ACCE: Advanced Combustion & Cross-Reference Engine

Smart, Chemistry-Aware Diagnostics for Thermal Processes

Overview

ACCE is a modular, intelligent process- monitoring platform for kilns, boilers, and other fired systems. It delivers real- time diagnostic insight by combining live operating data, engineered baselines, and chemistry- aware logic.

Key data inputs

- Continuous tag data: gas flow, O₂, CO, SO₂, temperature
- Commissioned process baselines & feed chemistry profiles
- Calculated load percentage via real- time algorithms

With these inputs, ACCE can detect:

- Ring buildup & deposit formation
- Air- density driven airflow changes
- Combustion instability

Core Capabilities

- **1. Commissioned Baseline Intelligence** Stores reference curves for gas flow, air flow, fan speed, and feed/fuel composition.
- 2. Load- Based Rule Scaling Automatically scales alert thresholds with process load, eliminating nuisance alarms.
- **3.** Air- Density Detection Flags airflow reductions caused by density changes instead of hardware faults.
- **4.** Fuel-Aware Combustion Analysis Adjusts SO₂/CO expectations dynamically based on live fuel split (e.g., gas vs. petcoke).
- 5. Feed Chemistry- Aware Logic Cross- evaluates CaCO₃, SO₃, and Na₂O with gas data to detect COS formation or ring risk.
- 6. Chemistry Engine for Ring Detection Combines SO₂, CO, temperature, and alkali loading to predict deposit zones at incipient stages.

Smart Rules Engine

- Declarative YAML rule sets—simple to read and edit
- Multi-tag logic (e.g., SO₂ + CO + temperature)
- Fuel- and load- aware scaling
- Reference- curve comparisons against commissioned baselines
- Completely transparent—no coding required

What ACCE Doesn't Need

- Hard- coded setpoints
- Daily manual tuning or custom scripting
- Vendor- lock templates
- Alarm flooding—rules cross- reference before an alert is issued

Why We Built ACCE

Traditional monitoring tools treat each parameter in isolation. ACCE captures the interdependent nature of combustion and chemistry to:

- Preserve Expertise encode seasoned knowledge into rule logic
- Reduce Downtime predict and prevent deposit formation early

Empower Operators - provide context- aware guidance for better decisions

What ACCE Can Do

- Real- time data monitoring & anomaly detection
- Cross- checking multiple signals for deeper insight
- Contextual alerts with actionable guidance
- Site- specific configuration per unit
- Transparent logic for training & diagnostics
- Scalable deployment across multiple kilns, boilers, or furnaces

In short, ACCE is your process- aware assistant—merging live data, smart logic, and chemistry insight to drive safer, more efficient combustion while safeguarding irreplaceable operator know- how.