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OCTOBER 2013

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# CONTENTS

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# **COVER NOTE**

Connecting Young Engineers Today	5
COVER STORY All About Sharing and Networking YES, it's a Great Opportunity	6 8
PRESIDENT'S CORNER IEM is essentially YOU	12
FEATURE ARTICLES Isohyetal Map Development Using Three-Dimensional Drafting Software: Case Study of the Sarawak Region Centrifugal Compressor Performance Estimation	15 20
ENGINEERING DIGEST	30
FORUMS IEM YES National Summit 2013 and YES 43rd Annual General Meeting 2013 YES, it's Rock-n-Roll at Gala Dinner 2013 Technical Visit to MRT Cochrane Underground Station Site	31 34 38

## FROM THE DESK OF PEMANDU

Achieving Corporate Integrity	.49
GLOBE TREKKING Agnes Keith House, Sandakan	.50
PINK PAGE	

#### THEMES – 2013

November 2013 Oil, Gas & Mining Engineering

> December 2013 Facilities Management





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# **Connecting Young Engineers Today**

by **Engr. Mah Way Sheng** Chairman, Young Engineers Section The Institution of Engineers, Malaysia

**MALAYSIA** produces thousands of fresh engineers every year but the industries are still demanding for more. Are we producing insufficient engineers? Or could it be that there are not enough good engineers?

IEM's Young Engineers Section (YES) plays an important role in raising the competency level of engineers. It's always been our mission to continually and progressively support the professional development of engineers while assisting them towards achieving professional status. We have been organising many activities for engineers and this month, *JURUTERA* will cover some highlights of the year.

YES membership currently stands at 17,406 (Graduate and Student). We are responsible for reaching out to more engineers who are nonmembers to take part in our development programmes. The number of members is expected to increase tremendously in the coming years. YES and its branches have been putting great effort into taking care of its members' benefits and welfare.

We are seeking to form a better relationship among young engineers. It is our responsibility to understand their needs so that we can continue to serve them better. With the theme *Connecting Young Engineers*, we certainly want to make IEM more relevant to each and every engineer.

We firmly believe that young engineers should be given an equal chance to discover and develop their potential. Our stories in this month's *JURUTERA* will tell you how Connecting Young Engineers can transform you into a professional. YES is the right place where you can do just that! Take up the challenge. I'm sure you will find it enriching and fulfilling!

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### ANNOUNCEMENT

Effective **28 August 2013**, Department of Standards Malaysia (Standards Malaysia) new website address is *www.jsm.gov.my* and new email address is *name@jsm.gov.my*.

# All About Sharing and Networking

by Tan Bee Hong



**INSPIRATION** can come from many directions and in many forms. For Ir. Yau Chau Fong, it was his uncle, Ir. Runny Poh, whose stories about his engineering inventions and achievements sparked off a flame in the young Chau Fong that, over the years, fanned into a roaring fire that even a tsunami wouldn't extinguish. "I had always wanted to be an engineer, even as a young boy. It was because of my uncle, who is now retired, that I have always felt that engineering is one way we can help society," says Ir. Yau, 34, who grew up in Malacca.

"In secondary school, I loved Physics, especially the chapters on electricity. Of course I was also interested in Art and History but Physics was my real love." His teacher father and housewife mother were very supportive and encouraged him in his passion. He continues: "You know, I was very shy as a boy." Really? I think aloud that's really hard to picture the extremely articulate Entrepreneur-Engineer as shy, quiet boy.

He laughs and explains: "All this changed when I joined IEM and Toastmasters International. I wanted to learn to speak up... in public. It's very important for one's career development."

Today, his motto in life is "Burst Your Fear". And that is just one example of how the IEM has helped to develop Ir. Yau's career path. As a student at Universiti Malaya, he joined the Engineering Society of UM. IEM was always on the lookout for volunteers, so after he graduated in 2001, he signed up immediately and had never regretted it. "Again, Uncle Runny was a huge influence as he was also very actively involved with IEM," he says. Ir. Yau was Chairman of YES (Young Engineers Section) from 2006 to 2008. The year after, he became a Council Member and this year, he is also elected as one of the IEM's Executive Committee (Excomm) member.

## SAY 'YES'

IEM and YES are doing a great job helping fresh graduates to grow professional skills, says Ir. Yau. But sadly, he notes, there are not enough volunteers. He cites the lack of time as just one of the reasons for this. "We need to help young graduates develop both hard and soft skills and to provide them the necessary guidance. Through YES, they can learn greater technical skills for their career and soft skills to help them move up the corporate ladder."



IEM G&S (Graduate & Student Section, now known as YES) AGM 2002, the first AGM which Ir. Yau attended



Ir. Yau giving his incoming chairman address 2006/2007

With a grin, he adds: "Engineering can be a very fun profession, you know and YES can show them the way." He has one piece of advice to the present (and future) Board of Committee of YES: "Keep up the good work and focus on creating more events to get more people interested in engineering." Personally, Ir. Yau has no intention of stopping the good work. "I will continue to contribute to IEM. I believe there is plenty of room still for growth," he says. "When engineers are connected, they can share knowledge to grow faster."



# **ON MENTORING**

Ir. Yau did not attain his PI through IEM's mentoring system but he is convinced that this is the better method for young engineers to do so. "If it's done through the supervisor-atwork method, the immediate supervisor may be too busy to have the time or not have the intention to do so," he explains. "I feel the mentoring system is still the better approach as it is more systematic and reliable."

#### SATISFYING TERM OF OFFICE

Looking back at his years of sacrificing his leisure time to offer his services to IEM, his eyes turn a tad misty with satisfaction. "I wanted to do something to revive YES, to create greater awareness of engineering as a profession. It was also my aim to inject new life into YES," he says enthusiastically. "For a start, I organised the annual dinner that same year in 2006. The dinner at Grand Blue Wave in Shah Alam, was a huge success, with 52 tables filled, a record of sorts.



IEM G&S Annual Dinner and Dance 2006

Another moment of satisfaction that he treasures, he says, is the chance to be organising chairman for the 13th YEAFEO (2006), the Young Engineers of the ASEAN Federation of Engineering Organisation (YEAFEO) Conference, in Kuala Lumpur. The event is held in different countries each year. "We had over 100 participants from all over the ASEAN region. The bonding and networking of young engineers is necessary for sharing of ideas and personal development," he says.

His latest project was as Chairman of the recent IEM Engineering Week 2013, held last month (September). "We organised activities to generate greater awareness about Engineering. But we had fun too, such as the Engineer's Run which had two options: 3km and 6.5km. Sports is a great way to get people together," he says, adding that there was also EINIX 2013 (Engineering Invention & Innovation Exhibition).

## THE YPA

The Young Professionals Alliance was started towards the end of 2006. This group comprises not just engineers



EINIX 2013



Engineer's Run 2013

but also lawyers, pharmacists and chartered secretaries. What mooted the formation of YPA? Ir. Yau explains: "Life is all about sharing and connecting with others and when different professions can get connected, they can learn and share. Just because we are engineers, we needn't and shouldn't confine our knowledge to engineering only." Indeed, as today's world grows smaller, boundaries disappear. One never knows when a little knowledge of law and medicine may be imperative in one's life and this is what Ir. Yau cannot emphasise enough. "We just want to link up young professionals. It benefits each and every one," he concludes firmly. The YPA organises networking sessions and talks as well as meet up for festive occasions.

#### **PERSONAL JOURNEY**

An engineering degree provides the basics for a career but, Ir. Yau feels, there is much more to being an engineer than just that. He says: "There are endless career possibilities. Engineering (as a job) is not everything. Engineers need to develop soft skills as well. We need skills like sales and accounting for climbing the corporate ladder. We're not academicians." He cites his own career path as an example. "When I first graduated, I worked in an air-conditioner factory. But I prefer customer-related interaction, design

and creativity," he says. He next joined an engineering consultancy and stayed on the job for eight years. He then started his own business but he was too much of a greenhorn still. It lasted all of five months. "Customers weren't that confident in me as they thought I was too young and inexperienced to be doing what I was doing. I found that out the hard way," he says. So he returned to the workforce, this time in the consulting section of a data centre company. It was here too that Ir. Yau had some of the finest moments in his working life. "I was able to assist my client to obtain a tier accreditation for the data centre, one of the first to get one in the country."

A second source of pride was when he successfully "electrified" a diesel pump house in Genting Highlands in 2009. "It's in the middle of the forest and now, when I look at it, I get such a tremendous sense of satisfaction and continued amazement to think that I have done this." This month, Ir. Yau begins a new chapter in his career with the start of his own consultancy firm. We wish him all the best.

#### **ON THE HOMEFRONT**

With his intense involvement in IEM and YPA as well as a new career path, how does Ir. Yau manage to have a personal life? The father of two-year-old Charmaine smiles wistfully as he says he wishes there were more hours in a day. "24 hours are definitely not enough. I try to get home in time every day to see my little baby before she goes to bed," he says, chuckling sheepishly as he adds that he doesn't always make it and little Charmaine's asleep before he rolls into the driveway of his house. "With my new office in the same neighbourhood, I'm hoping I can squeeze in more time to spend with her and my wife," he says.

Engr. Mah Way Sheng, 28

Engr. Vivekasugha

Alif Gunaalan, 25



by Tan Bee Hong

Sdr. Yew Weng Kean, 22

**SDR.** Yew Weng Kean pops his head into the Council Room at The Institution of Engineers, Malaysia in Petaling Jaya and seeing that I'm alone, explains that the other two have gone to grab a bite of breakfast. Quickly he calls them and in just a few minutes, young engineers Engr. Mah Way Sheng and Engr. Vivekasugha Alif Gunaalan walk in through the door. The former is Chairman of the Young Engineers Section 2012/2013 and 2013/2014 and the latter is the Honorary Secretary-Treasurer of YES. Sdr. Yew, 22, is a committee member and still pursuing post-graduate studies in electrical engineering. It is a coincidence that all three in electrical engineering but YES is open to all disciplines of engineering. The three guys are bundles of unadulterated enthusiasm. One has to be as working with YES is on a purely voluntary basis.

So why do they do it?

Engr. Mah, 28, says: "It's a give and take situation. Instead of hanging out with friends for drinks or going to the cinema, we spend time doing IEM work. But you know what? At the end of the day, we gain from the networking and we learn new skills." Engr. Vivek, 25, admits time can be an issue as all have jobs. "But as an engineer, we should learn to manage time in order to be able to organise our working day. Teamwork is the key. And technology helps immensely. In the old days, people get together for a meeting perhaps every month. Today, we have email... actually, even email is slow. We have instant communication in so many forms," he says happily. "Personally, I have gained a lot from IEM, so I feel I want to give back."

Meanwhile, Sdr. Yew, 22, looks a little bemused. "It's not a problem," he stresses. Despite study commitments, he is not fazed by the additional responsibilities at YES. Patiently sitting in one corner and listening to us chatter on for the last 10 minutes without trying to slip in a word sideways, he doesn't come across as a man of action. But we really should never "judge a book by the cover". Apart from work with YES, Mr Yew is president of his university's basketball team among other things. "It all boils down to learning to being focused and to manage time properly," he explains. "And choices too. One can choose whether to go watch a movie or to do work for YES."

Engr. Mah adds: "YES takes care of young engineers like us and helps us in professional development as well as acquire social skills. We offer professional talks, technical courses and soft skills development such as writing. We also organise technical visits which are very informative."

#### **THE CHALLENGES**

Time is one thing. Human resource is another. As past Chairman Ir. Yau Chau Fong pointed out, volunteers are not exactly queuing up outside the door. Despite YES having 18,000 members comprising students and young engineers, Engr. Mah admits it could do with more members volunteering their time.

"Every activity requires manpower," says Engr. Mah. "For instance, we held the Engineer's Run and Engineering Invention and Innovation Exhibition last month. Planning and executing the two events require lots of work, including printing of banners, paperwork etc." Yes, the young engineers are not taking it easy. They also organised fun activities such as sports and rafting as well as workshops and courses. Engr. Mah concedes that it's difficult to get members to attend meetings, especially on workdays.



**EINIX 2013** 

Engr. Vivek adds: "Unlike my employer, not all understand the need for IEM work. Some feel it's a waste of time. They don't see that networking and learning at IEM can be of great help to the engineer as well as the company." Financial constraint is another huge challenge for the committee. "We have limited budget and so when we organise events, we have to think of ways to generate income, such as holding workshops and courses," says Engr. Mah.

#### **CSR ON THEIR MINDS**

While networking and learning are positive advantages for YES members, Engr. Mah says it's not always about themselves. "We do want to help society at large but we don't want to just give out money; we rather offer our services. Recently, we helped give an orphanage a new coat of paint and did a roof extension over the kitchen for



Orphanage - before (top) and after

another. We managed to rustle up some suppliers to donate raw materials and we even roped in the Young Professionals Alliance to chip in."

Then, when the YES committee heard about a water supply problem that blighted the lives of an Orang Asli community in Cameron Highlands, the members made a trip there to find out how they could help. They followed with a second trip and rigged up a piping system linking the village tap to a river that would ensure the village doesn't run dry.





A helping hand for the Orang Asli community



Recruitment drive at Sekolah Menengah Teknik Kuala Lumpur

#### **RECRUITMENT DRIVE**

The committee is always on the lookout for ways to increase awareness of engineering as a profession. "We organise activities in universities and create engineering clubs in secondary schools to create interest in engineering," says Engr. Mah, who says his own interest is innate. "As a child, I was always dismantling toys to find out how they worked." For Engr. Vivek, listening to his father talk about his job at TNB was what fascinated him, "especially high voltage". As for Sdr. Yew, his electrical engineer mum used to bring him to her office where he picked up bits of information that he would chew on later. "Do you know that during Earth Hour, it is imperative to control the generator?" he asks me enthusiastically. No, I didn't. But I do now and as he says, it can be fascinating.

# **1SUDOKU** Centerpiece "1"

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#### by Mr. Lim Teck Guan

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(Solution is on page 49 of this issue.)



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# **IEM is essentially YOU**

by Ir. Choo Kok Beng, FASc

WHETHER you are a new Student Member or a senior Fellow with IEM, I must make it clear that all of you are invaluable to IEM.

IEM is essentially *you*, because IEM is created by engineers for engineers. In light of this, I strongly believe that no one should be neglected within IEM, whether you are a young IEM member or a seasoned IEM Fellow. As such, IEM has been taking measures to remain relevant to every member. If we do not strive to remain relevant, we would take a downhill journey in no time. I hope to reassure every member how deeply IEM cares for your needs and that there is much that you can look forward to in the future, regardless of your membership category.

You might be reading this in a

corner of your campus library but

that doesn't make you any less important than every other IEM

member. Student Members make up the largest group of members

in IEM and have a lot of potential

to grow. IEM channels 30% of

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#### **STUDENT MEMBERS**



YES National Summit

your activities. The IEM Young Engineers Section (YES) has organised many student activities and community projects which all engineering students can participate in during semester breaks.

Similarly, student members are encouraged to be involved in engineering clubs in schools, to stimulate the interest of school children in Science and Mathematics, thus paving the way for the country's future engineers.

### **GRADUATE MEMBERS**

So you have graduated. Now what?

You would undoubtedly require a job. The IEM portal provides an opportunity for you to post your resume for selection by employers of engineers. The IEM Academy established recently aims to strengthen the efforts of IEM Training Centre Sdn. Bhd. to enhance your skills for entry into the industry. Down the line, the next step of your career would obviously be to obtain the professional engineer title. There are various initiatives and activities to develop the skills of graduate engineers and to help them prepare and succeed in the professional interview, and gain the corporate membership of IEM and recognition.

## **CORPORATE MEMBERS**

To perform better in your employment, earn a higher salary and eventually embark on your own business venture, you will need to be recognised as a competent engineer in your area of specialty, locally and internationally.

IEM can make that happen for you. IEM Corporate Membership, which is at par with the chartered engineer status all over the world, provides international recognition of your competence and skills. This recognition will enhance your business and networking prospects locally and internationally. On the local front, we have just signed an MoU with Majlis Bandaraya Petaling Jaya (MBPJ) which will open up more opportunities for IEM members to be involved in the city's infrastructure development and maintenance.

Apart from technical training and conferences, IEM has recently successfully organised the "Regional Conference on Liberalisation of Services Sector" (RCLSS 2013) in Johor Baru. This will facilitate members in exporting their expertise.

# **FELLOWS**

You have made it. IEM is indeed happy for you. It is time for you to leave a lasting legacy for the younger members in IEM. We invite you to give back to IEM by guiding younger engineers and learning together with them. In turn, IEM recognises the invaluable contributions of IEM Fellows by awarding them Honorary Awards at both national and international levels.



EINIX 2013

The efforts put in by IEM and our members have caught the eye of leaders from both the public and private sectors. Recently, during the closing ceremony of IEM Engineering Invention & Innovation Exhibition (EINIX) 2013, the Menteri Besar of Selangor threw a challenge to our members when he said he was looking forward to appointing an engineer as a Lord Mayor in the Selangor State. This indeed is a great recognition of our efforts.

#### **EVERY SINGLE ONE MATTERS**

Given everything that has been said above, nobody should doubt that the Institution remains relevant to not only our members but also to society at large.

If you have ideas, feel free to talk to me. I'm always open to discussion and suggestions.

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# Isohyetal Map Development Using Three-Dimensional Drafting Software: Case Study of the Sarawak Region



by Ir. Dr Kuok King Kuok and Ms. Chiu Po Chan

The Isohyetal method is commonly used to estimate mean area rainfall and rainfall distribution over a river basin. Nowadays, there are various types of software available for plotting isohyets include Surfer 10, ArcInfo, IDRISI, CARIS, HYDSTRA and MicroSurvey.

However, most of these are expensive and require expensive annual renewal fees. Therefore, there is motivation to find cheaper, yet widely available software for plotting isohyets. In this study, Autocad Civil 3D, software used for planning, designing and management of all types of civil engineering projects, was chosen for generating isohyets.

The selected study area was Sarawak, the largest State in Malaysia, with plenty of undeveloped forest land. Four annual isohyetal maps of Sarawak were generated for 1980, 1990, 2004 and 2007. The results revealed that Autocad Civil 3D was able to create isohyetal maps accurately and comparable with the one plotted using HYDSTRA as prepared by Department of Irrigation and Drainage Sarawak.

KEYWORDS: Isohyetal Map; AutoCAD Civil 3D; Annual Rainfall

# **INTRODUCTION**

There are three common methods to estimate mean areal rainfall and rainfall distribution over a river basin. One of them is isohyetal method. Isohyets is similar to contour lines found on geographical maps. The information required to plot an isohyetal map is the location of rainfall stations and its appropriate rainfall data (American Society of Civil Engineers, 2006). The isohyetal map for Malaysia year 2009 is presented in Figure 1.

There are various types of software available nowadays for plotting isohyets. These include Surfer 10, ArcInfo, IDRISI, CARIS, HYDSTRA and MicroSurvey. Surfer 10 is a contouring and three dimensional (3D) mapping program that can produce contour maps, 3D surface maps, 3D wireframe maps, vector maps, image maps and post maps (Surfer 10, 2011). ArcInfo is Geographic Information System (GIS) based software. The software allows users to perform advanced surface analysis and modelling, generate professional quality maps and place sophisticated labelling on the map (Esri,n.d.). IDRISI is the integration of GIS and Image Processing software solution for the analysis and display of digital spatial information (Clark Labs, 2009).

CARIS is equipped with digital mapping capabilities for generating 3D surface maps. CARIS is widely used in the marine, land and aviation sectors (CARIS, 2011). Besides, HYDSTRA is integrated with GIS functions for managing



Figure 1: Isohyetal Map of Malaysia (Isohyet Maps, 2009)

large amounts of time-series data in the hydro power, water resources and wastewater industries. HYDSTRA is also able to analyse rainfall data and produce isohyetal maps (KISTERS,n.d.). MicroSurvey is able to produce contour, surface mapping or even design of roads and slopes (MicroSurvey CAD, 2010).

### **STUDY AREA**

Sarawak experiences equatorial climate with relatively uniform temperature within the range of 23°C to 32°C throughout the year. Humidity is high, with mean monthly relative humidity above 70% (Malaysian Meteorological Department, 2010). The average rainfall is between 3,300 mm and 4,600 mm per year, depending on locality.

The rainfall pattern is mainly influenced by the southwest and northeast monsoons. The southwest monsoon (indicated by red arrows in Figure 2) is from early June to September. The wind blows from the southwest at light breeze below 15 knots (Malaysian Meteorological Department, 2010). During the monsoon season, most of the cloud condenses and falls as rain on the west side of Kalimantan before reaching Sarawak. This results in significantly lower rainfall during these few months.



Figure 2: Southwest and northeast monsoon winds

The northeast monsoon (indicated by blue arrows in Figure 2) usually starts in early November and lasts till March. During this season, north-easterly winds blow at 15-30 knots (Malaysian Meteorological Department, 2010) and maximum rainfall occurs especially along the coastal region, causing major flooding (Department of Irrigation and Drainage Sarawak 2009).

The inland areas are relatively free from the influence of seasonal winds and experience even distribution of rainfall throughout the year.

### **AUTOCAD CIVIL 3D**

AutoCAD Civil 3D is specially designed to support all types of civil engineering projects. Developed by Autodesk Inc., AutoCAD civil 3D utilises 2 and 3-dimensional, dynamic, model-based design technology to provide a tool for planning, designing and management purposes (AutoCAD Civil 3D, 2011). Technical drawings, geological maps as well as topographical maps are easily produced using AutoCAD Civil 3D. In addition, the software also helps users to generate and evaluate designs quickly and accurately. If there are some errors, AutoCAD Civil 3D also allows editing easily. One of the features in AutoCAD Civil 3D is the ability to produce contour plots.

#### **METHODOLOGY**

The annual total rainfall obtained from the hydrological year book is imported into AutoCAD Civil 3D for generating Isohyetal maps. The principal for plotting contour lines is adopted to generate isohyets lines. The map showing the locations of rainfall stations set up by Department of Irrigation and Drainage (DID) Sarawak, is required. The procedure for generating isohyets using AutoCAD Civil 3D is presented in Figure 3.



Figure 3: Procedure for generating isohyets using AutoCAD Civil 3D

Six steps for generating isohyets using AutoCAD Civil 3D are listed below.

**Step 1.** Create a new layer in AutoCAD Civil 3D through the *layer properties manager* function to accommodate the annual rainfall data for all rainfall stations available in Sarawak as presented in Figure 4.



Figure 4: Create new layer using layer properties manager function

**Step 2.** Input the total annual rainfall data for each station into AutoCAD Civil 3D through the *create points* toolbar (refer to Figure 5). Each point created in the new layer requires the name of the station and its elevation. This elevation basically is the annual rainfall for that particular station.



Figure 5: Dropdown menu for "create points" toolbar

*Step 3.* Group together all the points created by creating a point group (refer to Figure 6). The data from this point group will be used to generate isohyets lines on Triangulated Irregular Network (TIN) surface.

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Figure 6: Creating point groups

**Step 4.** Create TIN surface to generate isohyetal lines through *Create Surface* function. AutoCAD Civil 3D connects the surface points that are closest together to create TIN surface.

**Step 5.** Import the point group into the TIN surface to generate the isohyetal lines as shown in Figure 7. The appearance of the isohyetal lines including isohyets lines intervals can be modified using *Surface Style editor* function. *Contour smoothing* function will reduce the sharp edges of the isohyetal lines drawn by AutoCAD Civil 3D.

*Step 6.* Label the isohyetal lines with different annual rainfall values through *adding surface labels* function to TIN surface. Multiple labels can be created concurrently by dragging the mouse across several contour lines by selecting "Contour – Multiple". Besides, the appearance of the label styles include text height, style, orientation, rotation and colour can also be modified according to user preference.



Figure 7: Generated isohyetal map

#### **RESULTS AND DISCUSSION**

Four annual isohyetal maps – for year 1980, 1990, 2004 and 2007 – were plotted using AutoCAD Civil 3D and the results presented in Figure 8, 9, 10 and 11 respectively. Results showed that most of the isohyets plotted using AutoCAD Civil 3D were comparable with the one published by DID Sarawak using HYDSTRA (DID, 1980, 1990, 2004 & 2007). These isohyetal maps can be used to study the changes in annual rainfall for Sarawak from 1980 to 2007.



Figure 8: Generated Isohyetal map of Sarawak year 1980 with interval of 560 mm by Autocad Civil 3D



Figure 9: Generated Isohyetal map of Sarawak year 1990 with interval of 360 mm by Autocad Civil 3D



Figure 10: Generated Isohyetal map of Sarawak year 2004 with interval of 500 mm by Autocad Civil 3D



Figure 11: Generated Isohyetal map of Sarawak year 2007 with interval of 350 mm by Autocad Civil 3D

## CONCLUSION

The study successfully constructed four annual isohyetal maps (1980, 1990, 2004 and 2007) for Sarawak using AutoCAD Civil 3D, which is widely available and which can be used for plotting all types of engineering drawings. By plotting the isohyetal maps, the changes of rainfall pattern can be identified and analysed. However, several limitations that may affect the accuracy of the plotted isohyets have been identified. These are:

- Annual rainfall data obtained from the DID Sarawak contains some missing data.
- b) There are fewer rainfall gauging stations in1980 than 1990, 2004 and 2007.
- c) The lack of rainfall gauging stations especially in inland Sarawak, near the border with Kalimantan, Indonesia. ■

Ir. Dr Kuok King Kuok holds PhD in Hydrology and Water Resources and Bachelor of Civil Engineering with honours, both from University Technology Malaysia, Master of Engineering major in Hydrology from Universiti Malaysia Sarawak. He is also a Professional Engineer registered with Board of Engineers Malaysia, EMF International Professional Engineer (MY), Asean Chartered Professional Engineer. He is also a corporate member of Institution of Engineers Malaysia, ASEAN Engineer and APEC Engineer. He has authored and co-authored more than 30 national and international conference and journal papers. Currently he is lecturing at Swinburne University of Technology Sarawak Campus.

**Ms. Chiu Po Chan** graduated with Bachelor of Information Technology major in Software Engineering, and Master of Science in Computer Science, both from Universiti Malaysia Sarawak. She has authored and co-authored more than 20 national and international conference and journal papers, mainly in application of artificial intelligence in hydrology and water resources. Currently, she is lecturing in Faculty of Computer Science and Information Technology, Universiti Malaysia Sarawak.

#### REFERENCES

- [1] American Society of Civil Engineers, (1996), *Hydrology Handbook*, Library of Congress, United States of America.
- [2] AutoCAD Civil 3D, (2011), Autodesk Inc, viewed 20 May 2011, http://usa.autodesk.com/civil-3d.
- [3] CARIS,(2011), About The Company, viewed 10 March 2011, http:// www.caris.com/company.cfm.
- [4] Clark Labs, (2009), *IDRISI Taiga GIS and Image Processing Software*, Clark University, viewed 10 March 2011, http://www.clarklabs.org/products/idrisi-taiga.cfm.
- [5] Department of Irrigation and Drainage Sarawak,(2009), Historical Flood Events Recorded in Sarawak From 1946-2009, viewed 25 March 2011, http://www.did.sarawak.gov.my/flood/hflood08-09.html.
- [6] DID (1980). Hydrological Year Book Year 1980. Department of Drainage and Irrigation Sarawak, Malaysia
- [7] DID (1990). Hydrological Year Book Year 1990. Department of Drainage and Irrigation Sarawak, Malaysia.
- [8] DID (2004). Hydrological Year Book Year 2004. Department of Drainage and Irrigation Sarawak, Malaysia.
- [9] DID (2007). Hydrological Year Book Year 2007. Department of Drainage and Irrigation Sarawak, Malaysia.
- [10] Esri (n.d.), ArcInfo, viewed 10 March 2011, http://www.esri.com/ software/arcgis/arcinfo/index.html.
- [11] Isohyet Maps (2009), Malaysian Meteorological Department, viewed 16 March 2011, http://161.142.139.60/isohyet/maps/2009/ jan2009/010109.
- [12] KISTERS (n.d.), Hydstra Water Resource Management, KISTERS Pty Ltd, viewed 11 March 2011, http://www.kisters.com. au/english/html/au/homepage.html.
- [13] Malaysian Meteorological Department, (2010), General Climate of Malaysia, Ministry of Science Technology and Innovation, viewed 12 March 2011, http://www.met.gov.my/index.php?option=com\_co ntent&task=view&id=75&Itemid=1089&Iimit=1&Iimitstart=0&Iang= english.
- [14] Surfer 10, (2011), Golden Software Inc, viewed 18 March 2011, http://www.goldensoftware.com/products/surfer/surfer.shtml.

# CONGRATULATIONS



Each year the Society of Chemical Engineers, Japan (SCEJ) Award is given to an individual who has made significant contributions to the field of chemical engineering in Asia. For 2013, IEM is proud to congratulate **Ir. Prof. Dr Dominic Foo Chwan Yee** for being awarded

"The SCEJ Award for Outstanding Asian Researcher and Engineer". Ir. Prof. Dr Dominic is Professor of Process Design and Integration at the University of Nottingham Malaysia Campus, and the Founding Director for the Centre of Excellence for Green Technologies. He is a Fellow of the Institution of Chemical Engineers UK (IChemE), and Chairman for the Chemical Engineering Technical Division of IEM for Session 2012/2013. Ir. Prof. Dr Dominic is the Chief Editor for *IEM Journal*, Subject Editor for Transactions of IChemE Part B (*Process Safety & Environmental Protection*, Elsevier), Editorial Board member for *Clean Technology and Environmental Policy* (Springer), and *Chemical Engineering Transactions*. He is the winner of the Innovator of the Year Award 2009 of IChemE, Young Engineer Award 2010 of IEM, as well as the Outstanding Young Malaysian Award 2012.

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# **Centrifugal Compressor Performance Estimation**



by Cheah Cang To

This article first provides some introductory materials on compressors and presents the method developed by the author specifically for multi-stage compressor performance estimation based on data obtained from selected applications in Oil & Gas industries.

Nomenclature					
Κ	=	Isentropic exponent or ratio of specific heat	V	=	Volume
Ср	=	Specific heat capacity at constant pressure	n	=	Polytropic exponent
Cv	=	Specific heat capacity at constant volume	С	=	Constant
Т	=	Absolute temperature	Нр	=	Polytropic head
ν	=	Specific volume	nv	=	Polytropic volume exponent
Hp	=	Polytropic head	nt	=	Polytropic temperature exponent
ugc	=	Universal gas constant	ηp	=	Polytropic efficiency
R	=	Specific gas constant	ueq	=	Equivalent impeller tip speed
Т	=	Temperature	Deq	=	Equivalent impeller diameter
Tc	=	Critical temperature	S	=	Work input factor
Tb	=	Boiling temperature	ψp	=	Polytropic head coefficient
Tbr	=	Reduced boiling temperature	•	=	Inlet volume flow rate
Tr	=	Reduced temperature	Q		
Р	=	Pressure	Ср	=	Heat capacity at constant pressure
Pc	=	Critical temperature	Cv	=	Heat capacity at constant volume
Pr	=	Reduced pressure		=	mass flow rate
ω	=	Pitzer acentric factor	m		
vr	=	Reduced volume	Ø	=	Flow coefficient
ηp	=	Polytropic efficiency	Ŧ		
Ζ	=	Compressibility factor			
Note: subscripts 1 and 2 used in the content denote conditions at suction and discharge flanges, respectively.					

#### **SECTION 1: INTRODUCTION TO COMPRESSOR**

A compressor is rotating machinery that increases the pressure of compressible fluid by reducing its volume. Compressors exist in numerous forms. The exact configuration depends on the specific application. In general, the different types of compressors can be categorised into two main groups, namely:

- Positive displacement Positive displacement machines work by mechanically reducing the volume of the working fluid. These machines can be divided into two sub-groups: Rotary and Reciprocating.
- b. Dynamic: Dynamic machines work by mechanically changing the velocity of working fluid, which can be divided into Axial and Centrifugal.

Fig. 1 summarises the compressor family in term of compression ratio and actual inlet volume flow rate. Flow

and compression ratio limits are indicated in Fig. 1, it can be seen that positive displacement machines are not suitable for handling inlet volume flow higher than 1700 m<sup>3</sup>/ hr (approximately).

It should be noted that the left end of dynamic machine does not reach zero flow. The threshold of minimum inlet volume flow rate is defined by the surge limit of dynamic machine.

This article focuses on the application of multi-stage centrifugal compression system, which is commonly used on offshore platforms transporting natural gas from offshore facilities to onshore plants. A typical cross-sectional view of multi-stage centrifugal compressor can be seen in Fig. 2. A centrifugal stage consists of 3 basic components (Fig. 3): Rotor assembly (impeller), diffuser and return channel. Gas flows along shaft circumference towards impeller inlet eye, and kinetic energy is mechanically exerted by impeller blades. The gas then leaves the impeller and enters the



Fig. 1: Typical application ranges of compressor types in term of compression ratio with respect to inlet volume flow rate [6]

diffuser (static part of compressor), diffuser is used to reduce gas velocity (after leaving impeller) and increase the static pressure. Compressed gas from the diffuser is routed into the subsequent impeller via a return channel.



Fig. 2: Typical cross-sectional view of centrifugal compressor [6]



Fig. 3: Sketch of compressor stage (impeller, diffuser and return channel)

The compressor performance curve consist of plots of compressor discharge pressure (or polytropic head) at various constant rotational speed conditions (Fig. 5). Minimum and maximum allowable inlet volume flow rates at constant rotational speed are called "Surge" and "Choke" limits, respectively.

Centrifugal compressors are volumetric machinery, so when there is insufficient gas to replace what is being pushed forward (i.e. towards the left end of performance curve), discharge gas will flow backwards through the compressor towards the suction side. The gas flowing backwards increases the volume on the suction side and the compressor picks up and begins to push the gas forward again. This phenomenon is called "Surge". This occurs very quickly and the backward and forward gas flow causes rapid fluctuations in the flow, pressure and temperature of the compression system. Prolonged operation in surge mode can seriously damage the compressor as well as associated upstream and downstream equipment due to high vibrations in the compression loop. Surge can be prevented by implementing anti-surge system and control valve, which recycles discharged gas back to the suction flange in order to maintain minimum volume flow rate to the compressor.

Operating compressors in the high volume flow region (towards the right end of performance curve) is often referred to as "Choke". Choke occurs when the internal gas flow velocities are close to Mach 1, and generates a rapid increase in pressure losses. Prolonged operation in the choke limit should be avoided, because efficiency of compressor is very low.

Efficiency islands (of constant efficiency) are contours ranging from 74% to 82% in example provided in Fig. 5. The addition of efficiency islands on performance curves effectively provides a 3-dimensional topology to this 2-dimensional curve. With inlet conditions specified (e.g. suction pressure, suction temperature, inlet volume flow rate and gas compositions), compression power can therefore be estimated.

Compressors are often required to operate across a range of flows and pressures; the design point is typically landed at the peak efficiency region of performance curves.

Integrity of impellers may be lost (due to excessive shear forces between impeller shroud and blades) if maximum allowable tip speed is exceeded when the compressor operates above the maximum continuous speed.

Combining first and second law of thermodynamics as well as few dozens of algebraic steps, the theoretical compressor work (or compressor head) is derived as follow.

$$H_{g} = Z_1 R T_1 \frac{n_{e}}{n_{e} - 1} \left[ \left( \frac{P_2}{P_1} \right)^{\frac{n_{e} - 1}{n_{e}}} - 1 \right] \Rightarrow J/kg \qquad \text{Eq. 1 [1]}$$

Centrifugal compressors do not develop constant compression ratio at a given inlet volume flow rate; rather they develop a constant polytropic head at a defined inlet volume flow rate.

Re-arranging Eq. 1, compressor discharge pressure (P2) can be calculated.

$$P_2 = \exp\left[Ln\left(\frac{H_p(n_v-1)}{Z_1RT_1n_v} + 1\right) \times \left(\frac{n_v}{n_v-1}\right)\right] \times P_1 \Longrightarrow N/m^2 \quad \text{Eq. 2}$$

Compressibility factor (Z) is a measure of deviation of real gas behaviour from ideal gas behaviour. Gas behaved differently at a given temperature and pressure. However they behave similarly at temperatures and pressures normalized with respect to their critical temperatures and pressures, namely reduced temperature and reduced pressure, respectively.





Fig. 4: Generalised compressibility factor chart derived from experimental data [5]

Compressibility factor (Z) is defined as the ratio of the actual volume of real gas to the volume estimated by the ideal gas law. Compressibility factor of real gas used in Eq. 1 and Eq. 2 can be obtained from generalised compressibility factor chart (Fig. 4).

Compressor discharge temperature can be derived from the following polytropic compression expression:  $PV^n = C$ . Where: P = pressure, V = volume, n = polytropic exponent and C = constant

$$P_{1}V_{1}^{n} = P_{2}V_{2}^{n} \Rightarrow \frac{P_{1}}{P_{2}} = \left(\frac{V_{2}}{V_{1}}\right)^{n} \Rightarrow \frac{P_{1}}{P_{2}} = \left(\frac{RT_{2}}{P_{2}} \times \frac{P_{1}}{RT_{1}}\right)^{n} \Rightarrow \frac{T_{2}}{T_{1}} = \left(\frac{P_{2}}{P_{1}}\right)^{\frac{n-1}{n}} \Rightarrow T_{2} = T_{1} \times \left(\frac{P_{2}}{P_{1}}\right)^{\frac{n-1}{n}}$$
Eq. 5

Thermodynamic characteristics of real gas (i.e. polytropic exponents) can be estimated by real gas equations of state, Lee-Kelser-Plocker (LKP) equations of state are used in this article. It would be impractical to produce complete steps of LKP in this article; only key parameters pertaining to the derivation of polytropic exponents will be presented. For instance, details derivation of reduced volume (Vr) will not be given in this article as it requires extensive calculations



Fig. 5: Typical centrifugal compressor performance curves

with iterative procedures. Reader can refer to literature dedicated for this topic. [2]

Isentropic volume exponent, Kv is defined as:

$$\begin{aligned} C_{e} &= -\frac{v}{P} \frac{C_{p}}{C_{e}} \left( \frac{\partial P}{\partial v} \right)_{T} \\ \text{there:} \\ \frac{\partial P}{\partial v} \right)_{T} &= \left( \frac{\partial P_{e}}{\partial v_{e}} \right)_{T} \frac{P_{e}^{2}}{ugc \times T} \end{aligned}$$

For LKP equation of state, the partial derivative  $\langle \partial v_r \rangle$  is defined as follows:

$$\begin{aligned} \left(\frac{\partial P_r}{\partial v_r}\right)_{T_r} &= -\frac{T_r}{v_r^2} \left[ 1 + \frac{2B}{v_r} + \frac{3C}{v_r^2} + \frac{6D}{v_r^3} + \frac{c_4}{T_r^3 v_r^2} \left\{ 3\beta + \left(5 - 2\left(\beta + \frac{\gamma}{v_r^2}\right)\right) \frac{\gamma}{v_r^2} \right\} \exp\left(-\frac{\gamma}{v_r^2}\right) \right] \end{aligned}$$

Where:

$$B = b_1 - \frac{b_2}{T_s} - \frac{b_3}{T_s^2} - \frac{b}{T_s}$$
$$C = c_1 - \frac{c_2}{T_s} + \frac{c_3}{T_s^3}$$
$$D = d_1 + \frac{d_2}{T_s}$$

(Continued on page 25)

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Metal Roofing System - Cliplock 710 - Tex-Roof - URoll



Lightweight Roof Truss System - C-Sections - Battens

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Structural Product - C-Purlin

Metex Steel Sdn. Bhd. | A-1-1 & A-2-1, Pusat Perdagangan Kuchai, No. 2, Jalan 1/127, Off Jalan Kuchai Lama, 58200 KL, Malaysia

Constant	Simple Fluid	Reference
b1	0.1181193	0.2026579
b2	0.265728	0.331511
b3	0.154790	0.027655
b4	0.030323	0.203488
c1	0.0236744	0.0313385
c2	0.0186984	0.0503618
c3	0.0	0.016901
c4	0.042724	0.041577
d1	0.0000155488	0.000048736
d3	0.0000623689	0.00000740336
β	0.65392	1.226
γ	0.060167	0.03754



namely  $\left(\frac{\partial P_{r}}{\partial v_{r}}\right)_{r}^{\text{simple}}$  and  $\left(\frac{\partial P_{r}}{\partial v_{r}}\right)_{r}^{\text{reference}}$ 



shall be evaluated with constants of "simple fluid".

shall be evaluated with constants of "reference fluid".

Isentropic temperature exponent, Kt is defined as:



is defined as follows:

For LKP equation of state, the partial derivative  $\left(\frac{\partial P_r}{\partial T_r}\right)_r$  is defined as follows:



Where:

Constant	Simple Fluid	Reference
b1	0.1181193	0.2026579
b3	0.154790	0.027655
b4	0.030323	0.203488
c1	0.0236744	0.0313385
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 $\left(\frac{\partial P_r}{\partial T_r}\right)$ 

shall be evaluated with constants of "simple fluid".



shall be evaluated with constants of "reference fluid"

Both  $\left(\frac{\partial P_r}{\partial v_r}\right)_{r_i}$  and  $\left(\frac{\partial P_r}{\partial T_r}\right)_{r_i}$  shall be interpolated by Pitzer acentric factor, a with the following formula:

$$X = X^{\text{simple}} + \frac{\omega}{0.3978} \left( X^{\text{reference}} - X^{\text{simple}} \right)$$

Where:

$$X = \left(\frac{\partial P_{e}}{\partial v_{e}}\right)_{T_{e}} \cdot \left(\frac{\partial P_{e}}{\partial T_{e}}\right)_{v_{e}} \text{ and}$$

$$\omega = \frac{\ln\left[\frac{101325}{P_{e}}\right] - 5.92714 + \frac{6.09648}{T_{tot}} + 1.28862\ln T_{tot} - 0.169347T_{tot}^{*}}{15.2518 - \frac{15.6875}{T_{tot}} - 13.4721\ln T_{tot} + 0.43577T_{tot}^{*}}$$

 $\left(\frac{\partial P_{r}}{\partial P_{r}}\right)$ Substit

Substituting the values of 
$$(\partial v_r)_{r_c}$$
 and  $(\partial T_r)_{v_c}$  into  
 $\left(\frac{\partial P}{\partial v}\right)_r = \left(\frac{\partial P_r}{\partial v_r}\right)_r \frac{P_r^*}{ugc \times T_c}$  and  $\left(\frac{\partial P}{\partial T}\right)_r = \left(\frac{\partial P_r}{\partial T_r}\right)_r \frac{P_r}{T_c}$  respectively.

Both Kv and Kt can now be calculated. Where:



 $\left(\frac{\partial P_{r}}{\partial P_{r}}\right)$ 

Gas compression undergoes polytropic process, therefore both isentropic exponent Kv and Kt must be converted into polytropic exponents, namely:

1. Polytropic volume exponent,

 $\eta_{v} = \frac{K_{v}}{1 + \left(1 - \frac{1}{\eta_{p}}\right) \frac{K_{v} - 1}{K_{v}} K_{v}}$  Eq. 6

2. Polytropic temperature exponent,

$$n_{t} = \frac{1}{1 - \frac{Z \times uge}{C_{p}} \left(\frac{1}{\eta_{p}} - 1\right) - \frac{K_{t} - 1}{K_{t}}}$$
Eq. 7

These polytropic exponents (Eq. 6 and Eq. 7) are used for calculating polytropic head and compressor discharge temperature.

1. Polytropic head,  $H_p = Z_1 R T_1 \frac{\overline{n_v}}{n_v - 1} \left[ \left( \frac{P_2}{P_1} \right)^{\frac{n_v - 1}{n_v}} - 1 \right]$ 2. Discharge temperature,  $T_2 = T_1 \left( \frac{P_2}{P_1} \right)^{\frac{n_v - 1}{n_v}}$ 

# SECTION 2: CENTRIFUGAL COMPRESSOR PERFORMANCE ESTIMATION

In oil and gas projects involving API 617 process hydrocarbon centrifugal compressors, EPC consultant rotating equipment engineers often face challenging tasks (after official process conditions are forwarded to compressor vendor to perform equipment sizing and selection):

- a) To perform sensitivity checks against change of process conditions, typical scenarios are changes of suction temperature, suction pressure, change of intermediate pressure (if compressor duty gets split into two process stages due to temperature limitation caused by high pressure ratio), inlet volume flow rate, process gas composition, etc.
- b) To establish appropriate alarm set-point(s) on compressor discharge header to pre-alert the operator from operating compressor into Choke region for prolonged duration, it will require a better understanding of compressor head and inlet volume flow rate with respect to compressor performance maps.
- c) For a given worst scenario, i.e. highest head required (either low suction pressure or high discharge pressure, or even combination of both), typical query from client is how much gas flow can be handled by the selected centrifugal compressor within the capacity of selected driver (e.g. gas turbine, electric motor, steam turbine, etc).

# THIS SECTIONPROVIDES GUIDANCE FOR PREDICTING CENTRIFUGAL COMPRESSOR AERODYNAMIC PERFORMANCES

- 1) To obtain centrifugal compressor performance curves from vendor, essential data set are:
  - a. Polytropic head vs. inlet volume flow rate
  - b. Polytropic efficiency vs. inlet volume flow rate
  - c. Discharge pressure vs. inlet volume flow rate (this is used to check if calculated values are within ballpark figures).
- 2) Extraction of performance data from vendor's curves of item 1a and 1b above.
- 3) Converting polytropic head into work input factor (as detailed in the following section, refer to Eq. 9).
- In parallel with item 3, convert inlet volume flow rate into dimensionless parameter, i.e. flow coefficient (refer to Eq. 10).
- 5) Pairing polytropic efficiency with flow coefficient as mentioned in item 4.
- Item 3 and 4 will then form the compressor characteristic curve, namely work input factor vs. flow coefficient (refer to Fig. 8).
- Reduce the following data set (7a, 7b and 7c) into flow coefficient and find the corresponding work input factor per item 6) above:
  - a. inlet volume flow rate
  - b. equivalent impeller diameter
  - c. equivalent impeller tip speed.
- 8) Use the same flow coefficient of item 7 to obtain polytropic efficiency as depicted by the relation of item 5.
- Finally, expand work input factor into polytropic head coefficient using Eq. 8 described in the following section. Transforming polytropic head coefficient into polytropic head per Eq. 8.
- Compressor discharge pressure, discharge temperature and compression power can be estimated with Eq. 2, Eq. 5 and Eq. 12, respectively.

Polytropic head coefficient is defined as follows.

$$\psi_p = \frac{2H_p}{u^2} = 2\eta_p s$$
 Eq. 8 [1]

Re-arranging Eq. 8 so that work input factoris related topolytropic head, polytropic efficiency and impeller tip speed.

$$s = \frac{H_p}{\eta_p u_{eq}^2}$$
 Eq. 9 (Note: "equivalent impeller tip speed" is used instead of impeller tip speed)

To estimate compressor discharge pressure (P2), basic information needed are:

- a) Aerodynamic component: Polytropic head
- b) Thermodynamic components: Gas inlet compressibility factor, specific gas constant, suction temperature, polytropic volume exponent and suction pressure.

This section outlines the essence of aerodynamic part of centrifugal compressor, i.e. polytropic head. Gas thermodynamics (e.g. polytropic exponents, isentropic exponents and compressibility factor) are briefly explained in Section 1 of this article.

Flow coefficient (which is widely used in centrifugal compressor terminology) is defined as compressor inlet volume flow rate divided by the product of impeller area (from impeller tip-to-tip) and impeller tip speed:

$$\varphi = \frac{4Q}{\pi D_{eq}^2 u_{eq}} \qquad \text{Eq. 10 [1]}$$

Eq. 10 is identical with PTC10's [4] definition for flow coefficient (refer to clause 2.5.2 of PTC10, 1997). PTC10 defines flow coefficientas follows:

"The flow coefficient is a dimensionless parameter defined as the compressed mass flow rate divided by the product of inlet density, rotational speed, and the cube of the blade tip diameter. Compressed mass flow rate is the net mass flow rate through the rotor"

To line-up Eq. 10 and PTC10's definition for flow coefficient, it can be seen that ratio of mass flow rate to inlet density of PTC10 is equivalent to compressor inlet volume flow rate of Eq. 10, and product of rotational speed with cube of blade tip diameter of PTC10 is equivalent to the product of impeller area with tip speed of Eq. 10.

Please note that  $\frac{4}{\pi}$  in Equation 4 may be omitted since it is a mere combination of numerical constant, i.e. 1.27324.

Example of flow coefficient calculated with Equation 4 and simplified version of Equation 4 omitting  $\frac{4}{\pi}$  (please refer to Table 1).

Impeller diameter = 0.7000metre Impeller tip speed = 220 m/s

Q_dot (m^3/s)	4*Q_dot/(pi*D^2*U)	Q_dot/(D^2*U)
4	0.04724	0.03711
4.2	0.04961	0.03896
4.4	0.05197	0.04082
4.6	0.05433	0.04267
4.8	0.05669	0.04453
5	0.05906	0.04638

Since there are many variances of flow coefficient (some may define volume flow rate in term of US customary unit, e.g. gallons per minute, cubic feet per minute, etc) being used in the oil and gas industry, it would be wise to havea definition (including unit of measurements) of flow coefficient clearly defined upfront to avoid potential misunderstanding or misinterpretation between the end user and the compressor manufacturer. With the knowledge of work input factor and flow coefficient, oneshould be able to convert the following vendor data, namely:

- a) Polytropic head vs. inlet volume flow rate into work input factor vs. flow coefficient
- b) Polytropic efficiency vs. inlet volume flow rate into polytropic efficiency vs. flow coefficient.

#### EQUIVALENT IMPELLER DIAMETER

Note that equivalent impeller diameter (i.e. pseudo impeller diameter that represents overall impeller diameter of multistage compressor line-up) and associated equivalent impeller tip speed shall be used to expand Eq. 9 and Eq. 10 into polytropic head and inlet volume flow rate, respectively.

This is due to the fundamental fact that cumulative (or total) polytropic heads are typically reported in vendor's performance maps (i.e. not polytropic head developed by one impeller); refer to Fig. 6 for illustrative purpose.



Fig. 6: Typical centrifugal compressor performance maps; polytropic head vs. inlet volume flow rate

Equivalent impeller diameter is defined as follows:

$$D_{eq} = \sqrt{d_1^2 + d_2^2 + d_3^2 + d_4^2 + ...}$$
 Eq. 11

(Note: subscript denotes impeller number)

## WORKED EXAMPLE DEMONSTRATING DERIVATION OF CENTRIFUGAL COMPRESSOR CHARACTERISTIC CURVES BASED ON COMPRESSOR PERFORMANCE MAPS

Centrifugal compressor performance data extraction (both polytropic head vs. inlet volume flow rate and polytropic efficiency vs. inlet volume flow rate) from vendor's compressor performance maps (arbitrary selected near 100% speed, as it would yield accurate results if new compression duties are near to the selected speed region).

With the following impeller information:

- a) Equivalent impeller diameter = 0.3810 meters
- b) Equivalent impeller tip speed = 279.29 m/s

Work input factor, flow coefficient and associated polytropic efficiency are derived as per Table 3.

Table 2: Tabulated compressor performance data at 14000 rpm speed region with 5 points cover from surge to Stonewall limit

Inlet Volume Flow Rate (m^3/hr)	Polytropic Head (meter)	Polytropic Head (J/kg)	Polytropic Efficiency
412.76	4043.76	39655.78	0.67436
559.92	3875.01	38000.84	0.72617
680.00	3472.69	34055.45	0.72261
784.57	2825.34	27707.08	0.65987
867.40	2023.40	19842.79	0.52796

Table 3: Calculated work input factor and flow coefficient based on data reported in Table 2 with Equation 9 and 10

Flow Coefficient	Work Input Factor	Polytropic Efficiency
0.00360	0.75389	0.67436
0.00489	0.67089	0.72617
0.00593	0.60420	0.72261
0.00684	0.53830	0.65988
0.00757	0.48184	0.52796



Fig. 7: Data extraction from vendor's performance maps

After compressor characteristic curves are obtained, proceed to the following steps utilising input data as listed below:

- a) Impeller diameter (remember to convert into equivalent diameter)
- b) Rotational speed (which in turn will be transformed into impeller tip speed)
- c) Process data (i.e. suction pressure, suction temperature, inlet volume flow rate and gas composition).

Evaluate flow coefficient with input (a) and (b) above, it then gets mapped with work input factor and polytropic efficiency per Fig. 8, and finally expanded to polytropic head coefficient and polytropic head according to Eq. 8.



Fig. 8: Compressor characteristic curves (work input factor and polytropic efficiency vs. flow coefficient)

Compressor discharge pressure and discharge temperature are calculated with Eq. 2 and Eq. 5, respectively.

Lastly, compression power can be estimated using the following formula.

$$power = \frac{mH_p}{\eta_p}$$
 Eq. 12

Predicted centrifugal compressor performance data per compressor characteristic curves of Fig. 8:

Compressor Parameter	Data	Unit of Measurement
Suction pressure	91.24	barA
Discharge pressure	147.88	barA
Suction temperature	37	deg. C
Discharge temperature	67.11	deg. C
Gas power required	988.2	kW
Rotational speed	15140	rpm
Polytropic head	46636.53	J/kg
Inlet volume flow rate	500	m^3/hr
Mass flow rate	53581.91	kg/hr
Polytropic efficiency	70.24	%

### CONCLUSION

With the methodology described above, it is possible for Rotating Equipment consultants to perform preliminary checks of new compression duty under the performance maps furnished by compressor vendor, which may be beneficial for fast track conceptual study or even Front End Engineering Design projects on extremely tight project schedules.



Fig. 9: Predicted centrifugal compressor performance curves

Furthermore, as more and more actual curves/data become available, the in-house developed selection tools will become more accurate, in turn providing even more accurate predictions for future projects to come.

#### REFERENCES

- [1] Klaus Lüdtke, Process Centrifugal Compressors, Springer (2004).
- [2] Cang To Cheah and James Richard Bryan, Investigation of k-factor for real gas using LKP equation of state, Compressor Tech 2 (March 2011).
- [3] PTC 10, Performance Test Code on Compressors and Exhausters, ASME (1997).
- Yunus A. Cengel and Michael A. Boles, Thermodynamics An [4] Engineering Approach 5th Ed, McGraw Hill.
- [5] Centrifugal compressor web link, http://www.dresser-rand.com/ literature/turbo/DATUM2012.pdf.
- [6] Royce N. Brown, Compressors Selection and Sizing 2nd Ed, Gulf Professional Publishing.

Cheah Cang To obtained his Bachelor of Mechanical Engineering (Upper second class honors) from Swinburne University of Technology (Hawthorn, Australia) in 2006. He was a site engineer specialising on gas fired boiler and HRSG (heat recovery steam generator) erection works for power plants and is now attached with Technip Malaysia as a rotating equipment engineer

# **CONGRATULATIONS**



The IEM would like to congratulate Dato' Ir. Dr Gue See Sew for being conferred Darjah Setia Pangkuan Negeri (D.S.P.N) which carries the title "Dato" in conjunction with the 75th birthday of Yang di-Pertua Negeri Tun Abdul Rahman Abbas on 13 July 2013.

The Editorial Board, IEM

#### CORRECTION

Adalah dimaklumkan bahawa terdapat satu kesilapan atas nama calon berikut dalam senarai yang diluluskan untuk menduduki Temuduga Profesional dalam buletin bulan Ogos. Nama betul calon adalah seperti berikut:

		PERPINDAHAN AHLI
No. Ahli	Nama	Kelayakan
KEJUF	RUTERAAN MEKANI	IKAL
47575	YONG GEE SUAN	BE HONS (MMU) (MECHANICAL, 2006)



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# **CBIP unit bags RM50mil contract**

CB Industrial Product Holding Bhd (CBIP) has announced that its unit Modipalm Engineering Sdn Bhd has been awarded a contract worth RM50.3mil.

In a filing with Bursa Malaysia yesterday, CBIP said the contract was from TDM Bhd subsidiary PT Rafi Kamajaya Abadi for a continuous sterilisation palm oil mill project in Nanga Pinoh Melawi, Kalimantan Barat, Indonesia.

The award is expected to contribute positively to CBIP's earnings for the financial years ending Dec 31, 2013, 2014 and 2015, it said.

.....

(Sourced from The Star, 12 September, 2013)

# M'sia-S'pore high-speed rail link 'engagement process' to be completed by Q4

Malaysia is aiming to complete the engagement process with Singapore for the construction of the KL-Singapore high-speed rail (HSR) link by the fourth quarter of this year, said the Land Public Transport Commission's (SPAD) chief executive officer Mohd Nur Kamal.

"We are just starting the engagement process with Singapore. The negotiations will start soon. We are targeting to (complete) somewhere between the third and fourth quarters of this year," he said.

When asked if the HSR would be impacted by the Government's pending plans to keep the country's expenditure in check, Mohd Nur said: "As of the current information we have received, we do not expect it to be impacted by that (reduction in expenditure)."

SPAD chairman Tan Sri Syed Hamid Albar, meanwhile, said that it was still "too early" to talk about dishing out tenders or project costs, as the finalisation of key details of the HSR project was still pending. "If everything remains the same, then we are still targeting for it to be completed by 2020," he said.

(Sourced from NST, 11 September 2013)

# ECER's Kertih Biopolymer Park to draw RM7b deals by 2015

The East Coast Economic Region (ECER) authority says its Kertih Biopolymer Park (KBP) is on track to attract RM7 billion worth of investments by 2015. ECER Development Council chief executive officer Datuk Jebasingam Issace John is confident of achieving the target as the park is located at the gateway to the rapidly growing markets of Asean, the Far East and Asia Pacific.

"Currently, the park has received RM4 billion worth of investments from two foreign companies, CJ CheilJedang and Arkema," he said.

Jebasingam said both companies have started work on the biomethionine plant project, with operations to commence by 2014.

He said the integrated facility will use renewable energy from biomass instead of natural gas and renewable raw materials to produce bio-methionine. It will become the first in the world to use a fermentation process to produce L-methionine. He added that the main objective of the park is to develop the polymer industry and ancillary services through value chain clustering.

KBP is a second-generation bio-filtration complex that is the largest in Asia, making Malaysia a pioneer in biotechnology.

(Sourced from Business Times, 10 September 2013)

# Petronas invited to bid for LNG deal

Lithuania, the largest of three Baltic States, has invited Petronas to participate in the bidding for a contract to supply liquefied natural gas (LNG) for its LNG terminal in Klaipeda Port.

Its Economy Minister Evalda Gustas said the country's interest was conveyed at a meeting with Petronas president and group chief executive officer Tan Sri Shamsul Azhar Abbas and executive vice-president (gas and power business) Datuk Anuar Ahmad, yesterday.

"We see Petronas as a very serious possible partner," Gustas said, adding that the tendering process has started and will be finalised by year-end. Petronas, he said, has to decide this month or next whether it wants to participate.

Gustas is leading a seven-member delegation to Malaysia to explore new markets for Lithuania, especially in the Southeast Asian region.

He said the LNG terminal, currently under construction, would initially need half a billion cubic metres of LNG a year once it opens in 2015. It was reported that the project would give the Baltic state access to the global LNG market.

(Sourced from NST, 4 September 2013)

# Panasonic Solar Plant begins fullscale op

Panasonic Energy Malaysia Sdn Bhd (PECMY), a solar manufacturing company set up by Panasonic Corp, has started the full-scale production of HIT (Heterojunction with Intrinsic Thin-layer) solar modules at its RM1.84 billion plant here.

Its managing director Yasuyoshi Kawanishi said the plant has an annual production capacity of 300 megawatts (MW). With the factory now at full-scale operation, Panasonic's overall production capacity will increase to 900 MW from 600 MW, he said.

Kawanishi said the company will expand its business to meet growing solar power demand, especially in the Japanese market, where environmental awareness and the attractiveness of feedin tariffs (FITs) are seeing record solar installations.

Panasonic HIT offers the world's top level conversion efficiency and excellent feature of temperature dependence that ensures more power generation even during summer at high temperatures.

Kawanishi said the company is also poised to tap into the growth potential in countries such as Europe and the US. "We hope to penetrate European market within this year," he said.

In December 2011, Panasonic started work on the manufacturing base on the 28.35ha site in Kulim Hi-Tech Park, which was planned to combine the production of wafers, solar cells and modules.

(Sourced from NST, 4 September 2013)

# IEM YES National Summit 2013 and YES 43rd Annual General Meeting 2013



by Ir. Lee Cheng Pay, Engr. Danny Lee Woon Dian, Sdr. Yew Weng Kean and Sdr. Kuugan Thangarajoo

YOUNG ENGINEERS SECTION

**FOR** years, IEM Young Engineers Section (YES) has been organising the National Summit annually. It serves as a platform for young engineers to exchange ideas and to connect with each other. This year's IEM YES National Summit, held in collaboration with the Student National Summit in Kuala Lumpur, was led by IEM YES KL Chairman Engr. Mah Way Sheng and attended by 80 representatives from all branches in the country – Penang, Perak, KL, Sarawak, Miri and Sabah. It was a huge success.

The summit started on 27 June, 2013 when the various participants arrived and checked in at Lembah Azwen in Hulu Langat, Selangor. There was no activity planned for the first day as the participants were arriving at different times. However, after checking in, participants took the opportunity to mingle with each other and to exchange contacts.

#### **TEAM BUILDING ACTIVITY**

After breakfast the next morning, Engr. Mah Way Sheng gave a warm welcome speech which signalled the start of the summit. The first event of the day was team building. Participants were split into two teams and instructed to make a raft using plastic drums, rope and timber. They had to ensure it would be stable and float-worthy. It was exciting to see the high level of team spirit as everyone worked together.

After that, they were split into smaller groups and briefed by the facilitator on the next team building event. First of all, they formed a circle in front of the pond and sang a song alongside the instructor. Then, each team had to work together to cross the pond with the aid of a rope. The aim was to build the confidence of the team members.

Finally, it was time to test the rafts. Each team was required to row the raft to the other end of the pond and back. The spirit of competitiveness was very strong. The team building exercise was quite exhausting and after it ended, everyone was given ample time to take a rest and freshen up before the inter-branch and students meetings began.

### **INTER-BRANCH MEETINGS**

The meetings were held concurrently in different meeting rooms. In the National Summit Inter-branch meeting, Engr. Mah started the ball rolling with a speech. During the meeting, it was unanimously voted that YES Perak branch will organise the National Summit in 2015. One of the highlights was the decision that every branch would contribute to the National Summit fund to help the organising branch.



Registration of YES National Summit 2013 participants



Participants waiting to be divided into groups



Participants fixing the raft

## **STUDENTS NATIONAL SUMMIT 2013**

On the other side, the Students National Summit was attended by student leaders and representatives from 10 IEM Student Sections, namely UNITEN, UTAR, UiTM, UTP, UMP, UNIMAS, UTHM, USM, UMS and UCSI. The meeting was chaired by Sdr. Kuugan Thangarajoo from IEM-SIR UNITEN. The meeting focused on problems faced by student sections and collaboration among student sections in future events. All student sections presented their annual reports and UMS was elected as organiser for the 2014 National Summit meeting which would be held in Sabah. Outcomes were later presented by Sdr. Kuugan to the IEM-YES National Summit meeting delegates.

#### FRIENDLY FUTSAL GAME

On the last day of the three-day event, a friendly futsal game was held among the male delegates at Sports Planet Kota Damansara. International Size FIFA Approved Pitch was used for the game. After a light warm-up session, delegates were divided into four teams. The objective was to have fun and it was interesting to see the YES delegates and Student Section delegates playing without reservations while the women delegates loudly cheered them on.

#### THE 43RD ANNUAL GENERAL MEETING (AGM) OF THE YOUNG ENGINEERS

The 43rd Annual General Meeting (AGM) of the Young Engineers Section was held on 29 June, 2013, 2.30 p.m. in Auditorium Tan Sri Prof. Chin Fung Kee, Wisma IEM, in accordance with the IEM Graduate and Student Section Bylaws and Regulations.

Chairman Engr. Mah Way Sheng conducted the meeting after confirming that the quorum had been filled. He highlighted the section's achievements and thanked the committees and volunteers of the session 2012/2013 besides welcoming the Chairman and the committees of the Young Engineers Section of the other branches.

The meeting continued with the presentation of the Annual Report and Financial Statement by the Honorary Secretary and Treasurer, Ir. Lee Cheng Pay, who also reported on the various activities held in line with the mission of the Young Engineer Section.

Two matters were raised at the meeting. These were proposals to revise the financial year end and the activities reporting year end, so that they would coincide with IEM Financial and Activities report. Both proposals were accepted by the members.

With no other matters arising, the Chairman announced the dissolution of the Committees of Session 2012/2013 and handed the floor over to the election officer who then presented the line-up of elected office Bearers for Session 2013/2014 as follows:



Raft race during the team building activity



National Summit 2013 Inter-branch meeting



Group photo of YES Branch leaders

Chairman	Engr. Mah Way Sheng	2013/2014
Vice Chairman I	Engr. Wong Yoke Mei	2013/2014
Vice Chairman II	Engr. Ameirul Azraie Mustadza	2013/2014, 2014/2015
Hon. Secretary/ Treasurer	Engr. Vivekasugha Alif Gunaalan	2013/2014
General Committee	Engr. Chin Yik Ming	2013/2014, 2014/2015
Member	Engr. Krishnath Tangaragee	2013/2014, 2014/2015
	Engr. Aida Yazrin Mohd. Khairi	2013/2014, 2014/2015
	Sdr. Yew Weng Kean	2013/2014
	Engr. Chong Ee Lian	2013/2014
	Engr. Abul Aswad Abdul Latif	2013/2014
Immediate Past Chairman	Engr. Shuhairy Norhisham	2013/2014



Students National Summit meeting

The continuing Chairman for the Session 2013/2014, Engr. Mah Way Sheng, expressed his hope that the new committee would continue to connect with the Young Engineers as well as ensure that the section would continue to serve the interests of Young Engineers for their professional development. ■

**Ir. Lee Cheng Pay** (MIEM) graduated in Bachelor of Electrical Engineering from University of Malaya (UM). He is currently the youngest council member in IEM. He is also an Associate Principal at AD Consultants (M) Sdn Bhd.

**Engr. Danny Lee Woon Dian** (Grad. IEM) is currently the Graduate Affairs Director of The Young Engineers Section (YES), IEM. He obtained his Bachelor of Science in Civil Engineering from the University of Illinois at Urbana Champaign, USA. He has been actively involved in IEM YES since 2011. He is now attached with Perunding Abad as a Project Engineer.

**Sdr. Yew Weng Kean** is currently the Student Affairs Director of The Young Engineers Section (YES), IEM. He obtained his Bachelor in Electrical Power Engineering (Hons.) from Universiti Tenaga Nasional (UNITEN). He is currently pursuing his PhD in Electrical Engineering in UNITEN.

**Sdr. Kuugan A/L Thangarajoo** is currently the Vice President of IEM-SIR UNITEN Student Section. He is currently pursuing his bachelor's degree in Mechanical Engineering in Universiti Tenaga Nasional (UNITEN).

# **IEM DIARY OF EVENTS**

Kindly note the scheduled upcoming events. All events will be held at Wisma IEM, Petaling Jaya unless stated otherwise

Two-Day Course on Design Concepts of Plumbing and SWV Systems

#### 30 & 31 October 2013

Talk on Business Ethics and Corporate Governance – What Is It and Why Does It Matter to Engineers Organised by Building Services Technical Division Time: 9.00 a.m. to 5.30 p.m. (CDP: 13)

#### Technical Visit to Malaysian Milk (Vitagen)

#### 8 November 2013

Organised by Agricultural and Food Engineering Technical Division Time: 2.00 p.m. to 4.00 p.m. (CPD: 1.5)



Group photo of the new committee and attendees of the 43rd Annual General Meeting

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RM 2,224,106.70 from IEM Members and Committees

RM 741,502.00 from Private Organisations

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(ANOTHER RM 9,184,391.30 IS NEEDED)

The Institution would like to thank all contributors for donating generously towards the IEM Building Fund HELP US TO PROVIDE BETTER SERVICES TO YOU AND TO THE FUTURE GENERATION

(The donation list to the Wisma IEM Building Fund is published on page 36)

# YES, it's Rock-n-Roll at Gala Dinner 2013

YOUNG ENGINEERS SECTION



by Engr. Vivekasugha Alif Gunaalan

**YOUNG** Engineers Section (YES) of The Institution of Engineers, Malaysia, held its Gala Dinner 2013 on 29 June, 2013 at the Grand Ballroom of Summit Hotel, USJ, Selangor. This was the first dinner of its kind organised by YES. It coincided with the IEM YES National Summit 2013 as well as the 2nd Engineering Students National Summit 2013 where YES KL played host, together with IEM SIR UNITEN Student Section, IEM UITM Student Section and IEM UTAR Student Section.

The dinner also marked the closing ceremony of the National Summit as well as the official launch of the YES Corporate Video. The dinner was attended by Ir. Choo Kok Beng, FASc IEM President, accompanied by Y.Bhg. Dato' Ir. Lim Chow Hock, IEM Deputy President, and the Executive Committee Members and Council Members.

The Summit had brought all YES branches together in Kuala Lumpur for a branch meeting including team building and technical visits, with a similar role for 2nd

THE SEMANTHONE

Engineering Students National Summit attended by representatives of all IEM Student Sections from various engineering universities in the country.

In his welcome speech, YES Chairman Engr. Mah Way Sheng highlighted all the major achievements of YES and how it had grown from a small group at the start to an over 18,000-strong membership comprising young engineers and engineering students. Engr. Mah also emphasised the need to connect young engineers in the country to create a bigger and closer-knitted community for the betterment of the society. He then thanked the organising committee and the leaders of all branches who had worked hard for the national summit.

The event then proceeded with the National Summit Closing Speech by Ir. Choo Kok Beng, who first congratulated YES for organising the National Summit 2013 and the Gala Dinner with the theme "*Rock-n-Roll*", a first for IEM. He continued by emphasising how important it was for young engineers to evolve to become one of the frontiers of IEM in terms of connecting with the younger generation and encouraging them to be part of IEM. He said YES should continue to work hand in hand with IEM to realise the vision and mission of the institution

> Immediately after the speech and closing ceremony, the official YES Corporate Video was launched and played for the first time. This was part of YES's efforts to reach out to the younger generation and to promote YES and IEM in an advanced medium. The video summarised the vision and mission of YES and the major activities organised.



IEM National Summit 2013 Closing Speech by IEM President, Ir. Choo Kok Beng

Welcoming Speech by YES Chairman, Engr. Mah Way Sheng



IEM YES National Summit Closing Ceremony and Launching of YES Corporate Video

1 Doot	Com	mittoo	Mom	ho
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- Engr. Ameirul Azraei Mustadza
- Engr. Puvanesan Mariappan
- Sdr. Yew Weng Kean
- Engr. Vivekasugha Alif Gunaalan

#### 2. Best Co-Opted Member

- Engr. Aida Yazrin Mohamad Khairi
- Engr. Chin Yik Ming
- Engr. Chooi Jia Hong

# 3. Best Graduate Volunteer

- Engr. Danny Lee Dian Woon
- Engr. Krishnath Tangaragee

Following that, the IEM President and Deputy President conferred IEM Young Engineer 2012/2013 awards to two recipients, Engr. Ngeow Yen Wan (Past Chairman of YES KL) and Engr. Catherine Sim Siew Ping (Past Chairman of YES Penang) for outstanding achievements in their respective fields and their active involvement in IEM.

YES Awards for 2012/2013 were also given out to those who had contributed and helped the institution in various aspects. The recipients were (in random order):

• Engr. Kok Jing Shun

#### • Engr. Puteri Aqilah Anwar

#### 4. Best YES Branch

- YES Southern Branch
  YES Penang Branch
  YES Pahang Branch
- 5. Best IEM Student Section
- IEM UTP Student Section
- IEM UTAR (KL) Student Section
- IEM (SIR) UNITEN Student Section

Besides that, tokens of appreciation were given to various branch representatives and students for their commitment in attending YES National Summit 2013. Souvenirs were also presented to the YES Committee who served in the 2012/2013 Session and appointment letters presented to the newly appointed YES 2013/2014 Session Committee Members.





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A Capella Performers from IEM UTAR Student Section



IEM YES Gala Dinner 2013 Group Photo

A special presentation by the A Capella Group of IEM UTAR (KL) Student Section, captured the attention of all present while YES KL members sang the closing song.

The organising committee would like to express its sincere appreciation to the IEM President, Deputy President, Executive Committee Members, Council Members, Valued Table Donors namely MEI Consultants Sdn Bhd, G&P Consultants Sdn Bhd, Sepakat Setia Perunding, Khairi Consult Sdn Bhd and all guests. The committee also expressed congratulations to all award winners. YES rocked again!!!

Engr. Vivekasugha Alif Gunaalan (AAE, Grad. IEM) is currently the Honorary Secretary/ Treasurer of The Young Engineers Section (YES) and Committee Member of Electrical Engineering Technical Division (EETD), IEM. He obtained his Bachelor in Electrical Power Engineering (Hons.) from Universiti Tenaga Nasional (UNITEN) and currently pursuing Master's degree in Electrical Engineering in UNITEN as well. Engr. Vivekasugha Alif Gunaalan is now working as a Project Engineer at the Regional Manager (Central) Office, Asset Development Department, Transmission Division, Tenaga Nasional Berhad (TNB).

#### Pengumuman SENARAI PENDERMA KEPADA WISMA yang ke-67 DANA BANGUNAN IEM

Institusi mengucapkan terima kasih kepada semua yang telah memberikan sumbangan kepada tabung Bangunan Wisma IEM. Ahli-ahli IEM dan pembaca yang ingin memberikan sumbangan boleh berbuat demikian dengan memuat turun borang di laman web IEM http://www.myiem.org.my atau menghubungi secretariat di +603-7968 4001/5518 untuk maklumat lanjut. Senarai penyumbang untuk bulan Ogos 2013 adalah seperti jadual di bawah.

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# Technical Visit to MRT Cochrane Underground Station Site

YOUNG ENGINEERS SECTION



by Engr. Kok Jing Shun

**ON** 29 June 2013, as part of the National Summit events, technical visits were organised for the participants. Because of the large number of participants, they were split into two groups: Graduates and Students. The graduates were assigned to the MRT Cochrane Underground Station Site while the students were assigned to the Jalan Pudu/Jalan Imbi/Jalan Hang Tuah intersection upgrade project.

The technical visit started promptly at 9.30 a.m. with a warm welcome by MMC-Gamuda KVMRT and a brief introduction to the project background, challenges, development and highlights. The Klang Valley Mass Rapid Transit (KVMRT) project is the biggest single infrastructure project undertaken by the Government and the line is expected to be operating by mid-2017. MMC-Gamuda KVMRT was awarded the project to carry out 9.5km of underground construction work from KL Sentral Station to Maluri Station.



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Participants listening to the presentation by MMC-Gamuda KVMRT on the MRT project



Group photo of the National Summit 2013 Graduate participants at the site

During the presentation, some participants raised their concerns about the operational feasibility of the construction work as well as the safety of both workers and the public. To reassure them, engineers and management executives from MMC-Gamuda KVMRT answered the concerns with relevant technical explanation and guarantee of safety.

After the presentation, IEM YES KL's Chairman, Engr. Mah Way Sheng thanked MMC-Gamuda KVMRT for hosting the visit and presented its representatives with a token of gratitude.

The participants were then invited to enter the MRT construction site, accompanied by the Safety Officer. Before entering, however. participants were reminded to wear their respective Personal



IEM YES KL's Chairman, Engr. Mah Way Sheng presenting a token of appreciation to MMC-Gamuda KVMRT

Protective Equipment (PPE). During this technical visit, the Project



View of the assembly of the Tunnel Boring Machine (TBM) from above

engineers further explained about the current progress of work, the challenges they encountered and solutions for the challenges. The participants were impressed by the scale of the construction work. We even managed to get a glimpse of the assembly in progress of the Tunnel Boring Machine (TBM). To commemorate the technical visit, a group photo was taken at the construction site.

When the visit ended at noon, it had successfully stimulated the minds of the young engineers as well as increased their knowledge on the project.



Group photo of the National Summit 2013 Graduate participants in front of the MRT Information Centre

Engr. Kok Jing Shun (Grad. IEM) is currently the Publicity Director of The Young Engineers Section (YES) IEM. He obtained his Bachelor of Mechanical Engineering from University of Malaya (UM). He is now attached with LI-Zainal Consulting firm as a Mechanical Engineer.



# My Amazing First YEAFEO Experience

YOUNG ENGINEERS SECTION



by Engr. Aida Yazrin Mohamad Khairi

I had always wanted to take part in IEM's activities, especially those organised by the Young Engineers Section (YES). But because of work commitments and other reasons, I could only join in the activities from last year. Work could be so hectic and I felt grateful to be able to take a break finally.

In December 2012, I attended the 19th Young Engineers of the ASEAN Federation of Engineering Organisation (YEAFEO) Conference in Phnom Penh, Cambodia. The trip was organised by YES KL.

We searched for affordable hotels, places to go and things to do. I was extremely excited about the trip. Cambodia was one of the countries on my bucket list of places to visit and now I was getting a chance to actually cross it off that list. Besides, the many wonderful and unforgettable experiences as told by members of the YES committee who had attended the previous YEAFEO, only added to my excitement and eagerness for the trip.

A month before our departure, I surfed the internet to get as much information as I could about Cambodia, including places of interest, culture and of course, the local delicacies. Our itinerary was planned by the YES Committee members, but that didn't stop me from doing my own little research to satisfy my curiosity.

I was told that the Malaysian YEAFEO delegation this time would be much bigger as it would include participants from YES KL, YES Penang, YES Sarawak, YES Miri and the UTHM IEM Student Section. I didn't think it was possible to get more excited than I already was, as I'd never met any of the members from other YES branches. Making new friends was one of the many things I looked forward to on trips like this.

The official event would only start on Monday, but most of us decided we'd travel earlier and arrive on Saturday, just for a chance to take in the sights and sounds of Phnom Penh, the capital of Cambodia. We visited many attractions, such as the Independence Monument, a silk weaving factory, Choeung Ek Memorial (The Killing Fields), night markets (shopping was inevitable), Russian Market and Central Market. We managed to do all these in one day, Sunday, so you could imagine what a hectic dayit was.

Absorbing the history and culture of the Cambodians was an amazing experience. The one place that touched us all deeply was The Killing Fields. Some of us couldn't help but shed a tear to learn about the hardships the Cambodians suffered during the Pol Pot era. Words could not express how grateful I was to be living in Malaysia during those rough times and I felt great empathy for the Cambodian people's sufferings. I was also a little awestruck by how strong they were as they had managed to overcome all obstacles that life had thrown their way. Not only that but they also came out stronger than ever.

When the Conference started on Monday, everyone came dressed in formal attire to greet friends from all over ASEAN and other neighbouring countries. I was one of the early birds to go down for breakfast! After I registered at Sofitel Phnom Penh Phokeetra hotel and while waiting for the meeting to start, I met so many people from many



YES delegates at the Phnom Penh Independence Monument



YEAFEO delegates on a river cruise on the Mekong River



YES committee in front of Angkor Wat

different countries and backgrounds. I was so overwhelmed by everything that it left me speechless at times. It was an indescribable feeling to see no social, communication or other barriers between the participants of different nations and engineering backgrounds – whether they were from Myanmar, Hong Kong, Japan, Cambodia, Singapore, Indonesia, Thailand or Vietnam.

Everyone was enjoying themselves. It was like a breath of fresh air for me to feel the carefree aura that filled up the room. So I relaxed, opened my mind, and socialised with the other participants. I wouldn't be surprised if, at the end of the day, they all thought I was extremely talkative! I tend to talk a lot when I'm having a wonderful time.

After the networking session, the conference started and participants were separated into different working groups, regardless of their background. It was a smart move and definitely helped everyone to get to know each other better. I participated in the YEAFEO meeting where Young Engineers leaders from ASEAN and neighbouring countries came together to share their organisations' activities. We discussed issues related to young engineers, exchanged ideas and shared them with participants of different countries. It was very enlightening to see how passionate and concerned all these leaders were about current issues facing young engineers in the field.

In between the meetings, technical presentations and technical visits, our Cambodian friends managed to arrange a river cruise along the Mekong River for some of the Japanese, Myanmar, Hong Kong and Cambodian delegates. We brought along some packed *roti canai* and curry from the Malaysian restaurant in Phnom Penh. Our new friends loved it and ate it all up in record time.

After that, everyone started to loosen up and we introduced them to some childhood games from Malaysia, such as *Chap Kali Chap*. It got everyone excited and brightened up the mood in the boat. To add to that, we had beautiful, clear weather that night. It was the perfect ending to a perfect day.

On the final night, we attended the closing ceremony of CAFEO 30. The chairman had provided 2 songs for us to in advance so we could practise before the ceremony. The chosen songs were "*Satu Malaysia*" and "*Go YES*", an adaptation of the popular song by A-HA, Go West. For our performance, our group, including the seniors of IEM, went on stage with a small Malaysian flag in hand, and sang.



A group photo after the closing ceremony



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At first, I was a bit apprehensive about going on stage to sing in public. However, I could feel that this was very different from wedding karaoke sessions and soon, my shyness melted away to be replaced by a carefree side of me that hardly ever surfaced. It was truly an unforgettable experience, from the performances of each and every country to the fun "train-ride" around the ballroom, as everyone within the ASEAN region and its neighbouring countries were united, regardless of language, race and religion.

After the official YEAFEO event, some of us had arranged to travel to Siem Reap together with the Hong Kong delegates. If you don't know where that is, it's the site of UNESCO's World Heritage Site, the famous Angkor Wat. We went to Tonle Sap (a lake), ate local Cambodian food and of course, visited Angkor Wat. The sunrise and sunset over at Angkor Wat was unlike any beautiful scenery I had ever seen, and it took my breath away.

Overall, the trip was, for me, a dream come true. This opportunity that YES had given me allowed me to make so many friends whom I would never forget. Already I am looking forward to attending the next YEAFEO, which will be in Indonesia. Yes, I have bought my ticket to Jakarta! Have you? Well, what are you waiting for? Go grab a ticket NOW! I'll be looking forward to seeing you there!



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YEAFEO friends at the main entrance to Angkor Wat

# HERE ARE WHAT SOME OF MY FRIENDS SAY ABOUT "MY FIRST YEAFEO EXPERIENCE"

"I was amazed at the number of friends I made at YEAFEO 30. There were people of all ages, from different countries and different backgrounds, ready to get connected with everyone else. More than that, I was motivated to be a better engineer who could contribute more to society."

- Suraya

"My first impression of YEAFEO was that it was a lot of fun! Meeting nice people, eating delicious food and going to interesting places. The best thing was that we were not separated by age, race, country, skin colour, religion or language."

- Jerrard Yong Xing

"It was a very good platform to connect with young engineers from ASEAN countries. Making new friends and exchanging thoughts and ideas as well as sharing knowledge with each other, really allowed me to appreciate and enjoy the conference. I learned a lot from YEAFEO. It had been such a beautiful experience for me. I hope I will be able to join the event again." – Abul Aswad

"CAFEO 30 was my first time, but I felt like I had been there for ages, thanks to all the other young engineers from ASEAN continents who mingled with zero difference in terms of language and ethnicity. This was also my first time presenting a technical conference paper, making it my most memorable CAFEO ever. Looking forward for this year's CAFEO at Jakarta!!! :-)"

- Vivekasugha

Engr. Aida Yazrin Mohamad Khairi (Grad. IEM) is currently the Social and Community Director of Young Engineers Section (YES), IEM. She obtained her Bachelor in Civil Engineering (Hons.) from Universiti Tenaga Nasional (UNITEN) and Masters of Science in Highway and Transportation from University of Putra Malaysia (UPM). She joined IEM since graduating and served YES since 2012 with passion. She is now with Khairi Consult Sdn Bhd as an engineer specialising in Road and Highway.





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# BACFREE – Rainwater Harvesting System

AGRICULTURAL AND FOOD ENGINEERING TECHNICAL DIVISION

**THE** Agricultural and Food Engineering Technical Division of IEM organised a technical visit to Bacteria Free Water Engineering Sdn Bhd (BACFREE) in Subang Jaya Industrial Estate on 23 March 2013. Thirty people took part in this technical visit.

BACFREE was established in 1982 to supply water filters and waste water solutions. In 2007, the company ventured into rain water harvesting (RWH) and was been appointed the Malaysian and Singaporean partner for WISY AG of Germany, a leading manufacturer of RWH systems and accessories in the world.

BACFREE technical director Dr Chee Chung Yee introduced us to the background of the company and told us that its RWH system customers included Pavilion, Bangsar Shopping Mall, IJM, Mah Sing, Sime Darby and Petronas. There are many advantages in using RWH such as:

- a. Reduces household water bills. The system provides water for non-portable purposes such as flushing toilets, laundry, landscape irrigation and car washing.
- b. Provides an alternate water supply during water rationing or supply interruption.



by Ir. Yong Hong Liang

cadfocus

- c. Enhances the value of a property.
- d. Reduces storm water runoff, thus mitigating the possibility of flash floods.
- e. Being chlorine free, it is excellent for watering the garden and filling up ponds.
- f. As a main water source in rural areas where there is no supply of tapped water.

Dr Chee pointed out that the BACFREE RWH system design is compliant with the following guidelines:

- a. Rainwater Harvesting Guidebook by DID Malaysia.
- b. British Standard BS 8515:2009 Rainwater Harvesting System – Code of Practice.
- c. German Standard DIN 1989-2001-10 Rainwater Harvesting System – Part 1: Planning, Installation, Operation and Maintenance.
- d. Warta Kerajaan Negeri KPKT.
- e. MSMA, 2nd edition.

# ZWCAD + 2014







Commercial RWH filter demonstration by BACFREE

Residential RWH filter demonstration by BACFREE

f. DBKL and MPK guidelines.

At present, in Selangor, Perak and Kuala Lumpur, any new residential property development of minimum 100 m<sup>2</sup> roof area is required to install a proper designed RWH system. This applies to commercial buildings and factories as well.

- Dr Chee said the WISY RWH filters have a "4 steps system" as below:
- a. Self-cleaning: FS first flush filter collector. Fits into a single downpipe.
- b. Smoothing inlet: Calming down flow to low speed when rain water enters the tank.
- c. Floating suction filter: Second filtration.
- d. Multifunction overflow: Skims off floating particles from the water surface in the tank.

Besides these, Dr Chee said, the RWH system maintenance will ensure that the system is always in good condition. Several water parameters to be examined are turbidity, colour, hardness, TDS, Coliform and pH. He also briefed us on the information needed for designing a RWH system, such as water demand, roof catchment area, days of storage, annual rainfall and intensity.

After the presentation of an IEM token of appreciation to Dr Chee, the participants were treated to nasi ayam penyet for lunch. The technical visit concluded with a project reference site visit to Nadayu 28, Sunway.

**Ir. Yong Hong Liang** graduated from Universiti Putra Malaysia with Bachelor Engineering (Agricultural) and Master Science (Soil & Water Engineering). He has more than 10 years experience in development of oil palm plantation and rural area in Malaysia and Indonesia. Currently, he is the Deputy Chairman of Agricultural and Food Engineering Technical Division, IEM.

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# Visit to Express Rail Link (XRL) in Hong Kong



PROJECT MANAGEMENT TECHNICAL DIVISION by Ir. Vincent Wong Khien Ngie

**THE** Project Management Technical Division (PMTD) of IEM went on a four-day visit to the Hong Kong side of the Express Rail Link (XRL) which will link Guangzhou, Shenzhen and Hong Kong in year 2015. The visit on 23-26 March 2013, attracted 15 participants from various disciplines of the engineering fraternity from IEM.

The 26km Hong Kong section of the HK\$66.90 billion Guangzhou-Shenzhen-Hong Kong XRL is from the huge landscaped underground terminus in West Kowloon to the border of Hong Kong and Shenzhen. It then links up with the 16,000km China National High-speed Railway Network. The rail link will shorten travel time from Hong Kong to Guangzhou from the present 100 minutes to just 48 minutes. When completed, the link will enhance Hong Kong's reputation as the southern gateway to Mainland China. The project is being run as Hong Kong's Government Owned and Funded Assets. This means the government funds construction works and MTR Corporation acts as delivery partner, project managing construction and earns a fee for operating the completed infrastructure.

The XRL construction, started in 2007, involves the construction of a delicate railway tunnel, beginning from the common border. About 10 km towards the Hong Kong side, it involves mixed ground earth pressure balance or slurry shield tunnel boring machines (TBMs), followed by the next 2.56km on drill and blast method through two main mountains in New Territories and approximate 2km of cut and cover method section through downtown Kowloon.

We visited the Shek Kong site where the emergency rescues siding of 30m below ground and an at-grade stabling siding are under construction with open-cut method and are near completion. The emergency rescue station is the interchange station where the TBM-bored mixed ground tunnel section gives way to a 2.56km drill and blast tunnel. In the briefing by the Construction Manager of XRL Tunnels SSS, Ir. Charles Lau Kam Keung, at the Shek Kong site, we learned how such a huge scale project was broken down into manageable packages with a general manager assigned to each contract for day-to-day responsibilities and the major issues of dealing with interfaces between contracts. To comply with Hong Kong's stringent environmental laws, the bentonite slurry plant was constructed at a cost of HK\$30 million to minimise the permissible noise level in the vicinity.



Group photo for the technical trip

Site briefing by MTR Project Team Leader



Temporary works for cut and cover tunnel at Austin Station



Thrust block in front of launching shaft at MTR tunnel

At the northern end of the XRL (border with mainland China). the Project Manager of XRL Tunnels (South), Mr. Bill Cloves, briefed us on the challenges of mixed earth pressure balance machines and slurry shield TBMs that have to be driven through faulted ground under protected wetlands where vertical access shaft is not allowed as this is part of a UNESCO heritage site. The China side of the EXL is a single bore tunnel which will merae with the Hong Kong side twin bore tunnel, so the difficulties of merging a single bore to twin bore and cross borders legislative issues were highlighted.

At the Kowloon Austin MTR Station Visitor Center, the Project Director talked about the challenges of having the tunnels running through reclaimed land areas that had buried jetties, piers, sea walls and drainage culverts, beside the mounting challenges of TBMs squeezing beneath MTR subway tunnels with just 2.8m clearance, passing through either side of pairs of

2.5m diameter bored pile supporting existing road interchange and treading 2m above a water transfer tunnel as well as through piled foundations of high rise estates as the TBMs approach the cut and cover section running into the Kowloon terminus. On top of the challenges underground, having to keep open existing major roads that crossed the West Kowloon Terminus, was a major issue and a challenge for MTR.

We were also briefed about the complexities in dealing with the community as MTR Corporation places great importance on community relations to ensure success of the project. Beside newsletters, regular interactions were held with the community during important occasions such as the Mid-Autumn Festival to establish a close rapport with the community. The visit ended with a site walk around the West Kowloon Terminus construction site.

The visit enriched our knowledge of the various elements of project management such as contract administration, planning control, cost control, quality control, material management, office management inter-phase management and reporting mechanisms, short term rolling programmes, monitoring of implementation schedules against the master programme and recovery measures to accelerate construction progress towards milestones and targets.

Ir. Vincent Wong Khien Ngie Director of Hacent Consultant Sdn Bhd. He holds a B.Eng (Civil)1999 and Msc (Geotechnical & Geological Engineering) 2003 from Universiti Putra Malaysia.



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# **Achieving Corporate Integrity**

by Anti-Corruption NKRA, PEMANDU and Mechanical Engineering Technical Division

**INTEGRITY** is a priority agenda in Malaysia. To achieve this, the Government has put in place proper mechanisms to reduce corruption in its bid to promote higher ethical values through the introduction of the National Integrity Play (NIP) in 2004. The same year, the Government also established the Malaysian Institute of Integrity (IIM) as a mechanism to promote and coordinate the implementation of NIP.

In support of NIP, SSM had been appointed as the Secretariat to develop a blueprint on integrity agenda for the economic institution through deliberations with various working groups made up of corporate members, professional bodies and industry associations under the auspices of the then Ministry of Domestic Trade and Consumer Affairs. The blueprint, entitled *"Business Ethics: Towards Enhancing Corporate Integrity and Business Ethics: A Practical Guide for Malaysian Companies"*, was published by IIM. In addition, the Government also upgraded the Anti-Corruption Agency to the Malaysian Anti-Corruption Commission (MACC) in 2009.

Under the newly-introduced Government Transformation Plan (GTP), which was unveiled on 28 January 2010, the Government aspired to curb corruption by initiating the National Key Result Areas (NKRAs) and, to identify the country's ranking in fighting corruption, surveys were carried out by the Transparency International to ascertain the Corruption Perception Index (CPI).

In support of the Government's aspirations in combating corruption, SSM spearheaded the development of SSM's Best Business Practice Circular 3/2012 entitled "Achieving Corporate Integrity" (BBPC 3/2012) in collaboration with the Corporate Integrity System of Malaysia (CISM) Roundtable Members comprising SSM, Malaysian Institute of Integrity (IIM), Performance Management and Implementation Unit (PEMANDU), Monitoring and Coordination Division NKRA Corruption, Malaysian Anti-Corruption Commission (MACC), Transparency International Malaysia (TI), Bursa Malaysia Securities Bhd and the Securities Commission of Malaysia. The BBPC 3/2012, launched on 27 January 2012, is an initiative to further promote the Corporate Integrity Pledge (CIP) which was introduced by PEMANDU in March 2011 and to promote the use of the Corporate Integrity System Assessment and Questionnaire (CISAQ) developed by IIM.

CIP allows companies and businesses in Malaysia to make a unilateral declaration that it will not commit corrupt acts, will work towards creating a business environment that is free from corruption and to implement the Anti-Corruption Principles – the five key principles that promotes integrity, transparency, good governance and the strengthening of internal control systems that can support the effective prevention of corruption.

Companies and businesses are encouraged to undertake the CISAQ to evaluate and measure the level of integrity that is being practised in their operations. CISAQ is a tool to assess the 12 dimensions related to corporate integrity and it provides companies and businesses with a blueprint for risk assessment, areas of improvement and is a general indicator of a company's corporate integrity. This will help companies and businesses assess and measure their progress in making a formal and transparent commitment to ethics and integrity in the workplace.

The BBPC is a guideline that can be used by companies and businesses to enhance and improve their integrity. To ensure viability and sustainability in the 21st Century, businesses and companies must practice integrity and good corporate governance, making these an integral part of their organisations.

Source: Suruhanjaya Syarikat Malaysia

Solution for 1Sudoku published on page 10 of this issue

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# **GLOBE TREKKING**



# Agnes Keith House, Sandakan



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



**SABAH** is also known as Land Below The Wind. This is actually the title of the first book by Agnes Keith about her life in North Borneo in the 1930s. The phrase *"land below the wind"* was used by sailors in the old days to describe the lands south of the typhoon belt, but Agnes applied it exclusively to North Borneo in her book and it has since stuck to Sabah as its exclusive tagline.

Agnes Jones Goodwillie Newton Keith (4/7/1901-30/3/1982) was an American author best known for her book, *Three Came Home*, which was made into a film of the same name in 1950. She married Englishman Henry G. Keith, also known as Harry Keith, in 1934. Henry had been working in Borneo since 1925 and was its Conservator of Forests, Director of Agriculture and Honorary Curator of the State Museum in Sandakan at the time of their marriage. The Keiths lived in a government building on a hilltop in Sandakan from 1934 until they were taken prisoners by the Japanese during World War II in 1942.

After the war the Keiths returned to Sandakan to find the house destroyed. They built a new house in 1946/7 on the same site and in a style similar to the original. They named the house *Newlands* and lived there until they left Sabah for good in 1952. After that, the house was left unoccupied and soon fell into disrepair. However, it was restored in 2001 and opened to the public in 2004 as an example of a post-war colonial wooden bungalow. Since then, it has become a popular tourist attraction in Sandakan.

When my wife and I visited the Agnes Keith House a few years ago, it brought back fond memories of the time we stayed in an English cottage in the United Kingdom. There was even a tea house next to the Agnes Keith House where we enjoyed a cup of steaming hot English tea with scones.

**Ir. Chin Mee Poon** is a retired civil engineer who derives a great deal of joy and satisfaction from travelling to different parts of the globe, capturing fascinating insights of the places and people he encounters and sharing his experiences with others through his photographs and writing.



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