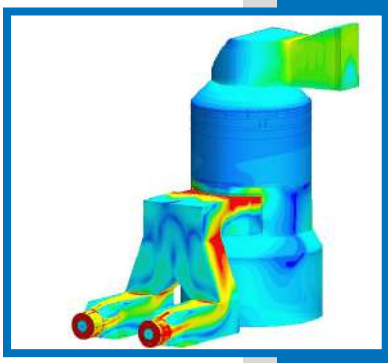
Modeling Services

CFD & Experimental

Support system performance guarantees through modeling technologies.

Fuel Tech's experimental (physical) modeling studies combined with Computational Fluid Dynamics (CFD) modeling allow for an insightful understanding of existing flow conditions and effective design of corrective devices such as turning vanes, ash screens, injection systems and static mixers for each unique project.



Physical Models designed to 1/12th scale, combined with CFD

We specialize in fluid dynamics modeling of air pollution control equipment. Scale models of 1:4 to 1:18 have been built for testing for installations in Europe, North America and Asia. Our focus continues to be the delivery of the most accurate and innovative solutions for our customers.

By combining computational and experimental modeling for ESPs, Fuel Tech can predict fluid behavior in new and existing ESP installations, identify flow problems, analyze the process conditions and provide solutions. Corrective flow devices can then be designed, tested and optimized to ensure that flow characteristics meet industry standards.

Innovative techniques are used in physical flow modeling to improve performance in flow critical equipment. Our flow models are constructed quickly and accurately using CNC cut steel as a skeleton, while clear plastic is tested using the latest in flow analysis equipment.

The combination of unique construction techniques, state-of-the-art technology and years of experience enables model studies to be performed in half the time required by our competitors, thereby providing our customers with the confidence and guarantees needed to proceed with construction or retrofitting.

Selective Catalytic Reduction (SCR) processes are modeled to ensure that the catalyst is effective and catalyst life is extended for as long as possible. Proper mixing of flue gas and good flow and velocity profile are required to prevent ammonia slip and ensure that NO_X emissions are minimized.

Modeling of Fabric Filters (Baghouses) can be used to predict and solve problem areas of wear and particulate fallout, while reducing overall pressure losses.

Flue Gas Desulphurization (FGD) systems are modeled to prevent poor performance, while solving other problems associated with wet scrubber processes such as:

- Inlet duct liquid pullback
- Mist eliminator performance
- Excessive pressure losses
- Fan inlet flow distribution
- Spray coverage
- Liquid collection

Optimization projects:

- Reduce system pressure losses
- Improve velocity, temperature, gas species and ash distributions
- Prevent in-duct ash and fallout

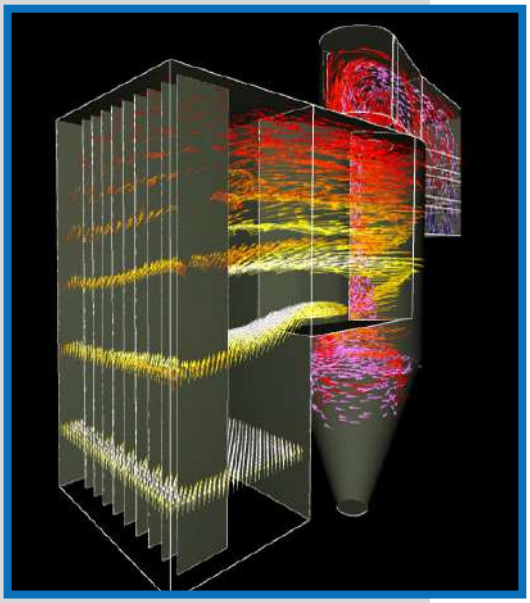
Fuel Tech has experience modeling and optimizing the following types of equipment:

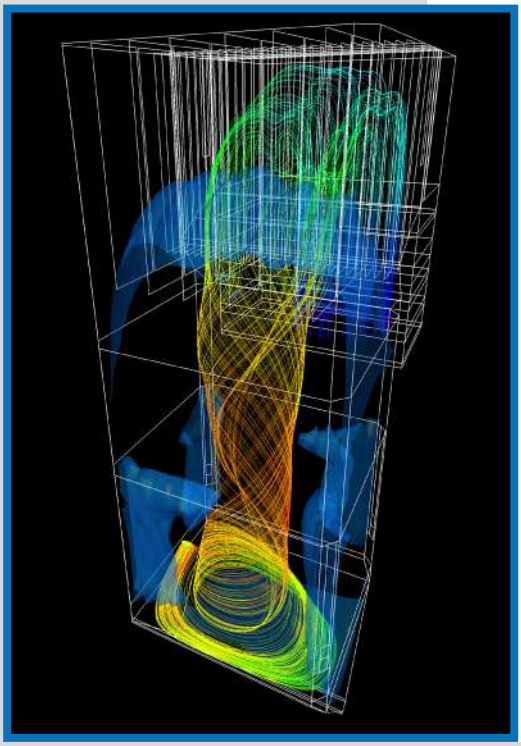
- Boiler Combustion
- Low NO_X Burners
- Over-Fire Air
- Electrostatic Precipitators (ESP)
- Selective Non-Catalytic Reduction Process (SNCR)
- Selective Catalytic Reduction Process (SCR)
- Fabric Filter (Baghouses)
- Flue Gas Desulphurization System (FGD)

FUEL TECH

Technologies for clean air & pure water

Modeling Services





CFD Models designed to accurately predict system performance.

Computational Fluid Dynamics (CFD)

Every Fuel Tech product installation has a custom process model supporting it. The model begins with a Computational Fluid Dynamics (CFD) simulation.

CFD models generate predictions of operating temperatures, velocities and other variables from a virtual replication of real-world geometry and operating inputs. Once the base model is generated, we “fly” through the model, using our proprietary visualization software; designed to make explicit to the engineer the complex behaviors of combustion flows. Fuel Tech engineers can explore their models from any perspective with the software and engage the customer in the design stage and tap into the expertise of their plant’s experts.

Additional modeling is performed for each unit depending on the type of Fuel Tech application. Once a complete understanding of the process conditions is achieved, a chemical injection strategy is optimized.

Fuel Tech has developed its own chemical spray models specific to boiler and duct conditions, and these models have been validated with both laboratory characterizations of our sprays as well as field performance during 20 years of applications.

Fuel Tech engineers use visualization software to reposition sprays dynamically and gauge the effect on desired performance. CFD simulation of the original model with spray injection provides a more precise mapping of chemical performance.

This proprietary visualization software provides our engineers the ability to show our designs in an immersive, interactive way. Our engineers recognize the information contained in their simulation datasets more rapidly and with greater precision.

Group visualization sessions in our stereovision projection laboratory in Warrenville, IL allow for enhanced design creativity and further risk management. Our designers and sales personnel communicate visually what they have discovered, allowing customers a complete understanding of our recommendations. Customer engagement and feedback on what they see in the virtual environment enriches the design process and further increases quality.