IFS ACADEMY

Training For The Future!!

Introduction to Computational Fluid Dynamics using

ANSYS Workbench & FLUENT

Instructor-Led Online Training

Course Curriculum

(Duration: 40 Hrs. including Lectures & Practicals)

➢ **Engineering the Future:**

- CAD, CAE (CFD & FEA), and CAM, applications, and scope in industry and research.

➢ **Introduction of Computational Fluid Dynamics (CFD)**

- **Governing Equations:** Conservation of mass (continuity), momentum (Navier-Stokes), and energy. Assumptions and simplifications (incompressible vs compressible, steady vs transient).

- **Compressible vs Incompressible Flow Setups in ANSYS Fluent:** Ideal gas vs constant density models. Selection of appropriate solvers and energy models.

➢ **Introduction of ANSYS Workbench, FLUENT & ANSYS Products**

- **Geometry and Meshing:** Geometry creation (basic shapes to complex CAD import) Mesh generation: structured, unstructured, inflation layers Mesh quality and refinement strategies.

- **ANSYS WORKBENCH**
    a. ANSYS Workbench
    b. Workbench Overview
    c. Basic Workflow
    d. Alternate Workflow
    e. Cell States
    f. Sharing Data between Different Solvers
    g. File Location on Disk
    h. Use of Archive / Restore
    i. Working with Parameters / Refresh and Update

- **SpaceClaim**
    a. What is SpaceClaim?
    b. Launching SpaceClaim
    c. Space Claim Interface
    d. Tree Outline
    e. Details View
    f. Status / Info Bar

      g. Toolbars: Selection Tool

      h. Toolbars: View Controls

- **Mesh Quality**
  - a. Impact of the Mesh Quality
  - b. Impact of the Mesh Quality on the Solution
  - c. Grid Dependency
  - d. Hexa Vs. Tetra
  - e. Mesh Statistics and Mesh Metrics
  - f. Mesh Quality Metrics
  - g. Mesh Quality
  - h. Aspect Ratio
  - i. Smoothness
  - j. Mesh Metric Graph
  - k. Section Planes
  - l. Mesh Quality Check for Fluent

- **Simulation Setup in ANSYS Fluent:** Setting material properties, Defining cell zones and boundary types, Solver settings: steady/transient, pressure-velocity coupling, Use of monitors and initialization.

- **Post-Processing Workflows:** Contours, vectors, streamlines, surface/volume integrals Report generation (forces, heat transfer, flow rates).

Sr. No.	Name of Projects
1	**Internal Flow Analysis of a Mixing Tee** - Geometry and mesh generation for T-junction - Steady-state laminar/turbulent flow simulation - Velocity and pressure distribution - Effect of inlet velocity ratio - Use of contours and streamlines
2	**Fluid Flow and Heat Transfer in a Mixing Elbow** - Conjugate heat transfer between fluid and solid elbow - Temperature and velocity profile development - Wall heat flux analysis - Use of energy model and thermal boundary conditions

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