Altair | **UTM** UNIVERSITI TEKNOLOGI MALAYSIA | School of Professional and Continuing Education (SPACE)

PROFESSIONAL CERTIFICATE

DESIGN AND OPTIMIZATION IN ADDITIVE MANUFACTURING

(3D PRINTING TO THE INDUSTRIAL FLOOR)

INTRODUCTION

The key success for local manufacturers to sustain and to survive in global competitive challenge is to modernize technology and development process capacity and capability in manufacturing. This requires local manufacturers to enhance simulation driven design and optimization technology in the area of Additive Manufacturing (AM) to manufacture high technology components at competitive cost and lead time.

With additive manufacturing as one of the nine pillars in Industry 4.0, it is necessary for local manufacturers to enhance and to develop in house simulation driven design and optimization capability in Additive Manufacturing (AM) area in order to innovate and to improve existing manufacturing technology towards lightweight products without compromising strength and performance. Additive manufacturing covers many application areas including aerospace components, electronics, medical devices, architectural designs, and consumer products. Therefore, participants will take part in lab sessions that will provide hands-on experience with a state-of-the art 3D Printing technology.

Optional Courses

(24 - 25 October 2019) 2 DAYS
ADVANCED SIMULATION ENGINEERING
An Engineering Design Programme

(15 -16 August 2019) 2 DAYS
COMPUTER AIDED INDUSTRIAL DESIGN (CAID)
An Engineering Design Programme

(27 - 28 June 2019) 2 DAYS
RAPID PROTOTYPING & 3D PRINTING
An Engineering Design Programme

CORE COURSES

DESIGN AND OPTIMIZATION IN ADDITIVE MANUFACTURING
An Engineering Design Programme

3 DAYS
8 - 10 july 2019
9am - 5pm

UTMSPACE, Level 2 (Podium), Residensi UTM Kuala Lumpur, No 8, Jalan Maktab, 54000 Kuala Lumpur, Malaysia.

* Compulsary course as to accomplish full certification programme

* *Compulsary program as to accomplish your full Professional Certification program*
* *Each participant required to complete minimum 3 courses to obtain their full certification*
* *Assesment will be given for each course*
* *Certificate of Accomplishment will be awarded for each course*
* *Assessment : 60% - 70% (test, cases studies and in-class activities)*
* *Participants must attend all classes and fulfill course requirement*
* *Software / Endorsement from Altair (as per request from Altair & UTMSPACE)*

UTMSPACE UTMSPACE is a Training Provider under HRDF (Reg. No. 0902)
IN-HOUSE Courses can be designed in accordance with organizational requirements

HRDF Claimable

INTRODUCTION

The basic of sustainability and success in global competitive challenge is to modernize technology along with development process capacity and capability in components manufacturing. This requires the enhancement of simulation driven design and optimization technology to manufacture high technology components with competitive cost and lead time.

TARGET AUDIENCE/ PARTICIPANTS

- Engineer / RnD Engineer
- Manufacturing Engineer
- CAE/ Design Engineer
- Mechanical Engineer
- VP's of Product Development and Manufacturing
- Technologies and Innovation Strategist

COURSE OUTLINE

DAY 1

1. Additive Manufacturing
> Different technologies
> Why AM, advantage of AM, current trends in AM, etc.
> Identification of parts for AM
> AM Part Design workflow

2. 3D Printing vs Topology Optimization
> How to get added value for 3D Printing

3. Inspire hands-on Training, Inspire Introduction & Model Setup
> Sketching and Styling for Design Modelling Process
> Process Flow for Concept Design Generation
> Exploration on Structurally Efficient Concept

Day 2

4. Topology Optimization
> FEA
> Optimization Basics
> Topology Optimization
> Polynurbs modelling
> Design interpretation & verification

OBJECTIVE

These 3 days course will be using Altair's Solidthinking INSPIRE as a simulation driven design and optimization solution, to solve challenging design problems and can be interface to existing CAD tools for shape and size refinement.

OUTCOME

- Participant will be able to demonstrate driven design method approach in manufacturing process for industrial product
- Participant will be able to develop and investigate structural concept efficiently according to the given material design layout and producing industrial product through additive manufacturing process
- Exposure to the FFF technology type of 3D printer and its configuration

5. Inspire hands-on Training:
> Analysis, Connection & Topology Optimization
> 3D Modelling and Editing
> Industrial driven lecture

6. Technology Demonstration
> Individual & Tutorials

Day 3

7. General Design Guidelines for AM
> Geometry considerations
> Material property considerations
> General design alerts

8. DFAM for FDM, SLS & DMLS
> Key design considerations
> Support design
> CAD design & file conversion
> Effects of build orientation & Mid-build inserts

9. Case Studies & Discussion
> Airline seat buckle – how DMLS is used to create lighter parts in mass transit aircrafts
> Bicycle pedal – supports vs orientation

10. Lattice Optimization, Topography, Gauge Optimization; Polynurbs

11. Hands-on Session
> Interactive Video Session
> Individual Tutorials.
> Individual Assessment

Fees per pax
RM 2390.00

INTRODUCTION

Rapid prototyping is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD) data. Construction of the part or assembly is usually done using 3D printing or "additive layer manufacturing" technology

TARGET AUDIENCE/ PARTICIPANTS

- Product Designer
- Architect / Industrial Designer
- Engineering Designer/ Junior Designer
- Senior Designer and Engineering Designer
- Technologies and Innovation Strategist
- Creative Managers
- RnD Engineer/ Senior Technician

COURSE OUTLINE

DAY 1

1. Introduction to 3D Printing (FFF)
> What is FFF 3D Printing
> Historical Development
> FFF Vs FDM Technology
> Applications

2. 3 Design
> Basic of 3D Design
> Designing 3D object for FFF 3D printing
> FFF 3d printing advantage and limitation
> Product Analysis

3. Rapid Prototyping Process Chain
> 3D Modeling (CAD)
> Data Conversion
> Post Processing
> 3D Printing Execution

4. Materials Selection
> Size of Filament
> Type of Filament Material
> Strength of Material
> Material Issues

OBJECTIVE

3D printing or additive manufacturing is a process of making three dimensional solid objects from a digital file. The creation of a 3D printed object is achieved using additive processes. In an additive process an object is created by laying down successive layers of material until the object is created.

OUTCOME

- Understand the process of rapid prototyping
- Able to enhance the capability of uses on the 3D Printing
- Learn the limitation and set back of 3D Printing
- Acquires knowledge of additive manufacturing process from 3D Printing

DAY 2

5. 3D Printing Software Setting – Cura
A. Quality
> Layer height
> Shell thickness
> Enable retraction

B. Fill
> Bottom/Top thickness
> Fill Density

C. Speed and Temperature
> Print speed

D. Support
> Support type
> Platform adhesion type

6. 3D Printing Machine Operation
> Machine Button and Function
> Material installation
> Upload printing file
> Run machine

7. Demonstration of 3D Printing

Fees per pax
RM 1590.00

COMPUTER AIDED
INDUSTRIAL DESIGN

ADVANCED SIMULATION
ENGINEERING

INTRODUCTION

Industrial Designers need to develop forms faster and explore various styling alternatives. Visualisation of products with realistic renderings generated in real time is a must-have tool for Industrial Designers to evaluate their design.

TARGET AUDIENCE/PARTICIPANTS

- Product Designer
- Industrial Designer
- Engineering Designer
- Junior Designer
- Senior Designer and Engineering Designer
- Technologies and Innovation Strategist

OBJECTIVE

Learn to use high quality 3D Hybrid Modeling and Rendering Environment in Evolve to evaluate, research, and visualized various designs faster and more efficiently.

OUTCOME

- Participant able to work design process with in digital workflow
- Manage to design an initiate revision and design output within industry standard
- Synthesize design ideas with digital modeling by working with computer aided design modelling technologies which related to manufacturing and prototyping process

INTRODUCTION

Design engineers, product designers, and architects need to create and investigate structurally efficient concept designs quickly and easily.

TARGET AUDIENCE/PARTCIPANTS

- Product Designer
- Architect
- CAE/ Design Engineer
- Engineering Designer
- Senior Engineering Designer
- Manufacturing Engineering
- Mechanical Engineer
- RnD Engineer

OBJECTIVE

Learn how to use INSPIRE to assign motion-generated forces as boundary condition inputs for structural FEA and analyse design concepts.

OUTCOME

- Ability to estimate and validate a model based upon input and output data
- Able to create model production based on new input and output data
- Ability to comprehend and apply advance theory based and understanding of engineering fundamental and to predict effect on engineering activities
- Able to conduct simulation study on complex engineering and development process

COURSE OUTLINE

DAY 1

1. User Interface

- > Modelling Views
- > Working Modes
- > Modelling Toolbar and Tool Panel
- > World Browser and Consturction Tree
- > Transformation

2. Curves and 2D Modelling Tools

- > Curves Tab
- > Free-form Curves
- > NURBS Curve
- > MetaCURVE
- > Open Polyline
- > Rounded Polyline
- > Modelling Techniques

DAY 2

3. Surfaces and 3D Modelling Tools

- > Surfaces Toolbar
- > Make Manifold
- > Intersect
- > Boolean Operations
- > Blend Surface
- > MultiSweep
- > Skin
- > Birail
- > Loft
- > RadialSweep
- > Round
- > PolyNURBS

4. 3D Modelling and Rendering Methods

- > Material Browser
- > Rendering Workflow
- > Perspective Camera
- > Lights
- > Interative Rendering
- > Rendering Methods

COURSE OUTLINE

DAY 1

1. Introduction to Inspire

- > Mouse controls
- > Interface Overview

2. Model Setup

- > Setup Toolbar
- > Loads
- > Enforced Displacement
- > Load Cases
- > Materials

3. Analysis

- > Introduction to Analysis
- > Run Analysis Settings
- > Run History and Status
- > Analysis Results

4. Connections

- > Connections Toolbar
- > Fasterners
- > Joints
- > Connectors
- > Spot Welds
- > Contacts

5. Inspire Manufacture Introduction

- > Introduction to Manufacture
- > Run Analysis - Porosity
- > Result Types for Porosity
- > Run Analysis - Thinning
- > Result Types for Thinning

DAY 2

6. Surfaces and 3D Modelling Tools

- > Ground Parts and Rigid Groups
- > Joints
- > Analysis and Results
- > Motors
- > Actuators
- > Profile Editor
- > Springs and Dampers
- > Loading for Analysis
- > Debugging

TRAINERS

Mohd Nurul Amin

Graduated from Universiti Teknologi Petronas, Malaysia, with B. Eng (Hons) Mechanical Engineering. He has 9 years of experience involving various high-tech industries such as automotive, aerospace, rail and renewable energy specializing in Finite Element Analysis (FEA/CAE), Engineering Design (CAD) and Project Management.

He was involved with various projects as FEA/CAE engineer for 3 years in automotive particularly in Static Metallic and Fatigue. He also play an important role in FEA/CAE model validation for Airbus A350 XWB for 1 year. Looking forward with the opportunity he had, he then joined Scomi Engineering Bhd and involved with KL, Brazil, and Mumbai Monorail projects as Senior FEA Engineer. Trusted with his capabilities and eager to take new challenges, recently he was given the responsiblity to manage a multi-million-ringgit large scale solar farm project in Kedah.

Ahmad Taufiq Abdul Rani

BSC (Hons) Industrial Product Design, Aston University UK, Msc Manufacturing System, UPM. Currently working on 3D printing business and technical training industry. He has more than 20 years experience in rapid prototyping technology from small to large scale industries and education sector. Works with well-known rapid prototyping solutions provider such as STRATASYS, 3D SYSTEM, OBJET ULTIMAKER, etc.

REGISTRATION FORM

To confirm your registration, please complete this form including payment.

*DETAILS OF PARTICIPANT ATTENDING THE COURSE:

No.	Name of Participant	Mobile No.	E-mail Address	NRIC (for HRDF claim)	Fee (RM)

(Please attach a separate list if necessary)

*UTMSPACE respects the privacy of its customers with regards to personal data. For further details, please visit : www.utmspace.edu.my/pdpa

Total _____

SPONSORSHIP : ☐ Self-Sponsored   ☐ Company-Sponsored

INDIVIDUAL / COMPANY DETAILS (for issuance of invoice) :

Organisation : _____

Co. Reg. No* : _____ * if applicable

Address : _____

_____

Contact Person : _____

Tel No. : _____   Designation : _____

Fax No. : _____   E-mail : _____