



UTILITY BOILER

WHAT WE OFFER

We offer a comprehensive analysis and optimization of your utility boiler that will:

- *Increase the load and efficiency of the boiler*
- *Reduce operational costs*
- *Significantly reduce decision making risks for retrofits*
- *Minimise pollutants emissions*
- *Provide valuable information for operator training*
- *Minimize flue gas emissions*

UTILITY BOILER ISSUES

Utility boilers are key equipment in power generation stations, which directly influence the economy, safety, and stability of the power generation, and also have common operational problems:

- *Low combustion efficiency*
- *Unstable combustion process (especially at lower load and for lower grade coal)*
- *Slagging on furnace walls and fouling on heater surfaces*
- *Local overheating*
- *High pollutants (NO_x, SO_x) emissions*
- *High temperature corrosion issues*
- *Combination of different fuel*
- *Optimisation of air and fuel delivery system*

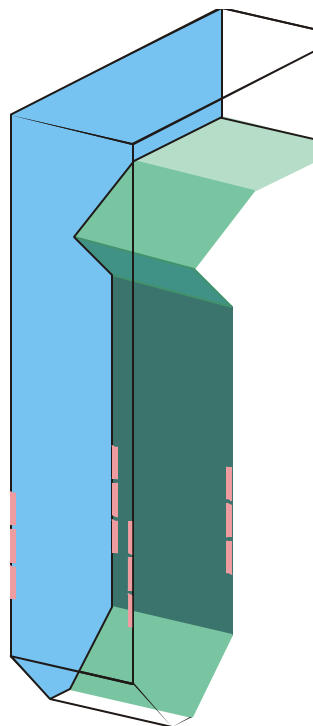
These problems are closely related to the flow, heat transfer, and combustion processes in the boiler. Process simulations enable clients to obtain a better understanding and comprehensive analysis to solve boiler problems.

TRADITIONAL SOLUTION METHODS

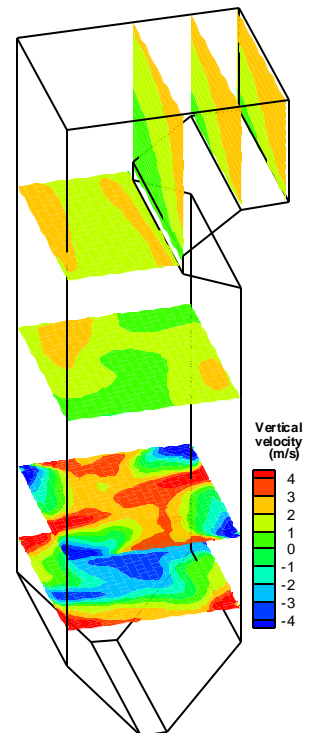
Boiler designs and modifications were based on experience and simple physical modelling. The complex nature of the turbulent gas flow and combustion in the boiler limits this type of approach, often leading to unsatisfactory results. Many power generation companies have spent millions of dollars on modifications that have not fulfilled their expectations or the contractor's promises.

A NEW SOLUTION

The advent of high-speed, cost effective computing has produced a new and powerful analysis tool: process modelling. PSL has invested millions of dollars in the development of a sophisticated boiler analysis tool that can simulate the complex details of an operating utility boiler. The process modelling gives the distribution of various parameters such as gas velocity, temperature, flue gases species, and particle trajectory. The tool can also be used to predict, in advance, the outcome of any boiler modification, including combustion air and fuel flow changes, coal type changes, or even a complete retrofit of the burner systems.



Tangential Coal-fired Utility Boiler



Vertical Velocity Distribution

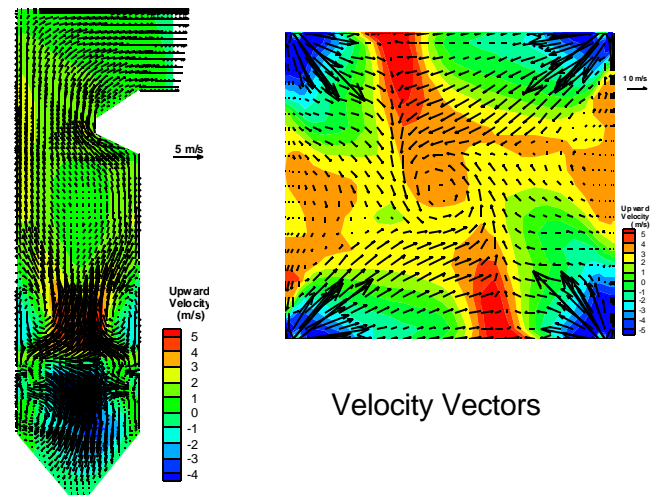
WHAT PSL CAN DO FOR YOUR BOILER

- Analyse the existing operational system
- Improve combustion efficiency by optimising air and fuel system
- Improve combustion stability through retrofitting of burner structure and adjusting of air and fuel system
- Lighten slagging through retrofitting of burner structure and adjusting of air and fuel system
- Predict optimal operation systems for different kinds of coal
- Reduce Pollutants emissions by introducing advanced combustion techniques
- Eliminate local overheating
- Evaluate any changes in boiler structure and system to minimise risks in the decision making process

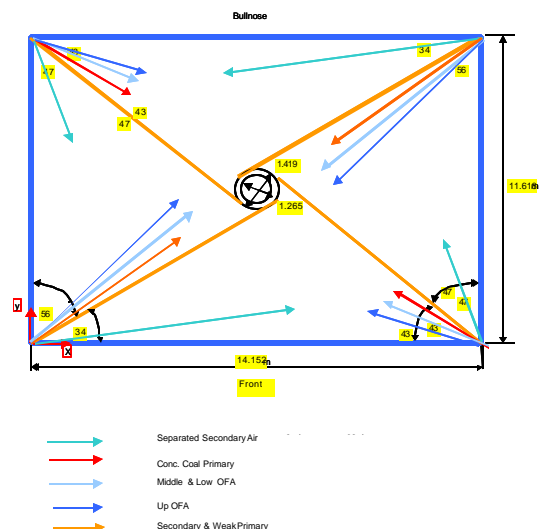
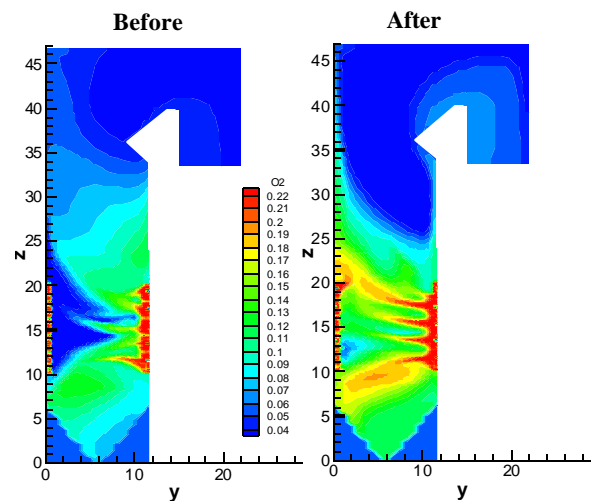
HOW WE DO IT

PSL works closely with power station personnel to collect information necessary to set up and run the utility boiler model. We then set up and run a baseline and one or more modified cases. Detailed results of the simulation are presented in graphical form showing gas flow velocities, gas temperatures, combustion gas species distributions, coal particle trajectories, wall heat transfer distributions, and a host of other relevant information. Computer animations of the gas flow and fuel particulate may also be included for operational training.

Simulation results allow for a thorough understanding of the boiler operation, and provide the basis for optimising the existing air and fuel system. In some cases it may be sufficient to improve the boiler's operating practices, in other cases, it may be beneficial to retrofit the boiler with a new air or fuel system. The decision depends on the severity of the operational problems and the budget available for the boiler upgrade. Any of these changes can be evaluated in advance by our utility boiler analysis tool, helping to minimise risks in the decision making process.



Velocity Vectors



PROCESS SIMULATIONS LIMITED

Consulting engineers specializing in the modeling and analysis of industrial process equipment including:

- Recovery Boilers
- Biomass/Utility Boilers
- Headboxes
- Digesters
- Lime Kilns
- Wood Kilns
- Hydrocyclones
- Air Ports, Nozzles, Ducts

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