

Specialized engineering analysis & design (SEAD) in iron and steel

Technologies

To sustain competitiveness in the global market there is a continual need for the iron and steel industries to improve the performance of new and existing processes, equipment, and structures. This includes increasing operational efficiency, reducing plant downtime, minimizing technological risk, meeting changing environmental requirements, 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.

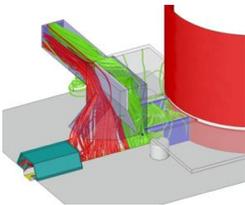
Capability and service

Hatch's Specialized Engineering Analysis & Design (SEAD) group is a multidisciplinary engineering team with 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 extensive experience solving real-world problems where standard design practices and empirical methods are not sufficient. The SEAD group's expertise is typically applied to:

- Problem solving, plant de-bottlenecking and troubleshooting
- Performance evaluation and optimization of equipment & processes



By adding an internal baffle, fume captured by the hood in this casthouse was improved without increasing the exhaust volume.



Technicians performing AU-E measurement of refractory thickness.

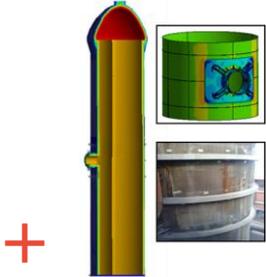
Contacts

Hamid Ghorbani

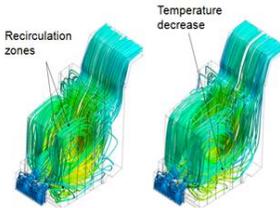
Practice Lead, Mechanical & Structural
+ 1 905 403 3784
hghorbani@hatch.com

Tom Plikas

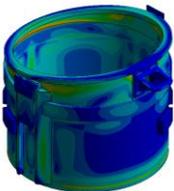
Practice Lead, Process
+ 1 905 403 37174
tplikas@jhatch.com



Thermal-mechanical stress analysis to identify root cause of blast stove refractory failures and develop an effective design improvement.



Analysis of waste gas boiler to assess ways of reducing NOx emissions to meet environmental requirements.



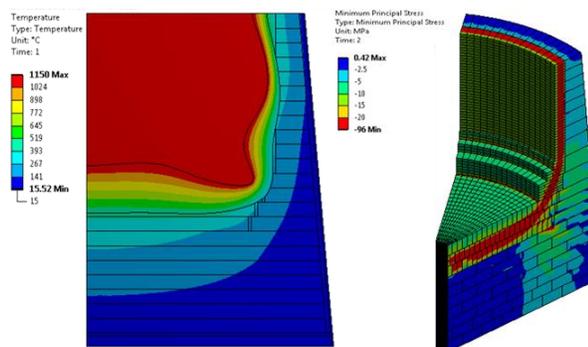
Thermal/mechanical stress and fatigue analysis of molten metal ladle.

- Process and technology development
- Prototyping of new processes
- Analysis and custom design of gas, slurry, and water-handling systems
- Thermo-mechanical analysis and design
- Seismic analysis and design of existing and new structures
- Flow-induced vibration
- Structural vibration analysis, measurement, and health monitoring
- Fitness-for-service analysis of equipment and structures
- Field test work and data analysis
- Design of experimentation using physical models
- NDT of refractory and stove conditions using AU-E and LFPU measurements

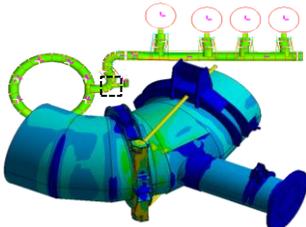
Why Hatch?

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.

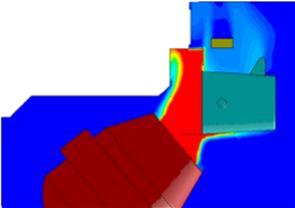
The SEAD Group works in close collaboration with engineers from the Iron & Steel business units at Hatch who are recognized experts in the field. By combining the practical engineering know-how and experience of these engineers with the specialized expertise within the SEAD Group, a very capable Hatch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



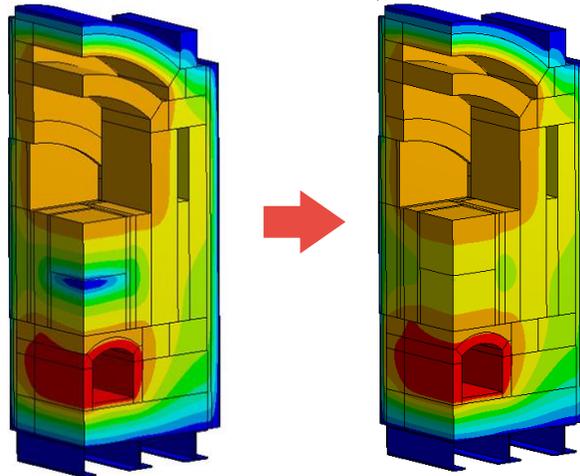
Thermal-structural modeling of blast furnace refractory system to characterize hearth conditions based on thermocouple data and AU-E measurements, identify structural design deficiencies, and develop design improvements.



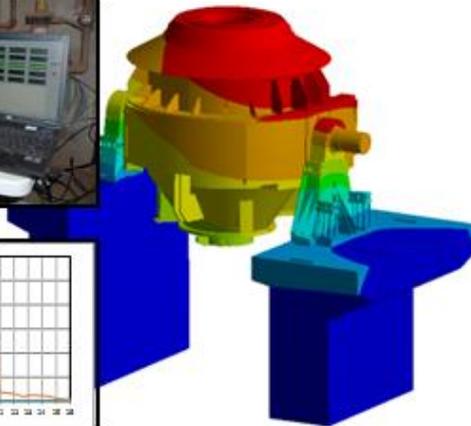
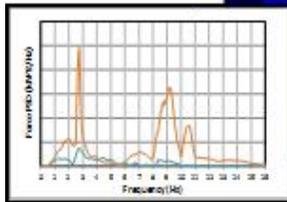
Redesign of blast air distribution system to extend campaign life, including piping flexibility analysis & thermal-mechanical optimizations components.



Secondary emissions control system development using CFD modelling techniques.



Transient thermal analysis and all-around thermal/structural design of coke oven.



BOF random vibrations measurements, load characterization, and redesign to avoid future damage to the system.