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Foamfrax



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safer*

*specialty products that
save energy, reduce pollution and improve fire safety*

Overview

- Technology
- Foamfrax Process
- Benefits
- Product Forms
- Case Studies
- Target Markets & Applications

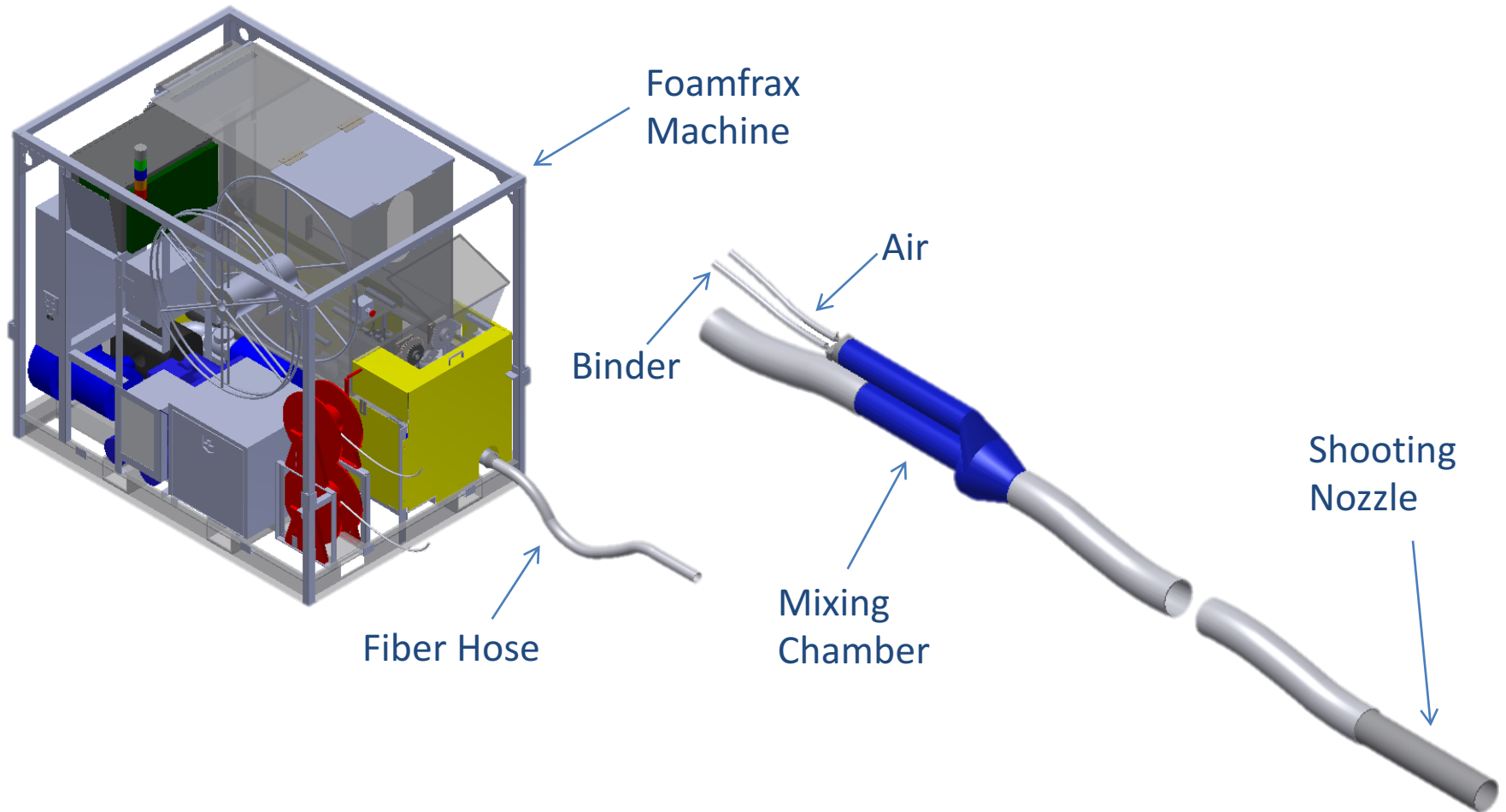




Technology

- **Proprietary Technology Encapsulates Fibers in Foam Binder Matrix**
- **Unifrax Holds the Technology License for the Refractory Market, Global Agreement**
- **Foamfrax Utilizes Proprietary Binders and Equipment.**
- **Installed by Unifrax Licensed Distributor/Contractors**

Foamfrax Process





Benefits

- **Speed of installation**
- **Low airborne fiber levels**
- **Fuel/Energy efficiency**
- **Lining upgrades over existing hard refractory and RCF linings.**
- **Backup lining for gunnite and rammed plastics**
- **Lighter (8pcf – 25pcf) than dense refractories**
- **Monolithic ceramic fiber lining system**
- **Well suited for intricate geometries**
- **Incorporates a level of safety over other installed materials**

Product Forms

- Foamfrax Grade I (2300° F)
- Foamfrax Grade II (2600° F)
- Foamfrax Grade III (3000° F)
- Foamfrax RG (1800° F)
- Foamfrax RG+ (2300° F)
- Foamfrax HD (2300°, 2600° & 3000°)
- Isofoam (2300° F) Low Bio-Persistent Fiber
- Isofoam RG (1800° F) Low Bio-Persistent Fiber



Foamfrax Veneer Applications

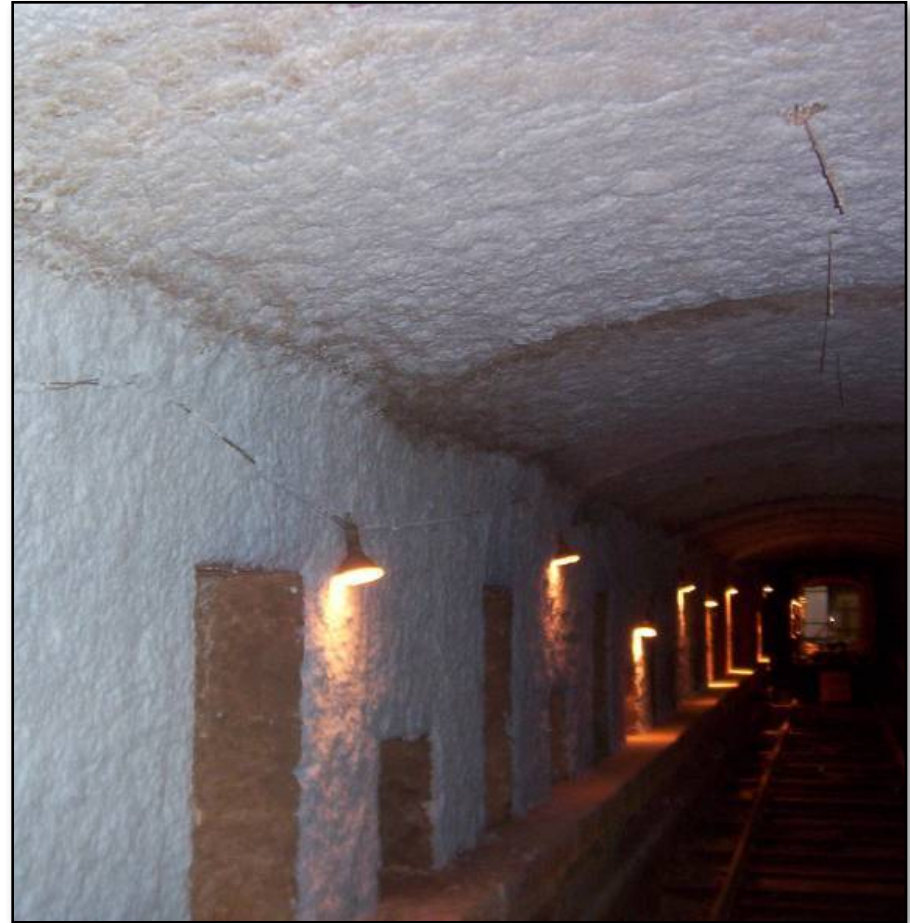
Advantages



- Increased Efficiency
- Rapid installation speed, minimum down time
- Lining upgrades
- Postpone major capital investment
- Maintenance tool

Case Study (Veneer)

- **Unit: Tunnel Kiln**
- **Operating Temperature: 2100°F**
- **Scope: 2" thick veneer over refractory**
- **Lining System: Foamfrax Grade I**





Results

- Because there is less temperature variation within the tunnel kiln the result is a more consistent/controlled burn with less color variation in the finished product.
- Kiln throughput was increased from 24 cars/day to 26 cars/day, an 8.3% productivity gain.
- Fuels savings of 3% - 4% per 1000 bricks produced.

Full Thickness Linings

Advantages

- Installation rates up to 1500 board feet/ Hr.
- Monolithic Construction
- Composite Lining System
- Anchors Unexposed



Case Study (Full Thickness)

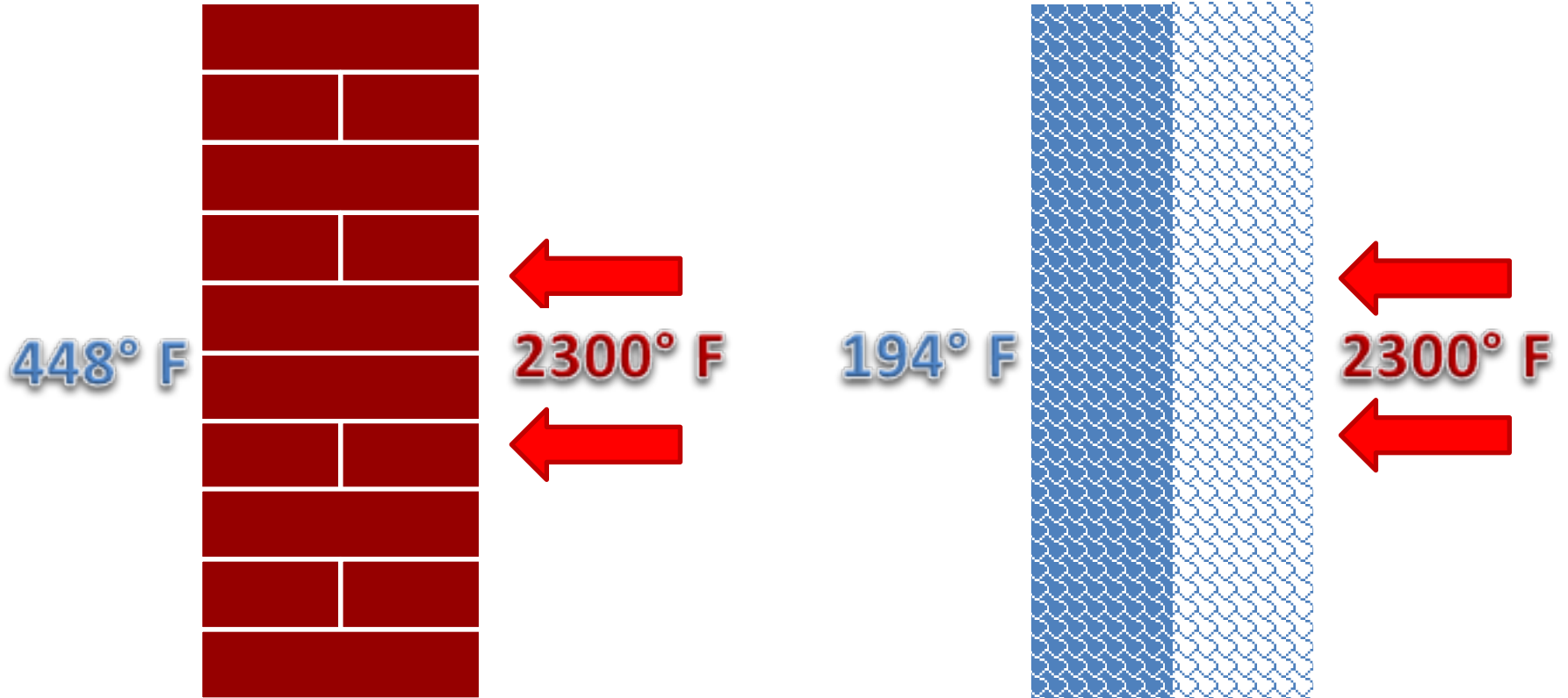
- Operating temperature: 2300°F
- Scope: 13-1/2" Composite Sidewall Lining
 - 7" Foamfrax Grade I
 - 6-1/2" Foamfrax Grade II
- Anchoring System
 - Inconel 601 "V" Anchors



Comparison

13-1/2" Firebrick

7" Grade I & 6.5" Grade II

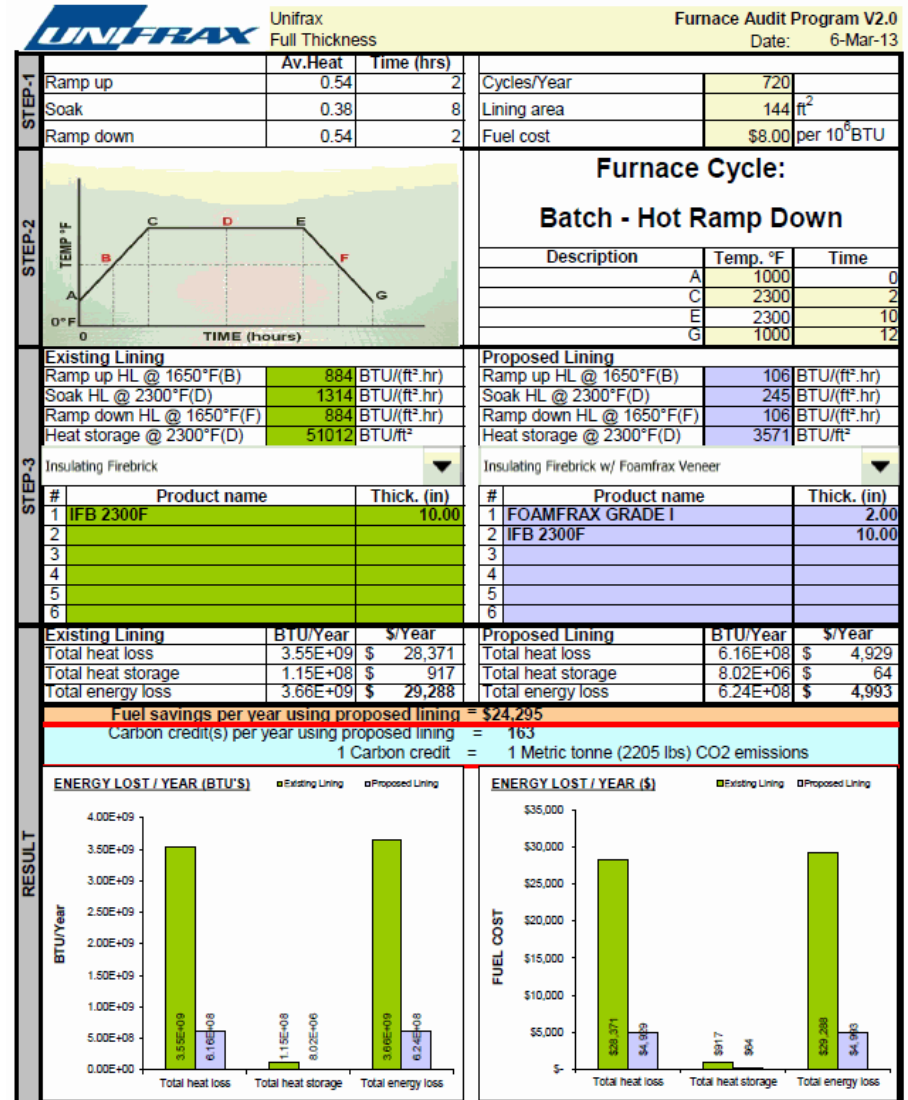


Results

- Improved throughput due to reduced heat loss.
- Potential for shorter firing cycles due to reduced heat storage.
- Fuel Savings offset price of Foamfrax.



2 years into service



Foamfrax HD Applications

- Grade I, II, and III in a 12pcf–16pcf range
- Increased density from binder formulation and machine setting modifications
- Non-hydrated set, must be dried/fired



- Improved Installation times of kiln cars.
- Complex geometries can be molded.
- Use limit up to 2800° F.

Foamfrax RG Applications

Advantages

- Installation Rates of up to 900 Board Feet/Hr.
- Monolithic back-up material.
- Reduced material handling & cutting issues.
- Reduces Lining cross section
- 50% less dense and 3X more efficient than Light weight Castable.
- 1/6 the density and 10X more efficient than gunnite.



Case Study (RG Full Thickness)

- Aluminum Re-heat oven
- 1000F Application
- RG shot on 2 sides, arch and both doors
- Exterior insulation added to ducts
- Anchored using standard V anchors and steel wire mesh
- 4" FF RG replaced fiberwall construction
- Reheat times reduced from 4 hours to 2 hours
- After 6 months use, no issues.



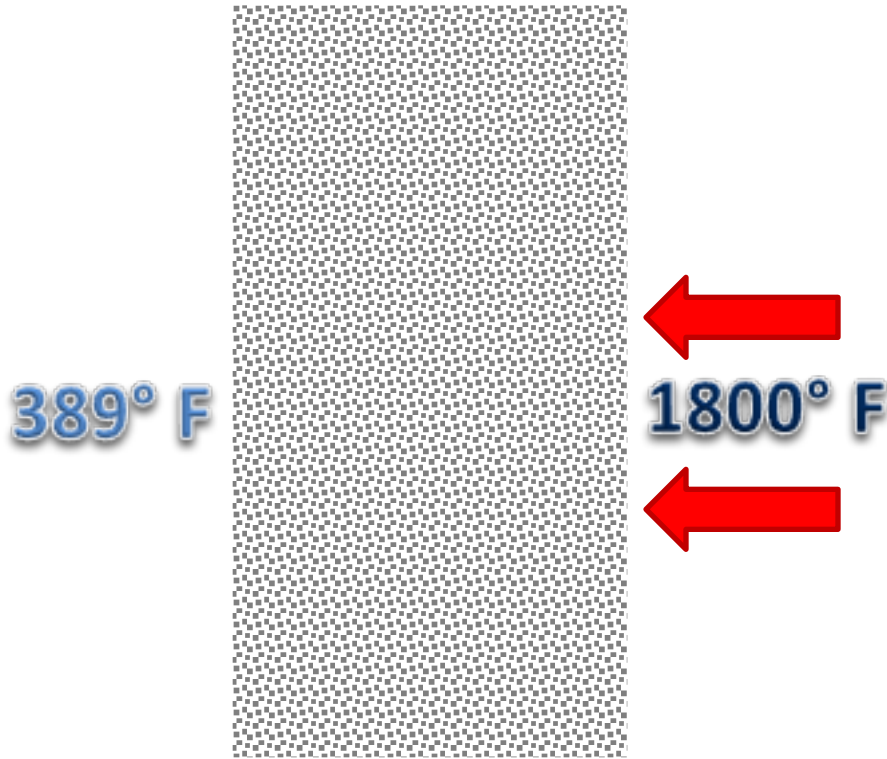
Case Study (RG Backup)

- Operating temperature: 1800°F
- Scope: 6" & 10" Foamfrax RG backup to gunnite.
- Anchoring System
 - 304 SS studs with threaded ends for "V"
- Installation Date: February 2012
- Minimize cold face temp to minimize external insulation.



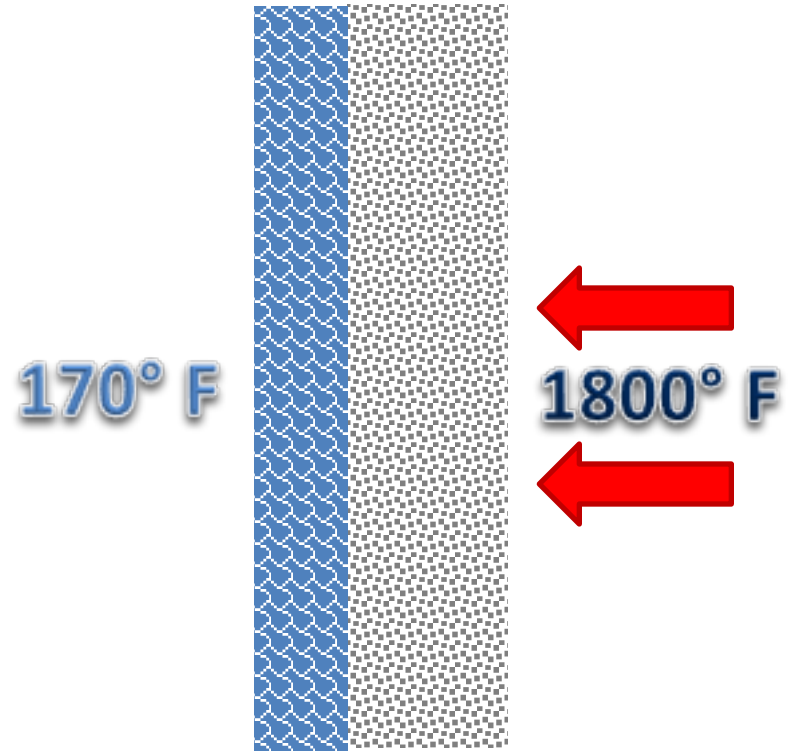
Results

20" Gunnite



Heat Loss = 989.9 BTU/(ft²*hr)

6" Foamfrax RG + 10" Gunnite



Heat Loss = 182.5 BTU/(ft²*hr)



Results

- Increased hopper volume due to decreased lining thickness.
- **18.4% of the Heat Loss of a traditional gunite system.**
- Increased overall heat recovery of the system.
- Increase in installation rate.
- Minimal scrap (1%-3%) rebound loss.
- Reduced risk of reportable injury.



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MARKETS and APPLICATIONS

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Target Markets



○ Steel/Forge

- Roller Hearth Furnaces (Veneers, F.T., RG)
- Reheat Furnace Veneers
- Ladle Stands
- Over the Road Covers
- Coil Annealers
- Continuous Annealing Line
- Batch Forge Furnaces
- Rotary Hearth Furnaces

Target Markets

- **Ceramic**
 - **Low Mass Kiln Cars**
 - **Tunnel Kiln Veneers**
 - **Sanitary Ware Refire Kiln**
 - **Periodic Kilns**
- **Aluminum**
 - **Furnace Doors**
 - **Soaking Pit Veneers**
 - **Back-Up Insulation**



Target Markets



○ Power

- Steam Boiler Tubewall Exteriors
- Co-Gen and Turbines
- Bio-Mass Steam Generation
- Molten Salt Storage Tanks

○ Chemical Process Industry

- Ethylene Furnace Veneers
- Ammonia Reformer Veneers
- RTO Full Thickness
- Heater Full Thickness

Target Applications

- **Veneer**
 - Fuel Savings
 - Consumable Insulation
- **Full Thickness**
 - Fast Turnaround
 - Special Applications/Geometries
- **Back-Up**
 - Behind Castable and Plastic
 - Reduces Lining Thickness
 - Improves Insulation Properties



Backup

- Reduced lining cross section
- Reduced shell temperatures



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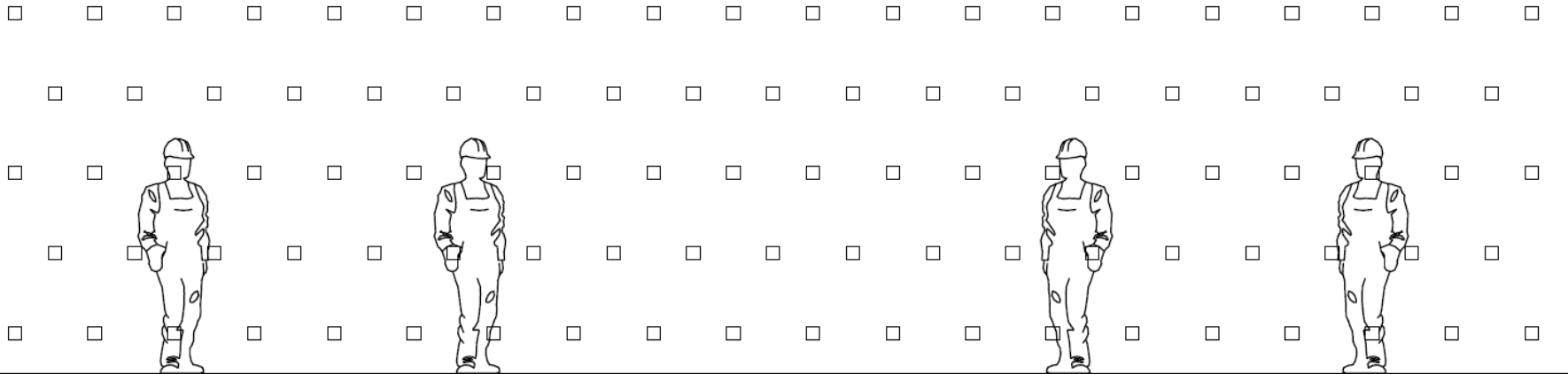
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Complex Geometries

- Improved rates
- Less manpower
- Safer installation



Quicker Rates



Can a crew of 4 men cut and install 2" of backup board on this wall in 1 hour?

You can with Foamfrax!



Veneer

- Dramatic fuel savings
- Cost effectiveness
- Ease of installation

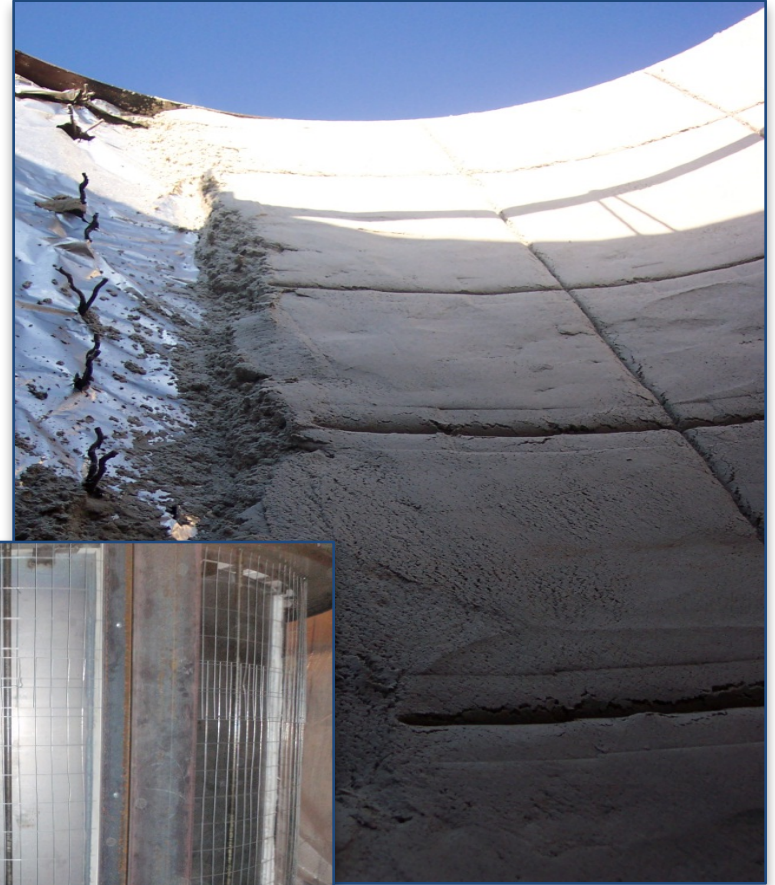


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Exterior Applications

- Ground Flares
- Molten Salt Tanks
- Power Boilers





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Questions ?

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Thank You For Considering Foamfrax & Foamfrax RG as a Heat Management Solution

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