CHASE NEDROW
INDUSTRIES

PETROCHEMICAL

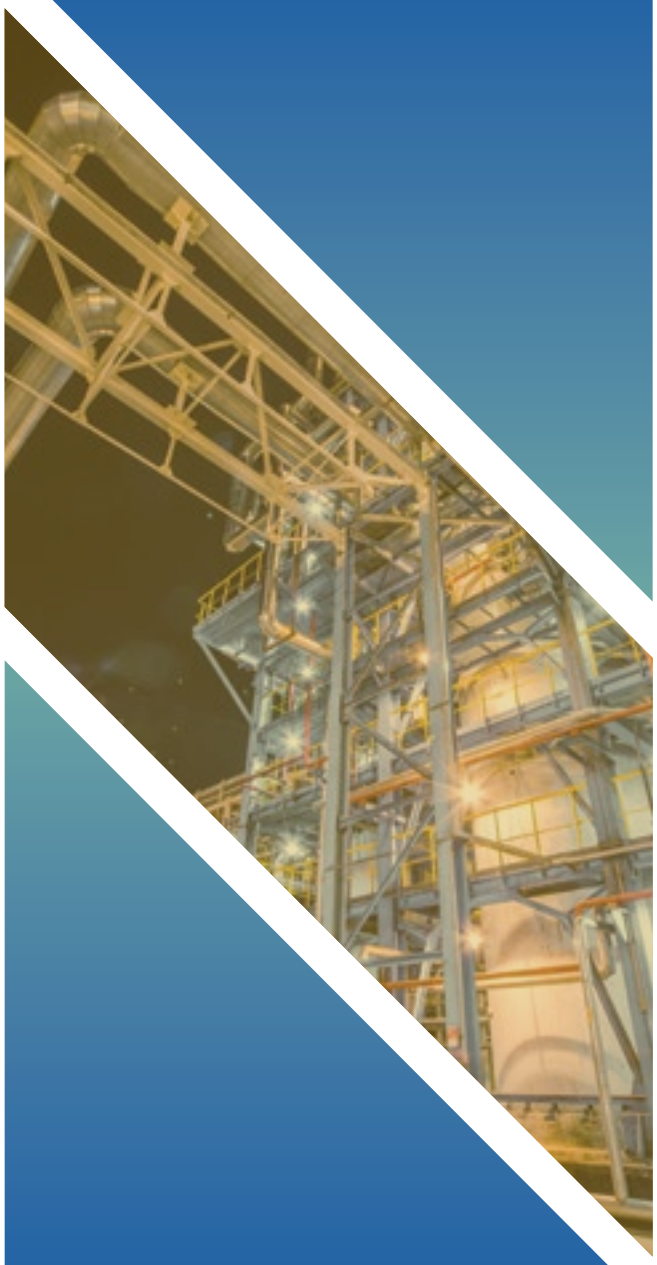
Transforming
Petrochemical Performance

REDUCE FUEL, EXTEND RUN LENGTHS, AND LOWER EMISSIONS WITH HIGH-EMISSIVITY COATINGS

Emisshield®
CONSERVE ENERGY. ENHANCE PRODUCTION.

CERTIFIED

CHASENEDROW.COM/PETROCHEMICAL



Our Value to Petrochemical Operations

Petrochemical units operate in extreme temperatures, corrosive gases, and under pressure to maximize throughput while reducing emissions. Emisshield coatings address these challenges with measurable results.

Proven Gains

- **5–15%**
  increases in production capacity
- **5–12%**
  reductions in fuel use
- **Extended run lengths**
  from annual to 30+ months
- **Lower CO_2 and NO_x emissions**
  – reduce carbon intensity
- **Increased life of all substrates**

By raising surface emissivity, Emisshield improves heat flux, stabilizes combustion, and protects refractory and metal surfaces from creep, corrosion, and thermal shock.

Table of Contents

Emisshield®

CONSERVE ENERGY. ENHANCE PRODUCTION.

From Re-Entry to Refining:

The Only **NASA-Derived** Coating in the Space Technology Hall of Fame

Key Advantages

≤ 75 µm

Ultra-thin (≤75 µm) yet highly durable crystalline layer

5,000 PSI

Adhesion strength exceeding 5,000 PSI

3090°F

Stable to 3090°F and able to withstand thermal shock from –450°F to 3090°F

Developed under NASA to withstand the extreme thermal demands of spacecraft re-entry, Emisshield coatings bring aerospace-grade performance to fired equipment. As the only high-emissivity coating inducted into the Space Technology Hall of Fame, Emisshield combines elite thermal science with measurable industrial gains. The coating delivers emissivity values from **0.85 to 0.95,** mimicking blackbody behavior to dramatically increase thermal efficiency in petrochemical furnaces.

- **Stable emissivity**
  under thermal cycling
- **Third-party tests**
  confirm extended ceramic fiber life and reduced shrinkage

CHASE NEDROW INDUSTRIES

*Emisshield coatings combine **aerospace origins** with proven **industrial performance.***

What It Means for Petrochemical Units

- **Raises the emissivity** of refractories and tubes from 0.4 (brick) to **~0.95 (Emisshield)**
- Efficiency in combustion chamber increases **3–5%** at a minimum
- **More radiation absorbed** by process tubes = higher throughput, lower firing rates
- Lower tube metal temperatures **slow coke formation**, extending decoke intervals
- Proven first in aerospace, **validated in furnaces** worldwide

What Sets Emisshield Apart

Developed by NASA for extreme thermal protection

85th Inductee into the **Space Technology Hall of Fame**

Emissivity: 0.85–0.95 (nearly blackbody behavior)

Open, transparent QA/QC and field application process

Customized formulations for each furnace environment

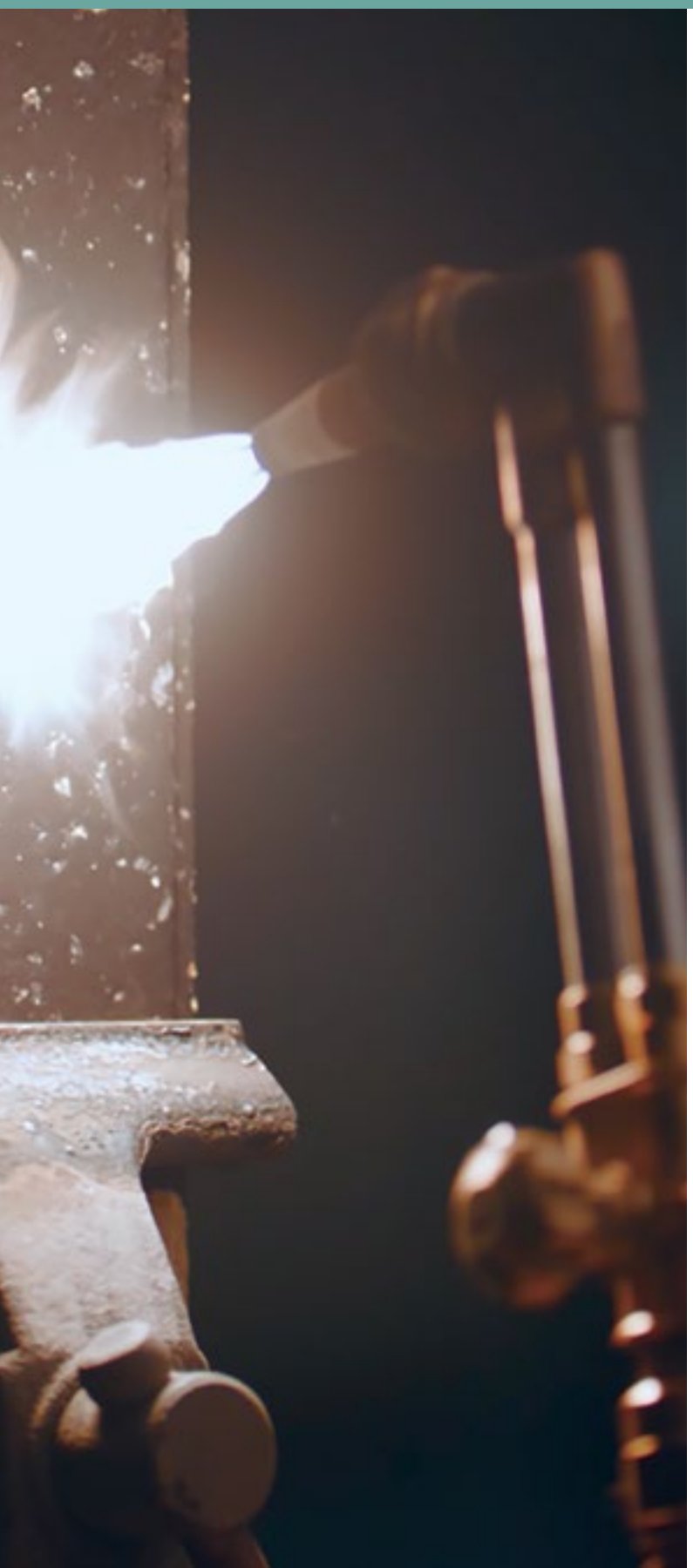
Non-hazardous, water-based chemistry

Documented ROI and increased equipment uptime

How Emisshield Works

By converting internal furnace surfaces into **high-emissivity radiators (ε ≈ 0.9)**, Emisshield transforms the energy balance inside fired equipment.

Active surfaces treated with Emisshield behave like grey bodies—absorbing and re-radiating more energy inward. This optimizes radiative heat transfer, improving temperature uniformity, stabilizing combustion, and maximizing energy absorption by the process fluid.



Features & Benefits in **Fired Equipment**

Uniform radiant energy distribution

Across walls and tubes – minimizes flame impingement and localized overheating

Tube wall temperatures reduced by 100–160°F

Decreasing creep, oxidation, and localized coke formation

Extended decoking intervals

VCM furnaces increased runtime from 12 months to 30+ months under stable operation

Lower radiant wall temperature gradients

Improved flame stability and burner performance

Ceramic fiber shrinkage reduced to <1%

Compared to 5–7% in uncoated materials – maintains wall insulation integrity over time resulting in longer life

Higher effective emissivity

Enables lower firing rates to achieve the same process outlet temperatures – reduces fuel consumption and emissions

More consistent heat flux

Into tubes improves throughput control and reduces thermal cycling stresses

Engineering Diligence & Certified Application

Every **petrochemical** furnace is unique. Emisshield's process begins with exhaustive data collection and ends with validated performance in the field.

STEP 1

Engineering Diligence

Multi-page questionnaires capture furnace geometry, tube metallurgy, operating temperatures, fuels, coking history, draft conditions, and burner data. This level of detail ensures accurate thermal modeling and root-cause analysis.

Client input is a central part of Emisshield's planning process. Application design, scope, and substrate specifications are developed collaboratively with plant engineers and operational teams to ensure that the coating strategy aligns with operational targets and long-term reliability goals.

STEP 2

Technical Review

A cross-disciplinary team evaluates inputs and specifies the exact coating formulation and application method suited to the process.

STEP 3

Certified Application

The application phase is open, documented, and designed to be collaborative. Clients are welcome to observe every stage—including surface preparation, spraying, and QA verification—to ensure full transparency and confidence in the coating's execution. Emisshield provides clear documentation of coating thickness, surface prep, and emissivity performance as part of final handover.

- **SSPC/AMPP surface prep** and grit blasting
- **Precision spray application,** 2–5 mils
- **Cure cycle monitoring** and adhesion pull tests **(>5,000 PSI)**
- **QA/QC documentation** and inspector sign-off

STEP 4

Certified Application

Annual inspections and performance certifications confirm coating integrity, adhesion, thermal stability, and performance. This rigor ensures ROI is measured, verified, and sustained.

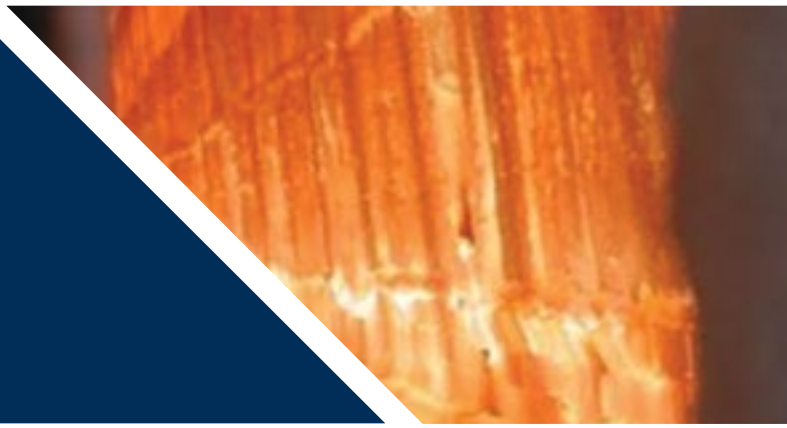
Protection
Where It Counts

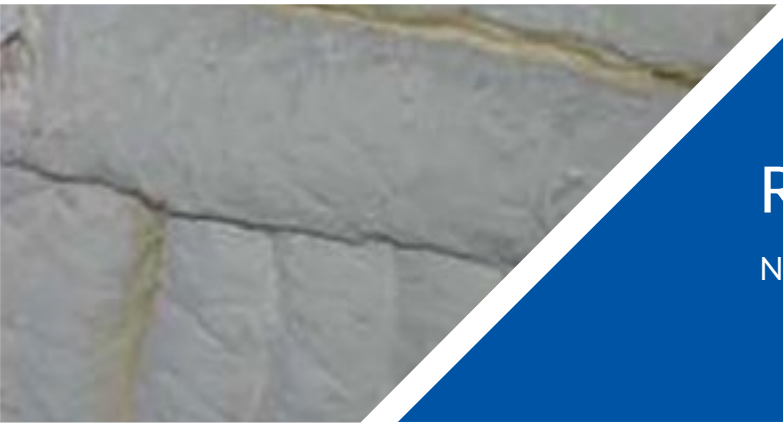
Emisshield is applied to the most critical assets in petrochemical operations:

Emisshield converts furnace surfaces into **high-emissivity emitters,** balancing heat, reducing fuel consumption, and extending service life.

Refractory Linings **& Radiant Walls**

Lowering shell temperature losses





Refractory Ceramic **Fiber**

Negligible shrinkage (<1%), over 300°F higher stability

Burners & **Flares**

Improved combustion efficiency, reduced radiant loss

Process **Tubes & Coils**

Reduced tube temperature, eliminated creep

CASE HISTORY

KWINANA, AUSTRALIA

CSBP Primary Ammonia Reformer

Overview

CSBP operates a natural-gas-fired primary ammonia reformer in Kwinana. The radiant box temperatures exceeded the alarm set-point (>1480°F), leading to repeated emergency shutdown alarms and concerns about damage to process tubes. CSBP required a method to lower these bridge wall temperatures while enhancing production and energy efficiency.

Application information

Emisshield coatings were applied to the ceramic fiber, insulating firebrick (IFB), and burner blocks in the reformer's east and west chambers. The work covered the radiant walls, end walls, roof, transition ducting, and walls up to the top of the convection section. The furnace operates at ~1830°F and the heat exchanger at ~930°F.

Emisshield®

Summary

Improved bridge wall cooling and ***5% higher ammonia*** output through balanced heat and extended refractory life.

Following the application, CSBP experienced a 5% increase in ammonia production and significant reductions in energy and maintenance costs, resulting in a return on investment of less than one year (ROI). The high-emissivity coating re-radiated energy (heat) away from the bridge wall, keeping temperatures below alarm levels. The ceramic fiber modules lasted longer, with reduced shrinkage, dusting, and joint formation. Overall, the coating enabled CSBP to reduce fuel consumption, improve production, and meet its environmental sustainability goals.

Emisshield Benefits

Less than 1 Year ROI

5%

5% production increase.

Re-Radiation

Effective re-radiation of heat.

Temperature

Lowered bridge-wall temperatures.

Prevented Shutdowns

Lifespan & Durability

Increased lifespan and durability of ceramic fiber modules.

Reduced Shrinkage

Reduced shrinkage, dusting, and joint formation.

Lower Fuel Consumption

Environmental Compliance

TEXAS, USA

Ethane Cracker

Overview

Huntsman Chemical's Texas ethylene cracker needed to reduce fuel use and extend the life of its refractory. Emisshield products were applied alongside other upgrades (new IFB in the lower radiant walls, new refractory ceramic fiber modules, new radiant tubes, low-NO_x burners, and penetration seals) to evaluate energy-savings potential.

Application information

Operating at ~2100°F, the furnace used Emisshield ST-series products on the IFB and the new refractory ceramic fiber modules, applied with a HVLP spray gun. The substrates included IFB and new refractory ceramic fiber modules.

Emisshield®

Summary

Reduced coking and stabilized heat profiles delivered **measurable fuel savings** and **consistent ethylene yield** through reduced downtime.

Fuel consumption dropped by 12%, resulting in significant annual cost savings and a return on investment of less than one year (ROI). Ceramic fiber shrinkage was reduced to less than 1%, compared to the typical 5–7%. Downtime was reduced by a factor of two to three, and the exterior unit temperature decreased by more than 150°F. These improvements generated substantial yearly savings.

Emisshield Benefits

12%

Fuel Savings

Less than 1 Year ROI

<1% Shrinkage

Shrinkage on ceramic fiber reduced to <1%.

2–3×

Downtime reduced by 2–3X.

>150°F

External furnace temperature lowered by >150°F.

Longer Substrate Life

Longer refractory and ceramic fiber life and better temperature uniformity.

LABORATORY VALIDATION

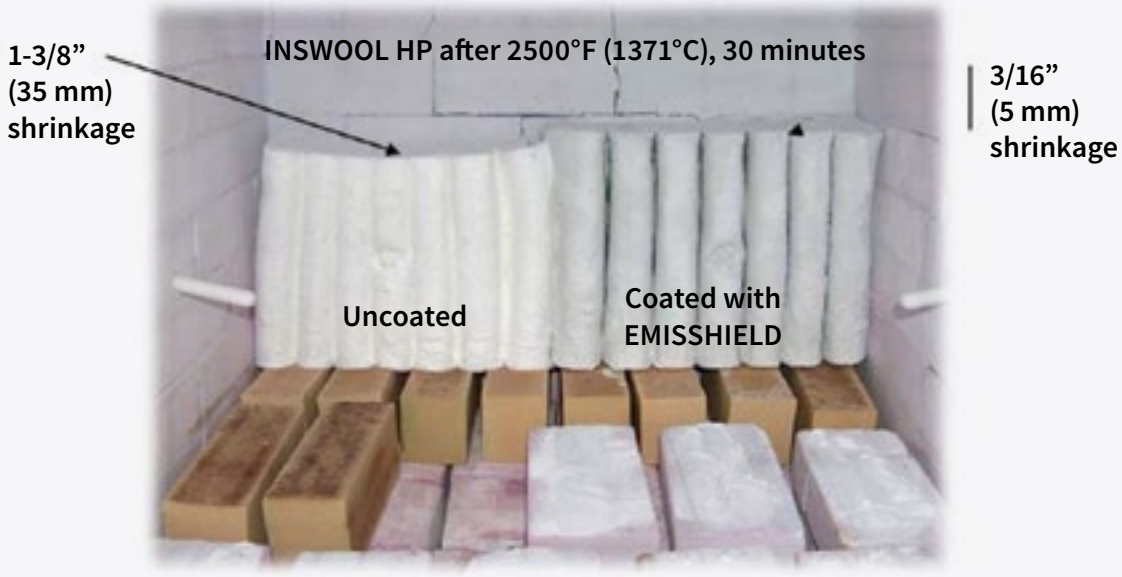
Ceramic Fiber Testing

Overview

Third-party testing was conducted to evaluate how the coating affects ceramic fiber modules. The objectives were to determine whether the coating reduces shrinkage, increases the continuous-duty temperature limit, and lowers the cold-face surface temperature.

Application information

Six tests were conducted over a one-month period using various types of ceramic fiber at different temperatures. Twelve thermocouples monitored both hot-face and cold-face temperatures, as well as furnace and load conditions. Emisshield coatings were applied to ceramic fiber modules, while others were left uncoated for comparison.



Summary

Coated fiber modules **withstood 300°F higher temperatures** and showed under **1% shrinkage** versus uncoated Ceramic Fiber.

The tests showed that Emisshield-coated ceramic fiber retained its size and shape significantly better and had a continuous-duty temperature limit ~300°F higher than uncoated fiber. Ceramic fiber modules exhibited shrinkage of less than 1%, compared with 2–5% for uncoated modules. Cold-face temperatures were 42–50°F lower on coated fiber. The coating, therefore, extends the life of ceramic-fiber linings, decreases downtime and maintenance requirements, and allows operation at higher process temperatures.

Emisshield Benefits

<1% Shrinkage

Shrinkage on ceramic fiber reduced to <1%.

~300°F

Continuous-duty temperature limit increased by ~300°F.

42–50°F

Cold-face temperatures lowered by 42-50°F.

Longer Refractory Life

Reduced Maintenance

Emisshield®

TEXAS, USA

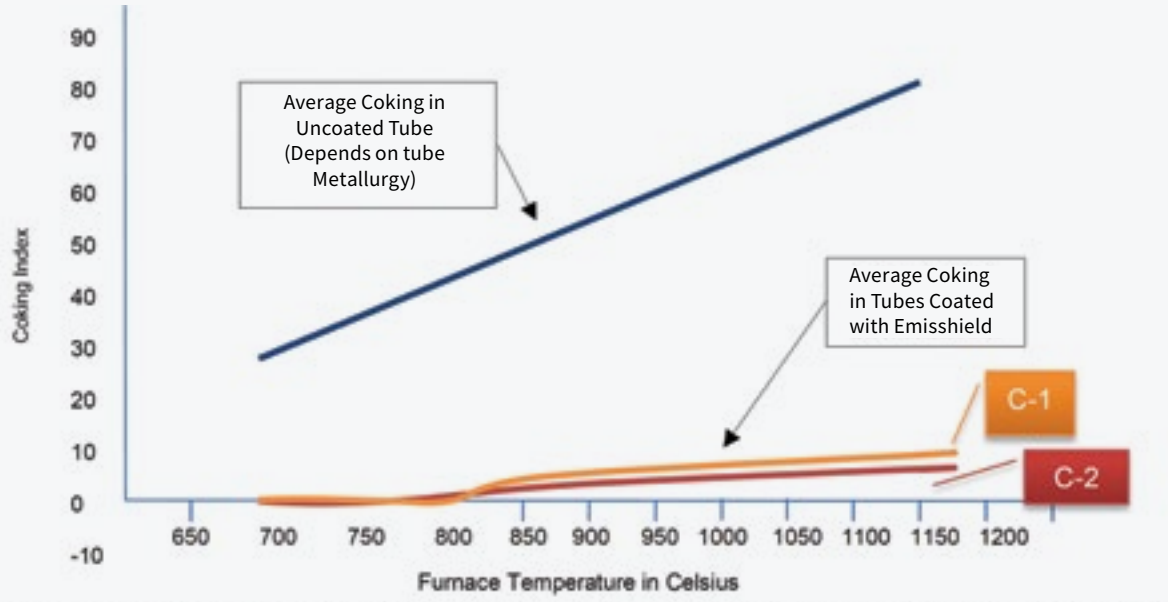
Reducing Coking in Process Tubes

Overview

Continuous coking study with various feeds conducted in Texas by a major petrochemical company. Various feeds were analyzed and the goal of project was to determine effectiveness of Emisshield on reducing or eliminating coking.

Application information

Emisshield was applied to the exterior of Incoloy process tubes, properly prepared in accordance with relevant AMPP guidelines.



Above shows third-party data to determine Coking Index and confirmed that Emisshield dramatically reduces coking in process tubes.

Summary

Significant **decrease in coking**, elimination of hotspots resulting in improved tube longevity, improved heat transfer, increased efficiency, and run length.

The coating improved uniform heating across the tubes, reducing hot spots, and non-uniform heat flux. The time between decoking cycles increased significantly, representing a 3–5x improvement. The coke that did form was lower in volume and easier to remove, reducing maintenance costs and downtime.

Emisshield Benefits

30+ Months

Decoking interval extended from 9 months to 30+ months.

7+ Years

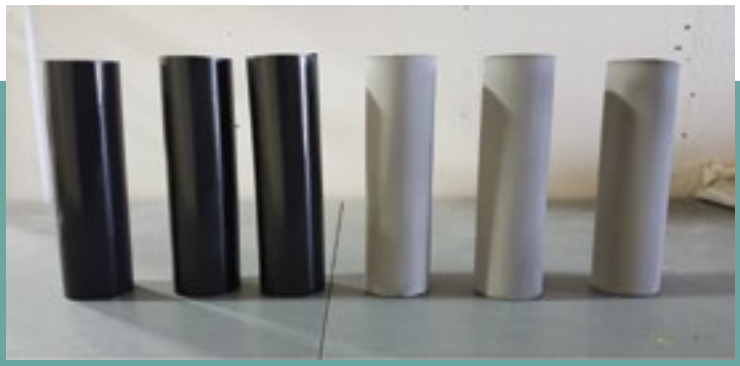
Consistent performance in excess of 7 years.

Uniform Heating

Improved uniform heating reduces hot spots and non-uniform heat flux.

Reduced Coke

Smaller, granular coke deposits are easier to remove.



SABIC KINGDOM OF SAUDI ARABIA

VCM/EDC Cracking Furnace

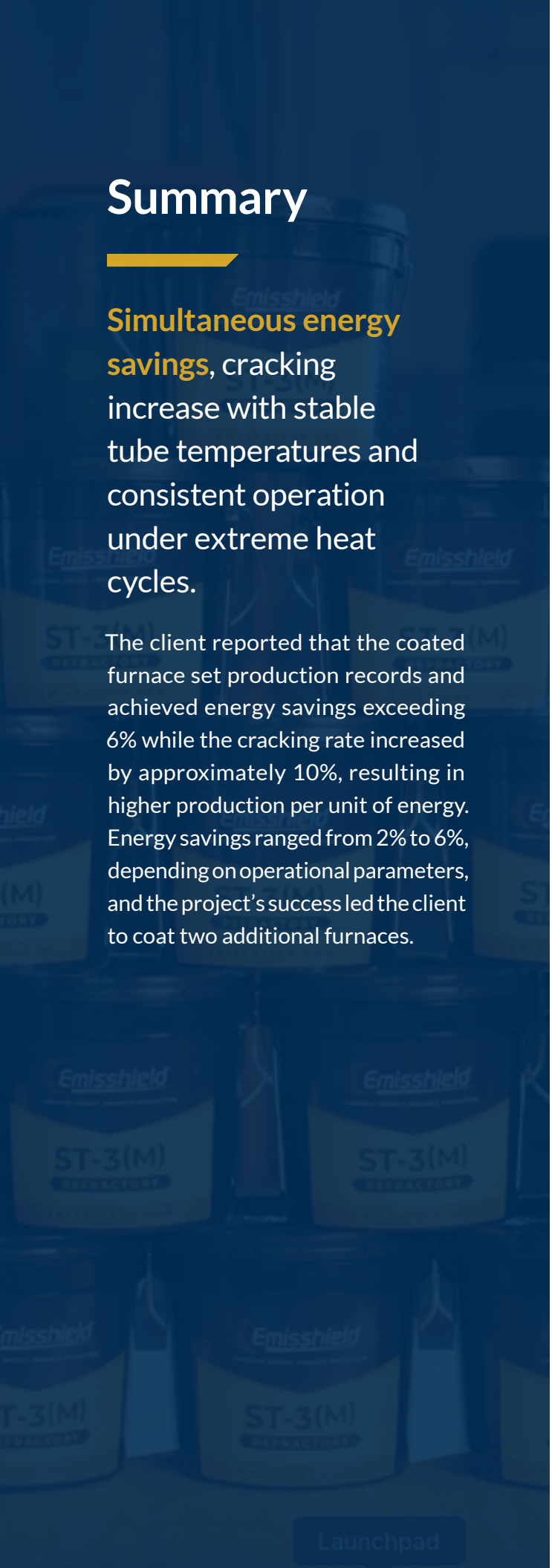
Overview

A petrochemical operator in the Kingdom of Saudi Arabia sought to improve the efficiency of an EDC cracking furnace while increasing cracking rates. A third-party evaluation reported the performance of an Emisshield high-emissivity coating system.

Application information

The furnace operates at approximately 1560°F. Emisshield was applied to 40 process tubes, the ceramic fiber walls and burner blocks.

Emisshield®



Summary

Simultaneous energy savings, cracking increase with stable tube temperatures and consistent operation under extreme heat cycles.

The client reported that the coated furnace set production records and achieved energy savings exceeding 6% while the cracking rate increased by approximately 10%, resulting in higher production per unit of energy. Energy savings ranged from 2% to 6%, depending on operational parameters, and the project's success led the client to coat two additional furnaces.

Emisshield Benefits

10%

10% increase in cracking rate.

6%

Energy savings of 2–6% with reports exceeding 6%.

Higher Production

Higher production per unit of energy; the client coated additional furnaces since 2013.

SAUDI ARAMCO – MIDDLE EAST

Oil-Field Flares

Overview

Beginning in 2013, Emisshield partnered with Aramco and other Middle Eastern flare operators to reduce flare shell temperatures and extend flare life. Over 50 flares of various types have been coated since the program started.

Application information

The flares burn natural gas and are constructed of stainless steel. Emisshield specialized flare coatings were applied to flare tips and shells to improve combustion efficiency and reduce surface temperatures. The program has been ongoing since 2013.

Emisshield®

Summary

Improved combustion uniformity reduced visible emissions and increased flare efficiency during continuous service.

Emisshield specialized flare coatings lowered flare metal temperatures, improved combustion efficiency, and extended flare lifespan by 7–10 times. The coatings are designed for extremely high-heat and corrosive or sour-gas environments, to include high H_2S. They also reduce air emissions and increase the destruction and removal efficiency (DRE) of the flares.

Emisshield Benefits

7–10+×

Lifespan increase of 7–10+×

Improved Combustion

Lower metal temps and improved combustion efficiency.

Improved VOC Destruction

Reduction in air emissions and higher DRE.

High-Heat

Suitable for high-heat, corrosive, and sour-gas environments.

Internal Protection

Protects against internal combustion in the event of cross winds.

GHENT, BELGIUM

Ethane Steam Cracking Pilot

Overview

As part of the European Union's Horizon 2020 IMPROOF initiative, Ghent University conducted a third-party validation of high-emissivity coatings in a steam cracking furnace. The objective was to quantify energy savings, confirm coating performance under operational conditions, and support modeling for industrial-scale application. With energy intensity and emissions reduction at the core of the project, the Emisshield coating was tested in the university's pilot unit to demonstrate its potential for improving heat transfer, reducing fuel usage, and lowering carbon intensity in ethylene production.

Application information

Emisshield was applied to the radiant walls and ceiling of the furnace's two cracking cells. These zones operate at high temperatures and are critical for heat transfer into the process coils. The preheat cells were left uncoated as a control. Coating thickness, surface preparation, and application were consistent with field protocols. Thermal and process data were gathered over repeated cracking cycles, and performance was benchmarked against uncoated operation under identical load and severity conditions.

Summary

Pilot unit **cut fuel use by 4.8%** with no loss in conversion; independent tests confirmed higher emissivity and modeling projected **7–12% savings** at full scale.

Following the coating, the pilot unit demonstrated a 4.8% reduction in fuel consumption at steady state, without impacting feed conversion or outlet temperatures. Independent lab tests confirmed the coated refractory's emissivity increased from ~0.4 to ~0.95. Simultaneously, CFD modeling and radiative heat transfer simulations from the broader IMPROOF program projected energy savings of 7–12% in full-scale ethane furnaces. These results provide validation of both Emisshield's performance and the predictive models used to guide industrial adoption.

Emisshield®

Emisshield Benefits

4.8%

4.8% total fuel savings in pilot unit.

~0.95 Emissivity

Refractory emissivity increased from ~0.4 to ~0.95.

1290–1800°F

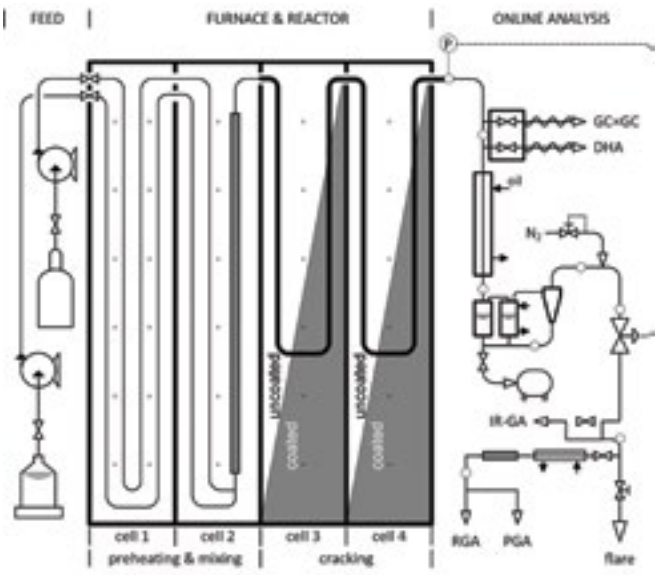
Stable coating performance from 1290–1800°F.

7–12%

Modeled 7–12% energy savings in full-scale furnaces.

Lower CO_2

Lower CO_2 emissions and improved efficiency.



TEXAS, USA

Eastman Ethylene Furnace

Overview

Eastman Chemical in Texas sought to evaluate energy savings and production gains by applying Emisshield coatings to its ethylene furnace. New process tubes were installed concurrently.

Application information

The furnace operates at ≈2100°F. Emisshield products were applied to the insulating firebrick (IFB) and the ceramic fiber modules using a HVLP spray gun.

Summary

6% energy savings and **9% higher production** simultaneously achieved through improved radiative heat transfer and lower wall temps.

Eastman achieved 6% energy savings and a 9% increase in ethylene production after coating. The payback period was less than 1 year.

Emisshield Benefits

6%

Reduction in fuel consumption.

9%

Production increase.

Less than 1 Year

Payback in less than 1 year at typical fuel prices.

Improved Uniform Heating

LAPORTE, TEXAS

Sulfur Furnace

Overview

A sulfur furnace in LaPorte, Texas, running on natural gas, sought overall thermal improvements and reduced maintenance. The furnace had a four-year-old hard refractory lining.

Application information

Emisshield was sprayed onto existing refractory walls of the sulfur furnace. The unit operates at roughly 1800°F and burns natural gas.

Summary

Fuel demand dropped 5% and tube life extended as coating stabilized heat distribution across reaction zones.

After coating, the furnace achieved 5% energy savings and a marked improvement in thermal response. Carbon emissions declined, and the outside furnace shell temp dropped significantly. The coating extended the life of the refractory and cut maintenance requirements.

Emisshield Benefits

5%

5% fuel savings.

Improved Thermal Response

Lower Carbon Emissions

Reduced Exterior Furnace Shell Temperature

Improved Refractory Life

Reduced Maintenance

TEXAS, USA

Apache Nitrogen Steam Boiler

Target Wall and Tubes with Emisshield

Burner Wall with Emisshield

Overview

Apache Nitrogen Products evaluated Emisshield on a 46 MMBtu/hr Erie City boiler to improve heat transfer and reduce casing losses. The coating was applied to Boiler #1, with performance compared to an identical uncoated unit (Boiler #2). The goal was to confirm energy efficiency gains, reduced surface temperatures, and increased steam output.

Application information

Emisshield was applied to both castable refractory and carbon steel tube surfaces. Steel was grit blasted and chemically cleaned prior to coating; refractory required no prep. Thermal imaging was used pre- and post-application to track performance changes.

Summary

4–5% fuel efficiency gain and lower shell temps led to more steam production, improved combustion, and measurable energy savings.

Following the Emisshield application, Boiler #1 demonstrated measurable improvements in thermal performance temperatures were notably lower, and overall boiler efficiency improved by 4–5%. Thermal imaging showed clear temperature reductions on the burner wall and sidewall surfaces when compared to the uncoated Boiler #2. Operators also reported an increase in steam output capacity, confirming enhanced heat transfer efficiency without increased fuel consumption.

Emisshield Benefits

4-5%

4–5% improvement in boiler efficiency.

Shell Temperatures

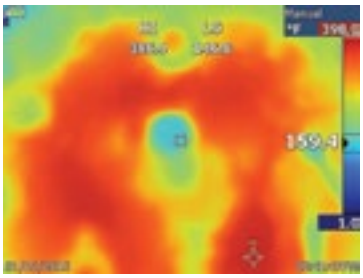
Lower shell temperatures on burner and sidewalls.

Lower Excess Air

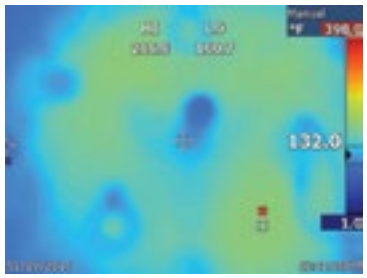
Reduced excess air improves combustion stability.

Increased Performance

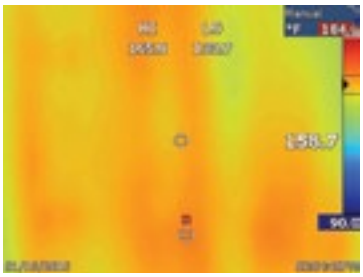
Increased Performance (higher steam output).



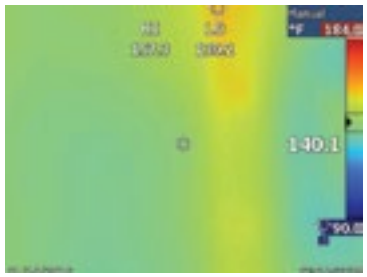
Burner Wall, Boiler #2 - uncoated



Burner Wall, Boiler #1 w/Emisshield



Sidewall, Boiler #2 - uncoated



Sidewall, Boiler #1, w/Emisshield

TERRA INDUSTRIES, OKLAHOMA

Terrace-Wall Ammonia Reformer

Overview

Terra Industries operates a Foster-Wheeler twin-cell terrace-wall ammonia reformer with 190 tubes per cell. During a scheduled outage, the plant planned to replace a 5-inch section of 2600°F insulating firebrick (IFB) but found the IFB in both cells needed replacement. Insufficient IFB stock led to the installation of high-temperature ceramic fiber modules coated with Emisshield.

Application information

The coated modules were installed in the upper terrace, operating at approximately 1800°F, and Emisshield was sprayed onto the modules.

Figure 1 – Upper terrace sidewall showing uneven heating on insulating firebrick.

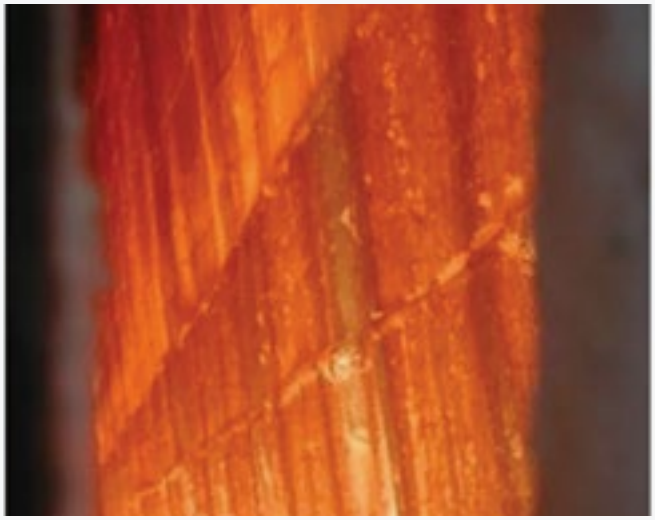


Figure 2 – Upper terrace sidewall after most insulating firebrick have been replaced by ceramic fiber modules and coated with Emisshield ST-17. Note the even heating on the coating and the cooler coating temperature due to increased radiation of heat to the tubes.

Summary

Coated modules maintained radiance uniformity and durability, **reducing energy loss** and maintenance frequency

Photographs showed that the Emisshield-coated modules radiated heat more uniformly and were darker and more evenly colored than the original IFB. After eight months of service, the coated modules exhibited no shrinkage or ablation, demonstrating the coating's ability to protect high-temperature fiber modules.

Emisshield Benefits

Uniform Heat

Uniform, more intense heat radiation from coated modules.

No Shrinkage

No shrinkage or ablation after eight months of service.

Increased Service Temperature & Life

Alternative solution when IFB replacement material is unavailable; extends service temperature and life.

Emisshield®

KENTUCKY

Westlake Ethylene Furnace

Overview

An ethylene furnace in Kentucky needed to cut fuel use and improve temperature uniformity. Emisshield coatings were applied solely to the furnace's refractory.

Application information

The project targeted the refractory surfaces of the Selas ethylene furnace. Initially, fuel savings of 1.8% were measured. After additional operational adjustments, energy savings increased to the 3% range. Improved uniformity of the radiant-wall temperature profile was observed.

Emisshield®

Summary

Lower furnace shell temp and faster heat transfer increased cracking efficiency and extended furnace operation.

This project involved only a partial application of the coating to the refractory surface, yet still delivered a verified 3% fuel-savings improvement. While modest compared to larger-scale installations, this result highlights the material's ability to enhance thermal efficiency and reduce greenhouse gas emissions even without full system coverage. It reinforces that meaningful performance gains can be achieved without a complete relining or full-furnace coating.

Emisshield Benefits

3%

Partial project resulted in Initial fuel savings of 1.8%, rising to ~3% once post-coating adjustments were completed.

Uniform Temperature

More uniform radiant-wall temperature profile.

Emission Reduction

Contribution to emission-reduction goals.

Beyond Conventional Coatings

THE NEXT GENERATION OF HIGH-EMISSIVITY COATING SYSTEMS

Emisshield represents the next generation of high-emissivity technology, developed from NASA's Thermal Protection System, and engineered for continuous duty beyond 3090°F. It delivers reliability and efficiency that conventional coatings cannot match, maintaining adhesion and emissivity under the harshest thermal cycling conditions in a non-toxic and VOC-free solution.

Unlike coatings that flake, oxidize, or rely on hazardous chromium, cerium, and lithium oxides, Emisshield forms a dense, flexible bond that resists degradation and extends equipment life. Trusted by NASA for spacecraft re-entry and validated through industrial performance, it provides measurable fuel savings, reduced coking, and long-term protection for petrochemical furnaces operating in the most demanding environments.

- **Temperature stability exceeding 3090°F** — more than 750°F higher than typical coatings.
- **Adhesion strength verified** under repeated thermal cycling.
- **3–5x longer recoat intervals** than coatings and rigidizers.
- **Free of heavy metals** for safer plant operation.
- **Space-certified heritage,** trusted in NASA spacecraft re-entry.
- **All test results verified** by third party.

If NASA trusts Emisshield to protect spacecraft on re-entry, **petrochemical operators can trust Emisshield** to protect their furnaces.

A Higher Standard of Performance

Emisshield transforms radiant surfaces into efficient, high-emissivity radiators that balance heat, lower fuel demand, and stabilize furnace operation. By improving radiant heat transfer, the coating enhances temperature uniformity and minimizes flame impingement, leading to safer, more efficient combustion.

Tested across reformers, ethane crackers, and flares, Emisshield has delivered consistent results — measurable reductions in fuel consumption, fewer hot spots, and significantly longer run lengths. Operators report faster heat-up times, improved process control, and reduced downtime between maintenance cycles, all contributing to a more reliable, energy-efficient operation.

3090°F

Continuous 3090°F stability

Zero

Zero oxidation failure

3–5x

3–5x longer service life

Zero

Zero toxic oxides

85th Member

Inducted as 85th Member of the Space Technology Hall of Fame

Proven, Patented, and Verified

22 Patents

Including Pyrolysis Furnace and Process Tubes & Flare Tips

40 +

Formulations Covering Metals, Fibers, Refractories & Composite Systems

500+

Global Installations Across Reformers, Crackers, Boilers & Flares

With 22 issued patents and more than 40 engineered formulations, Emisshield maintains the largest intellectual-property portfolio in the high-emissivity coatings industry. Each coating is designed for specific substrates — from carbon steel and Incoloy process tubes to ceramic fiber, castable, and refractory brick — ensuring compatibility across every critical furnace application.

Every Emisshield product is backed by laboratory validation and verified field performance. Independent testing confirms emissivity values of 0.90-0.95 and adhesion strength exceeding 5,000 psi under extreme thermal cycling. The result is a coating that outlasts and outperforms all conventional options available today.

- **0.85–0.95 spectral emissivity** *confirmed by third-party testing*
- **5,000 psi bond strength** *under ASTM adhesion standards*
- **Engineered for metals, fibers, and refractories worldwide**
- **Certified non-hazardous** *water-based chemistry*

Performance Verified:
Findings at a Glance

Independent audits, field studies, and global installations consistently confirm Emisshield's impact across a range of petrochemical applications. The data shows measurable efficiency gains, longer run lengths, and reduced emissions — results achieved not in lab conditions, but in furnaces operating under full industrial load.

Fuel Efficiency

Energy savings of 4–10% verified across ammonia reformers and ethylene furnaces.

Production Output

Throughput increases of 3–6% with improved radiant heat transfer.

Extended Run Lengths

Maintenance and decoking intervals expanded from 12 to 30+ months, tripling uptime.

Temperature Stability

Maintained emissivity above 0.90 through 2730°F thermal cycles with no surface loss.

Reduced Ceramic Fiber Shrinkage

Under 1% shrinkage versus 5–7% uncoated in long-term exposure tests.

Emission Reduction

CO_2 and NO_x emissions lowered by 5–12%, supporting compliance and sustainability goals.

Operational ROI

Commonly less than one year through fuel and maintenance savings – project specific.

Increased Lifespan

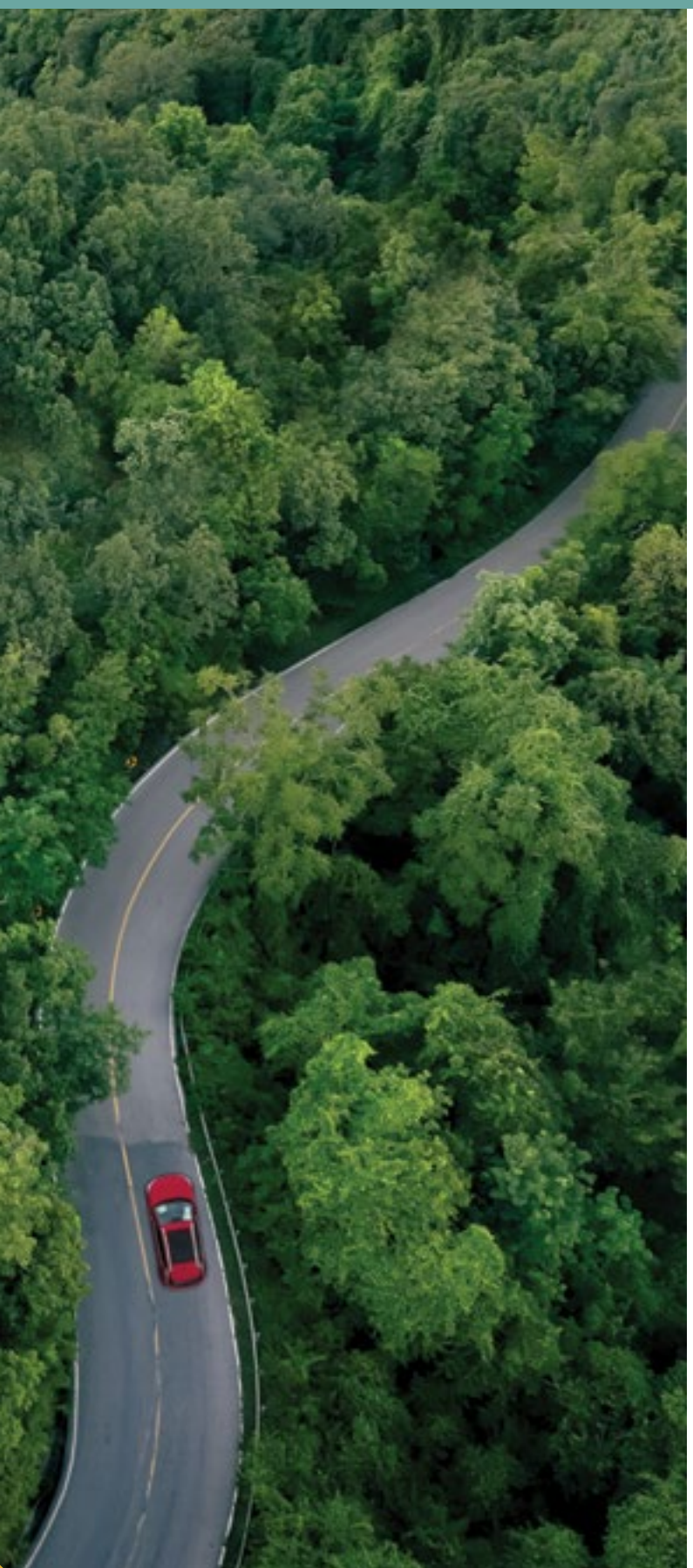
increased substrate life, corrosion resistance, equipment lifespan, decreased maintenance and downtime

Emisshield®

Decarbonization, Sustainability, & Emissions Reduction.

Fuel consumption directly drives carbon emissions in petrochemical furnaces. Every 1% reduction in fuel input delivers a proportional decrease in CO_2 output. Emisshield installations routinely achieve 5–12% reductions in firing rates, creating measurable sustainability gains while lowering operating cost.

By stabilizing radiation and reducing flame impingement, operators also see secondary benefits: lower NO_X formation, fewer hot spots, improving workplace safety.



Operational **Impact**

Lower Carbon Intensity

Fuel consumption reduced 5–12%, directly lowering CO_2 output and energy cost.

Quantifiable Sustainability Gains

Each 1% fuel reduction equals a proportional cut in carbon footprint.

Engineered Solution (10 MMBtu/hr Furnace)

~10% less fuel, ~54,000 tons CO_2 reduction annually.

Reduced Emissions Across the Board

Lower NO_x and VOCs through more complete combustion and reduced firing rates.

Proven Return on Investment

ROI is often under one year with fuel and carbon savings – project specific.

Improved Operator Safety

Reduced radiant heat reaching casings and walkways lowers personnel exposure.

Zero-VOC Application Chemistry

Non-hazardous, water-based formulation supports ESG and regulatory compliance.

Engineering-Driven Project Evaluation

Before any Emisshield installation, every project begins with a detailed engineering questionnaire to capture furnace design, operating conditions, fuel data, and performance goals. This ensures the correct formulation, accurate performance modeling, and a tailored application plan. The depth of this process demonstrates the rigor behind every Emisshield project—results are engineered, validated, and never guesswork.

General Project Information:

Project Name:	
Project Type:	
Furnace Type & Manufacturer:	
Project Furnace Location/Address:	
Intended Application Date:	
Detailed Existing Operational Issues:	
Detailed Desired Performance Results:	

Emisshield Project information:

Substrate Type 1: & Substrate Manufacturer:		Age		Area 1 (ft^2 or m^2) :	
Substrate Type 2: & Substrate Manufacturer:		Age		Area 2 (ft^2 or m^2) :	
Substrate Type 3: & Substrate Manufacturer:		Age		Area 3 (ft^2 or m^2) :	
Substrate Type 4: & Substrate Manufacturer		Age		Area 4 (ft^2 or m^2) :	

Additional Questions:

How many and type of Burner blocks:	
*TMT=Tube Metal Temperature	
Operating Temperature(s):	
Shut Down Frequency / Cause:	
Next Two Scheduled Maintenance Shutdowns:	
Annual Maintenance Costs:	
Normal Heat up/Cool down rate days:	

Additional Questions:

Days between decoking:	
Decoking Duration:	
Coil Inlet Temp of Radiant Section (raw material)	
Coil Outlet Temp of the Radiant Section:	
Vapor or Liquid Phase (product)	
Stack Temperature:	
Damper Position:	
Excess O2:	
Fuel Temperatures:	
-Inlet to Process Preheat:	
-Outlet to Process Preheat:	
Maximum Temperature Excursions:	
Detail Range of Temperature Excursions:	
Stack O2 Level:	

Fuel Information:

Fuel Type & Atmosphere:	
Gas Composition:	H2S: NH3: CO2: H2O: CH4: C2H6: C3H8: C4H10: Total:
Alternate Gas Composition:	H2S: NH3: CO2: H2O: CH4: C2H6: C3H8: C4H10: Total:
Annual Fuel Usage:	
Fuel Cost (€/MWh):	

Product Information:

Annual Production (unit/year):	
Product Value (€/unit):	
Describe Uniformity of Production	

Required Attachments & Supporting Documentation

Please attach the following to this completed questionnaire: PFD and P&ID

- Drawings and pictures of the desired project and problem areas to be considered for Emisshield Application.
- Existing temperature data and all specific energy usage data for the Project. (Please complete the Attached Heat Balance Template)
- Please Provide – PFD and P&ID for the furnace, Programmable Logic Controller (PLC) details and all set points and Control Loops.
- Please advise if this data needs to be covered by an NDA and we will properly execute.

Emisshield®

Global Reach, **Local Expertise**

TRUSTED PERFORMANCE ACROSS THE PETROCHEMICAL INDUSTRY

From refinery reformers to ethane crackers, Emisshield coatings are operating in petrochemical facilities across six continents. Our global network of engineers and certified application partners ensures consistent performance standards — whether it's a new installation or an upgrade to existing fired equipment.

Through close collaboration with EPC firms, furnace OEMs, and plant operators, Emisshield delivers not only coating technology but also deep technical knowledge and on-site expertise. Every application is guided by NASA-derived science, industry testing, and a commitment to safer, more efficient, and more sustainable operations.

CHASE NEDROW INDUSTRIES

Exclusive North American Distributor and Installer of Emisshield High-Emissivity Coatings

CHASE NEDROW
INDUSTRIES

Your North American Partner

Chase Nedrow is proud to serve as the exclusive North American distributor for Emisshield, bringing NASA-derived coating technology directly to petrochemical facilities across the continent. With over four decades of hands-on experience in refractory systems, we help plants achieve measurable efficiency, safety, and environmental performance gains.

Our Vision

To advance a future where high-quality refractory products, seamless installation, and specialized coatings converge to elevate industrial performance while promoting environmental stewardship through longer lifespans, reduced emissions, and greater overall efficiency.

Our Mission

Commitment to drive efficiency, growth, and sustainability for the refractory consumers we serve by combining our cutting-edge industrial knowledge with over four decades of hands-on expertise in refractory products, tools, and high-emissivity coatings.

To connect with our petrochemical team or request a consultation, scan the QR Code:

CHASE NEDROW
INDUSTRIES

CHASENEDROW.COM

Exclusive North American Distributor and
Installer of Emisshield High-Emissivity Coatings

Chase Nedrow Industries | 150 Landrow Drive | Wixom, MI 48393 | (248) 669-9886