

CFD MODELLING (FIRE, SMOKE, & HEAT BEHAVIOUR)

“Simulate. Predict. Protect. Master Fire Behaviour through CFD.”

Schedule

Venue	Fees
In-House	ASK FOR THE QUOTATION

► **Available delivery methods:** In-House Training

Introduction

Computational Fluid Dynamics (CFD) modeling plays a crucial role in predicting fire, smoke, and heat movement in built environments, tunnels, and industrial facilities. This technical course provides fire safety engineers, emergency planners, and researchers with a practical and theoretical understanding of CFD tools—such as FDS (Fire Dynamics Simulator)—to simulate fire scenarios, assess smoke control measures, and enhance fire safety design.

Objectives

Participants completing this course will be able to:

- Understand fire, smoke, and heat transfer fundamentals within CFD frameworks
- Use Fire Dynamics Simulator (FDS) and Smokeview for fire behavior modeling
- Set up geometries, meshes, combustion models, and ventilation strategies
- Analyze and validate CFD results for fire safety applications
- Apply CFD to real-world case studies for fire investigation or design

Why Attend

Traditional fire modeling cannot capture the complexity of fluid motion, smoke layers, and heat flux. This course enables participants to simulate and visualize fire events for better engineering decisions, safety audits, and post-incident reviews.

Target Audience

- Fire protection engineers
- Safety consultants and investigators
- CFD specialists and building designers
- Fire & rescue service planners
- Risk assessment professionals

Individual Benefits

- Acquire hands-on experience with leading CFD software (FDS/Smokeview)
- Increase technical competence in fire and smoke simulation
- Understand fire modelling’s role in passive and active fire design
- Expand your portfolio in fire safety engineering

Organizational Benefits

- Improve design validation and compliance with fire codes
- Model realistic fire and smoke scenarios to guide emergency planning
- Reduce costs of physical testing with simulation-based analysis
- Enhance investigative capabilities in fire incidents

Instructional Methodology

- Theory-based sessions and interactive CFD demonstrations
- Step-by-step software tutorials using real case examples
- Hands-on lab exercises and simulation assignments
- Group discussion and model validation techniques

Course Outline

5-DAY DETAILED COURSE OUTLINE (CUSTOMIZABLE)

Training Hours: 7:30 AM – 3:30 PM

Daily Format: 3–4 Learning Modules | ☕ Coffee Breaks: 09:30 & 11:15 | 🍽️ Lunch Buffet: 01:00 – 02:00

Day 1: Introduction to Fire Modelling & CFD

- Module 1: Fundamentals of Fire Dynamics (07:30 – 09:30)
- Module 2: Basics of Heat Transfer, Combustion, and Smoke Movement (09:45 – 11:15)
- Module 3: CFD Principles & Navier-Stokes Equations Simplified (11:30 – 01:00)
- Module 4: Overview of Fire Modeling Tools – FDS, Smokeview, Pyrosim (02:00 – 03:30)

Day 2: Getting Started with FDS

- Module 1: Installing and Navigating FDS and Smokeview (07:30 – 09:30)
- Module 2: Building a Basic Fire Scenario: Room Geometry & Mesh Design (09:45 – 11:15)
- Module 3: Defining Materials, Fuels, and Combustion Models (11:30 – 01:00)
- Module 4: Visualizing Results in Smokeview – Temperature, Smoke, Visibility (02:00 – 03:30)

Day 3: Advanced Scenario Modelling

- Module 1: Ventilation, HVAC, and Pressure Zones (07:30 – 09:30)
- Module 2: Heat Release Rate (HRR), Fire Growth, and Fire Source Modeling (09:45 – 11:15)
- Module 3: Detectors, Sprinklers, and Suppression System Simulation (11:30 – 01:00)
- Module 4: Running Multi-Room or Tunnel Fire Simulations (02:00 – 03:30)

Day 4: Interpreting & Validating CFD Results

- Module 1: Smoke Layer Analysis, Visibility, and Toxicity Spread (07:30 – 09:30)
- Module 2: CFD Data Extraction – Plots, Slices, Isosurfaces (09:45 – 11:15)
- Module 3: Model Verification, Mesh Sensitivity, and Error Checks (11:30 – 01:00)
- Module 4: Benchmarking Against Experimental Results (02:00 – 03:30)

Day 5: Practical Project & Certification

- Module 1: Group Project: Setup of a Real-World Fire Scenario (07:30 – 09:30)
- Module 2: Independent Simulation and Walkthrough (09:45 – 11:15)
- Module 3: Presentation of Results and Peer Review (11:30 – 01:00)
- Module 4: Course Wrap-Up, Feedback, and Certification (02:00 – 03:30)

Certification

Participants who complete all sessions and assessments will receive a **Certificate of Completion – CFD Modelling (Fire, Smoke & Heat Behaviour)**, recognizing their competency in using simulation software for fire dynamics applications.

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