

COOLSTAR®+ FOR REFINING

Next-level performance. *Plus* easy integration.

The new COOLstar®+ process burner combines the proven reliability of a trusted platform with advanced innovation to raise the bar for combustion performance in refining applications. Its retrofit-ready design enables refiners to operate reliably across a wide fuel range, from 100% natural gas to 100% hydrogen, improve unit reliability, and achieve best-in-class NOx emissions, all without costly overhauls or additional emissions control systems.

With innovative gas tips, an optimized tile design, and high-durability materials, COOLstar+ delivers stable operation across diverse fuels and operating conditions, minimizing downtime with easier maintenance and extending equipment life. For operators who want to do more with less, COOLstar+ maximizes long-term value through reliable innovation.

THE ULTIMATE COMBUSTION UPGRADE

With thousands of installations worldwide, the COOLstar has earned a reputation for reliability and consistent performance. The new COOLstar+ builds on that foundation with evolved technology to set new standards for refinery combustion equipment:

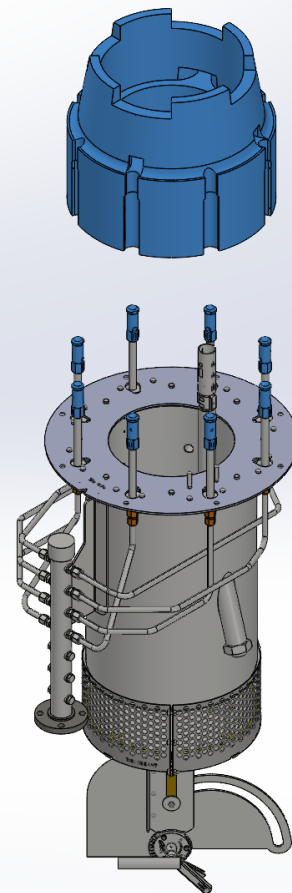
- **As low as single-digit ppm NOx emissions** without costly add-on techniques (EFGR or SCR)
- **Simple retrofit path** that keeps the original burner plenum and gas manifold in place
- **Greater uptime and productivity** with durable, crack-resistant tile design and long-life materials
- **Reliable fuel flexibility** from 100% natural gas to 100% hydrogen without compromise on flame stability and low CO emissions
- **Enables easy ignition** with either a pilot or igniter



+ Seamless Retrofits and Integration

COOLstar+ is engineered to make revamps and retrofits straightforward, minimizing outage time and complexity. Its compact footprint and adaptable design fit seamlessly into existing layouts, while the simplified tile design reduces weight and extends service life.

- Reuses existing round cut-outs in case of replacement, reducing construction work and cost compared to square designs
- Compatible with typical refinery heater configurations (distillation units, hydrofiners, and more)
- Single fuel valve connection keeps operations simple and reduces installation cost
- Removable gas tips and flame holders simplify maintenance and reduce downtime
- Flexible firing direction (up, down, horizontal) enhances applicability across heater types
- Works with natural or forced draft and ambient or preheated air systems



Standard COOLstar conversion

+ Ultra-Low Emissions Without Added Complexity



Meeting strict regulatory requirements while also maintaining cost-effective operations is critical in refining operations.

- COOLstar+ achieves best-in-class NO_x emissions, as low as single-digit ppm, without EFGR or SCR, reducing capital and operating costs
- High fuel staging with innovative gas tips maximizes internal flue gas recirculation (IFGR) for maximized NO_x reduction
- CO emissions remain low at startup and turndown, ensuring compliance in all operating states
- ARIA damper enables intuitive, optimized excess air management on natural draft systems
- Broad turndown ratio (5:1 minimum) provides operational flexibility while maintaining emissions control

+ Reliability That Reduces Lifecycle Cost

COOLstar+ is designed to withstand the extreme radiant heat and demanding conditions of refining heaters. High-grade materials and optimized construction improve reliability, minimize downtime, and lower the total cost of ownership.

Crack-resistant tile design extends operating life

Durable parts exposed to radiant heat extend service intervals and reduce consumables

Very low noise design improves operator safety and environmental compliance

Increased capacity potential enabled by minimal air pressure drop

+ Flexible Fuel Capability for Today and Tomorrow

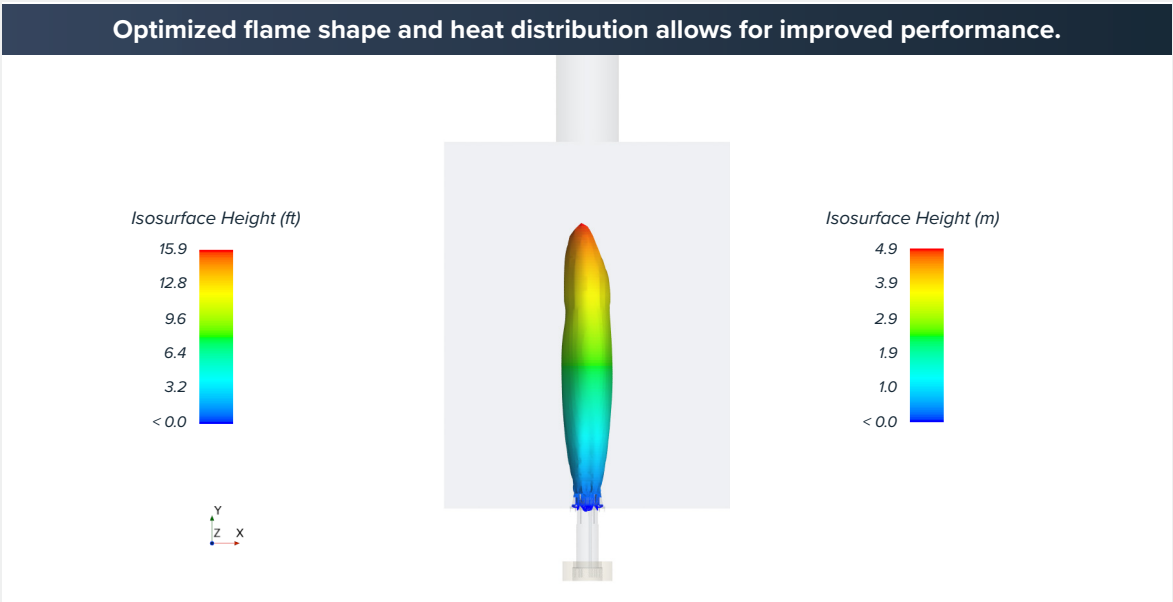
Refiners need burners that can perform reliably with today’s fuels while preparing for tomorrow’s decarbonization goals. COOLstar+ delivers both.

Stable operation across a wide range of fuels and excess air conditions

100% natural gas to 100% hydrogen firing capability

Innovative gas tips enable NOx minimization and plugging risk reduction

Category	John Zink COOLstar®+	Market Alternative
Ultra-Low NOx (<15 ppm) w/o EFGR/SCR	✓	✓
Low CO at startup/ turndown (<400 ppm)	✓	✗
Low noise	✓	✗
Retrofits into existing burner models	✓	✗
Durable/crack-resistant tile design	✓	✓
Parts durability (flame holder and tips)	✓	✓
Fuel flexibility (100% NG–H ₂)	✓	✓
Low cost of ownership	✓	✗



Built On Proven Reliability. Backed By John Zink Expertise

COOLstar+ is ushering in the next evolution in combustion performance with innovation that operations can trust. That's because it's founded on the success of COOLstar® process burner technology, which has thousands of installations world-wide.

And it's backed by the industry-leading field expertise, responsive service and technical support of John Zink, ensuring consistent performance, minimized downtime and efficient emissions control.

As a Koch Engineered Solutions company and a global leader in combustion and emissions control, John Zink has more installed equipment than any other manufacturer in the industry. Backed by nearly a century of proven field performance and experience, we work with customers to tackle challenges and shape industries across the globe.



Change The Equation For Combustion. Partner With John Zink.

Drive long-term value and success for your operation with the leaders in combustion and emissions control. The next-generation process burner is here to take combustion performance to the next level.

Let's get started.

To learn more about COOLstar®+, visit johnzink.com.



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