framatome

Computational Fluid Dynamics (CFD) Calculations

Framatome's Expertise in Computational Fluid Dynamics

With significant computational capabilities, Framatome makes its expertise available to non-nuclear industries

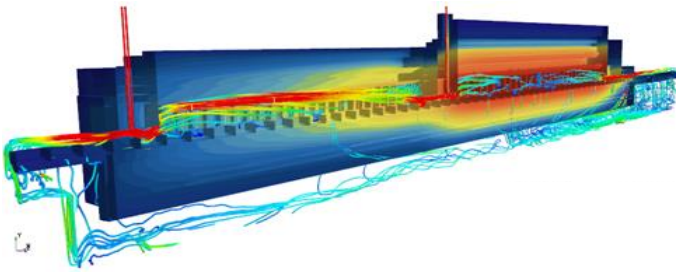
Challenge

- You aim to improve the quality of your products while reducing energy consumption
- You seek to optimize the performance of products and manufacturing processes (temperature homogeneity, concentrations, velocities, pressure drops, mixing)
- You must ensure the safety of your operations in terms of fire prevention, management of pollutant gases, and transport safety
- You validate your designs experimentally and wish to add simulation
- You validate your designs only with analytical methods and wish to bring more precision to your processes
- You are faced with computational limitations

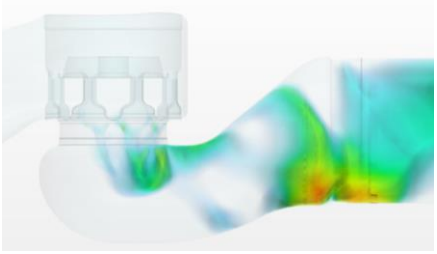
Solution

Framatome offers a comprehensive solution to address your challenges through Computational Fluid Dynamics (CFD):

- Secure computing and specialized engineers, ensuring the accuracy and reliability of your simulations
- Advanced numerical modeling that allows representing phenomena in all their complexity
- Comprehensive analysis to identify the best solutions
- HPC (High Power Computing) resources for complex and large-scale simulations



Change in temperature and velocity inside a sintering furnace



Flow in a high-pressure steam valve

Software

Ansys Fluent, Simcenter Star-CCM+, Openfoam, Ansys CFX

Key figures

60 dedicated and passionate specialists

Over **30** years of experience

6 teams across **3** sites in France, grouped within a dedicated competence center

30k CPUs and large **V100** GPUs

Customer benefits

- Reduction in energy consumption of your processes and loading
- Increased lifespan of your equipment
- Quality and compliance of simulations with obtained results
- Adaptation of the "simulation" solution to industrial needs
- Quick response time

Your performance
is **our** everyday **commitment**

Examples of achievements

Stationary calculations:

- **Loads on structures:**
- Thermal loads (conduction, convection, radiation)
- Pressure loads (pressure drop, acoustics)

- **Process optimization:**
- Flow distribution in collectors
- Heat exchanger performance

- **Performance calculations:**
- « Choked » flow rates in valves
- Pressure drops
- Energy consumption of furnaces

Transient calculations:

- **Thermal loads on structures:**
- Building design for fire safety
- Thermal transients (conduction, convection, radiation)
- Single-phase or two-phase flows

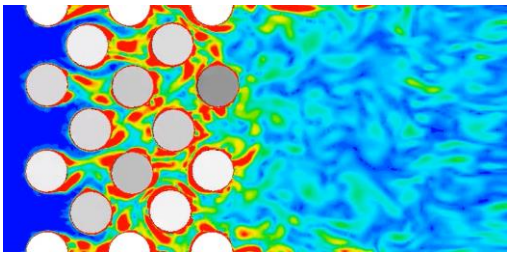
- **Gas and particle dispersion:**
- Atmospheric
- Internal

- **Sprays:**
- Pipe rinsing
- Cooling by spraying

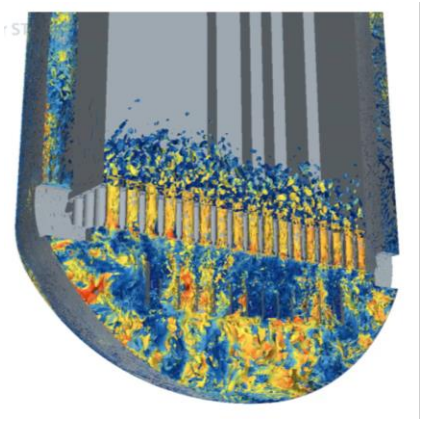
Unstationary calculations:

- **Fluid/structure interaction:**
- Vibration calculations
- Small displacements (decoupled method)
- Large displacements (coupled method)

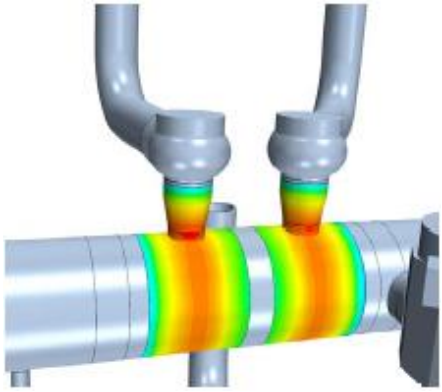
- **Thermal cracking:**
- Vortex rise
- Mixing zone



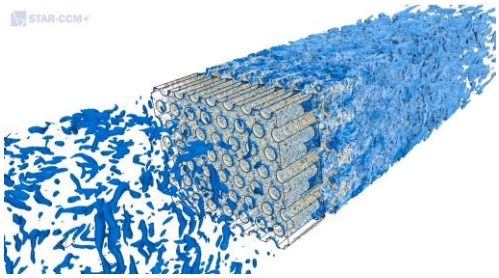
Unsteady flow through a tube bundle



Unsteady flow in a flow collector



Support for the manufacturing of complex fluid circuits for energy production



Development of turbulence downstream of a grid

References

- CompteR
- EDF Hydro
- CEA
- Baker Hughes
- TechnicAtome
- Orano
- China General Nuclear Power Group

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