

SULPHUR RECOVERY UNIT

CLAUS COMBUSTOR & THERMAL REACTOR

See Every
Hotspot
Before It
Becomes a Failure.

1350°C
PEAK FURNACE TEMP

24+ pts
PER SINGLE WAVEGUIDE

±1.5°C
ACCURACY

0.04 m²
GRID RESOLUTION

AI 3D
REAL-TIME HEAT MAPS

The Claus Thermal Reactor converts **50-70% of total sulphur** in a single extreme stage — at up to **1350°C** in a corrosive H₂S atmosphere. Its refractory lining is the only barrier between that process and your furnace shell.

µSTMapS provides complete, continuous visibility of the reactor's surface skin temperature — at grid-level resolution, in real time, with **AI-powered predictions** before failure occurs.

SENSOR PERFORMANCE

100-600°C
SKIN TEMP RANGE

14 m
MAX SENSOR AREA

0.5°C
RESOLUTION

ATEX
CX D IIC RATED

IIoT
MODBUS / SIM IOT

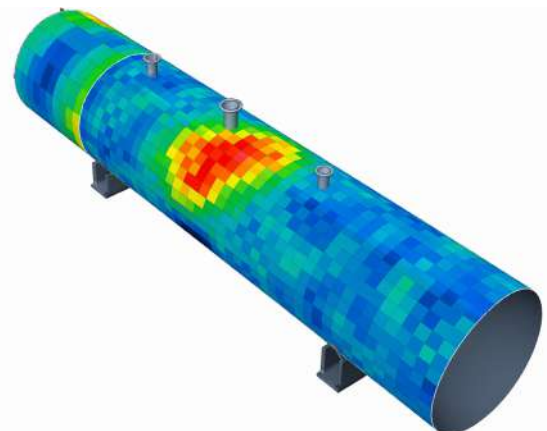
21+
GLOBAL DEPLOYMENTS

True Skin Temp
Actual shell surface, not process temp

Refractory Health
Degradation tracking & early alerts

AI Predictions
3D heat maps & failure forecasts

Non-Intrusive
Installation -Magnetic mounting, no welding



Grid-Based Thermal Mapping for Precise Hotspot Detection

Claus Combustors operate under conditions that systematically destroy conventional temperature sensors — extreme heat, aggressive sulfur compounds, and thick refractory walls that make direct measurement nearly impossible. Most facilities run with dangerously incomplete thermal visibility.

01 Conventional Sensors VS μ STMapS

✗ Without μ STMapS	✓ With μ STMapS
<ul style="list-style-type: none"> ✗ Corrosion & Early Failure — H₂S and SO₂ destroy thermocouple elements within months. ✗ Blind Inspection Areas: Only exposed areas visible; full check needs cladding removal ✗ No Hotspot Alerts: Limited data, no early hotspot detection ✗ No Location Accuracy: Virtual thermocouples don't pinpoint hotspots ✗ Reactive Maintenance Only — Zero predictive capability, no refractory health trend. 	<ul style="list-style-type: none"> ✓ No Electronics in Hot Zone — Waveguide sensing immune to corrosion and heat failure. ✓ Complete Surface Coverage — 24+ points per sensor with upto 0.04m² grid size. ✓ Real-Time Hotspot Alerts — AI detects thermal anomalies instantly for early action. ✓ Non-Intrusive Magnetic Install — No welding, no penetrations, no process shutdown. ✓ AI-Driven Predictions — 3D thermal maps and refractory health forecasts.

±1.5°C Accuracy	0.5°C Resolution	0.04 m² Minimum Grid Size	1150°C Proven Temperature	ATEX Rating
---------------------------	----------------------------	--	-------------------------------------	-----------------------

02 Why Temperature Control Is Mission-Critical

<p>🔧 Reaction Efficiency</p> <p>Temperature governs H₂S-to-SO₂ conversion — precise monitoring ensures optimal Claus efficiency at every stage.</p>	<p>🧱 Refractory Integrity</p> <p>The refractory lining degrades silently. Hotspot detection is the only way to intervene before structural failure.</p>	<p>🛡️ Catalyst Protection</p> <p>The refractory lining degrades silently. Hotspot detection is the only way to intervene before structural failure.</p>
<p>📄 Emissions Compliance</p> <p>Unstable temperatures drive COS, CS₂, and unconverted H₂S formation — causing regulatory violations.</p>	<p>🔥 Shell Safety</p> <p>Multi-point continuous data eliminates blind spots and prevents dangerous deviations before escalation.</p>	<p>📊 Asset Intelligence</p> <p>Real-time surface data enables data-driven decisions across operations, maintenance, and reliability.</p>

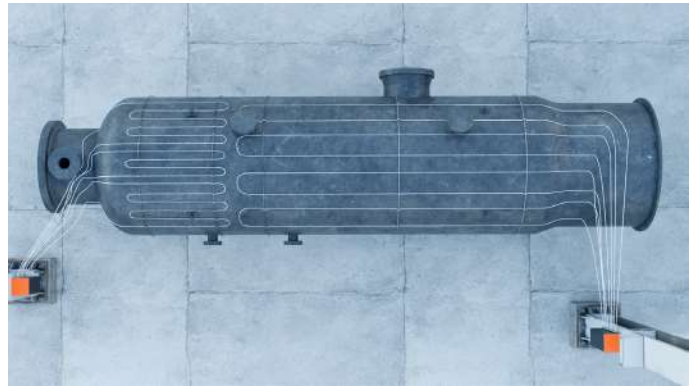
03 Patented Ultrasonic Waveguide Technology

The Physics Behind μSTMapS

Temperature is measured by analysing the propagation speed of guided ultrasonic waves through a precision Ni-Cr alloy waveguide rod. The speed of sound is a **deterministic function of temperature** — giving stable, drift-free readings with **no electronics anywhere in the sensing zone**. A single 14-metre waveguide delivers up to 24 simultaneous independent true surface skin temperature measurements.



— μSTMapS Top Side Installation on Reactor



— Non-Intrusive Magnetic Clamp Mounting System

Reaction Furnace

Flame Zone

Waste Heat Boiler

Sulfur Condenser

Catalytic Reactor

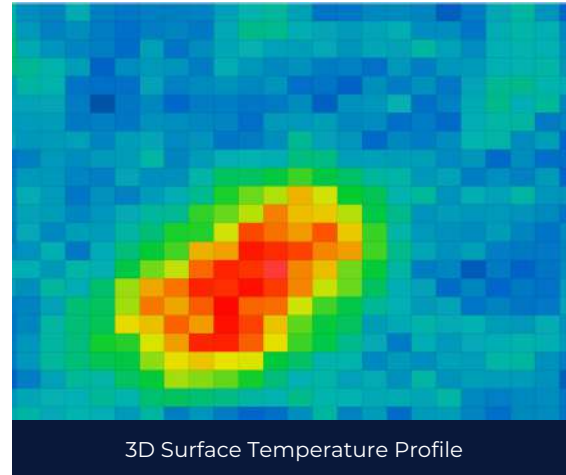
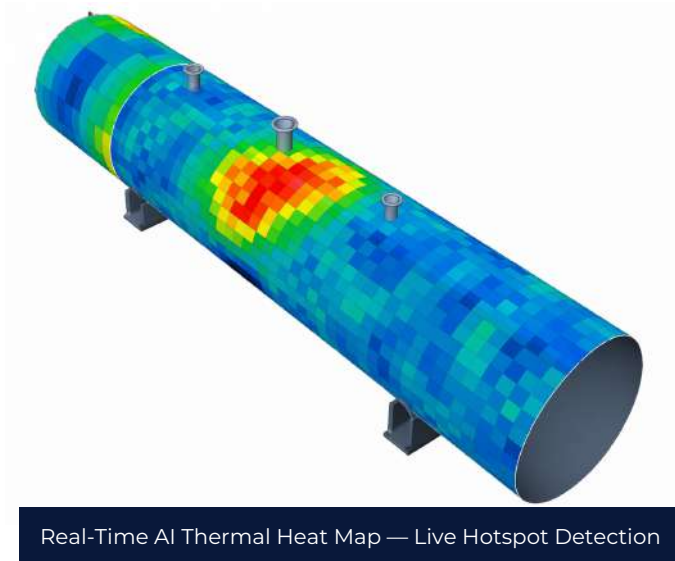
System Architecture - Sensor To Cloud / DCS



04

AI-Powered Thermal Intelligence

The integrated AI engine transforms multi-point measurements into actionable intelligence — giving operations, maintenance, and reliability teams a shared, real-time view of asset health.



LIVE 3D HEAT MAPS

AI-generated surface heat maps at 0.04 m² grid resolution — every hotspot visible in real time across the full reactor shell.

PREDICTIVE ALERTS

AI flags anomalies and predicts refractory failure before it occurs planned intervention, not emergency response.

TREND ANALYSIS

Long-term thermal trends provide refractory degradation curves supporting informed maintenance scheduling.

05 Operational Benefits For Refineries & Gas Plants

Improved Sulphur Recovery

Precise temperature control optimises H₂S conversion and boosts overall sulfur yield.

Prevent Unplanned Shutdowns

Early hotspot detection enables planned intervention before catastrophic failure.

Reduce Maintenance OPEX

Waveguide sensors outlast conventional thermocouples fewer replacements, less downtime.

Emissions Compliance

Stable monitored temperatures minimise COS, CS₂, and unconverted H₂S emissions.

Extend Asset Life

Condition-based maintenance from continuous health data extends furnace lifespan.

Cross-Team Insight

One dashboard for operations, maintenance, reliability, and process optimisation.

Is your SRU Thermal Reactor fully monitored?

Talk to our engineering team — we'll assess your asset and spec the right configuration.

XYMA Analytics Private Limited · IIT Madras Research Park · Chennai 600113

 +91 94429 49347

 sales@xyma.in

© XYMA Analytics Pvt. Ltd.