Introduction to Engineering Technologist, Engineering Technician and Inspector of Works

Speaker

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BEM Board Member and
Chairman, Engineering Technology Accreditation Council

Outcomes of the Presentation

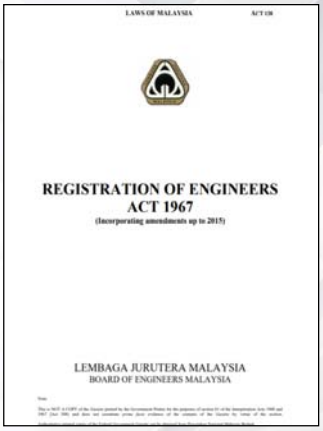
- **Introduction to Engineering Technologist, and Engineering Technicians/ Inspector of Works**
  - Engineering and Engineering Team (Engineers Vs Technologist Vs Technicians (IOW))
  - Their work scope and examples of career path
  - International recognition
- **How to become a Technologist, Technicians/ IOW**
  - Academic and Professional pathways
  - ETAC (Engineering Technology Accreditation Council)

Introduction

In 2015 the Registration of Engineers Act (REA) (1967) was amended to include the registration of

1) **Engineering Technologist** and
2) **Engineering Technicians** (**referred to as Inspector of Works in the Act (IOW)).**
3) Professional Engineer with a Practicing Certificate (PEPC)

This is in addition to the registration of **Engineers, (1967)** thus completing the spectrum of engineering professions, as Registered Persons under the Act.


LAWS OF MALAYSIA ACT 138

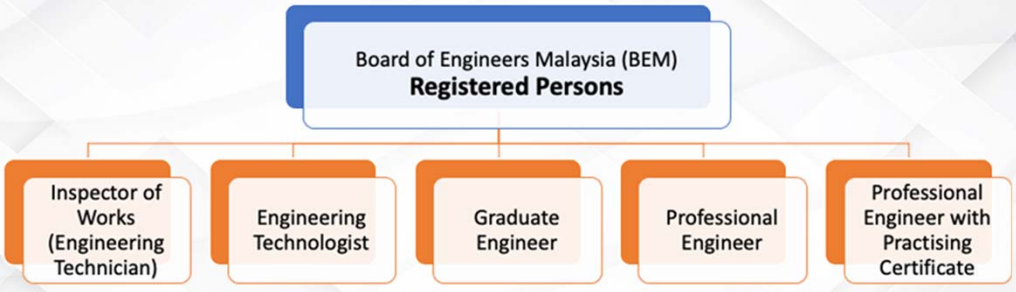
REGISTRATION OF ENGINEERS ACT 1967
(Incorporating amendments up to 2015)

LEMBAGA JURUTERA MALAYSIA
BOARD OF ENGINEERS MALAYSIA

Registration of Engineers Act (REA) (1967)

http://bem.org.my/registration-of-engineers-act-1967-revised-2015-

THE ENGINEERING TEAM



REA 2015 REA 2015 Ir. Ir. REA 2015

Introduction

Why do we need the Registration of Engineers Act ?

The purpose of the Act is :

To protect the public by legislative control so that the practice of engineering, which has a bearing on public safety, health and welfare, can only be carried out by licensed Professional Engineers, Engineering Technologist and Engineering Technicians (IOW)

The Board of Engineers Malaysia (BEM) is a statutory body constituted under the Registration of Engineers Act 1967. Its primary role is to regulate the practice of engineering under the Act.

Regulator

Introduction

Why the need for amendments?

The amended REA will be known as "Registration of Engineers Act 1967 (Revised 2015)", whilst the accompanying Regulations will be known as "Registration of Engineers Regulations 1990 (Revised 2015)". The Regulations are meant to supplement the Act in the day-to-day affairs, operations and functions of the Board of Engineers (Board).

These latest amendments are a direct result of Government polices on trade for services. As Malaysia developed towards a service industry the issue of "liberalisation" of the services came to the forefront in the Free Trade Agreements (FTA) which the country signed. These latest amendments directly address liberalisation issues in order for the country to meet its international obligations.

Mobility

6.0 New Categories of Registered Persons

Section 10 of the REA was amended to include new sections namely Sections 10C, 10D and 10E to provide for the registration of Engineering Technologist, Professional Engineer with a Practising Certificate and Inspector of Works as shown in Figure 1.

So that the new categories of registered persons can be regulated regulated and recognised to enable mobility due to recognition by International bodies.

PART III – REGISTRATION OF ENGINEERS
Inspector of Works, Engineering Technologist & Graduate Engineers

Section 7(2). - New Section

Not withstanding subsections (1) and (1A) –

(a) a Graduate Engineer may, subject to section 8, take-up employment which requires him to perform professional engineering services;

(aa) an Engineering Technologist may, subject to section 8, take-up employment which requires him to perform professional engineering services;

(ab) an Inspector of Works may, subject to section 8, shall register with the Board to take-up employment which requires him to assist the Professional Engineer in the supervision of engineering works;

Introduction

Registration of Engineers Act 1967 (Revised 2015):
Section 7(2) (aa) of Registration of Engineers Act 1967 (Revised 2015)

"an **Engineering Technologist** who is registered with the Board may subject to section 8, take up employment which requires him to perform **professional engineering services"**

Section 7(2)(ab)

"an Inspector of Works (IOW) who is registered with the Board may, subject to section 8, take up employment which requires him to **assist the Professional Engineer in the supervision of engineering works".**

Section 2

"Professional Engineering Services **means engineering services and advice in connection with any feasibility study, planning, survey, design, construction, commissioning, operation, maintenance and management of engineering works or projects and includes any other engineering services approved by the Board."**

"Engineering works **means all works which include any publicly or privately owned public utilities, buildings, machines, equipment, processes, works or projects that require the application of engineering principles and data."**

ENGINEERING TECHNICIAN VS IOW

What is the difference between IOW and Engineering Technician?

- In view of the recognition that "engineering" covers a wide spectrum of persons from engineers to engineering technicians; the Board has decided to register unregulated "engineering technicians" in the engineering industry.
- IOW is a new professional profession introduced in 2015 under REA
- IOW is not exclusively work for consultants supervising construction works under supervision of PE/PEPC.
- Engineering Technicians (which includes IOW) generally refers to **graduates with Diploma in Engineering or Engineering Technology**
- Minimum qualification for registration as IOW is a recognised or accredited Diploma in Engineering or Engineering Technology.
- Fresh grads from diploma holder may register as IOW (intern) while gaining experience before applying to register as IOW.

Introduction

What is Engineering

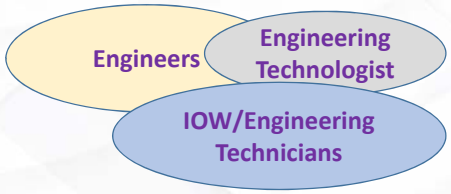
Engineering works is defined in the REA Act as all **works which include any publicly or privately owned public utilities, buildings, machines, equipment, processes, works or projects that requires the application of engineering principles and data.**

Engineering is involved in the optimum conversion of natural resources for the benefit of mankind through design, building and maintenance of machines and structures.

The scope of engineering services or engineering works encompass the entire product life cycle that includes research, complex analysis, complex design, development, product design, testing & evaluation, manufacturing, operations, service & maintenance and distribution & sales

ENGINEERING AND THE ENGINEERING TEAM

Definition in the REA Act: **Engineering works** include any publicly or privately owned public utilities, buildings, machines, equipment, processes, works or projects that requires the application of engineering principles and data.



Engineering team performs engineering services or works and in many cases there are overlapping of functions.

CAREERS IN ENGINEERING

CASE STUDY: CONSTRUCTION INDUSTRY

- **Engineers**
- **Engineering Technologist**
- **Engineering Technicians**

RESEARCH & FEASIBILITY STUDY	CONCEPTUAL DESIGN	DETAILED DESIGN	IMPLEMENTATION PLANNING	CONSTRUCTION AND QUALITY CONTROL	COMMISIONING AND TESTINGS	OPERATIONS	PREVENTIVE MAINTENANCE	CORRECTIVE MAINTENANCE	DECOMMISSION

Engineers → Engineering Technologist/Technicians

CAREERS IN ENGINEERING

ENGINEERING TECHNICIAN IN SERVICE INDUSTRY

- Engineering technicians (IOW) shall assist engineer in supervision of engineering work that requires application of engineering principles and data, help solve technical problems in many ways.

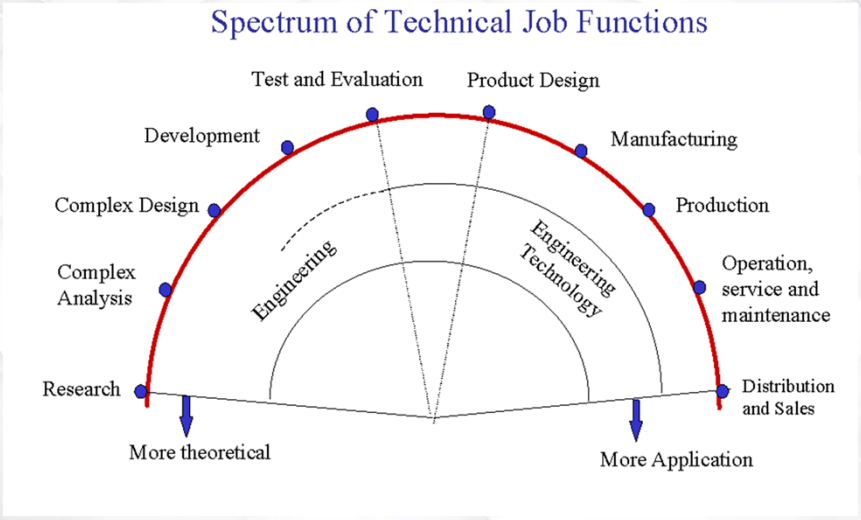
SET UP EQUIPMENT

CONDUCT EXPERIMENTS (R&D)

QUALITY CONTROL
- Check product
- Do testing
- Collecting data

COLLECT DATA & CALCULATE RESULT

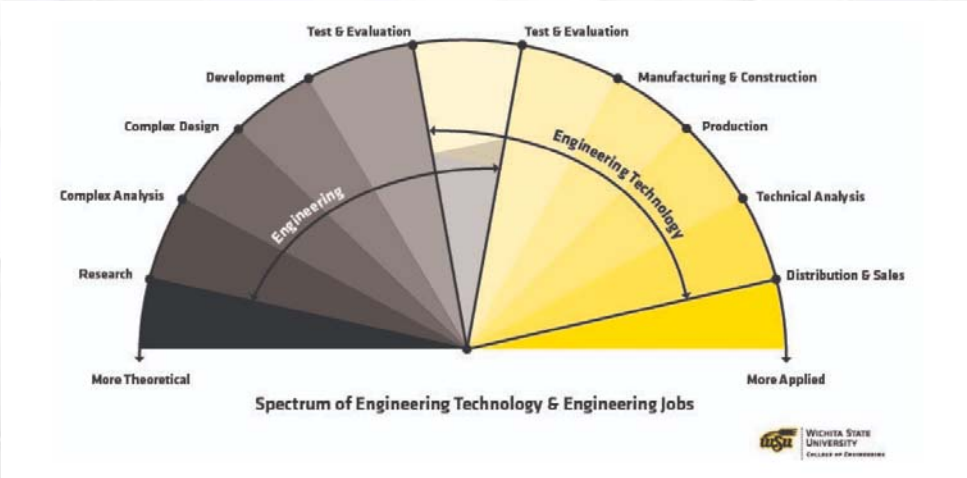
ENGINEERING TECHNOLOGY vs ENGINEERING



Source : Charlie P. Edmonson, "An Approach to Introduce Engineering Technology to High School and Junior High School Students", Department of Engineering Technology, University of Dayton.

ENGINEERING AND THE ENGINEERING TEAM

Where are the technicians???? **Almost everywhere.**



CAREERS IN ENGINEERING

Routes to careers in Engineering

There are several routes available via an academic programme at Diploma or Degree level in Engineering or Engineering Technology. **These academic programmes are accredited by BEM. For the latest list of accredited programmes visit *www.etac.org.my.***

There are also routes via professional skills qualifications issued by other bodies such as the Energy Commission (eg. Chargeman) and the Construction and Industry Development Board (CIDB).

- Bachelor of Engineering
- Bachelor of Engineering Technology
- Diploma in Engineering / Engineering Technology
- Professional Engineering Skills Certificate (incl. apprenticeship)
- Professional Qualifications Pathway (e.g. Licensed Aircraft Maintenance Engineers , CoC Class 1,2,3 and 4 Marine Engineers, Chargemen)

→ ENGINEERING CAREER OPPORTUNITIES

CAREERS IN ENGINEERING

ENGINEERING TECHNOLOGIST

Engineering technologist are graduates with a Bachelor's Degree in Engineering Technology (Level 6 MQF)

Engineering technologist education and training are application oriented, focusing among others on applied design, product development, manufacturing, product assurance, operation and maintenance based on current engineering practice standards.

Engineering technologists are also known as applied engineers or practical engineers and perform engineering works by applying engineering and scientific knowledge combined with technical skills.

Engineering Technologist

- Implement **engineering works** by applying engineering & scientific knowledge combined with technical skills **to support engineering activities**.

CAREERS IN ENGINEERING

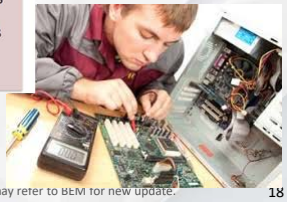
ENGINEERING TECHNICIAN

Engineering technicians are graduates that have acquired an Engineering or Engineering Technology Diploma qualification. Engineering technician education and training are highly application oriented and focusing on practical skills.

Engineering technicians are employed to work as part of the engineering team together with engineering technologist and engineers. Engineering technicians assist engineers and engineering technologist to implement engineering works by applying engineering knowledge combined with practical skills. Engineering technicians support the whole spectrum of engineering activities such as design, development, testing, manufacturing, operation service and maintenance.

Engineering Technician

- Implement **engineering technology works** by applying engineering knowledge combined with technical skills **to support engineering technology activities**.



ENGINEERING TECHNICIAN

Example: In the job scope of testing for example, engineering technicians assist the engineers and engineering technologist in collecting data, designing and performing tests, assembling equipment and recording test data.

Engineering Technician

- Implement **engineering technology works** by applying engineering knowledge combined with technical skills **to support engineering technology activities**.



CAREERS IN ENGINEERING

Inspector of Works (IOW)

Inspector of Works (IOW) who is registered with the Board usually takes up employment which requires him to assist the Professional Engineer in the supervision of engineering works".

The registration of IOW mainly under the three (3) main engineering disciplines i.e. **Civil, Electrical and Mechanical** or any other disciplines deemed appropriate**.**

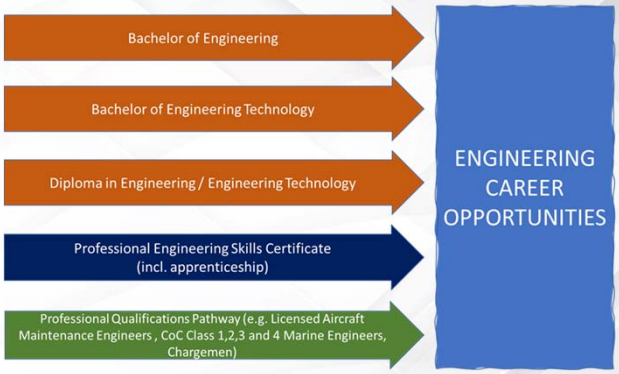
IOWs carry out supervision of engineering works on site assisting the Professional Engineers (PEPC /ECPs)




Academic and Professional Pathways

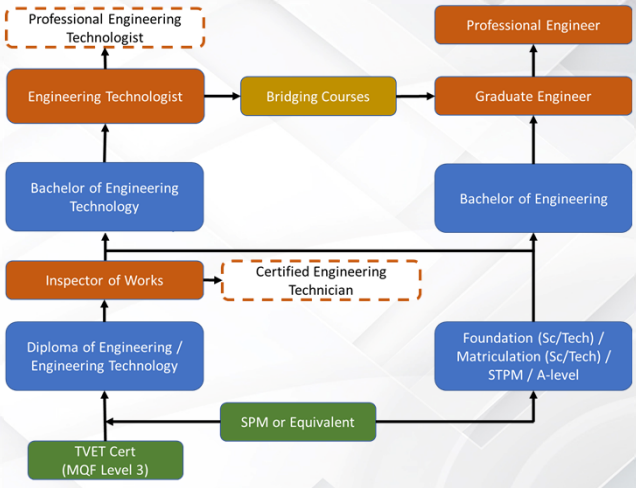
The Board of Engineers Malaysia has recently recognized several Professional Qualifications issued by other authoritative industry bodies such as the Department of Civil Aviation (DCA) and the Marine Department Malaysia (MDM) as equivalent qualifications enabling registration with the BEM.

Aircraft Maintenance License (AML) holders (Cat B and Cat C) issued by DCA and Marine Engineers with Certificate of Competency Class 1, 2 and 4 issued by MDM may apply to be registered with BEM as Graduate Engineer, Engineering Technologist or Inspector of Works (Engineering Technician) depending on the type of license issued.



Academic and Professional Pathways

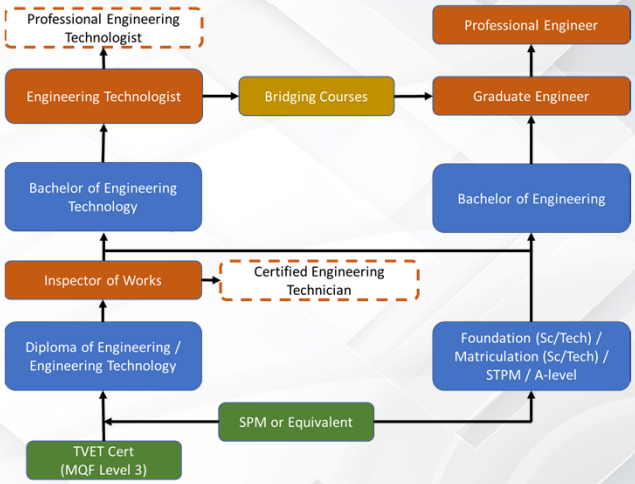
Holders of Diploma qualifications can further their studies by enrolling in a Bachelor of Engineering Technology or Bachelor of Engineering degree programme accredited by BEM. Credit transfer is possible but subject to type of programme and the credit transfer policy of individual Institutions of Higher Learning.



Academic and Professional Pathways

Graduates from an accredited Bachelor of Engineering Technology programmes are eligible to register with BEM as an **Engineering Technologist** allowing them to take up employment in providing engineering services.

Those who wish to further their professional development towards becoming a Professional Engineer may do so by taking up recognized bridging courses (approved top-up courses or a Master of Engineering by coursework) to qualify for registration as a Graduate Engineer. After three (3) years of work experience, a Graduate Engineer may apply to become a Professional Engineer.



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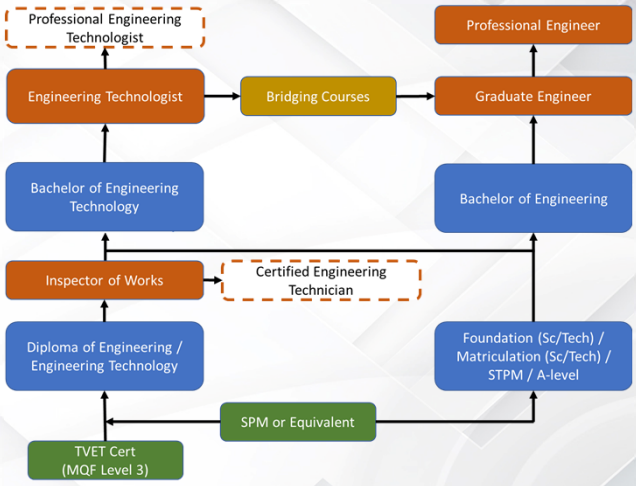
Academic and Professional Pathways

BEM's accredited engineering technology programs provide opportunity for continuous life-long learning and professional upgrading opportunities for various members of the engineering fraternity.

The BEM is currently in the process of establishing the **Professional Engineering Technologist** and **Certified Engineering Technician** status.



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Registration of IOW

Academic Qualification/ Equivalent

Subsection 10(E) stipulates the qualification for registration as an Inspector of Works with BEM. A person who holds any qualification which is recognized by the Board shall be entitled on application to be registered as Inspector of Works.

The recognized academic qualification for registration as an Inspector of Works with BEM includes the following:

1. Engineering Diploma awarded by Malaysia:

- Minimum Diploma in Engineering accredited by the Board's Engineering Technology Accreditation Council (**ETAC**).
- Minimum **Diploma in Engineering** accredited by Malaysian Qualification Agency (MQA) or equivalent recognised by BEM **(before 31st Dec 2018)**

2. Engineering Diploma awarded by Other Country:

- Diploma in Engineering accredited by professional body who are signatory of **Dublin Accord** is acceptable.

3. CAAM / DCAM Aircraft Maintenance License

- **Type Category B (without type rating)** of Aircraft Maintenance Licence (AML)

4. Certificate of Competency as Marine Engineer

- Third, Fourth (Junior Marine Engineer) or "holder of **Fourth Class Certificate of Competency** as Marine Engineer"

Registration of IOW/Technician

Academic Qualification/ Equivalent

Example :

3. CAAM / DCAM Aircraft Maintenance License

- **Type Category B (without type rating)** of Aircraft Maintenance Licence (AML)

Equivalent Qualification

Registration of IOW

IOW in Existing Practice

IOW In Existing Practice Before REA 2015

All **existing IOW** who were under employment of an ECP have the right to be registered with the Board during the transition period which was extended to **31st December 2018.**

After the deadline, existing IOW with the stipulated IOW qualification i.e. Diploma or Degree, with relevant site experience, can register as **IOW**.

Numerous applications for registration of IOW were received after the deadline and rejected due to the qualification criteria set. We were unable to accept non-engineering qualification for consideration after the transition period.

Registration of IOW

New IOW not Existing Practice

New IOW with **no supervision experience** registered as **Intern IOW** and work under the supervision of a registered IOW or Engineer/Eng. Technologist on site.

To register as IOW, the Intern IOW has to :

i. Complete **site experience**
   - Diploma holders – min. 2 years site supervision exp.
   - Degree holders – min. 1 year site supervision exp.

ii. to attend **BEM's approved IOW courses**,

iii. complete with the registration application at the end of his internship period with **experience and CPD records** verified/endorsed by PEPC.

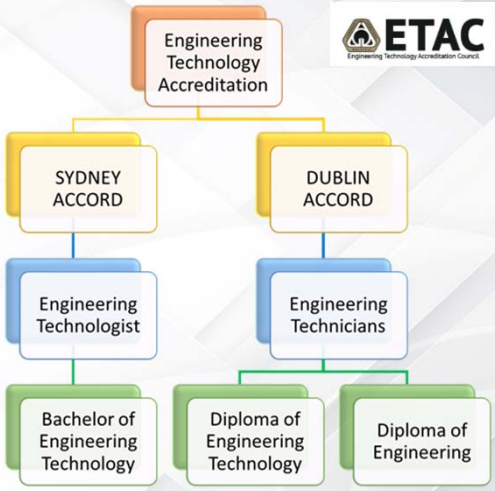
Accreditation and Recognition

ENGINEERING TECHNOLOGY ACCREDITATION COUNCIL (ETAC)

BEM established ETAC in 2015 as the only recognized accrediting body for engineering technology bachelor degree, engineering diploma and engineering technology diploma programmes offered in Malaysia.

The accreditation by BEM's ETAC also ensures the high quality and competency of graduates from engineering technology programmes at Bachelor's and Diploma level.

As a full signatory to the international Sydney Accord for engineering technologist and Dublin Accord for engineering technician education, BEM's accredited engineering technology programs are internationally benchmarked continuously to meet the high demands and expectations of the public from the engineering fraternity.



Recognition and Mobility

Educational Accords

I. Washington Accord
II. Sydney Accord
III. Dublin Accord

INTERNATIONAL ENGINEERING ALLIANCE

Competence Agreements

i. APEC Engineer
ii. International Professional Engineer
iii. International Engineering Technologist
iv. International Engineering Technician

International Engineering Alliance (IEA) - a global not-for-profit organization comprises members from 41 jurisdictions within 29 countries, across seven international agreements.

Standards for engineering education and expected competence for engineering practice.

Recognition and Mobility

INTERNATIONAL ENGINEERING ALLIANCE

Malaysia are signatories to the **Sydney and Dublin Accords** which falls under the umbrella of the International Engineering Alliance.

The Sydney and Dublin Accords were initiated to establish an international benchmarking for engineering technology qualifications at Bachelor and Diploma levels respectively and has developed statements of graduate attributes and professional competency profiles.

As of 2021, the Sydney Accord has eleven (11) full signatories namely Australia, Canada, Chinese Taipei, Hong Kong China, Ireland, Korea, South Africa, United Kingdom, United States, Malaysia and New Zealand. Another two (2) countries are provisional signatories namely Peru and Sri Lanka.

INTERNATIONAL ENGINEERING ALLIANCE

BEST PRACTICE IN ACCREDITATION OF ENGINEERING PROGRAMMES

Recognition and Mobility

Meanwhile, the **Dublin Accord has nine (9) full signatories** namely Australia, Canada, Ireland, New Zealand, Korea, South Africa, United Kingdom, United States and Malaysia.

A key benefit for holders of BEM accredited qualifications is that the programmes are recognized by other members of the international accords as 'substantially equivalent'. This makes it easier for qualification holders to gain professional registration in other countries, enhancing **internationally mobility and employment opportunities.**

INTERNATIONAL ENGINEERING ALLIANCE

Recognition and Mobility

INTERNATIONAL ENGINEERING ALLIANCE (IEA)

International Accords (BEM as Full Signatory)		Programme of Study (accredited by BEM)	Engineering Professions (BEM's registered person)
Washington Accord	BEM Programme Standard	Bachelor of Engineering	Engineers
Sydney Accord	BEM Programme Standard	Bachelor of Engineering Technology	Engineering Technologist
Dublin Accord	BEM Programme Standard	Diploma Engineering / Engineering Technology	Inspector of Works / Engineering Technicians

Accreditation and Recognition

ENGINEERING TECHNOLOGY ACCREDITATION COUNCIL (ETAC)

Two programme accreditation standards for use by Institutions of Higher Learning (IHLs) to meet the accreditation requirements namely:

Engineering Technology Programme Accreditation Standard 2020. This standard is applicable for Bachelor of Engineering Technology programmes.

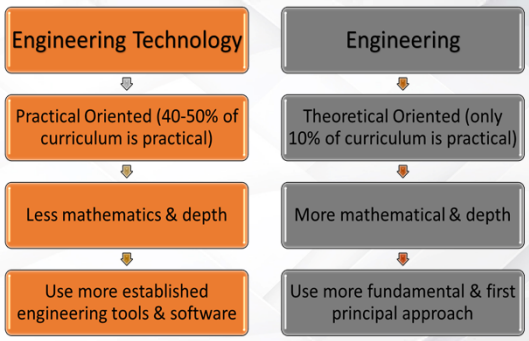
Engineering Technician Education Programme Accreditation Standard 2020. This standard is applicable for both Diploma of Engineering or Diploma of Engineering Technology programmes.

Accreditation and Recognition

ENGINEERING TECHNOLOGY vs ENGINEERING

An Engineering Technology (ET) programme of study has several differences from an Engineering programme. An ET programme uses a more practical (or applied) oriented approach for students to learn engineering subjects whilst a pure engineering programme will use a more theoretical approach. **ET students will do and perform more laboratory exercises and practical work to support the understanding of engineering subjects.**

A Bachelor of Engineering Technology program will have between 40-50% practical components in the curriculum. An engineering programme will have not more than 10% practical in its curriculum.



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Accreditation and Recognition

ENGINEERING TECHNOLOGY vs ENGINEERING

DEPTH OF KNOWLEDGE REQUIRED

ENGINEERING	ENGINEERING TECHNOLOGY	
Washington Accord Complex Problems	Sydney Accord Broadly Defined Problems	Dublin Accord Well defined Problems
In-depth knowledge that allows a fundamental-based first principles analytical approach	Knowledge of principles and applied procedures or methodologies	Solved using limited theoretical knowledge, but requires extensive practical knowledge

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ACADEMIC PROGRAMME ENTRY QUALIFICATIONS (1)

Students from a diverse academic background are eligible for entry into ETAC Diploma Level programme ranging from SPM, TVET Certifications (Level 3), Matriculation /Foundation and also MQA Accreditation of Prior Learning (APEL)

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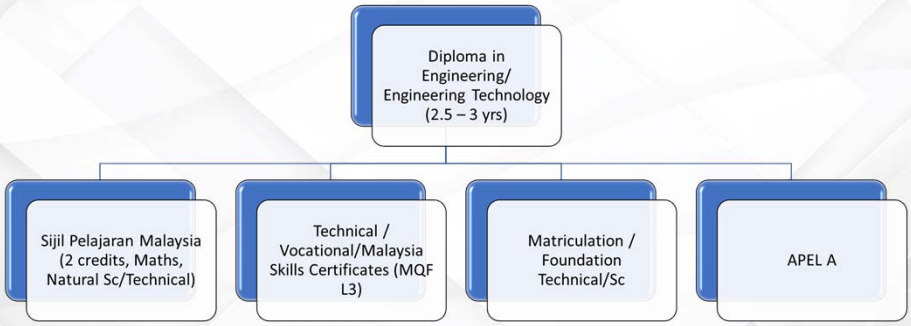

ACADEMIC PROGRAMME ENTRY QUALIFICATIONS (2)

For the Bachelor of Engineering Technology programme, the minimum allowable entry qualification ranges from a recognized Diploma (MQA Level 4), STPM, Matriculation / Foundation and also MQA APEL A.

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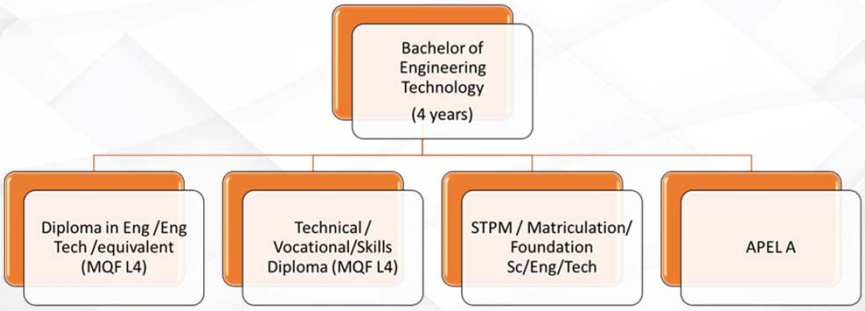

- Detailed and other additional entry requirements are however subject to intake policy of individual Institutions of Higher Learning (IHLs) offering the programme.

THANK YOU

Committed to Engineering Excellence

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