

## Prizes (with IEM Certificates)

**1<sup>st</sup> Placing: TBA**

**2<sup>nd</sup> Placing: TBA**

**3<sup>rd</sup> Placing: TBA**

**Consolation Prize: TBA**

**Certificate will be given to all participants**

Prizes for winners will be sponsored by Asian Pacific Confederation of Chemical Engineering (APCChE) in conjunction with the 19<sup>th</sup> APCChE Congress 2022

## Registration Fee

Malaysia team – IEM members RM250/team (there will be additional charges of RM10 per person for Non-IEM Members)

International team – USD100

## Deadlines\*

**TRAINING: TBA**

## **SUBMISSION OF:**

**PROGRESS REPORT - 31 May 2022**

**FINAL DESIGN REPORT – 30 June 2022**

**MANAGEMENT REPORT AND PRESENTATION**

**SLIDE - 31 July 2022**

## **DESIGN FINALE:**

**9 August 2022**

*\*Note: Date subject to change without prior notice*

## Registration

Please click the link below for registration.

[https://docs.google.com/document/d/1jk0\\_jRbc\\_QKmHQmij6OLh11RYzKJrAWYsYAJQEgvUbqA/edit](https://docs.google.com/document/d/1jk0_jRbc_QKmHQmij6OLh11RYzKJrAWYsYAJQEgvUbqA/edit)

## Organizing Committee

Chair:

Dr. Ang Wei Lun

### Co-Chairs:

Mr. Vincent Khaw Wei Chuen

Ms. Eunice Phang Siew Wei

### Committee members:

Ir. Dr. Chong Chien Hwa

Ir. Lee Teck Lii

Dr. Teow Yeit Haan

Ir. Assoc. Prof. Dr. Lee Tin Sin

Ir. Prof. Dr. Dominic Foo Chwan Yee

Ir. Thayananthan Balakrishnan

Dr. Ho Kah Chun

Ir. Mohammad Fadhli bin Mat Shah

Ir. Prof. Dr. Thomas Choong Shean Yaw

Dr. Hazlina bt Husin

Ir. Prof. Dr. Tee Tiam Ting

Mr. Mohd Fauzi Zanil

Mr. Mohamad Anwar Ahmad

Mr. Ong Wei Rex

## Enquiry

Chemical Engineering Design Competition  
2021/2022 Secretariat  
Ms. Nur Amira

Email: [amira@iem.org.my](mailto:amira@iem.org.my)

Tel. No.: 603–7968 4026

Chemical Engineering Technical Division  
The Institution of Engineers, Malaysia  
Bangunan Ingenieur, Lots 60 & 62, Jalan  
52/ 4, 46720 Petaling Jaya, Selangor Darul  
Ehsan.



**THE INSTITUTION OF ENGINEERS,  
MALAYSIA, IEM**

**&**

**ASIAN PACIFIC CONFEDERATION  
OF CHEMICAL ENGINEERING**

**10<sup>th</sup> IEM Chemical Engineering  
Design Competition**

**2021/2022**

**Valorization of Plastic  
Wastes Using Chemical  
Recycling Technology**

**Registration Closing Date  
15 April 2022**

## Organized by:

Chemical Engineering Technical  
Division (CETD)

Website: <http://iemcetd.blogspot.com/>

<https://www.myiem.org.my/>

Facebook:

<https://www.facebook.com/CETD.IEM>

Updated on  
12 April 2022

## Background

The design competition is initiated by Chemical Engineering Technical Division (CETD) of the Institution of Engineers, Malaysia (IEM) with the objective of enhancing the design competency practically and methodologically. This competition will provide an excellent opportunity for the students to meet and exchange ideas pertaining to the profession with practicing engineers.

The [19<sup>th</sup> Asian Pacific Confederation of Chemical Engineering \(APCChE\) Congress](#) will be held on 9-12 August 2022 with the theme of "Working Towards a Sustainable Society". APCChE Congress 2022 will be a unique platform for R&D experts, professional chemical engineers, academicians, and students especially from this Asia Pacific region and from all over the world to exchange their ideas and expertise in these research areas and foster collaborations for the benefit of the chemical engineering profession.

The 10<sup>th</sup> Chemical Engineering Design Competition 2021/2022 will be held by CETD in conjunction with the APCChE Congress 2022 to encourage the participation from local and international students and to provide a platform for them to exchange their ideas.

## Eligibility

All active chemical engineering students at diploma and degree levels from public and private institutions are eligible. Each participating team comprises up to 5 members from the same institution. Each institution can send up to 4 participating teams.

## Case Scenario

Recycling is one of the most effective approaches to reduce the impacts of plastic wastes on the environment. Generally, there are two common methods of recycling plastic waste, i.e. physical recycling and chemical recycling. The core principle of physical recycling of plastic wastes is a thermal process to heat and melt the thermoplastics into recycled resins which are low priced and quality. Nonetheless, physical recycling remains dominant in the industry due to low CAPEX while requiring simple technical skills to operate compared to chemical recycling. Chemical recycling is a process to break down the macromolecule chains of polymers into a spectrum of chemical molecules under high temperature and inert conditions. The products of chemical recycling include pyro-gas, pyro-oil, and pyro-char. Thanks to the advanced separation technology, high purity output compounds can be obtained and further supplied to the relevant industries as virgin compounds for production. On the other hand, residues such as oil and char can be used as fuel for heaters and building materials.

CETD Corporation is seeking recommendations from your company for the potential valorization of plastic wastes using chemical recycling technology. The recommendation should include an analysis of the technical, economic, health and safety aspects of the project. The plant should be able to process 10 to 100 metric tonnes per day of plastic waste. The design should attempt to employ new modular manufacturing methods which are becoming more common in the chemical process industry. Modular manufacturing is the concept that complete chemical processes or sub-sections of chemical processes can be prefabricated in a factory setting. By comparison, many existing chemical plants are "stick-built", meaning they were constructed outdoors at the plant site.

Modular manufacturing can offer several advantages such as quality control, increased worker safety and labor efficiency, cost savings, faster time-to-market, and scalable capacity.

Special issues to be addressed:

1. The types of plastic wastes should be limited from 1 to 6 according to the international resin code. The process of cleaning and preparation of plastic waste needs to be covered. The handling of wastewater during the cleaning process needs to be considered as well.
2. Since plastic additives are commonly used in plastic products. The robustness of the chemical recycling process to tackle such additives needs to be considered with design solutions.
3. Take into consideration the implementation of unitary modular manufacturing or parallel modular manufacturing. The assumptions made during the estimation of plant capital costs using correlations/correction factors for conventional, large process equipment should be noted and addressed in your report.

The design submitted shall be original and have not been previously submitted or published elsewhere. The proposed plant should have at least one reactor and at least one separation unit operation.

## Deliverables

### STAGE 1

(1) Progress Report (maximum 30 pages)

(2) Final Report (maximum 30 pages)

STAGE 2 (if and upon being shortlisted) DESIGN

FINALE

Details of deliverables can be found in the registration form.