Plume November 2025 fluidyn

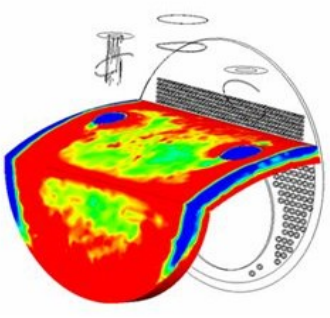
Applying Scientific CFD for RCA to Enhance Industrial Design Safety

In modern process industries, safety and reliability rely on identifying the root cause of failures. Traditional RCA, based on inspections and statistical methods, can miss problems hidden in complex flow dynamics. ***Fluidyn's multiphysics CFD tools*** numerically recreate incidents, simulating dust dispersion, airflow, heat, fire, pressure, and explosions to pinpoint ignition sources, evaluate ventilation and safety systems, and assess structural or equipment failures.

Unlike traditional RCA, transient CFD captures events like startups, shutdowns, and leaks, recreates accidents such as explosions or gas dispersion, and links fluid flow with structural stress and chemical reactions through multiphysics modeling. By enabling "what-if" scenarios, CFD not only explains failures but also guides preventive design and operational improvements, making RCA predictive and proactive.

This scientific reconstruction helps authorities and industries implement corrective design and operational measures to prevent future accidents.

Iso-surfaces of total pressure in the injection zone in a reactor



Furnace Wall rupture due to heat

Advantages of RCA Using Strongly Coupled CFD & Structural Analysis

- **See the Invisible**: Visualize hidden vibrations, fluid flow patterns, stagnant zones, thermal hotspots, and structural damage.
- **Multiphysics Insight** : Analyze fluid flow, heat transfer, structural stress, and chemical reactions together.
- **Virtual Accident Reconstruction**: Safely recreate leaks, explosions, or malfunctions in simulations.
- **Predictive Prevention**: Test "what-if" scenarios to optimize design and operations before failures occur.
- **Evidence-Based Solutions**: Quantitative insights link symptoms to root causes, improving safety and efficiency.

Technical Webinar on RCA

Join Fluidyn for an exclusive session on *Scientific Root Cause Analysis (RCA) with CFD* — uncovering how multiphysics simulations can reconstruct failures and prevent recurrence.
Gain insights from real-world case studies and learn how to integrate CFD-based RCA into reliability and safety workflows.

Date: 27th Nov 2025
Time: 3:00 PM IST
Platform : Microsoft Teams Meeting Link

Click Here to Register

Fluidyn Showcases Innovations at Pollutec 2025 and WNE 2025

Fluidyn showcased its innovative simulation and modelling tools at **Pollutec 2025** and the **World Nuclear Exhibition 2025**. At Pollutec, we demonstrated our **Inversion Modelling Tool** for real-time emission mapping, helping cities and industries make science-based decisions toward net zero. At **WNE**, we highlighted solutions for nuclear safety, ventilation, reactor optimization, radioactive dispersion, waste management, and environmental impact reduction.

Fluidyn recently participated in the Booster events in Italy and Spain, organised by Business France, promoting our products and services in these key markets and showcasing our innovative tool, **FLUIDYN-BFC**. Our 3D simulation software for batteries and fuel cells supports safer, more efficient e-mobility and energy storage solutions and has been recognized as a laureate of the **France 2030 Export program**!

Conferences and Publications

Fluidyn recently participated in HARMO 23, Hamburg, presenting two papers: **"Coupling CFD flow and dispersion model with renormalisation theory for in situ data inversion"**, applied to real-time CO_2 mapping in Dijon, France, and **"CFD model predictions comparison with the Jack Rabbit II experimental cases of chlorine dispersion"**, studying a chlorine release at Dugway Proving Ground, Utah, USA. These presentations highlighted how advanced modelling and data inversion can improve emissions monitoring and support urban and industrial net zero efforts.

At **CFD4NRS** in Japan, this November, Fluidyn will showcase its nuclear CFD expertise through two papers: **"Numerical Simulation of an Experimental Parametric Study of Particle Mixing Inside a Duct"** (with ORANO), demonstrating optimized placement of sampling points for radionuclide measurements in nuclear ventilation systems, and **"Modeling Uncertainty in CFD Simulations Using Interval Arithmetic: Radon Flux Calculation as a Case Study"** (with SRM Institute, India), using Fluidyn-MP, ANN, and PSO to quantify uncertainty and parameter bounds for radon diffusion flux.