

# Technical Visit to Knowles Electronics (M) Sdn. Bhd., Penang

ELECTRONIC ENGINEERING TECHNICAL DIVISION

reported by



Ir. Dr. Lee Choo Yong

IEM eETD organised a technical visit to Knowles Electronics (M) Sdn. Bhd. in Bayan Lepas Industrial Park, Penang, on 16 February, 2017. One of Knowles Corporation's main factories, it has been producing microphones since its establishment in 1989.

After the welcome remarks by Ir. Choon, Mr. Kee presented an overview of the Knowles organisation, the company history, product and application of hearing aid transducer, Micro Electro-Mechanical Systems (MEMS) microphone and engineering activities. Founded in 1946 by Hugh Knowles, a notable acoustic engineer, Knowles is currently a leading global provider of advanced voice and audio processors for mobile products. One of the most remarkable accomplishments of Knowles products was to amplify Neil Armstrong's words when he landed on the moon during the Apollo 11 mission in 1969.

Mr. Kee briefed the IEM delegates on the human ear structure and discussed some root causes of hearing impairment such as exposure to loud noise, age, birth defects and illnesses. Many types of hearing aid devices can be fitted to improve the hearing of a patient, such as behind the ear, in the ear, in the canal or cochlear implant. Knowles designs and develops microphones for these hearing aids.



Mr. Kee briefing IEM delegates on the human ear structure

Then, Mr. Kee talked about the use of the six sigma – Define, Measure, Analyse, Improve and Control (DMAIC) – and the "Theory of Inventive Problem Solving (TRIZ)" in the production and process development to meet high-quality manufacturing standards. He also presented the product development life-cycle where innovation played a crucial role from design to production. The duration of the product development life-cycle depends on the complexity of the product and requirements.

The engineering team in Penang is responsible for new products and process development (NPD), new-product introduction (NPI), product engineering, development of automated manufacturing and testing process to minimise production conversion time and therefore, increase productivity. Mr. Kee stressed that the development of human capital was essential in the product development life-cycle.

After the technical presentation, IEM delegates visited the production line to obtain the basic idea of manufacturing and testing of the microphone products. They were impressed with the fascinating automation processes developed by engineers in Penang which met the stringent specification and requirements of the products.



Mr. Kee said Knowles products have been used in mission-critical applications, including Apollo 11 mission in 1969



*Group photo at the end of the technical visit. Ir. Lee Choo Yong presenting a certificate of appreciation to Ir. Choon Kok Yuen.*

The delegates also visited the reliability testing laboratory which was equipped with a sound testing chamber. After the line tour, there was a Q&A session where IEM delegates had a chance to understand further about the processes and products they had seen earlier. Dr Leow Cheah Wei from eETD asked about the possibilities of a collaboration with IEM and Ir. Choon responded that there was a lack of engineers trained in the acoustic engineering and so, most of the engineers in Knowles are from a diverse engineering background and they acquired the knowledge in acoustic engineering through on-the-job training. Dr Leow, who is also on the industry advisory panel for Universiti Sains Malaysia (USM) said he would highlight to USM the opportunity to train students or engineers in acoustic engineering via academic-industry collaborations.

At the end of the visit, Ir. Lee presented a certificate of appreciation to Ir. Choon. ■