INNO-VISION CHALLENGE

THEME

Synergising Chemical Engineering and Sustainable Microelectronics for a Greener Future

THEME DESCRIPTION

The microelectronics industry is the foundation of modern technology, powering essential devices from smartphones to advanced computing systems. Nonetheless, this advancement has incurred considerable environmental expenses. As the demand for more powerful and efficient microelectronics increases, so too does the energy consumption, resource depletion, and development of electronic trash (e-waste) linked to their manufacturing.

Microelectronics manufacturing, particularly semiconductor fabrication and nanomaterial synthesis, is among the most resource-intensive industrial processes, consuming significantly more energy than conventional material processing. The business significantly relies on essential raw minerals like gallium and indium, which are at risk of supply constraints within the next two decades due to increased demand and limited natural reserves. The improper disposal of microelectronic components, including printed circuit boards and semiconductor chips, contributes to environmental pollution and potential emissions from hazardous substances, with global waste projections reaching 74.7 million metric tonnes by 2030.

The production of microelectronics has considerable environmental consequences, including resource extraction, high energy consumption, and toxic emissions. Semiconductor etching, an essential process, depends on fluorinated gases such as CF_4 and NF_3, which possess significant global warming potentials. It also generates wastewater pollutants, including PFAS, which threaten water quality and public health. The escalating problem of e-waste underscores the necessity for more sustainable procedures in microelectronics industries.

The theme, "Synergising Chemical Engineering and Sustainable Microelectronics for a Greener Future," underscores the vital contribution of chemical engineering to promoting sustainability in the microelectronics sector. This theme promotes the integration of chemical engineering concepts with advanced green technologies, urging participants to create new, environmentally friendly solutions that mitigate environmental damage, enhance resource circularity, and foster a sustainable, low-carbon future. By addressing these challenges, this

theme aligns with key Sustainable Development Goals (SDGs), including SDG 9 (Industry, Innovation, and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action), fostering a more sustainable and responsible future for the microelectronics industry.

Key focus areas include:

- Identifying and creating safer, sustainable alternatives to hazardous compounds in microelectronics manufacturing, thereby mitigating toxicity and environmental dangers.
- Developing and implementing energy-efficient and low-carbon manufacturing techniques that optimize resource utilization, minimize emissions, and enhance overall efficiency in microelectronics production..
- Implementing effective recycling and resource recovery systems to recover valuable materials, prolong the lifespan of microelectronic components, and advance towards a circular economy.

This theme utilises chemical engineering expertise to push participants to devise practical and significant ways that integrate sustainability with technological progress. By integrating chemical engineering with sustainable microelectronics, we can create a more environmentally responsible future for the microelectronics sector.

OBJECTIVES

1. To enhance students' ability to think critically, analyze problems, and design effective solutions using engineering principles.
2. To identify real-world problems, analyze their causes, and develop innovative solutions that can contribute to a better society.
3. To expose participants to emerging trends, technologies, and real-world engineering challenges.

COMPETITION DESCRIPTION

- This is a **GROUP** competition, with **THREE (3) participants per team**, and will be conducted **via ONLINE**.
- Each institution may enroll a maximum of **FIVE (5)** teams in this competition.

- Participants must **identify a problem** and **develop an innovative solution**, detailing their idea, methodology, feasibility, and impact in the field of engineering.
- Participants must submit a **FOUR (4)** - minutes presentation video, showcasing their idea, including problem statement, solution, and technical rationale. All members should appear on camera during the presentation, demonstrating their ability to present their innovations.
- Participants must provide **ONE (1)** summary document, outlining key points from the video.

ELIGIBILITY

- This competition is open to all **individual legal residents of Malaysia** who are **secondary school** or **pre-university students** (including those in matriculation, foundation, A-levels, IB, STPM, or equivalent) in the year 2025.
- Participants must submit an **APPROVED** original copy of their **student identity card (Matric Card)** or a **letter from the school** confirming their enrollment together with the **LATEST module registration** file.
- Each participant in a team must be from the **SAME** school / institution.

FORMAT

- **Presentation Video Guideline:**
  - Language of video content: **English**
  - Dress code: **Formal / Smart Casual / School Attire**
  - The maximum length of the video: **4 minutes**
  - The videos must be in **MP4 or WMV format**.
  - The resolution must be at **minimum 1280 x 720 (720p)**
  - All members should appear on camera during the presentation, demonstrating their ability to present their innovations.
- **Presentation Guideline:**
  - Each team must submit a presentation slide in both **pptx** and **pdf**.
  - Maximum limit of presentation slides: **17 SLIDES** (including Front page and Reference)
  - References must be stated at the end of the presentation slides according to **APA 7th reference style**. The reference must include the following details: Author, Year, Journal title and Volume page number (if any).

- **Summary Guideline**:
  - A summary of not more than **250 WORDS** regarding the video should be attached along with the video submission together with the cover page (refer to the submission format).
- **Cover page**:
  - A cover page must be included in the **beginning of the video as a thumbnail** and the cover page (thumbnail) must also be submitted separately in **pdf form during video submission via email.**
  - Cover page should include:
    - Title of Video
    - Name of Institution
    - Full Name and Identity Card Number (Malaysian) of each participant (The name of the team leader should be placed first followed by members in alphabetical order)
    - Team Name
    - Contact Number and Email Address of each participant (The name of the team leader should be placed first)

RULES AND REGULATIONS

- Each institution is entitled to send a maximum of **FIVE (5)** teams.
- Each team must consist of **THREE (3)** members.
- For online competition, each team is entitled to **ONE (1)** submission only.
- The submitted work must be of original work. Plagiarism is **STRICTLY PROHIBITED**.
- Political and '3R'- Race, Religion and Royalty contents are **NOT ALLOWED.**
- Decisions by judges are **FINAL** and **NOT** open to appeal.
- Late submissions will not be entertained under any circumstances.
- Entries which do not comply with any one of the above rules will be **AUTOMATICALLY DISQUALIFIED .**
- Upon submission, any modification on the contents is not allowed. Evaluators have the right to penalise the participating team for the change of contents.

SOFT COPY OF PRESENTATION VIDEO SUBMISSION

Video Submission Guideline:

- Video submission deadline: **3 November 2025**
- Submissions can only be made **29 DAYS** before the submission deadline (**5 October 2025 - 3 November 2025)**.
- Upon the video submission, any modifications to the video contents are not allowed. Judges have the right to penalise participating teams for the change of content.
- All entries must be submitted in the required format together and reached the organiser (via email) before the submission deadline.
  - Video in **.mp4** or **.wmv**
  - Powerpoint in both **.pptx** and **.pdf**
  - Video Summary in **.pdf**
  - Video Cover Page in **.pdf**

Submission Format via email:

- To   : regnaces.usm@gmail.com
- Email Subject   : [Inno-Vision]_Name of Institution_Team Name
- Example   : [Inno-Vision]_SMK XXX_Team01
- **The submission MUST include:**
  (1) [Inno-Vision]_Name of Institution_Team Name_Video
  (2) [Inno-Vision]_Name of Institution_Team Name_Powerpoint
  (3) [Inno-Vision]_Name of Institution_Team Name_Summary
  (4) [Inno-Vision]_Name of Institution_Team Name_Cover
- **File name format:**
  (1) [Inno-Vision]_SMK XXX_Team01_Video
  (2) [Inno-Vision]_SMK XXX_Team01_Powerpoint
  (3) [Inno-Vision]_SMK XXX_Team01_Summary
  (4) [Inno-Vision]_SMK XXX_Team01_Cover
- All successful receipt of submissions will be notified via the provided email within 3 working days. If the participants do not receive any reply from us, please do not hesitate to contact the organizer.

JUDGEMENT CRITERIA

- **CONTENT (50%)**
  - Depth of Knowledge
  - Relevance and Impact
  - Clear problem definition (Problem statement and Objectives)
  - Logical Structure and Methodology (Flow of ideas)
  - Innovation and Originality
  - Accuracy of Information
  - Practical Feasibility
  - Persuasive Justification
  - System Integration
  - Safety and Sustainability

- **PRESENTATION (30%)**
  - Clarity and Delivery
  - Presentation Quality
  - Presentation Structure and References
  - Confidence and Personal Appearance
  - Team Collaboration
  - Language

- **VISUAL APPEAL (20%)**
  - Audio Quality, Editing and Pacing
  - Use of Visual Aids
  - Consistency and Cohesiveness
  - Use of Accessibility Features (Subtitles, Readable visuals, etc.)

RESULT

The winners of the Inno-Vision Challenge will be announced during the NACES 2025 Closing Ceremony.

PRIZES

1st place   : RM300

2nd place   : RM250

3rd place   : RM200

IMPORTANT NOTES

- Each participant must agree to be bound by the official contest rules. The organizer has all the rights to eliminate or disqualify any participants that violate the guidelines as stated above. Such actions may be taken by the host without any prior notice.

- The judges' decisions are final and any appeals to the decisions will not be entertained.

- Participants must complete the registration form by the **10 of October 2025** to be eligible for participation.

- Any changes on the confirmed participants' list must be informed before the **17 of October 2025**. Any changes after the date will not be entertained.

- Organisers will hold the right to publish submitted presentations for future publications without prior notice to the participants. Kindly notify the organiser if you have a patent or a copyright reserved.

- Registration fees are non-refundable.

- The contents of this booklet are subject to amendment and improvisation. Participants will be notified when the amendments are made.

CONTACT INFORMATION

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