Michael STELMACH
Vice President – Sales, Mascoat Products
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Michael Stelmach began working in the industrial sector starting in October 1996, working with many types of insulation, fireproofing, paints/coatings and scaffolding. In 2000, shortly after being introduced to the technology of ceramic insulating coating, he began incorporating the technology into the business plan of the company he was working with at the time. In 2003, he was hired by Mascoat Products as industrial sales/technical manager, eventually reaching his current level of Vice President of Sales. Over the course of his tenure at Mascoat Products, he has helped develop and oversee the installation of Mascoat's coatings in over 17 countries, all the while promoting and educating the industry on ceramic insulating coatings.

Michael STELMACH
副总裁，产品销售
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1996年10月，Michael进入工业领域，处理各类绝缘涂料，如：防火、耐腐蚀、脚手架等。2000年，被推荐去陶瓷绝缘涂料技术部后，他开始将技术融入公司发展的一部分。2003年，Mascoat产品公司雇佣他为工业部销售/技术经理，目前他是销售部的副总裁。任职期间，他为公司开拓和发展海外市场，在17个国家建立Mascoat涂料的设备基地，同时宣传和发展陶瓷绝缘涂料业务。

1400 Session 6
Presentation from Sponsor

Ceramic Insulation Coatings in the Industrial Environment: What You Need to Know

1400 议题六
赞助商发言

陶瓷绝缘涂料（CIC）在工业环境中：您需要了解的

Ceramic Insulation Coatings in the Industrial Environment: What you need to know

Speaker: Michael Stelmach
Vice President – Sales, Mascoat Products
Houston, Texas, USA

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How did ceramic insulating coatings (CICs) evolve?

History of Ceramic Materials:

- Ceramics possess chemical, mechanical, physical, thermal, electrical, and magnetic properties that distinguish them from other materials.
- The development of pottery (ceramic material) was a significant milestone in human history. These durable and watertight ceramic containers possessed newly discovered insulating properties, which enabled them to keep contents hot or cold for extended periods of time.
- Advances in technology and increased knowledge of ceramics' effects on the heat transfer process helped derive the conception of ceramic insulation coatings. Ceramics are used today to protect the United States' space shuttles during re-entry into the atmosphere (3000° F or 1260° C)
- Initial uses of the coating were for rooftops and mobile homes or relatively low temperature applications – non technical sales.
- New technology emerged in 1993 that took the coatings to higher temperatures – and split the marketplace between:
  - Reflective Coatings – strictly reflective and do not provide personnel protection, heat retention or true R-value.
  - True ceramic insulating coatings (i.e. Mascoat Products) - employs ***all methods*** of thermal dynamic heat transfer to its advantage to provide all of the above – and much more.

Will CICs replace conventional insulation?

- **CICs are designed for applications that usually have multiple issues (i.e. CUI, Heat Retention, Anti-condensation or PP applications).**
- **Sometimes can be used in combination with conventional insulation materials (i.e. space constrictive problems).**

What is the difference in the application of conventional insulation and CICs?

Conventional insulation includes:

- Cutting of material.
- Application of the insulation & tying.
- Fabrication of metal jacketing.
- Installation of jacketing & banding.
- Cut and Caulk penetrations.
- Fabrication & installation of scaffolding (if needed).
- Removal of scaffolding.
- Cleanup are and remove all scrap insulation.

With CICs:

- Simple to prep the area to be covered.
- Apply the coating via spray.
- Recoat if needed.
- Clean up the area.

What about the long term effects?

Conventional Insulation	Ceramic Insulating Coating
CUI	No more CUI
Difficult repairs	Easy repairs/touch ups
Maintenance	No regular maintenance
Wear/Vibration	Virtually no wear
No Inspectability	Total Inspectability
Limited protection	Constant substrate protection

Checklist to ensure a “true” Ceramic Insulating Coatings

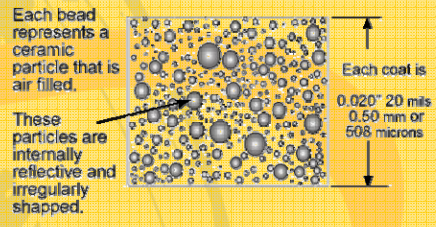
- ✓ Low or no VOCs
- ✓ Applicable to hot (working) surfaces
- ✓ Lightweight, no more than 7 lbs. per gallon (3.2 kg per 3.8 liters)
- ✓ Company has a strict internal quality control program that can be verified by customer
- ✓ Verified by outside testing, (UL, SWRI, ASTM, etc.) with documentation to back up claims

Questions to ask yourself before buying a CIC

- ✓ What is the technical information based on and can it be verified?
- ✓ Can the manufacturer be contacted to confirm the data provided to you?
- ✓ What is the wet weight of the coating?
- ✓ Does the manufacturer belong to or follow a quality assurance program?
- ✓ Did the salesperson properly explain how and why their coating works?

So what is in CICs?

- ➢ CICs are comprised microscopic glass and ceramic particles encased in a high grade acrylic binder.
- ➢ Each particle is inserted for a particular purpose.
- ➢ 50-85% solids by volume.
- ➢ Water based, no harmful solvents.



How do insulating coatings work?
How can they be so thin & produce dramatic temp drops?

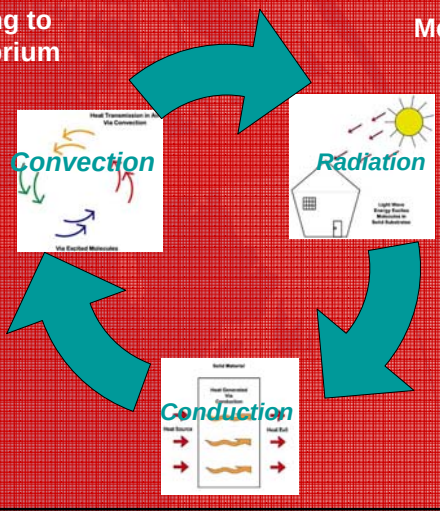
- True insulating coatings employ ***all methods*** of thermal dynamic heat transfer to its advantage.

⚠ Most other insulation systems use ONLY one method.

Before we can explain how it works, a brief thermal dynamics class!

Always trying to reach equilibrium

Methods of Heat Transfer



Heat Transfer Blocking Principles

5 thermal dynamics blocking agents:

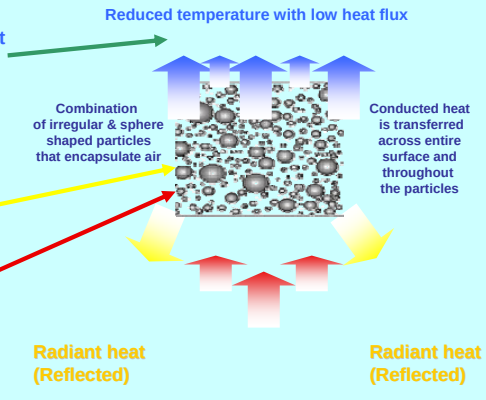
- **Conduction** – the way in which heat can be retarded via one solid to the next.
- **Reflectivity** – the method in which radiational heat is reflected or returned back. (just like mirror)
- **Emissivity** – is the method in which an object will radiate (gained radiation) heat back.
- **Transmittance** – the way in which radiated heat is gained.
- **Absorptance** – the way in which heat is gained from radiated heat as compared to a perfect radiator or black body.

Cross Section Diagram and Implementation of Blocking Agents

Heat Flux Transmission – Power of the heat (amperage – voltage) is reduced compared to other insulators. (Emissivity/Absorptance/Transmittance)

Conductive – The coating system blocks all aspects of heat transmission, not just the conductive aspect found in most Conventional insulators.

Reflective – Delta T uses all of the blocking agents to stop or reflect heat.



Cross section of Heat and Delta T Coating

Mathematical Formula for CICs' Performance

Heat Transfer Physics: True insulating coatings combine all of the blocking principles to produce a temperature differential.

This is why CICs can be so thin, yet achieve dramatic temperature reductions.

Anti-conduction
+ Reflection
+ Refraction
+ Emissivity
+ Transmittance
+ Absorptance

= Total Insulation Value

What's the difference between True Ceramic Insulation Coatings (CIC's) & Reflective paints? (Cross Section View)

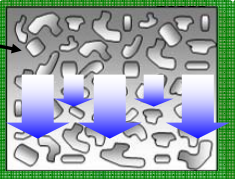
Def[illegible]eramic insulation coating is a [illegible]t provides both he[illegible]old dissipation as well as surface pro[illegible]tion for virtually any application.

Reflects heat only

Reflective paint 9-11 lbs

Higher heat flux

Conducted heat is transferred across entire surface & throughout the beads



CIC only 5-6 lbs

Reduced temperature with low heat flux

Forecasting – How can results be predicted

- A reputable insulation coating company should be able to accurately define thickness and payout in an engineered manner via computerized forecasts.
- The company should retain an on-staff thermal dynamics analyst.
- As a result, firms can assess true feasibility of our products and of customers' cost savings!

Where can the coating be used successfully?

- Pipes
- Steam lines
- Liquor vats
- Tanks
- Valves
- Heat exchangers
- Heaters
- Pressure vessels
- HVAC
- Pumps
- Coils
- And many others

Where do ceramic insulating coatings fit within industrial plants?

- Energy retention areas (i.e. tanks, etc) - best .
- Personnel Protection areas (PP).
- Hard to insulate areas (i.e. tank tops, valves etc.)
- Anti-Condensation Protection
- Areas prone to CUI

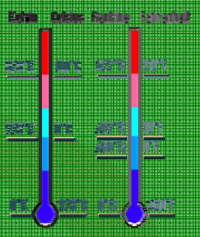



How do CICs protect against CUI?


- CUI forms when the moist environment between the insulation and the substrate.
- CICs prevent CUI by adhering directly to the substrate, leaving no room for an internal atmosphere.

Where are they ***NOT*** feasible?*

- High temperature applications that exceed 400° F (200° C) sustained or peak areas above 500ºF (260° C)
  Do not use on high pressure steam lines!
- Substrates that are beyond repair or with highly degraded surfaces.
- Applications where temp is below 45ºF (7° C) as coating thickness tends to be too excessive to produce results.



*Information is for Mascoat Products only.

Example:
Tank top

Application: ***Tank Storage Facility***

- **Problem:** ***Tanks were imploding due to pressure differentials while cleaning***
- **Reason for app:** ***Stop implosion, control radiant heat transfer***
- **Starting Temp =** ***300° F+ (148° C) Steam***
- **Result:** ***NO IMPLOSIONS***
- **DFT =** ***30 mils (0.75mm)***

Example:
Asphalt Tank Roof

Application : *Asphalt Tank Roof*

- Location: *Texas City*
- Vessel name: *A-215*
- Reason for application: *energy retention/maintain 350˚ F (176˚ C)*
- Results: *50-70% energy retention.*
- Photo location: *one w/ sidewall insulated and metal w/ roof coated*

Example:
Oil Storage Tanks

Application: *Crude Oil Storage Tanks*

- Location: *St. Charles, LA*
- Vessel name: *150-4, 150-5, 150-6*
- Reason for application: *energy retention, CUI (CUI so bad that when the inspector drilled through insulation, the drill went through the sidewall of the tank).*
- Results: *no CUI, calculation was performed to show the same energy saving as 1 ½" (4 cm.) of sprayed foam*
- Photo location: *any tank completely white and hurricane damage.*

Example:
Heated Storage Tanks

Application: ***Heated Storage Tanks***

- **Location:** ***LaCassine, LA***
- **Reason for application:** ***Energy Retention, CUI, Personnel Protection, Save $***
- **Results: No CUI**

Example:
Heated Storage Tanks

Application: ***Tank Storage Facility***

- **Problem:** ***Tanks were not retaining heat, requiring extra energy to keep a constant internal temperature.***
- **Reason for app:** ***Energy Retention, CUI, Personnel Protection, Save $***
- **Pre-application =** ***140 ° F+ (60 ° C)***
- ***Post-application: 110 ° F (43 ° C)***
- **Result:** ***Tanks retaining heat and CUI is no longer an issue.***
- **DFT =** ***30 mils (0.75mm)***

Example:
Heat Exchanger

Application: *Heat Exchanger*

- **Problem:** CUI, Personnel Protection
- **Reason for app:** Ease of maintenance, personnel protection
- **Starting Temp** = 200˚ F (93˚ C)
- **Post app. Temp** = 100˚ F (37˚ C)
- **DFT** = 40-60 mils (1.0-1.5mm)

Example:
Heater

Application: *Heater*

- **Problem:** CUI, Personnel Protection, Heat Retention
- **Reason for app:** Ease of maintenance, personnel protection, save $
- **Starting Temp** = 225˚ F (107˚ C)
- **Post app. Temp** = 110˚ F (43˚ C)
- **DFT** = 60 mils (1.5mm)

Example:
Valve Assembly

Application: *Valve Assembly*

- **Problem:** CUI, Personnel Protection
- **Reason for app:** Ease of maintenance, personnel protection
- **Starting Temp** = 200˚ F (93˚ C)
- **Post app. Temp** = 125˚ F (51˚ C)
- **DFT** = 60 mils (1.5mm)

Example:
Reactor Unit

- **Project:** Enterprise Processing facility
- **Location:** LaPorte, TX
- **Vessel name:** Reactor Unit
- **Reason for application:** Reduce condensation and eliminate solar loading.

Pre application, this unit had a tremendous problem with sweating. The coating was determined to be an effective solution in solving radiant heat gain due to solar loading. Post application, the unit no longer produced surface condensation as ran within its temperature parameters.

Example:
Processing Facility

Project: ***Processing facility***

- **Location:** Malaysia
- **Vessel name:** Reactor Unit
- **Reason for application:** CUI, Personnel protection, Cost
- **Results:** 294˚ F (146˚ C)
- **Post App:** 136˚ F (40-58˚ C)
- **DFT:** 100 mils (2.5 mm)
- **Time to completion:** 1 hour

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How to apply the coating

There are two main ways to apply the coatings:

- **Airless**
- **Small sprayer (SA gun)**

Is there any specialized training needed?

- CICs are ready to apply directly out of their containers.
- Tips and techniques can be taught quickly to increase thermal performance and application results

Apply directly

Future for Coatings

- Thermal insulation coatings are more readily accepted in preconstruction considerations – they are no longer just maintenance concerns.
- These coatings are changing the way factories are being designed and the way people think of insulation.
- Ultimately, this insulation solution reduces costs.

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