

Plant troubleshooting and solutions for energy-intensive industries

Using a suite of process simulation tools to identify the source of plant performance problems and to provide cost-effective solutions to those problems.

HRL provides troubleshooting services and solutions to power generators, miners, mineral processors, and manufacturing industries, including cement and paper, across Australia and around the world.

In addition to supporting plant operators, HRL assists Original Equipment Manufacturers (OEMs), engineering, service and contracting companies, insurance and legal firms, research organisations as well as government agencies.

Industries operate in an extremely competitive and challenging environment that places considerable pressure on maximising plant performance. Plant operators face growing pressures to limit emissions, fuel-use and maintenance costs, while improving the reliability of their plant.

Issues such as overheating or erosion can disrupt plant operation leading to inefficiency and possible plant downtime. HRL understands the need to pinpoint and rectify plant performance issues swiftly and with minimum total cost.

HRL offers process simulation and modelling tools that allow:

- testing of alternative modification options
 - quantifying of performance improvements
 - accurate up-front cost-benefit analysis.
- Modelling can be undertaken before a plant operator makes any commitment to plant modification.

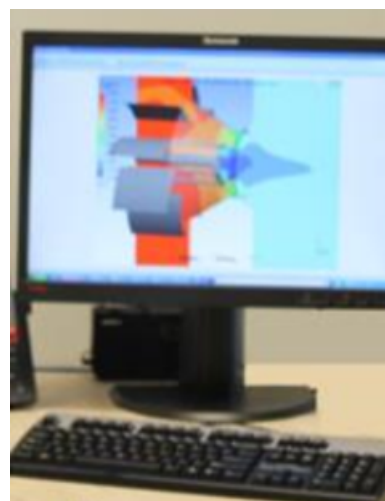
Challenges

Performance problems that plant operators can face include:

- low efficiency
- high temperatures or overheating
- fouling
- fuel burnout including char and CO (carbon monoxide) carryover
- poor flow distribution
- erosion
- product quality issues
- NO_x (nitrogen oxides) and SO_x (sulphur oxides) production.



HRL provides trouble shooting services and solutions to energy-intensive industries



HRL utilises process simulation and modelling tools

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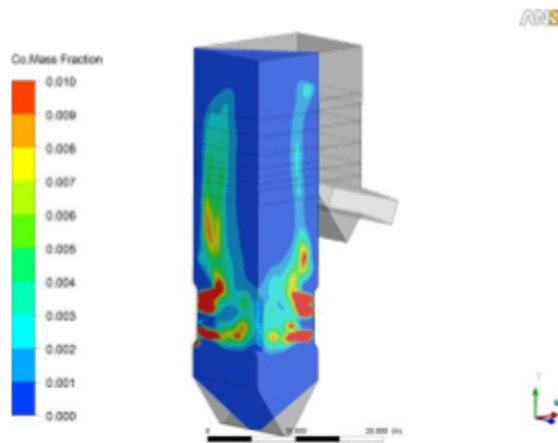
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expertise in action

Performance problems can arise from day-to-day operation and from operator-introduced changes such as:

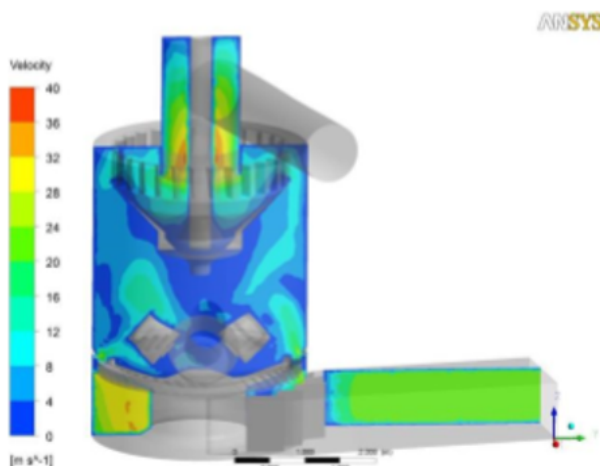
- introducing an alternative fuel supply
- operating at a lower load/throughput/production rate
- changing control settings such as burner operating settings
- retrofitting plant.



Analysis of boiler combustion

Challenges operators face in maximising plant performance and increasing efficiency include:

- identifying options for improving plant performance
- predicting and quantifying the impact an option will have on plant processes
- determining the most cost-effective options
- re-evaluating cost-prohibitive efficiency projects in light of the carbon tax and the Energy Efficiency Opportunities (EEO) program
- evaluating long-term abatement actions for continuing operations in a lower-emissions economy
- identifying and applying for government assistance packages where appropriate



Simulation of mill processes

Solutions

Addressing plant performance problems or improving performance requires an understanding of what is happening inside a plant. HRL's expert process-modelling service provides a non-intrusive method to 'look inside' a plant and to assess process flows. HRL's services offer cost-effective and low-risk alternatives for determining the root cause of a problem and for developing feasible solutions, those services include:

ANSYS Fluent

Fluent is powerful computational fluid dynamics (CFD) modelling software that can produce three-dimensional models of any flow system – excellent for troubleshooting systems with two-phase flow and chemical reactions.

Aspen Plus

Aspen Plus is process-simulation software widely-used in conceptual design, optimisation and performance monitoring to assist in improving performance or maximising efficiency.

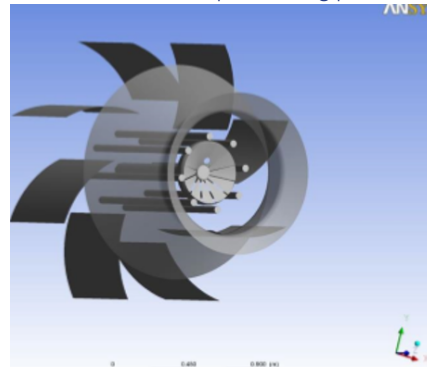
Thermoflow

The Thermoflow suite of programs – STEAM PRO, STEAM MASTER, GT PRO, GT MASTER and THERMOFLEX – is used in analysing, designing and costing conventional steam-cycle and gas-turbine combined-cycle plant – to address design and performance issues including air flows, alternative fuels and control modifications.

Benefits

The benefits clients enjoy by drawing on HRL's extensive experience in process simulation include:

- the root causes of plant performance problems
- assistance in understanding current plant performance and limitations
- a strong theoretical understanding of process issues backed by years of practical experience and expertise
- drawing on highly skilled technologists to produce results and recommendations that can withstand scrutiny
- modelling of alternative modification options to determine the cost-benefit equation before committing to plant modification
- results that can be coupled with Energy Efficiency Opportunities (EEO) programs and greenhouse credits assessments
- assistance in implementing plant modifications.



Advanced boiler design

Case Study 1

Determining the cause of cracking in a once-through steam generator

An LNG plant experienced propagated cracking in the header of a once-through steam generator. HRL experts proposed using thermodynamic software – Thermoflow and Aspen – to provide non-invasive and low-risk analysis to identify the root cause.

The cracking was a result of particular operating conditions, unstable water-flow patterns, and mal-distribution of flue-gas flow over the internal tubes.

HRL provided design and operational recommendations to prevent future cracking – helping to ensure the LNG plant could avoid unexpected outages and safety issues due to compromised operation of the steam generator.

Results from the modelling identified a feasible modification that could increase coal and char residence times to avoid the visible plume.

The minerals processor also had cracking issues in the boiler upstream of the afterburner.

HRL's experienced staff worked together with their client to create a Thermoflow model of the waste-heat recovery plant to better understand flue-gas temperatures and flows, fouling and the effect of air ingress. Then, the experts used Aspen software to model water and steam circulation in the boiler tubes.

The modelling indicated the likely cause of the cracking was heat transfer on an unprotected surface of the drum. Thermal insulation is now used.

Case Study 2

Fouling and toxic gas mitigation in a waste-combustion furnace

After installing a new fluidised-bed boiler a waste and recycling plant experienced occasional toxic gas excursions and fouling.

HRL personnel used computational fluid dynamics (CFD) modelling to simulate combustion, heat transfer, and flow within the furnace. The modelling helped to determine the effect of different furnace configurations on gas temperatures and fuel burnout. Next, Thermoflow software was used to investigate the impact of these changes on overall cycle performance.

HRL proposed a modification to improve furnace-heat transfer and reduce wall temperatures, effectively eliminating any fouling. The Thermoflow modelling indicated that the modification would have minimal impact on overall cycle performance.

Case Study 3

Modelling waste-heat recovery

A minerals processor, using waste heat from a kiln to produce electricity, was experiencing several issues. Incomplete combustion in an afterburner resulted in a visible plume exiting the stack. HRL experts proposed creating a computational fluid dynamics (CFD) model of the afterburner to assess performance of modifications proposed to improve combustion.

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The company's NATA Accredited Laboratories number is 561.

HRL Technology Group's ISO 9001 Quality Management is certified by BSI under certificate FS605116

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