN

123824	MUHAMMAD DANISH BIN BADRUL AZMI	UNIMAP

KEJURUTERAAN PETROLEUM

124425	DHIVIYA A/P PARIDASON	UTM
124245	FIGO HO JIA LE	UTM
124059	MUHAMMAD HADIF BIN RAZAIDI	UTP
123788	NURUL NADHRAH BT. ZULKHAIRY	UTM
123840	RIETHANELIA USUN RICHARD	UMS
124084	THIIK THIIK AGOTH CITHIIK	APU

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