



## Finite Element Analysis using Hypermesh & ANSYS Mechanical APDL

Course Curriculum (Duration: 120 Hrs.)

### Section I: Hypermesh

#### Chapter 1: Introduction to FEA

- a. Introduction to Finite Element Analysis
- b. Basic steps in Finite Element Analysis
- c. FEM methods and detailed explanation of any one method
- d. Types of analysis
- e. Basic element study: 1D, 2D, 3D
- f. Shape Function
- g. Derivation of Stiffness Matrix Equation

#### Chapter 2: Introduction to Hypermesh

- a. About Altair HyperWorks and its products
- b. About Hypermesh
- c. Consistent Units
- d. Getting Started With HyperMesh
- e. Opening and Saving Files
- f. Working With Panels
- g. Organizing a Model
- h. Controlling the Display
- i. Workshop

#### Chapter 3: Geometry Clean-up

- a. Hypermesh Geometry Terminology
- b. Importing and Repairing CAD Geometry
- c. Generating a Midsurface
- d. Simplifying Geometry
- e. Midsurface
- f. Defeaturing

#### Chapter 4: Shell Meshing

- a. Automeshing
- b. Checking and Editing Mesh
- c. 2D Shell Meshing and Topology Refinement
- d. Refining Topology to Achieve a Quality Mesh
- e. Batch Meshing
- f. Element quality checks

#### Chapter 5: 3D Solid Meshing

- a. Standard Tetra Meshing
- b. Volume Tetra Meshing
- c. Tetrameshing
- d. Using The Tetramesh Process Manager
- e. Element quality checks

### **Chapter 6: 1D Meshing and Connectors**

### **Chapter 7: Analysis Setup and Loading**

- a. Setting up Loading Conditions
- b. Analysis Setup and Loading

### **Chapter 8: Exporting and Solving**

- a. Exporting FE data to various Solvers like ANSYS, LS Dyna and Radioss
- b. Postprocessing

### **Chapter 9: Introduction to HyperView**

- a. Basic interaction with HyperView
- b. Animation, Plot, Video and Text Windows
- c. Animating data in Animation, Plot and Video Windows
- d. Loading Animation Files
- e. Model display attributes and organization
- f. Window display and mouse options
- g. Results Visualization: Contour, Deformed, Iso Surface, Tensor and Vector Plots

## **Section II: ANSYS Mechanical APDL**

- a. Static Structural Analysis**
  - Definition & Purpose
  - Terminology & Concepts
  - Procedure
  - Workshop - Static Analysis
  
- b. Modal Analysis**
  - What is modal analysis
  - Need of modal analysis
  - Free free run
  - Post processing technique
  - Presentation preparation based on result
  
- c. Harmonic Analysis**
  - Definition & Purpose
  - Terminology & Concepts
  - Procedure
  - Workshop - Harmonic Analysis

**d. Random Vibration Analysis**

- Definition & Purpose
- Terminology & Concepts
- Procedure
- Workshop - Harmonic Analysis

**Non-Linear Analysis**

- a. What is Nonlinear Behavior?
- b. What is Nonlinear Behavior
- c. Nonlinear Solution Using Linear Solvers
- d. Three Types of Nonlinearities
- e. Nonlinear FEA Issues
- f. General Nonlinear Analysis Procedure
- g. Nonlinear Controls
- h. Output Controls
- i. Postprocessing

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