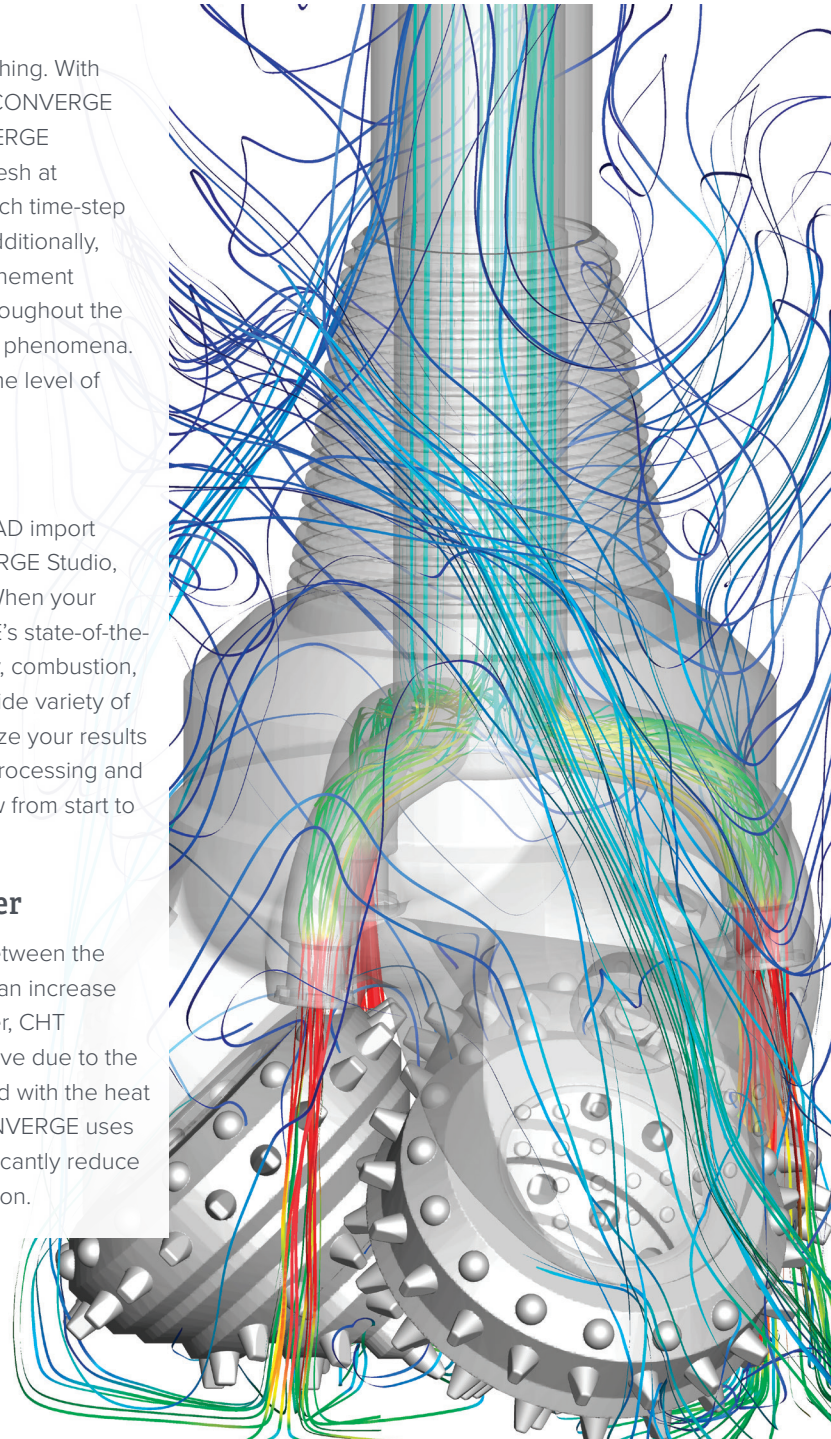
Oil & Gas

Solve Complex Oil & Gas Problems

In the oil and gas industry, efficient and accurate simulation of complex fluid flows provides critical insights for extracting, refining, and delivering hydrocarbons and for designing equipment. CONVERGE CFD software offers a powerful solution for simulating multi-phase fluid flows and complex moving geometries. With CONVERGE's autonomous meshing and suite of advanced physical models, you can simulate a wide variety of applications, including mixing tanks, gas leaks, heat transfer in drill bits, and wind and wave loads on offshore platforms and moorings.

Tricone Drill Bit



Never Make a Mesh Again

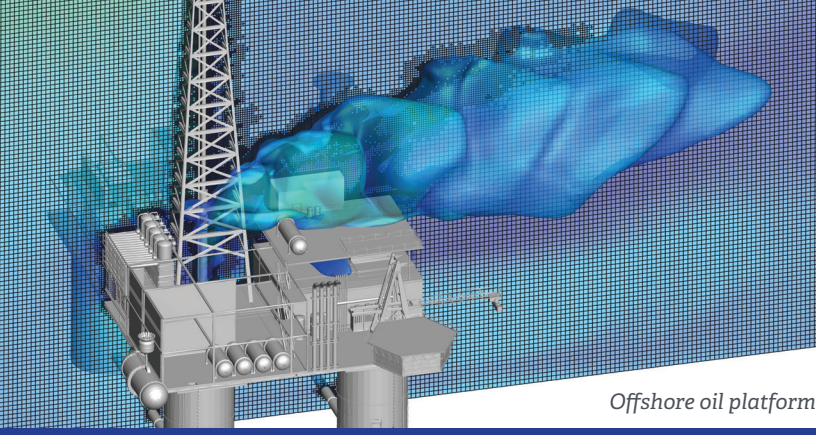
No matter the industry, no one likes meshing. With fully autonomous meshing capabilities, CONVERGE eliminates all user meshing time. CONVERGE automatically generates an optimized mesh at runtime and regenerates the mesh at each time-step to accommodate moving geometries. Additionally, CONVERGE applies Adaptive Mesh Refinement (AMR) to dynamically refine the mesh throughout the simulation to efficiently capture complex phenomena. Effective use of AMR can deliver the same level of accuracy with a lower overall cell count.

Quickly Go From CAD to CFD

Simplify your CFD workflow with easy CAD import and automated cleanup tools in CONVERGE Studio, CONVERGE's graphical user interface. When your geometry is ready, leverage CONVERGE's state-of-the-art physical models—including chemistry, combustion, spray, turbulence, and radiation—for a wide variety of applications. After your simulation, analyze your results with CONVERGE Studio's suite of post-processing and visualization tools, for a smooth workflow from start to finish.

Predict Conjugate Heat Transfer

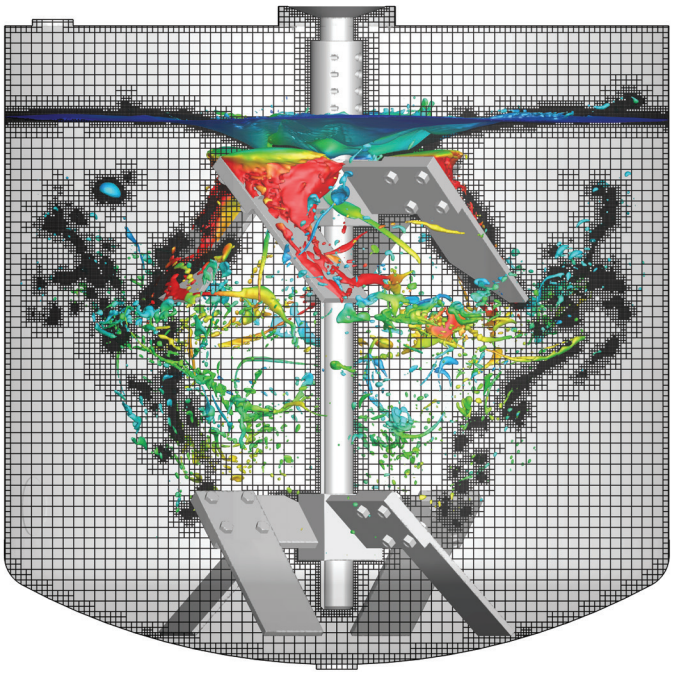
Solving conjugate heat transfer (CHT) between the fluid and solid portions of your domain can increase the accuracy of your simulation. However, CHT calculations are computationally expensive due to the large difference in time scales associated with the heat transfer in the fluid versus the solid. CONVERGE uses a novel super-cycling approach to significantly reduce the computational cost of a CHT simulation.



Offshore oil platform

Offshore Platform Solutions

Offshore platform and equipment design requires careful consideration of wave, wind, and other forces on structures such as moorings, tether lines, and rig structures. With CONVERGE's fluid-structure interaction (FSI) modeling, it's simple to perform displacement and frequency analysis of offshore platforms. The hydrodynamic force analysis in CONVERGE is enhanced by the ability to easily import real geometries, fully autonomous meshing, and accurate physical models.



Industrial mixing tank

Simulate Multi-Phase Flows

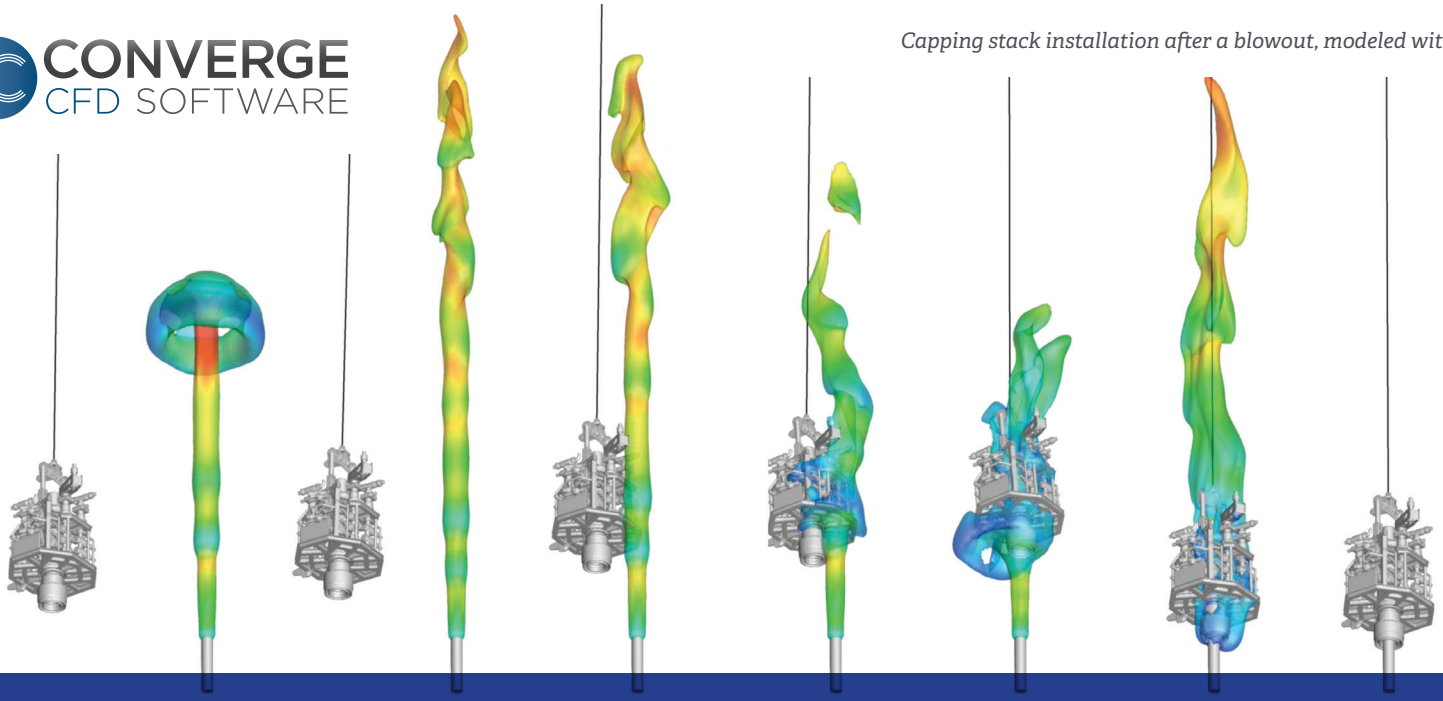
CONVERGE offers the Eulerian volume of fluid (VOF) approach for modeling multi-phase flows in three-phase separators, mixers, and valves. The VOF method locates and tracks the free surface in a liquid-gas flow or the interface in a liquid-liquid flow and offers several methods for interface reconstruction. AMR is coupled with VOF modeling to automatically increase the grid resolution at the fluid-fluid interface. This reduces numerical diffusion and helps resolve the interface at a reasonable computational cost.

Model Combustion

There are a variety of options for simulating combustion in CONVERGE, ranging from simple and fast models to detailed reaction chemistry. CONVERGE includes models for non-premixed, partially premixed, and premixed combustion, as well as surface chemistry for catalytic devices. For high fidelity simulations, the SAGE detailed chemistry solver is fully coupled with the flow solver for maximum accuracy and efficiency. In addition, AMR allows you to resolve the flame front by adding cells when and where you need them.

CONVERGE CFD SOFTWARE

Capping stack installation after a blowout, modeled with FSI



LEARN MORE

Ready to solve the hard problems with **CONVERGE** CFD? Visit us at convergecfd.com or contact us at info@convergecfd.com to learn how **CONVERGE** can give you the results you need.