

Precision Engineering Workforce Skills Qualifications (PE WSQ) Specialist Diploma

Course Duration

- 1-year part-time course consists of 5 modules. Participants need to complete 5 modules (all 4 Core Modules, and 1 Elective Module) to be awarded the Diploma.
- Up to three evenings per week from 6.30 pm to 9.30 pm

Course Fee

The current course fee is S\$11,500 (exclusive of GST). For Singaporeans and PRs, 90% subsidy (exclusive of GST) may be applied from WDA.

Core Modules

M1: Apply Injection Moulding Tool Design

Introduction

Polymeric materials are widely used in all walks of our lives. In recent years, owing to the advancement of materials and process technologies, more applications using polymeric materials have been found in high-precision industries such as automotive, aerospace, photonics, information technology and medical devices. To tap on these opportunities, it is essential for industry professionals to have a good understanding of polymeric materials and its properties as well as process technologies that are available. This course aims to provide participants with essential practical skills on polymeric materials' processing properties, injection moulding and mould design technologies.

Course Outline

1. Apply the principles of cavity mould
2. Design an optimum runner system and ejection system
3. Design tools for injection moulded plastic products

M2: Employ Laser for the PE Industry

Introduction

Laser applications in the manufacturing industry are increasingly widespread ranging from laser welding of components, laser colour marking of materials and laser surface hardening, among many others. This laser course will provide participants with an overview of how lasers are being incorporated in modern manufacturing environments as well as the fundamentals of laser technology, hands-on applications and safety in operating lasers, etc.

Course Outline

1. Select laser cutting technology
2. Prepare laser cutting equipment and materials
3. Convert, analyse and validate CAD/CAM files
4. Operate laser cutting system equipment
5. Operate laser welding system equipment
6. Operate laser surface modification system equipment

M3: Knowledge Based High Speed Machining

Introduction

Low cost and high quality products are always in demand and manufacturers are constantly looking for ways to enhance their productivity. High Speed Machining (HSM) is a manufacturing process that helps companies stay competitive by eliminating waste and maintaining high-quality standards. This course will cover the various high speed machining technologies that are available.

Course Outline

1. Identify job needs and obtain instructions
2. Observe safety precautions
3. Prepare for computer aided HSM
4. Manipulate 2D and/or 3D models
5. Fundamentals of high speed machining
6. Produce and manage HSM code files
7. Conduct pre-start checks
8. Operate and monitor process for trial program and correct variations

M4: Employ Advanced Metal Forming and Casting Technologies

Introduction

Bulk forming and casting are some of the principal processes for producing metal components in a wide range of engineering applications. This course will provide participants with better understanding of advanced, high quality forming and casting methods for bulk metals and will offer opportunities for hands-on experience with some of these technologies.

The course also covers forming technologies in manufacturing bulk-metal components including cold forging and cold rotary forming of light metal and steels, FEM simulation technology, heat treatment and metallurgy for bulk metal forming as well as casting technologies used on aluminium alloys. Participants will gain insight into achieving high accuracy and quality in formed components, material performance, process characteristics and manufacturing cost. The course will include hands-on experiments, operation and study on the equipments available in SIMTech.

Course Outline

1. Fundamentals of bulk metal forming
2. Cold forging
3. Cold form rolling and flow forming
4. Computer Aided Engineering simulation for metal forming
5. Metallurgy and heat treatment for bulk metal forming
6. Casting of aluminium alloys

Elective Modules

E1: Materials Characterisation for Manufacturing

Introduction

This unit will introduce commonly used techniques for materials characterisation and testing in the manufacturing industry.

It will be focused on material properties measurements: mechanical properties, optical properties, electrical properties, chemical properties, and thermal properties.

Course Outline

1. Dimensional metrology
2. X-ray characterisation
3. Scanning Electron Microscopy and X-ray microanalysis
4. Microscopy and spectroscopy techniques
5. Mechanical testing
6. Thermal analysis
7. Metallography

E2: Apply Powder Metallurgy and Powder Injection Moulding Technologies

Introduction

Powder Metallurgy (PM) and Powder Injection Moulding (PIM) are vital technologies for the modern global economy in net- and near-net shape manufacturing of quality metal and ceramic parts in precision engineering, consumer goods, transportation, healthcare, defence, and aerospace. In this module, participants will learn the basic principles and practical techniques related to PM and PIM covering issues related to materials, processing steps, design, quality assurance, engineering properties and costs.

Course Outline

1. Powder and its production and characteristics; techniques of powder characterisation
2. Basic principles, material issues, equipment and techniques related to mixing, compaction and sintering processes of PM and PIM
3. Capability and limitations of PM and PIM
4. Alternate powder-based processes and advanced processes
5. Selection of secondary processes for obtaining desired final properties in PM and PIM components
6. Property evaluation of PM and PIM components
7. Materials selection and design guideline primer for PM and PIM components
8. Comparison of PM/PIM to other competing technologies and review the economical advantages of PM/PIM

E3: Cutting Tool Technology

Introduction

Well selected cutting tools with correct tool geometries will lead to producing high quality and accurate components or parts.

This course will provide participants with cutting edge technology know-how and information on how quality cutters with the right tool geometry can be manufactured. Participants will also learn how to use state-of-the-art tool & cutter grinder to verify and generate cutting tools of excellent quality using the advanced grinding software.

Course Outline

1. Review of basic knowledge of cutting technology
2. Cutting tool technology
3. Cutting edge failure
4. Tool management
5. CAD/CAM technique for cutting tool manufacturing
6. Tool material selection