HATCH

SPECIALIZED ENGINEERING
ANALYSIS & DESIGN GROUP

ROTARY KILN / CALCINER

As one of the primary process vessels in the metals and mining industry, rotary kilns are utilized in numerous applications including drying, calcining, roasting, and induration. As businesses strive to improve efficiency and develop new processes to set themselves apart from their competitors, ensuring the optimum use of the capabilities of a rotary kiln is paramount. Modifications to standard kiln offerings may be used to assist with:

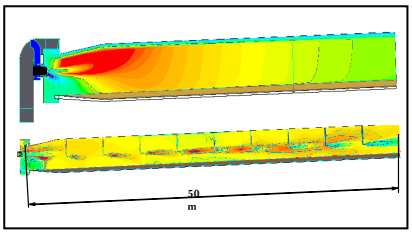
- Development of pilot plants for a new processes
- Reducing overall energy use or emissions through burner replacement
- Increasing capacity to maximize throughput on existing equipment while maintaining production quality

Rotary Kiln for Nickel Laterite Ore Roasting

PROCESS MODELING ADVANTAGES

Determining the impact of equipment and process modifications on the performance of rotary kilns can be difficult. Complex interactions between the gas-phase and solid-phase reactions make the use of typical advanced analyses (such as computational fluid dynamics) difficult. The inclusion of process devices affecting the solids, such as lifters, dams, and chains, further complicates analysis.

To complement its strengths in the mining and metals industries, Hatch has developed a specialized one-dimensional model to analyse the effects of process changes on rotary kilns. This model allows solid and gas phase chemical reactions, kiln devices such as lifters and dams, and dust elutriation effects to be taken into account for a wide range of processes. The use of this type of process model ensures that planned design or operational changes will have their intended effect. Flexibility is also present which allows the kiln model and other high-fidelity simulations such as CFD to interact with one another.



Design Optimization of High Temperature Residence Zone

PROVEN EXPERIENCE

Together with the expertise of our people, the use of the Hatch's proprietary process model allows kiln performance to be quickly and efficiently analysed for a wide range of process modifications. Examples of previous experience includes:

- Analysis of calcination, reduction, dehyrdoxylation, roasting, and oxidation processes
- Design optimization of equipment modifications including burner replacement, the addition of on-board fans, and the use of lifters and dams
- Estimating the impact of production changes on production quality, solids temperature, and dust elutriation
- Use of coupled CFD analysis for increased resolution for burner and gas-phase reactions

Leveraging our process modelling team, Hatch provides industry-relevant data that will ensure the optimal performance of rotary kiln systems.

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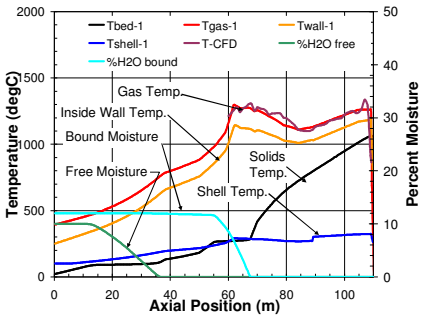

Typical results of Kiln Model showing gas, bed, shell temperature and moisture content along the length of the kiln.

SELECT PROJECT AND EXPERIENCE LIST

ARCELORMITTAL, KAZAKHSTAN

Re-design of a natural gas fired combustion system in a rotary kiln used for moisture removal and roasting of iron ore concentrate. The combustion system design was modified to meet the required residence time of the concentrate at the roasting temperature.

CERRO MATOSO S.A., COLOMBIA

Basic engineering design of a dryer burner installation. Optimization of burner location, orientation, and discharge gas velocity to optimize mixing with dryer off-gas.

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