

## SPECIALIZED ENGINEERING ANALYSIS & DESIGN

To sustain competitiveness in global markets there is a continual need for the resource, energy, and infrastructure industries to improve the performance of new and existing processes, equipment, and structures. This encompasses increasing energy efficiency, reducing plant downtime, minimizing technological risk, and developing new and emerging technologies. Specialized engineering analysis and advanced design methodologies are needed to achieve these goals. With a fundamental understanding of the underlying physical phenomena, these inherently complex engineering problems can be resolved, and practical and economically viable solutions produced.

### CAPABILITY AND SERVICE

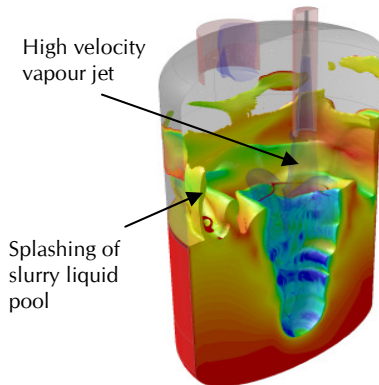
Hatch's Specialized Engineering Analysis & Design (SEAD) Group is a multidisciplinary engineering team who have advanced-level training and in-depth expertise in the following core areas:

- Transport phenomena (fluid mechanics, heat and mass transfer)
- Solid mechanics
- Structural and foundation dynamics
- Physical and chemical thermodynamics
- Chemical reaction engineering and combustion
- Magneto-hydrodynamics
- Process control and dynamics
- Mathematical modeling, programming, and software development

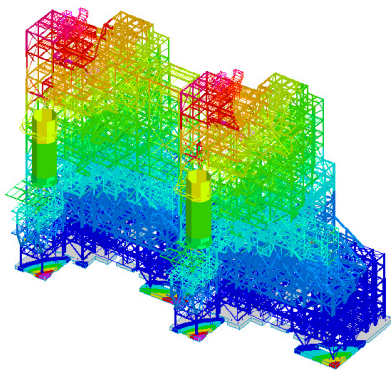
The team has years of experience solving real-world problems where standard design practices, empirical methods, and "rules of thumb" are not sufficient.

The SEAD group's expertise is typically applied to:

- Problem solving, plant de-bottlenecking and troubleshooting
- Performance evaluation, tuning, and optimization of equipment and processes
- Process and technology development
- Prototyping of new processes
- Scale-up analysis and process intensification
- Analysis and custom design of gas, slurry, and water-handling systems
- Complex structural analysis of systems and equipment
- Thermo-electrical-mechanical analysis and design
- Soil-structure interaction analysis
- Seismic analysis and design of existing and new structures
- Flow-induced vibration
- Structural vibration analysis and health monitoring
- Fitness-for-service analysis of equipment and structures
- Field test work and data analysis
- Design of and experimentation using physical models
- Technical bid evaluation of specialty packages



*CFD prediction of dynamic pressure letdown of a mineral slurry in a flash vessel*

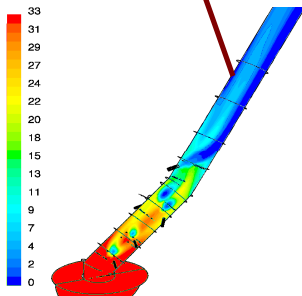
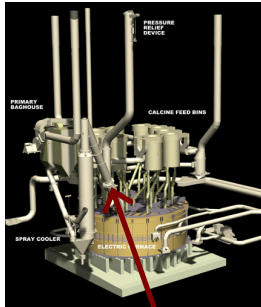


*Nonlinear foundation uplift analysis, including full interaction with soil and structures*

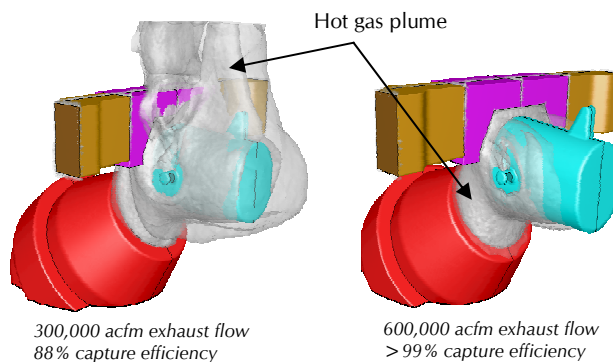
## SPECIALIZED ENGINEERING ANALYSIS & DESIGN

The SEAD Group utilizes a wide range of engineering analysis and design tools for the successful execution of projects. Numerical analysis tools such as finite element analysis (FEA) and computational fluid dynamics (CFD) are commonly used in combination with experimental and field data to develop practical engineering solutions for Hatch's clients.

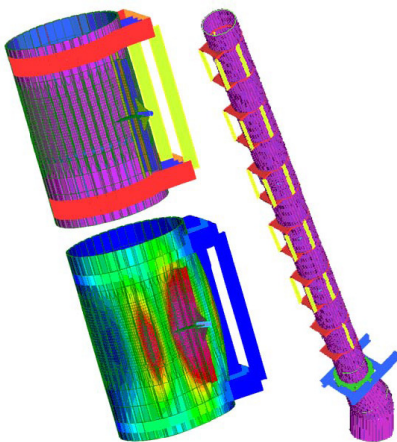
The SEAD Group works in close collaboration with engineers from the other business units at Hatch who are recognized experts in their respective fields. By combining the practical engineering know-how and experience of these engineers with the specialized expertise within the SEAD Group, a very capable Hatch team is able to provide the most effective solution to a particular engineering problem.



CFD prediction of the carbon monoxide concentration in a water cooled duct of a FeNi smelter using staged combustion



The effect of hood ventilation on the capture of emissions released during hot metal charging of a Basic Oxygen Furnace (BOF)



Characterization of hammer impact load and analysis of water-cooled combustion duct response

### CONTACTS

**Global Practice Director**  
 Ross Haywood  
 +61 7 3166 7799  
 rhaywood@hatch.com.au

**Practice Director - Africa**  
 Stephen Ritchie  
 +27 11 239 5449  
 sritchie@hatch.co.za

**Practice Director – Americas**  
 David Warnica  
 + 1 905 403 4074  
 dwarnica@hatch.ca