SPI COATINGS

PROVEN PERFORMANCE • REAL WORLD SOLUTIONS

EMPLOYEE OWNED

Presented By:

JOSEPH E. PRITCHETT

Where Physics, Data and Science Combine to Revolutionize Insulation

SUPER THERM®

Heat Neutralizer...Heat Block Insulation Coating™

SUPER THERM® 1989 35 YEARS 2024 BLOCKING HEAT

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THERMAL INSULATION
CORROSION PROTECTION

Some of our Clients

THERMAL INSULATION
CORROSION PROTECTION

SUPER THERM®

THIN FILM Closed Cell Insulation

A New Insulator

SUPER THERM® can replace the traditional method of insulating in many cases.

Revolutionary Results

SUPER THERM® already has over 30+ Years of proven field performance results.

Traditional = Only "slows" the full Heat load transferring through the material until it reaches heat flux (full).

Super Therm®: Blocks 95% of the entire "Initial" Radiational Surface Heat load leaving only 5% "available" for transfer

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SUPER THERM® vs STANDARD INSULATION

Real World tested usefulness in thickness and temperatures

SUPER THERM® tested at 25°C, 50°C, 75°C and 100°C showing same results in blocking heat load and transfer (see page 14).

Tested up to 100°C did not change the perform more than 10% showing that the ceramic load is consistent in blocking heat load at the increases in heat. **Thickness stays the same and performs consistantly.**

STANDARD INSULATION materials are all tested at only 25°C. Why is this? They are based on air pockets in different forms and "slowly" load heat. As it reaches Heat Flux, the test is shut down. After it reaches heat flux, the heat can and will pass through the materials faster because the resistance has been reduced. It is full of heat and will increase in heat flux as it continues to take on more heat. **Thickness "must" be increased at a descending performance.**

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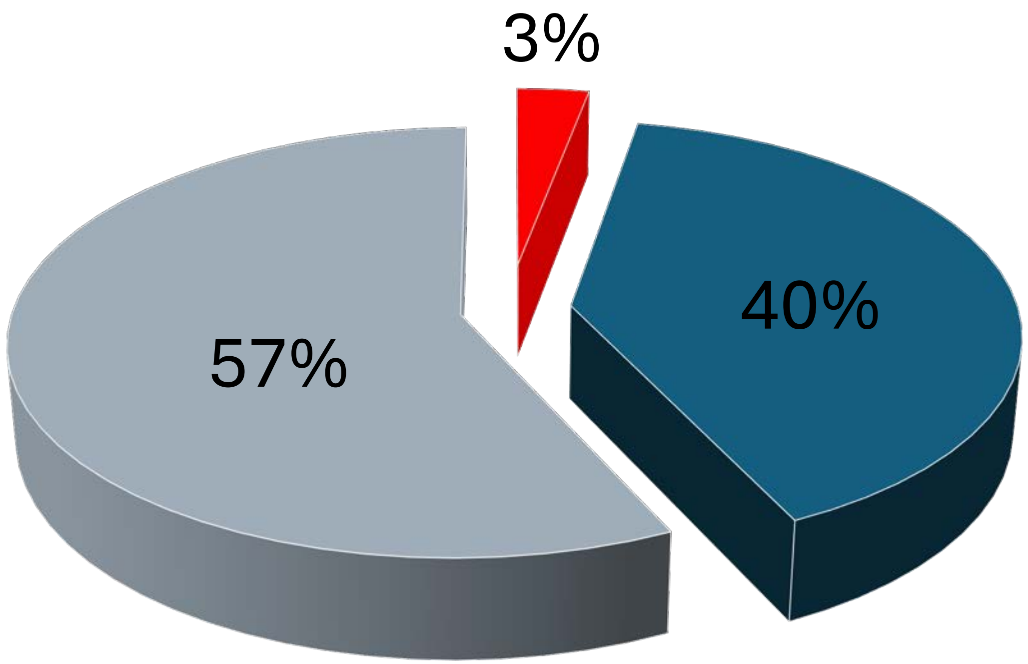
Sources of Radiation



- Ultra Violet — 97% Blocked
- Visual Light — 92% Blocked
- Infrared — 99% Blocked

By preventing initial Heat Load, SUPER THERM® blocks 95% of the heat from these sources. Proof of performance see in next slides.

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JIS A 5759 Film on Window Glass 5.3.4 (c)

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Table 1. Test body

Product name	Measured item	Dimensions	Quantity
SUPERTHERM	solar reflectivity	50 x 50 mm	3
	long wavelength emissivity		1

Table 2. Measurement results

Test body no. / Test item	1	2	3	Average
solar reflectivity	92.1	92.4	92.0	92.2
long wavelength emissivity	99.5			

(Note) For normally utilized white paint, solar reflectivity of about 80%, and long wavelength emissivity is about 90% (source: Architecture (handbook), compiled by the Architectural Institute of Japan, 1980).

Japan Testing Center for Construction Materials

International Testing

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Russian Academy of Sciences Institution, Institute for Solid State Physics

The Table gives summary data of total reflection coefficients measurement with the use of a resolving light filter, i.e. in visible band.

Table. Absolute values of reflection coefficients of SuperTerm coat samples and comparison samples.

Reflection coefficient ρ (%)							
Mirror (*Al*)	*D16*	Fresh electro-zinc coating	Oxygenated electro-zinc coating	"*ST*" Sample 1	"*ST*" Sample 2	"*ST*" Sample 3	"*ST*" Sample 4
90.4	45.7	65.3	16.3	96.1	95.9	94.3	94.5

As you can see in the table, coat samples have much higher reflection coefficient in comparison with bottom layer made of galvanized iron (both fresh and oxygenated) and duralumin samples. And what is more, the coats reflection coefficient in visible band appeared to be a little higher than the aluminum mirror reflection coefficient too.

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Product Certifications

ABS

U.S. GREEN BUILDING COUNCIL
LEED
USGBC

ENERGY STAR

ASTM INTERNATIONAL

DNV

UL

cradletocradle

CRRC
COOL ROOF
RATING COUNCIL

USDA

Masdar
A MUBADALA COMPANY

SAUDI ARABIAN STANDARDS ORGANIZATION

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FTC Rule 460 states that "Insulation" must be verified and substantiated by the DOE, Energy Officials, or a building professional.

Below: Copy and pasted from FTC 460 Rule

applications. These issues generally fall within the authority and expertise of state and local energy code officials, DOE experts, and other building professionals. This does not mean that the Commission endorses any particular claims or practices in the market. Any representations made by insulation sellers, whether covered by the R-value Rule or not, must be substantiated and otherwise not violate Section 5 of the FTC Act.

www.federalregister.gov/documents/2019/05/13/2019-09622/labeling-and-advertising-of-home-insulation-trade-regulation-rule

Any Insulation without DOE substantiation is considered "Questionable."
Performance MUST be rated by professionals - their work is shown on the next slides.
SUPER THERM® has been tested and substantiated directly by DOE.

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U.S. Department of Energy Weatherization Program

Testing on <u>SUPER THERM®</u> "Radiation Control Coating"

THE WEATHERIZATION PROGRAM TESTING RESULTS – Proving resistance of heat loading.

<u>Results incorporated with</u>

Radiation Control – Oak Ridge National Laboratory showing

Emissivity, Heat Load resistance and energy savings

<u>SUMMARY of DOE Test Results: **</u>

- *Ambient: 85°F. (29°C)
- *ROOF without coating: 164°F (73°C)
- *Roof coated with a white Elastomeric Reflective paint: 125°F (52°C)
- *Roof coated with SUPER THERM®: 86°F (30°C). <u>(1°F over ambient)</u>
- *<u>Interior</u> ambient reduced: 10.2°F (6°C – 84°F reduced to 74°F)

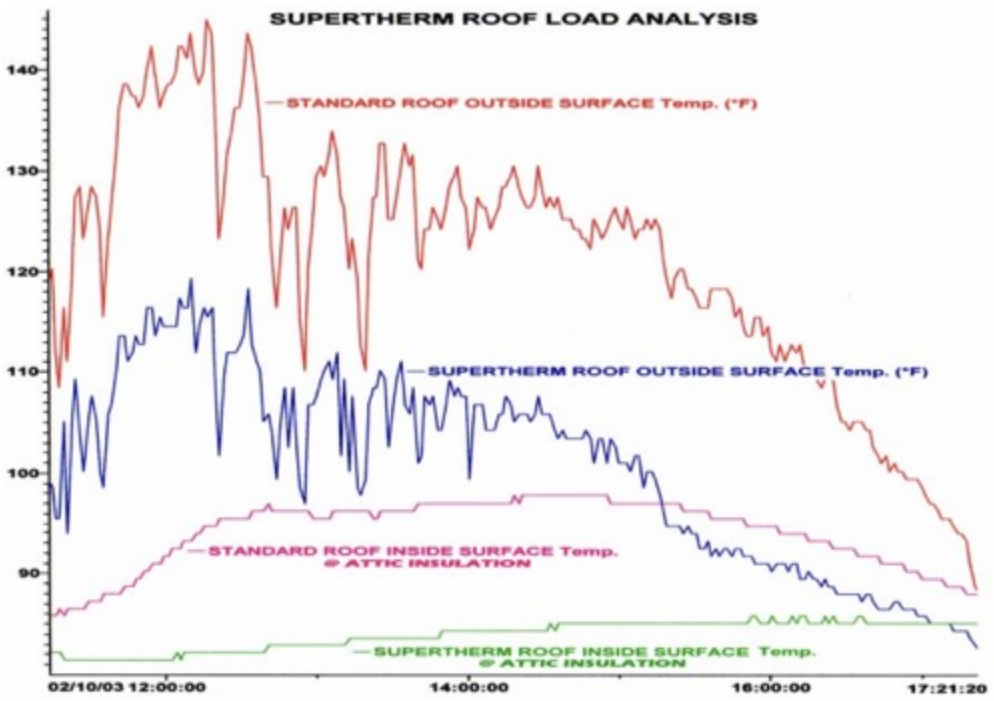
***Upon the return to the home a week later, the owner told the auditors that she had never turned on the A/C because it was comfortable.**

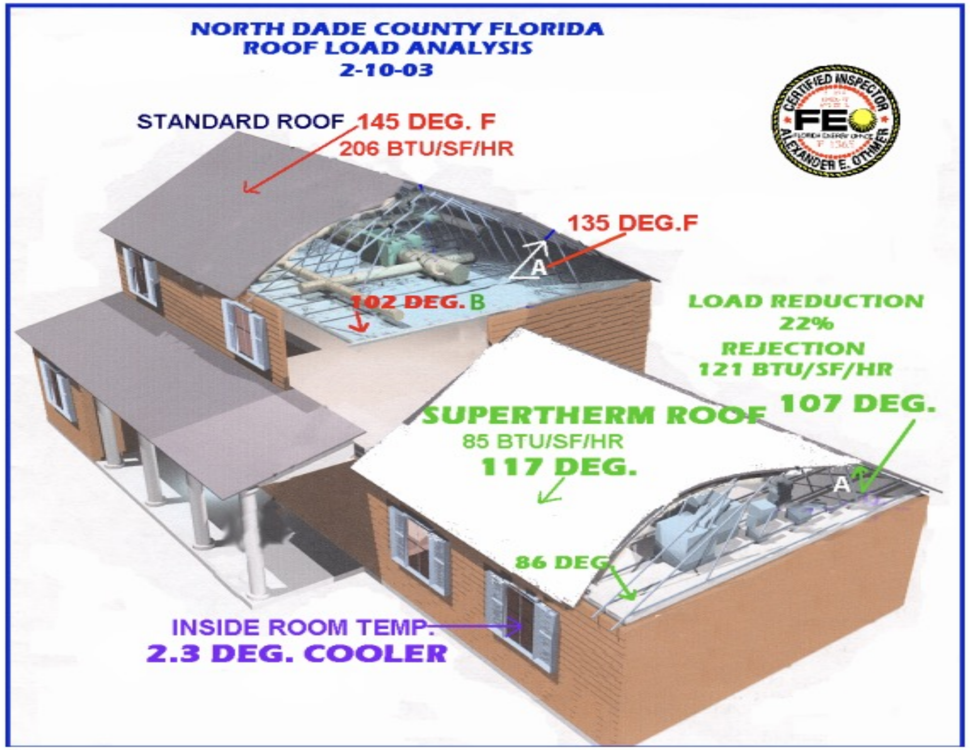
U.S. Department of Energy Report

THERMAL INSULATION
CORROSION PROTECTION

MIAMI Florida testing Utility Loads in Standard Buildings.

Half the roof coated and showed reduction in Energy Use.





Testing showed a 20-30% Reduction in Energy Use

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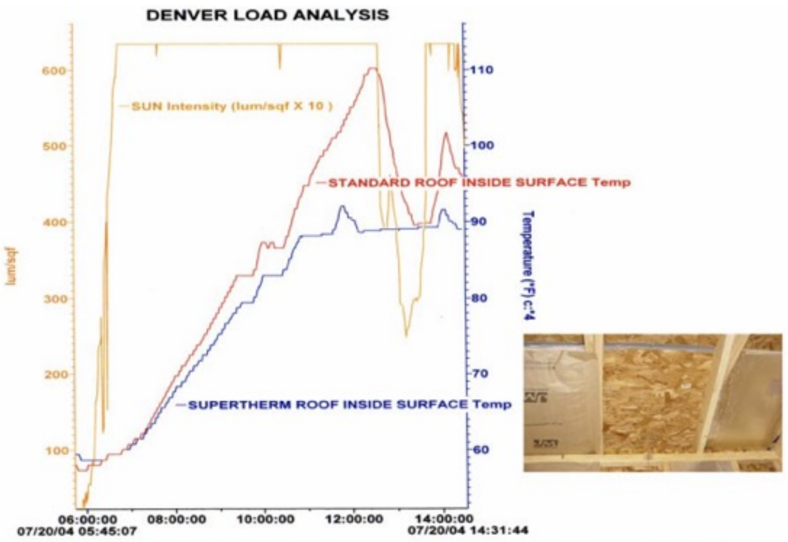
U.S. Department of Energy Report

Denver Testing SUPER THERM® versus Reflective Paint.

DOE requested that each individual board used to build the SUPER THERM® building was coated individually because they knew SUPER THERM® sealed so well simply sprayed over the entire building envelope so as to give the reflective coating on the control unit a better chance.



THESE PERFORMANCE ENHANCEMENT PROPERTIES WERE FOUND TO BE EQUALLY EFFECTIVE ON BOTH ROOF AND SIDE WALL APPLICATIONS.

Testing showed a 26-30% Reduction in Energy Use – Total Clouds during test.

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U.S. Department of Energy Report

LaPorte Texas Testing of SUPER THERM® on Shipping Containers

• INSIDE CONTAINER AMBIENT TEMPERATURE	22 DEGREES COOLER
• THERMAL CONDUCTANCE TO OUTSIDE ENVIRONMENT	50% LESS
• EXTERNAL SURFACE TEMPERATURE	47 DEGREES COOLER
• INTERNAL SURFACE TEMPERATURES	37 DEGREES COOLER
• OUTSIDE SURFACE REFLECTIVITY	50% HIGHER
• ULTRAVIOLET ABSORPTION RATE	92% LESS
• INTERNAL MOISTURE LEVELS	28.5% DRYER

Energy loads were reduced by approximately *46 to 52%* by applying *SUPER THERM®*

THERMAL INSULATION
CORROSION PROTECTION

Thermophysical Properties of SUPER THERM®

TABLE 4

Thermal Conductivity Calculations

Sample (No.)	Temp. (C)	Density (gm cm^{-3})	Specific Heat ($W\text{-}s\text{-}gm^{-1}K^{-1}$)	Diffusivity (cm^2 sec^{-1})	Conduct. ($W\text{-}cm^{-1}$ K^{-1})	Conduct. (BTU *)	Temp (F)
Plate	23.0	7.746	0.4407	0.14800	0.50523	350.54	73.4
	50.0	7.746	0.4638	0.14700	0.52808	366.39	122.0
	75.0	7.746	0.4800	0.14200	0.52796	366.30	167.0
	100.0	7.746	0.4951	0.13800	0.52925	367.20	212.0

* (BTU in hr^{-1} ft^{-2} F^{-1})

TABLE 5

Thermal Conductivity Calculations

Sample (No.)	Temp. (C)	Density (gm cm^{-3})	Specific Heat ($W\text{-}s\text{-}gm^{-1}K^{-1}$)	Diffusivity (cm^2 sec^{-1})	Conduct. ($W\text{-}cm^{-1}$ K^{-1})	Conduct. (BTU *)	Temp (F)
t=0.0149	23.0	1.639	1.1871	0.00279	0.00543	3.77	73.4
	50.0	1.639	1.2657	0.00272	0.00564	3.92	122.0
	75.0	1.639	1.3211	0.00271	0.00587	4.07	167.0
	100.0	1.639	1.3695	0.00256	0.00575	3.99	212.0
t=0.0397	23.0	1.639	1.1871	0.00324	0.00630	4.37	73.4
	50.0	1.639	1.2657	0.00303	0.00629	4.36	122.0
	75.0	1.639	1.3211	0.00287	0.00621	4.31	167.0
	100.0	1.639	1.3695	0.00274	0.00615	4.27	212.0
t=0.0474	23.0	1.639	1.1871	0.00324	0.00630	4.37	73.4
	50.0	1.639	1.2657	0.00311	0.00645	4.48	122.0
	75.0	1.639	1.3211	0.00300	0.00650	4.51	167.0
	100.0	1.639	1.3695	0.00285	0.00640	4.44	212.0

* (BTU in hr^{-1} ft^{-2} F^{-1})

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Very Low Heat Absorption

Reflectivity-Diffusivity-Density-Specific Heat
Very Low Absorption of Heat
Thermophysical Properties of **SUPER THERM®** not seen in "reflective paints"

SUPER THERM® operates based on industry-accepted heat values and has several key properties that enhance its performance:

High Specific Heat: SUPER THERM® has a high specific heat value. What does this mean? (Specific heat is defined by the amount of heat needed to raise the temperature of 1 gram of a substance 1 degree Celsius (°C)). Given that the ceramic compounds in SUPER THERM resist absorption of heat by density, have crystalline structure to divert heat and emissivity to repel heat back to the atmosphere, it takes a considerable amount of heat to increase the interior heat buildup inside SUPER THERM®. SUPER THERM® has a high specific heat (1.37 compared to 0.50 for metal) meaning it requires more energy to raise its temperature, as seen from the ASTM testing results in slide 14.

High Reflectivity: SUPER THERM® has a high reflective value (Avg 95%) across testing in the US, RUSSIA and JAPAN using very specific instruments. NOTE: These test methods used evaluate repelling heat and not just "light bounce" as most all reflectivity tests do. Example: White paint has a reflectivity of 70%. Does this mean it repels 70% of the surface heat?? Absolutely not. You lay your hand on the hood of a white car on a 90F/32C day, and you will burn your hand. Never with SUPER THERM®. It is within 1-3 degrees of ambient temperature as tested by the Federal DOE Weatherization Assistance Program.

Low Heat Absorptivity: The specific ceramic compounds used are engineered for extremely low density to resist heat load, using specific crystalline structure to divert heat waves, high Specific Heat ratio and the emissivity ability to resist loading heat while at the same time rejecting back to the atmosphere the 5% of heat absorbed on its surface.

Low Diffusivity: SUPER THERM® film has a diffusivity of 0.002 compared to 0.148 for a metal plate, making it 50 times more resistant to heat loading. Diffusivity measures how quickly heat spreads through a material. Due to the low density, specific crystalline structure and emissivity, the coating film does not load the initial heat waves from the sun rejecting them back to the atmosphere while the specific ceramic compounds will resist loading of heat from ambient to 1200F/650 ºC. The ceramic compounds are inert, stable and their structured ability cannot be changed therefore allowing them to work the same in all heat ranges as tested and witnessed by the Federal DOE geographic testing performed.

Super Therm® Blocks Sound

SUPER THERM® is a water-borne, ceramic-filled coating that has four ceramics chosen for insulation and sound reduction. Heat and sound vibration are presented simultaneously to a surface in the same type of radiation wave. The selection of ceramic compounds must be very low in either density or weight. Density must be present to create a vibration and to allow for sound continuation. If the vibration wave is not strong enough to affect vibration into the density of a substrate, then the sound is reduced or eliminated. The Ceramic compounds in SUPER THERM® are extreme low in density which will not vibrate and therefore blocks sound continuation.

SUPER THERM® has been tested under ASTM E90 "Standard Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions" and under ASTM E413 "Standard Classification for Determination of Sound Transmission Class." In the test, the walls were coated on both sides, with a total thickness of 20 mils (10 mils on each side) of SUPER THERM®, and the overall rating of the SUPER THERM® STC (Sound Transmission Coefficient) is 41. This represents the full range of Frequency (Hz) from 100 to 5000. In the speaking range of 1000 to 5000 the rating ranged from 41-51meaning half of the sound blocked.

This is essentially the same testing exemplified in IIC (Intermittent Impact Coefficient), which is related to the continuation of vibration waves. Measurements are based upon preventing these vibrations or sound continuations.

As SUPER THERM® has an overall performance of 41, and with the currently approved layer of lite deck tested and representing a performance of 48 for a single-family residence bedroom floor, the total sum of sound reduction is cumulative and would provide an excellent sound blocking structure far above any standard requirements.

U.S. Air Force Embraces SUPER THERM®

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Alternate Aircraft Preservation Coating

OGDEN AIR LOGISTICS CENTER

- Air Force Research Lab will perform a one year accelerated test to provide four years of data
- On-site simultaneous actual testing here on A-10 , F-16, F-15, and NAVY F-18 aircraft

Anticipated Savings and Benefits:

- Reduce materials: $140 per 5 gallon container X 1300 containers per year = $180K+
- Reduce labor from 4 coat system to 2 coats using airless sprayers, TBD
- Reduce twice the heat loading on aircraft skin compared to current Spraylat–better for electronics

BE AMERICA'S BEST

Super Therm Ceramic Coating for Building Exteriors

OGDEN AIR LOGISTICS CENTER

Area 23 Portable Office and Microturbine Enclosure Metal Exteriors painted with Super Therm Ceramic Heat Reflective Coating to reduce heat loading

BE AMERICA'S BEST

Las Vegas Airport

Harry Reid International Airport Las Vegas

Jet Bridges (platforms from building to airplane for loading and unloading of passengers) were coated with **SUPER THERM®** and exterior surfaces stay within 2°F of ambient air temperature meaning a reduction of exterior surface temperature of 60-80°F (15-26°C) during the summer.

NOTE: these temperature readings may not be the same in different locations or conditions.

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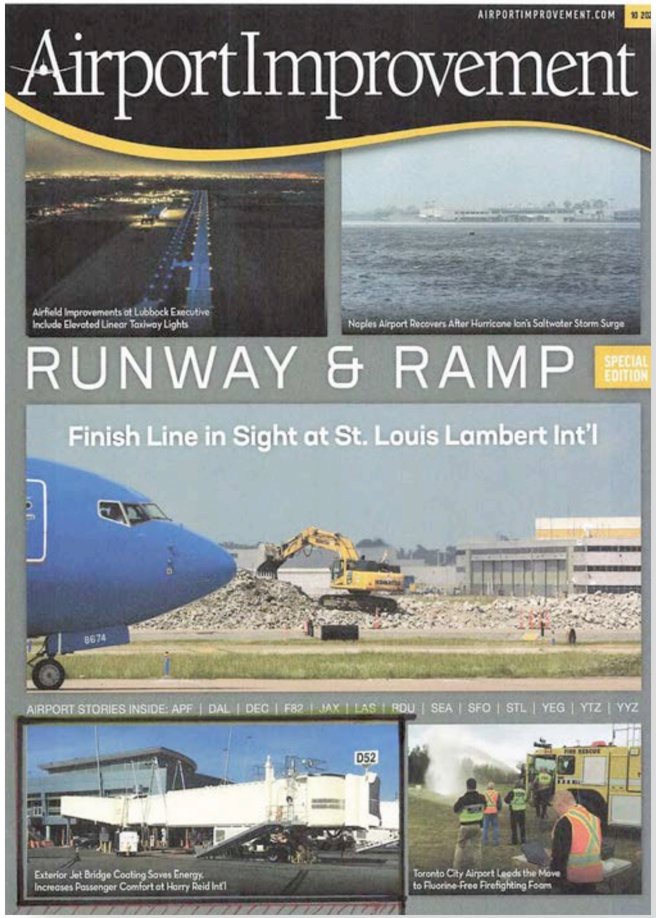
Airport Improvement Magazine
Super Therm® at Las Vegas Airport



October 2023

GROUND SUPPORT | LAS | 45

Application Process

Crews apply Super Therm® onto the roof and exterior sides of the jet bridges and also onto the rotating rotunda segments. Enamo Grip, another product from SPI Coatings, is applied on the sides of the bridges as a topcoat, but the roofs do not need it, Cappel advises. Enamo Grip 5000 is used as a topcoat on the rotunda segments for added protection against the additional movement and wear. Rust Gripe, a corrosion protection coating from SPI Coatings, is applied to any rails or other components showing signs of rust.

Applying Super Therm® isn't as simple as spraying on a fresh coat of paint, McMahan notes. The physical composition and viscosity of the material are unique, requiring special equipment and techniques. Contractors consequently need to be trained and certified by SPI Coatings to ensure quality and guarantee integrity of the product throughout its 10-year general product limited warranty. "SPI Coatings was definitely the firm that just knocked it out of the park for us," McMahan remarks. "Their quality was phenomenal, and they stand behind their product."

Naturally, coordination has been crucial during the phased applications at LAS. "We have to communicate well, so the [boarding bridge] is down for as minimal time as possible," says Leavitt. "It's really just sequencing- making sure we schedule things correctly with the intricacies of getting in and out of the airport property."

Each boarding bridge takes about seven to 10 days to coat, and work is completed onsite at LAS. The only preparation for airport personnel is extending the bridge to its full length so technicians can work on the entire structure. Crews from Southwest Specialty Coatings set up a barrier to protect the area around the jet bridge as they work. There is virtually no impact on travelers or airport operations.

Barring extreme weather conditions or bonding problems during application, Super Therm® can last 25 to 30 years before it may need to be reapplied, says Cappel. When that time comes, a new layer can be applied directly over the previous coating.

Efficiencies and Benefits

Because it takes less time to cool coated bridges, the airport's preconditioned air units will consume less energy and presumably last longer because they are running for shorter periods of time. Moreover, the ceramic coating is expected to extend the life of the bridges because it is thicker than regular paint, eliminates expansion and contraction of the metal structure and provides a buffer to everyday wear and corrosion.

Award-Winning Hoover Dam

SUPER THERM® (Heat), RUST GRIP® (Corrosion) and ENAMO GRIP (Sealant) protected the handrails on the Hoover Bypass Bridge reducing the surface heat to within a few degrees of ambient air temperature so visitors will never be burnt when holding or leaning on the rails in the extreme Arizona desert.

SUPER THERM® System won the E. Crone Knoy Award for New Technology.

E. Crone Knoy Award

for a single, recent, outstanding achievement in industrial or commercial coatings work that demonstrates innovation

SSPC The Society for Protective Coatings

Hoover Dam Bypass Bridge - Colorado River Bridge

Spans between Nevada and Arizona

Structure Owner: Federal Highway Administration
Contractor/Applicator: United/Anco Services - A Member of The Brock Group
Coating Material Suppliers: PPG Marine and Protective Coatings, and Superior Products International (SPI)

January 31, 2011
Las Vegas, NV

President

Executive Director

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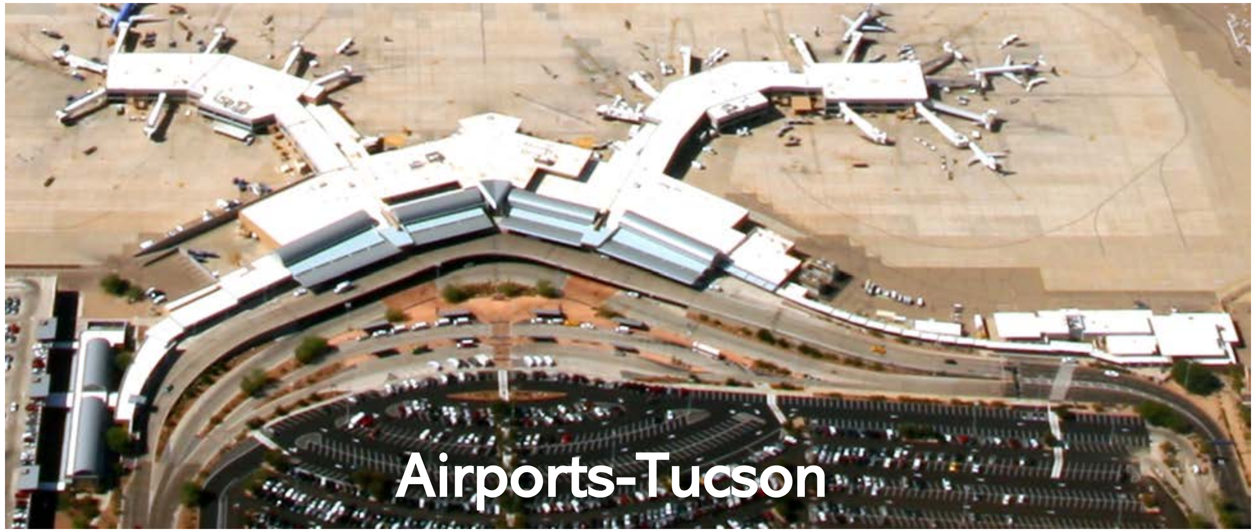
Global Projects and Partners



THERMAL INSULATION
CORROSION PROTECTION

10-Years - No Performance Loss

Room Temperature Data after 10 years ①

KOKUYO Co., Ltd. Nagoya Distribution Center (Aichi)

Application Date: July, 1994 Area: 6,000sq.m. (Batten Seam Metal Roof)

When COOL THERM was applied in 1994, the room temperature had decreased by 5 to 7°C. With the coomparison of the same outside air temperature, the coating maintained the same insulation effect in 2004, even 10 years after it was applied. There was no deterioration in coating, either.

Measurement Points: 1.8m from the mezzanine floor (center)

	BEFORE July 10, 1994	AFTER July 30, 1994	After 10 Years August 28, 2004
Outside Temperature	33.5°C	32.5°C	34.3°C
Room Temperature (mezzanine)	39°C	32°C	33.5°C

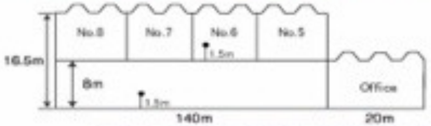
Room Temperature (mezzanine) 39°C 32°C 33.5°C

※ COOL THERM was applied to a total of more than 40,000sq.m. at Kokuyo Co., Ltd. including Shiga Distribution Center, Saga, Fukae, Headquarter Show Room, etc.

Room Temperature Data after 10 years ②

TOSHIBA Logistics Corporation Kyushu Branch (Fukuoka)

Application Date: August 1996 Area: 16,500sq.m. (Metal Roof)



It still maintains the same room temperature after 10 years.

Measurement Points: 1.5m from the 2nd floor (center)

	BEFORE August 10, 1994	AFTER August 1, 1996	After 10 Years August 15, 2006
Outside Temperature	35.5°C	36°C	35°C
Room Temperature (2nd floor)	39.2°C	32.9°C	33°C

※ COOL THERM was applied to a total of more than 70,000sq.m. at Toshiba Logistics Corporation including Ibaraki, Kashiwa, Higashi-Osaka, Chitose, Oita, Himeji, etc.

18-Years - No Performance Loss

THERMAL INSULATION
CORROSION PROTECTION

KOKUYO Co., Ltd.

Application Date: July, 1994 Area: 6,000sq.m. (Batten Seam Metal Roof)
Measurement Date: 30 July, 2012 (13:00 Ambient temp: 33.5℃)

18 years has passed since COOL THERM was applied in 1994, the surface stained badly. (Top Coat has never been applied since then.)

The room temperature was still reduced and maintained by 3.5℃ from 39℃ (39℃-35.5℃) when the ambient temp was measured the same (30 July・33.5℃).

	Outside Temperature	Room Temperature
BEFORE (1994)	33.5℃	39℃
AFTER (1994)	32.5℃	32℃
After 10 years(2004)	34.3℃	33.5℃
After 18 years(2012)	33.5℃	35.5℃

After 10 years (1994)

After 18 years (2012)

30-Year Real World Test Results

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Super Therm® 30-year Test in Kansas from 1989 to 2019
Achieved 35 years of Durability and Performance in 2024

K-TECH is a manufacturing facility located in Grainfield, Western Kansas, USA

Super Therm® was inspected and tested for durability and performance on July 10, 2019 – 30 years. Loss of only 2 mils (50 microns) from original applied film thickness, NO Failures and only 2°F Loss of Performance on surface temperature. – 30 years

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30-Year Real World Test Results Kansas

Temperature on Top of Roof
no coating 145F / 62.7C

Temperature on Top of Roof with
Super Therm® 98.4ºF / 36.8ºC

- **Drop in Surface Temperature of 47ºF with outside ambient air temperature of 90ºF after 30 years (8ºF above ambient)**
- Original coating film thickness was 15 mils; current film thickness is 13 mils - loss of 2 mils over 30 years is exceptional for a water-based coating
- **Super Therm® prevents thermal shock - no expansion or contraction - extends life and reduces maintenance for metal roof**
- No change in appearance over 30 years - still bright white with no tears, cracks, flaking, lifting, separating, or loss of adhesion in coating film
- **K-TECK is a manufacturing facility located in Grainfield, Western Kansas USA**
- Climate is very severe with -5°F (-21°C) in winter with snow and ice and with 100°F (38°C) in summer with sand-storms and very strong solar radiation. Super Therm® has withstood hail-storms without failure or damage.

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Roof Results: Japan

SUPER THERM® on your roof will drastically save energy

Coda Factory

May 1994 (Before)	3,767 Kw
May 1995 (After)	519 Kw
June 1994 (Before)	5,647 Kw
June 1995 (After)	1,869 Kw

Hitachi Electronic

Uncoated	82℃
Coated (After)	47℃
Room Temp. Reduction	35℃

THERMAL INSULATION
CORROSION PROTECTION

HPC® Coating

THICK FILM Closed Cell Insulation

Closed cell multi-ceramic filled water-based coating, sprayed on during operation. Insulates by "holding the heat on the surface of the skin. This causes the interior temperature to increase due to holding the heat which increasing the pressure inside the unit which in turn increases the interior temperature. Maintaining heat on the interior is the key.

All other standard insulation materials are designed to absorb heat and "slowly" transfer the heat to the exterior atmosphere. The ceramic compounds are designed not absorb the heat and hold the heat on the surface. Heat generated at point A is now more efficient to reach point B without loss.

Wrap and Jacket Insulation Systems is where the term CUI was used to describe the corrosion that develops under traditional insulation. HPC® Coating insulates and prevents CUI.

BP Eliminated Traditional Insulation to Prevent CUI

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THERMAL INSULATION
CORROSION PROTECTION

HPC® Coating at Georgia Pacific

HPC® Coating two-year test at Georgia Pacific
Saved 49% energy over Standard Wrap/jacket.
Saved $332,000 in one year on one digester unit.
Won the EPA ENERGY STAR AWARD for energy savings.

Award Winning EPA
October 2023

HPC® Coating (Hot Pipe Coating) a thick film water-based coating applied over hot surfaces to block heat escape from surface therefore holding heat inside the unit to save heat loss and save energy.

Wins the EPA ENERGY STAR Award for Saving Energy with the Georgia Pacific Engineering study performed.

- Insulation material giving an estimated less than a 12-month ROI established to Save Koch (GP) Industries millions estimated in future operations
- Provides Employee burn protection
- Stopped CUI completely

HPC® Coating

THERMAL INSULATION
CORROSION PROTECTION

<u>Pictures</u> FROM LEFT - 1: Georgia Pacific Digester 2: Northern Natural Gas 3: Russian Gazprom 4: Pemex Oil and 5: Georgia Pacific (Koch Industries).

THERMAL INSULATION
CORROSION PROTECTION

HPC® Coating Product Line

HPC® Coating - Ambient to 400°F/204°C
HPC®-INT Coating (400°F/204°C - 800°F/427°C)
HPC®-HT Coating (800°F/427°C - 1200°F/650°C)

- Sprayed on while in operation
- Build up quickly
- Start with thin coats
- Water-based
- Silicone Hybrid System
  In-field Gasprom

HPC® Coating

THERMAL INSULATION
CORROSION PROTECTION

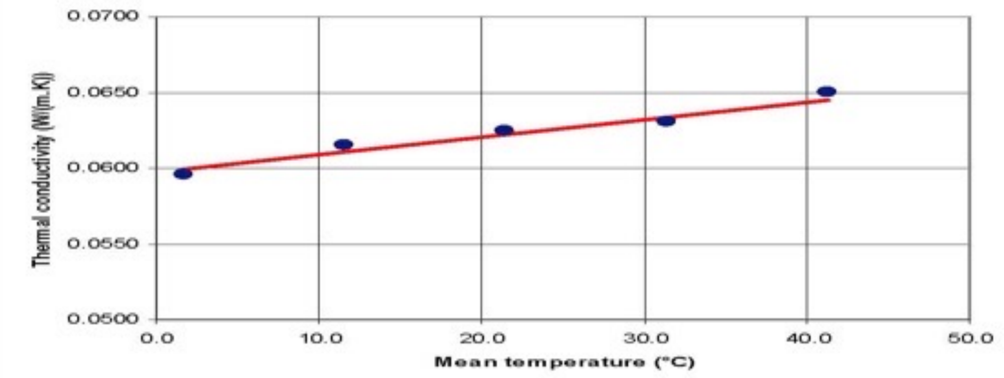


Figure 4 Relation between the thermal conductivity of Hot Pipe Coating and its average temperature

2.2.4.3 <u>Thermal conductivity at different mean temperatures</u>

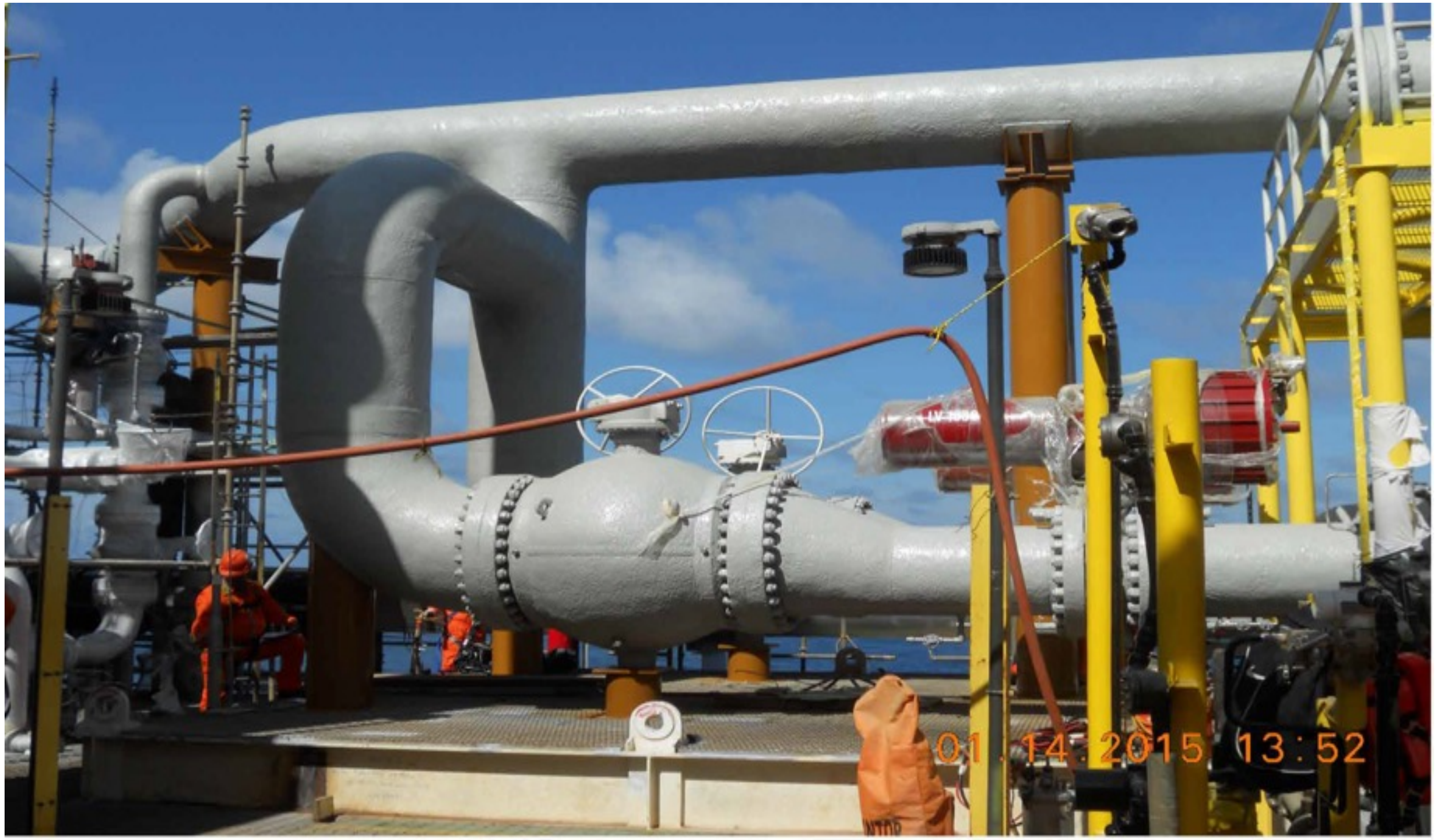
These are given in the following table:

Mean temperature °C	Thermal conductivity W/(m.K)
-10	0.059
0	0.060
10	0.061
20	0.062
30	0.063
50	0.066
100	0.071
200	0.083
300	0.094
400	0.106
500	0.117

As all insulating materials, Hot Pipe Coating performs the best at low temperatures. Above a mean temperature of 350°C, its thermal conductivity passes 0.1 W/(m.K). The effect on the surface temperature and the heat loss of 1 meter run steel pipe thus depends on the temperature of the fluid in the pipe, de insulation thickness applied, the diameter of the pipe and the fact of the pipe hangs inside or outside. Only to illustrate the effect of Hot Pipe Coating, we calculated the reduction in heat loss per meter run for a steel pipe with an exterior diameter of 10 cm, hung in an environment with an effective temperature of 20°C. The pipe transports a 350°C hot fluid

HPC® Coating

Mexico's Pemex Offshore Crude Piping applied in 2014 with HPC® Coating. An average temperature reduction of 55% (110°C) to a surface below 50°C. 350 mils / 9mm DFT.



THERMAL INSULATION
CORROSION PROTECTION

HPC® Coating

Showcasing the same offshore pipe section in 2024. HPC® Coating's ability to withstand harsh oceanic conditions while providing energy efficiency, reducing maintenance, and preventing corrosion.
No deterioration and no drop in performance. **10 years in-field service and no reduction of performance.**

NOTE: "10 YEARS OF HURRICANES AND NO DAMAGE"

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EMPLOYEE OWNED

THERMAL INSULATION
CORROSION PROTECTION

NASA SPINOFF 2024 Magazine published in February 2024 Highlights 35 Year Relationship with Superior Products International II. and SUPER THERM®

NASA SpinOff 2024 Features SUPER THERM® on Page 16

Excerpt From NASA SpinOff 2024 Interview

Super Insulation Requires Super Materials

Engineers at Marshall Space Flight Center have experience in testing spacecraft components against extreme temperatures, like the heat shield from the Orion spacecraft. The makers of Super Therm recognized this and reached out to the center for help. *Credit: NASA*

Super Therm has been applied in several places, including handrails on the Hoover Dam Bypass Bridge over the Colorado River. The selection of its ceramic and polymeric materials was assisted by NASA scientists. *Credit: Superior Products International II LLC*

NASA researchers helped create an insulation coating that blocks heat and sunlight

A summer day can be no picnic.

In addition to the outdoor heat and humidity, the direct sunlight beats indiscriminately on everything. Without proper insulation, a metal-roofed building can quickly feel like an oven.

In the late 1980s, Joseph Pritchett was developing an insulation coating in the U.S. Sun Belt and learned that not all his customers were satisfied with the options available at the time, so he thought he'd develop his own product. He knew NASA had experience in thermal testing, particularly in the realm of ceramics, which have several uses for the agency. Ceramics' heat-resistant properties make them excellent materials for spacecraft re-entry shields, and their durability is perfect for airplane components. However, as Pritchett later discovered, not all ceramic compounds can work in a coating that's applied wet and blended with paint. He had to find the right ceramic, and he thought by infusing paints with both insulating ceramic compounds and tough, resilient polymers, he could devise a coating insulation with the best features of both.

Through the Technology Transfer Office at NASA's Marshall Space Flight Center in Huntsville, Alabama, Pritchett contacted the center's materials lab. The facility had many ways to test heat-resistant materials, such as a thermal vacuum chamber that simulates the extreme temperature swings in space and a thermomechanical analyzer that measures how a sample expands under heating. When he asked researchers there for compounds that could help him, the scientists provided a list of possible ceramics. When none of those worked in a coating, the Marshall engineers widened their search and came back to Pritchett with more ceramic compounds.

Over a period of six years, Pritchett tested every compound on the lists NASA provided, whittling down the potential compounds until he found the perfect insulation. Pritchett founded Superior Products International II Inc. of Shawnee, Kansas, in 1995. The product, dubbed Super Therm, is a composite of both ceramic and polymeric materials. The ceramic acts as the primary heat reflector and heat-blocking insulator, while the polymer is more of a heat- and environmental-resistant binding agent. In 2011, when tested by the Oak Ridge National Lab for a pilot program for cooling low-income housing, it was confirmed that Pritchett's product would work as suggested and save energy when cooling homes.

Pritchett said the engineers at Marshall played a pivotal role in Super Therm's development, as their knowledge was key to finding the right ceramic material. In addition to building insulation, the material has been used in industrial applications, such as keeping equipment like tanks and pumps cool on oil rigs. Pritchett said other insulation providers have only recently started looking into the same material components to improve their products, but he's grateful Super Therm had the head start.

The thermal protection system on the outside of the space shuttle included hundreds of ceramic tiles custom made for the orbiter. These reflected heat off the shuttle's outside surface during atmospheric re-entry and were an inspiration for the ceramic ingredients in Super Therm. *Credit: NASA*

"It is now a source of accomplishment that I was able to work with NASA to get a start on the study of ceramic compounds when all the others are just now doing it," Pritchett said. "It gives us a 30-year head start on the study of what works and what does not work." ●

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SPI II and NASA

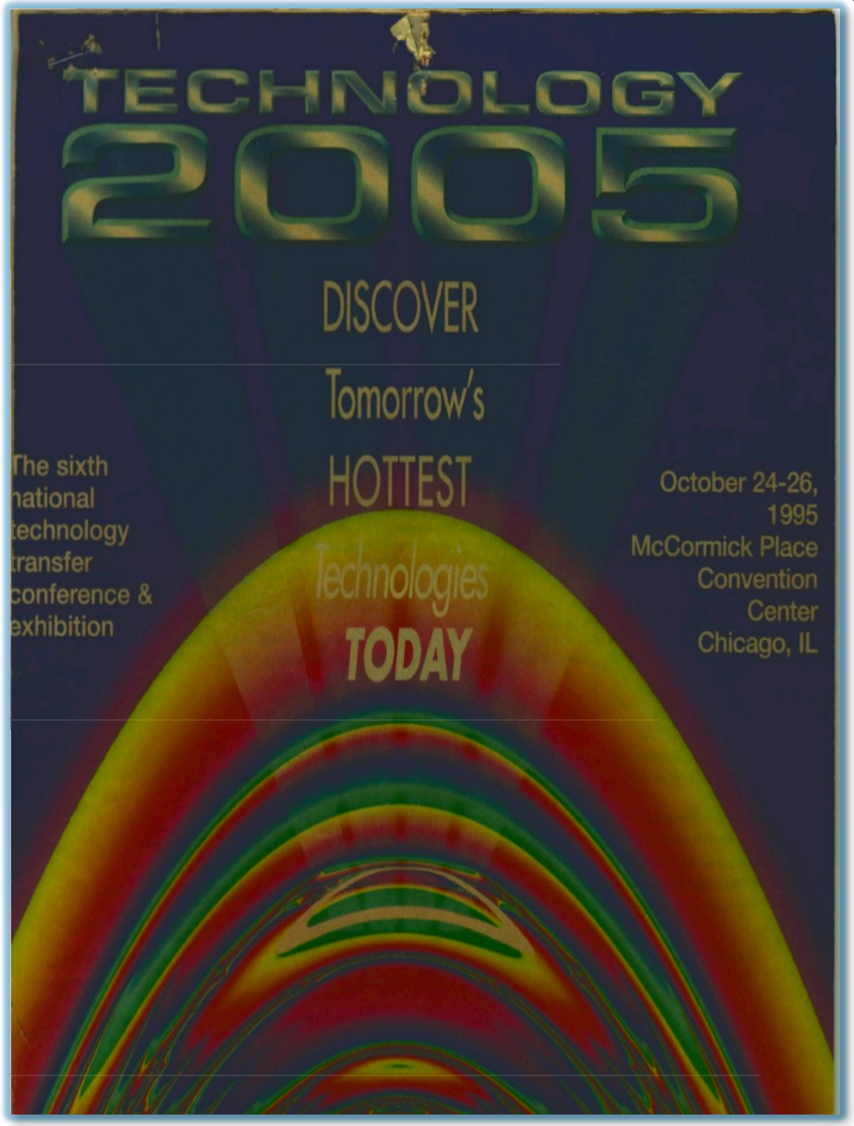
J.E. Pritchett , President at Superior Products International II, Inc.

Featured Speaker at the TECHNOLOGY 2005 (1995 in Chicago McCormick Center) conference on SUPER THERM® as the first "insulation coating" developed.

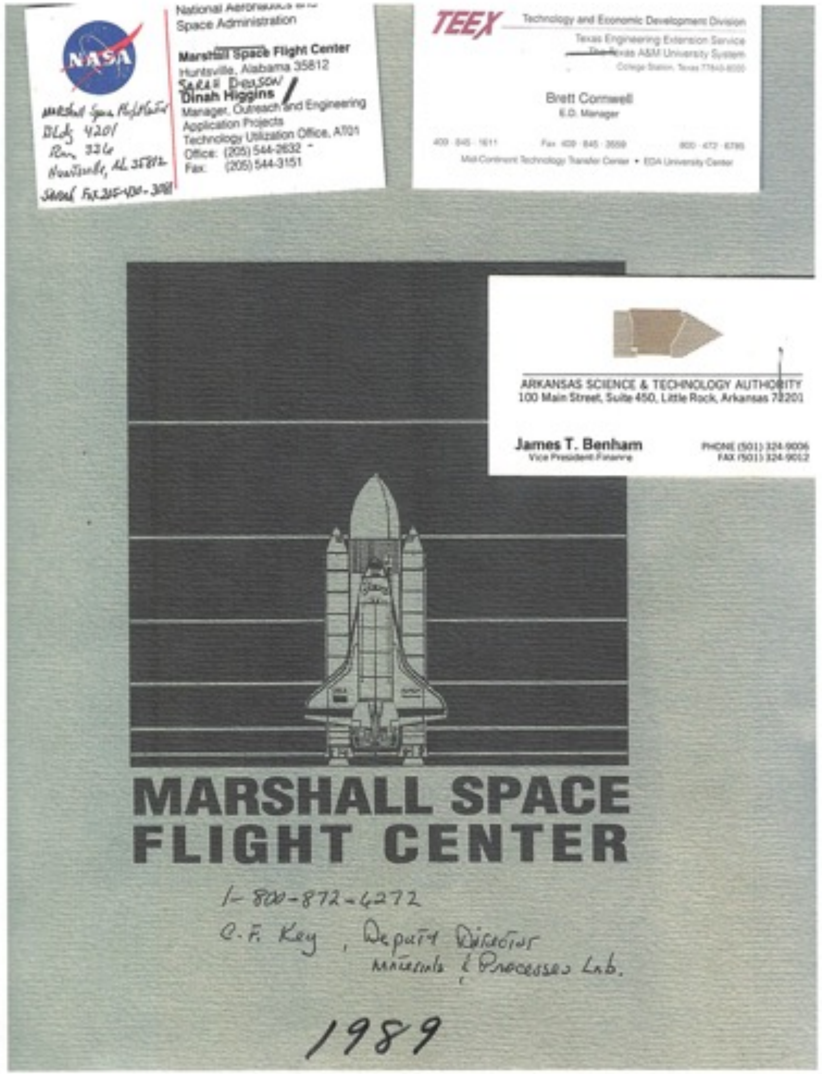
Each ceramic compound was tested one by one to find the few that actually worked when blended into a coating formula. That single step of individual testing takes time and effort having little to do with "throwing a lot of money at it" which has been the statement of large firms thinking the answers are in the web somewhere.

AI or web only "knows" what has been published and presented for public view. I have not published my findings nor will I. Therefore, AI and Web Sources remain in the dark on the 4000 Compounds tested that did not work at all.

I checked AI and over web asking specific questions that I know to ask to see if AI has this understanding and it does not. I find it amusing how AI will identify a compound as the "one that works" generally, then later in other material state it cannot work.



SPI II and NASA



George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812
AC(205)544-2121

MAY 29 1990

Reply to Attn of: AT01

Mr. J. E. Pritchett
President, Superior Products
2361 Saxwood
Box 2357
Salina, KS 67401

Dear Mr. Pritchett:

In reply to your letter dated March 23, 1990, I have been informed that Roger Harwell of our Materials and Processes Laboratory telephoned you and discussed the insulating powder compounds that you could add to your formula for SUPER THERM to increase its insulation ability.

Mr. Harwell suggested the following pigments be evaluated: SiO_2, ZrO_2, or SrO. Because of the thermal conductivity changes at high temperature (2000°), the pigment recommendations were SrO, ThO_2, TiO_2, and MgO. If the coating does not have to be white, then PbO (yellow) could be used to give a very low conductivity or Mn_3O_4 (black) could be used as second best.

We will dispose of the container of SUPER THERM that you sent.

Sincerely,

Ismail Akbay
Director, Technology Utilization Office

Ceramics Technology Dr. Dennis Tucker 544-2685

MTL. Sourcing Dr Richard Caugo 544-2629

Fisher Scientific

SrO - Strontium Oxide

SiO_2 - Silicon Oxide
ZrO_2 - Zirconium Oxide
SrO -

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THERMAL INSULATION
CORROSION PROTECTION

SPI Coatings' Range

Insulation / Fire Control

- Super Therm®
- HPC® Coating (400ºF/204ºC)
- HPC®-INT (400ºF – 800ºF/427ºC)
- HPC®-HT (800ºF – 1200ºF/650ºC)
- HSC® Coating
- Omega Fire™

Corrosion Control

- Rust Grip®
- Moist Metal Grip
- Lining Kote UHS
- Enamo Grip 5000

Top Coats

- Enamo Grip
- Enamo Grip 5000
- SP Seal Coat HT

Sealants/Roofing

- Super Base HS
- SP Liquid Membrane

Additional Coats

- SP Texture Coat

WHERE PHYSICS, DATA & SCIENCE COMBINE

SUPER THERM®

Heat Neutralizer...Heat Block Insulation Coating™

***As presented in this Power Point, all Testing is by*: NASA, Dept of Energy (DOE), ASTM and International testing labs with Real World Field Results**

Superior Products International – **spicoatings.com**
10835 W. 78th Street, Shawnee, Kansas, 66214 • 1-913-962-4848

NOTE: As per Advertising rule claims, the heat blocking results achieved on projects may be not be the same in different locations or conditions.