

CUSTOMER CASE STUDY

Olefins Pyrolysis Furnace Optimization and Alarm Reduction

BKOAI's engineers used mode-based alarming and predictive control to reduce nuisance alarms and improve reliability in olefins pyrolysis furnaces

Solution: Modal Alarming & Quench MPC **Industry:** Petrochemicals **Use Case Focus:** Alarm Reduction & Quench Control

GOALS

- Reduce nuisance alarms during critical furnace operation transitions.
- Improve furnace transition handling to maintain process stability.
- Minimize manual operator interventions during complex quench cycles.
- Increase control reliability in olefins pyrolysis furnace operations.

CHALLENGES

- High alarm volumes during furnace transitions overwhelm control room operators.
- Distinguishing critical process events from nuisance alarms is highly difficult.
- Quench control processes involve complex, interactive multivariable dynamics.
- Operators must frequently intervene manually to maintain stable system conditions.

SOLUTIONS

- Develop specialized modal alarming software for olefins pyrolysis operations.
- Implement user-friendly operator-facing interfaces for real-time monitoring and control.
- Install multivariable model predictive control systems for furnace quench processes.
- Optimize transitional operational logic to automate baseline stabilization processes.

RESULTS

- Nuisance alarms during furnace transitions were significantly decreased.
- Overall alarm rates dropped to safer, more manageable operating levels.
- Manual operator interventions were successfully minimized across both operational phases.
- Control reliability of the pyrolysis furnace operations was greatly improved.

EXECUTIVE SUMMARY

BKOAI's engineers used mode-based alarming and predictive control to reduce nuisance alarms and improve reliability in olefins pyrolysis furnaces. The solution combines specialized modal alarming software, operator-facing interfaces, and multivariable model predictive control for furnace quench processes. By automating transitional logic and reducing unnecessary operator intervention, the approach lowers alarm burden, improves process stability, and strengthens control reliability.

Reducing Alarm Burden During Furnace Transitions

Furnace transitions can generate high alarm volumes that overwhelm control room operators and make it difficult to distinguish critical process events from nuisance alarms. The project focused on reducing this alarm burden while maintaining process stability during critical operating transitions.

Applying Modal Alarming and Quench MPC

BKOAI developed specialized modal alarming software and operator-facing interfaces for real-time monitoring and control. A multivariable model predictive control system was installed for furnace quench processes, while transitional operating logic was optimized to automate baseline stabilization.

Improving Stability and Control Reliability

The combined solution significantly decreased nuisance alarms, reduced overall alarm rates to safer operating levels, and minimized manual operator intervention across both operational phases. The result was improved reliability for olefins pyrolysis furnace operations.

www.BKOAI.com · © 2026 BKOAI. All rights reserved.