

# **Module Synopses**

## **Certificate in Engineering Drafting & Design (EDD)**

### **1. Computer-Aided Drafting**

This module provides the knowledge of interpreting and preparing engineering drawing of mechanical parts based on ISO Standard recommendations. Participants will be able to use Computer-Aided Drafting & Design (CADD) software to create parametric solid models of mechanical parts and generate the corresponding basic detailed drawings.

### **2. GD&T Applications**

This module is designed to introduce to students the language of Geometric Dimensioning and Tolerancing (GD&T). Students will study the GD&T symbols and its modifiers, interpret the meaning and learn how to apply them in drawings in relation to function and relationship. They will also appreciate the benefits GD&T brings, its strength and advantages. The course will also cover basic inspection methods of verifying GD&T using functional gauges, open setup inspection and special inspection machines.

### **3. Parts Design Engineering**

This module aims to examine the interactions between design and manufacturing from the designer's point of view. Common manufacturing processes will be introduced and design guidelines will be developed for parts made by the process. The successful student will develop a basic understanding of the impact his or her design decisions will have on those who attempt to make the product.

Students will apply design principles in the design of plastic and metal piece part using CAD software for analysis and communication of the design parts.

## **Certificate in Productivity & Quality Improvement (PQI)**

### **4. Industrial Engineering**

This module provides understanding of productivity as well as knowledge and skills in the basics of industrial engineering which enhances productivity of the enterprise. Topics include method study, work measurement, enterprise resource planning, scheduling and ergonomics. Concepts and techniques taught include hands-on practical sessions.

### **5. Quality Engineering & Management**

This module teaches students the basic concept of quality management, knowledge of quality system standard as well as quality tools and techniques. Students will understand the requirements of the various quality system elements in ISO 9001. Students will also learn various techniques and statistical tools employed for controlling and improving quality in manufacturing organisation, including Measurement Fundamentals, Failure Mode & Effect Analysis, Statistical Quality Control and Design of Experiments.

## **6. Tooling Engineering**

This module aims to equip students with an understanding of roles and important of Tooling Engineering in product development and manufacturing. Students will apply the working and basic design principles involved in sourcing quality tooling at the lowest cost such as fixture for machining, assembly and inspection fixture, mould and die for large volume manufacturing. Students will have an appreciation on the latest technologies used for tool development and fabrication processes.

### **Certificate in Computer Aided Manufacturing (CAM)**

## **7. CNC Turning Technology**

Provides students with a working knowledge on CNC Turning Centers. It covers the CAD/CAM application aspect on CNC Turning Components. Together with the practical session on Measurements, the module integrates the key manufacturing activities from Design, Manufacturing to Inspection of Precision Turning components.

## **8. CNC Milling Technology**

Provides students with a working knowledge on CNC Machining Centers. It covers the CAD/CAM application aspect on CNC Milling Components. Together with the practical session on Measurements, the module integrates the key manufacturing activities from Design, Manufacturing to Inspection of Precision Milling components.

## **9. Multi-axis Machining Applications**

Provides Application knowledge on Advanced CNC Multi-axis Machining Technology. This covers job planning, work holding, tool selection and development of machining sequences which lead to the achievement of precision component parts specifications. The smart factory concept with integrated machines will be introduced to prepare students to be Industry 4.0 ready.

### **Certificate in Manufacturing Technology (MFT)**

## **10. Manufacturing Processes**

This module introduces various manufacturing processes adopted in the industries from the conventional processes to the net-shaped manufacturing processes and the advanced manufacturing processes such as additive manufacturing. Students will acquire the fundamental knowledge of these manufacturing processes, their capability and limitations, and the selection/application of manufacturing processes for any given product.

## **11. Data Analytics for Advanced Manufacturing**

This module provides students with an introduction to statistical and data analytics concepts that lay the foundation to understand statistical procedures and methods commonly used in the analysis of big data. The topics covered include descriptive statistics, probability distributions of discrete and continuous random variables, sampling distributions, statistical estimation,

regression, predictive modelling, clustering and association. Students will learn to use statistical and data analytic software tools for data analysis.

## **12. Automation & Robotics in Advanced Manufacturing**

This module provides up-to-date working knowledge and skills of implementing automation and robotics technologies in the manufacturing industry. It covers the fundamental concept, system architecture, functionalities, benefits and application areas. Related software, electronic hardware components and sub-systems including programming and configuration skills and the implementation methodology of automation and robotics system will also be introduced. The smart factory concept is introduced to prepare students for advanced manufacturing.

### **Certificate in IoT in Manufacturing (IMF)**

## **13. IoT Systems and Design**

This module aims to cover pervasive connectivity and architecture needed to deploy IoT systems in Advanced Manufacturing that enable collaboration across multiple sites. Topics covered include networking technologies and protocols, IoT architecture and infrastructure, wireless sensor network, network cloud and systems security. Looking into IoT applications, case studies and examples of Smart Factory are discussed too.

## **14. PLC for Advanced Manufacturing**

This module aims to provide students with a step-by-step approach of implementing an automation system in an advanced manufacturing setting. The basics of PLC (Programmable Logic Controller) will be covered, and it will involve programming, identifying appropriate I/Os, I/O interfacing and power rating considerations, programme testing and system trouble-shooting. Students will also learn the full process of implementing a PLC-based advanced manufacturing project.

## **15. Industrial IoT**

The module covers various digital technologies in Advanced Manufacturing. Topic includes networking of PLC with peripheral devices. Practical sessions will include configuring and programming a PLC system for automation tasks with web based and mobile apps information services. Condition monitoring with wireless sensors and data analytics will also be covered.