

Multi-point True Skin Temperature for Critical Assets

Powered by XYMA's AI-Driven Ultrasonic Waveguide Technology

In high-severity fired heaters—including refinery reformers, DCU pass heaters, and cracker furnaces accurate Tube Skin Temperature (TTST) monitoring and comprehensive thermal profiling are critical to ensuring asset integrity, operational safety, and sustained throughput stability.

Legacy inspection practices and manual SOPs—dependent on sparse thermocouples, line-of-sight infrared pyrometry, and periodic thermal camera surveys—fundamentally lack continuous, full-length visibility. These approaches introduce delayed detection and extensive blind zones, allowing critical hotspots, heat-flux imbalances, and early-stage tube degradation to go unnoticed until failure thresholds are crossed, often culminating in safety incidents, throughput loss, and unplanned outages.

How India's Largest Integrated Petrochemical Complex Automated TTST Monitoring and Thermal Profiling for Naphtha Cracker Heater Tubes

The Problem

Thermocouples

Localized readings, slow response, drift & blind zones



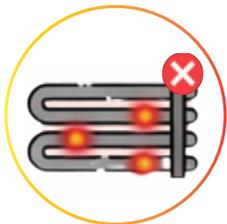
Infrared pyrometers

Emissivity error, operator dependent, rely on line of sight



Tube blind spots

Undetected hotspots, uneven heat flux & inefficient decoking



The Solution

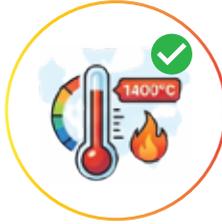
μ TMaps - IIoT & AI-enabled ultrasonic waveguide sensors



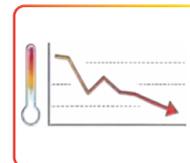
Real-time, multipoint tube skin temperature mapping



Temperature measurement range up to 1400°C



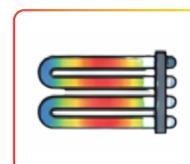
The Outcome



20–40°C deviation reduction



Early hotspot detection



Uniform heat distribution



AI-Driven Corrective Actions



Extend Tube life

How AI-Enabled Multipoint Temperature Monitoring Elevates Heater Performance at Panipat Naphtha Cracker

Featured on IndianOil Xpress News: PRPC's Inspection Team Champions AI-Driven Predictive Maintenance at Panipat Naphtha Cracker

 20°C - 40°C Average Temperature Deviation Reduction

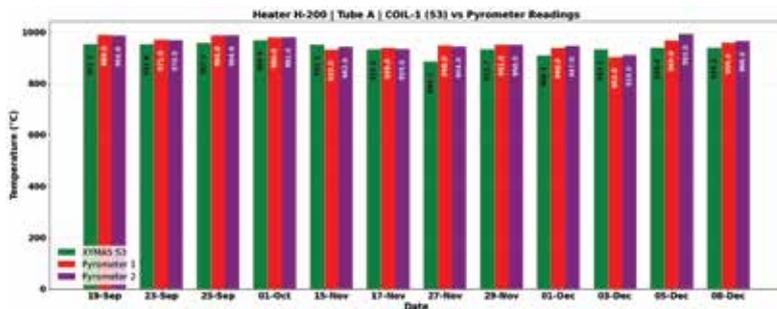
 Extend Tube Life

Transforming Heater Operations with AI and Ultrasonic Waveguide Technology

-  Installed at the IOCL - Panipat Naphtha Cracker Unit.
-  AI-enabled multipoint ultrasonic waveguide sensors provide continuous, high-accuracy monitoring of heater tubes exceeding 900°C.
-  Measurement range up to 1400°C with real-time, data-driven insights.
-  Pilot deployment on NCU Heater 200, conducted over three months.
-  Seamlessly integrated with plant historian and control systems for predictive analytics and operational insights.

Operational Value for Refineries & Petrochemical Plants

-  Predictive maintenance enablement
-  Higher asset availability and lifecycle extension
-  Early intervention before thermal runaway
-  Reduced tube failure risk and unplanned shutdowns
-  Improved furnace efficiency and fuel optimization



Glimpse of the process representation

Message from Panipat Refinery & Petrochemical Complex (PRPC)

The Inspection Department of the Panipat Naphtha Cracker (PNC) Complex has achieved a significant digital transformation milestone through the successful deployment of AI-enabled multipoint ultrasonic waveguide skin sensors for continuous monitoring of high-temperature Naphtha Cracker heater tubes. Developed by XYMA Analytics, this advanced system integrates AI and IIoT analytics to offer unmatched precision compared to conventional infrared pyrometers.

The deployment on NCU Heater 200 demonstrated significant improvements in safety and reliability, including a 20-40°C reduction in temperature deviation and the elimination of manual inspections in hazardous zones. Encouraged by these data-driven insights, the technology is set for commercial rollout to support predictive maintenance and operational excellence, establishing PRPC as a leader in AI-powered predictive temperature monitoring for critical heating processes.

-Vivek Sharma, SERM, PRPC

Ideal for Critical Fired Heaters Reformers

- Naphtha Cracker Furnaces
- Crude Distillation Unit (CDU) Heaters
- Vacuum Distillation Unit (VDU) Heaters
- HGU Reformers
- Delayed Coker Heaters

See Heater Tube Risks Before Failure
Scan to Explore AI-Enabled Multipoint Monitoring



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