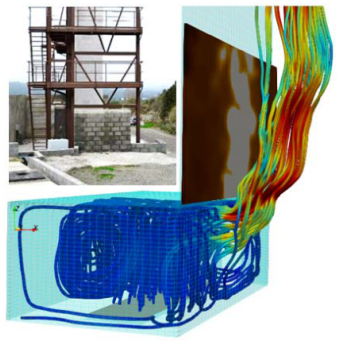
Contact us

Fire Safety: Engineering, Simulations, Tests and Evaluations

As one of the worldwide leaders in product's certification, Applus+ Laboratories is offering Fire Safety Engineering services. Our vision is to link together laboratory testing, numerical computing and people's knowledge, three pillars of safety analyses, to provide our clients with enhanced fire safety services.



FDS Simulation of fire test: heat flux received by a façade (visualization with Paraview).

OUR TECHNICAL COMPETENCES

Expertise in fire safety codes, standards and technical requirements.

Computational Fluid Dynamics (CFD) simulations of fire in complex 3D geometries for analysing:

- Ventilation and performance of smoke-exhaust systems.
- Temperature maps and heat fluxes at targets.
- Dispersion and concentration of toxic and flammable species.
- Evacuation procedures and fire-fighters intervention.
- Performance of automatic extinction systems.
- The definition of source terms through efficient combustion modelling.

Finite Element (FEM) simulation for calculating:

- Static and dynamic analysis of structures and mechanical elements.
- Linear and non-linear analysis of structures and mechanical elements.

- Thermal-stress analysis.
- Behaviour of materials (wood, steel, composites to cite a few) under thermal and mechanical loads: deformation and evaluation of collapse mode of structures,
- Cracks and stress analyses in concrete (tunnel linings).

CFD simulations can be performed with FDS, FLACS, ANSYS Fluent and OpenFoam while FEA can be done with DIANA and ABAQUS. Applus+ Laboratories has developed a methodology (from geometry definition through mesh generation to consistency analysis of the results) ensuring compliance with quality standards.

OUR SERVICES

On-site Inspection and Evaluation of Fire Protection Components and Systems:

- Technical Evaluations of active and passive singular fire protection systems for validating their performances in fire situations.
- Technical Inspections as a Third Party for evaluating fulfilment of regulations in force.
- Structural analysis in fire situations.
- Inspection, Test and Evaluation of existing automatic fire sprinklers systems according to maintenance plan or normative requirements (as NFPA 25 for example).
- Technical evaluation of products suitability for unconventional configurations and /or innovative products.

Performance Based Design (PBD) and Third-Party Evaluation:

- Assist main contracting parties in performing PBD analysis, from the development phase until the execution phase, following recommendations in ISO 23932-1. Perform CFD simulations with FDS and FEM simulations with DIANA for assessing Performance Criteria (ISO 23932-1) within the framework of national building codes and regulations.
- Third-Party Evaluation: global review of Performance Based Design project, including simulations performed within the framework of Performance Based Design methodologies.

Advanced Fire Safety Analyses for Singular Configurations:

- Analysis of singular and complex fire safety issues using technical capabilities (CFD, FEA) and know-how in fire safety engineering.
- Safety engineering for tunnel and subterranean infrastructures using both our experience in fire testing (in-situ tests, tests in our 600m long tunnel and ad-hoc tests) and our technical capabilities in fire safety engineering (CFD and FEM simulations).

Smoke test in Applus+ TST Tunnel

Technical Analysis of Product Failures:

- Diagnosis services of passive and active fire protection products failure.

**CFD = Computational Fluid Dynamics, FEM = Finite Element Method, FEA = Finite Element Analysis, PBD = Performance Based Design.*