

Insulating Hot Equipment to Reduce Environmental Heat for Employee Safety and Equipment Longevity

One issue... beyond just energy savings... that facilities using any type of heat process equipment focus on is the excessive heat that radiates from that equipment into the work spaces that surround it. This additional heat impacts not only the working environment and employee comfort and safety, but also other types of equipment or circuits nearby that are subject to the excess heat.

Additionally, the load on the HVAC unit for conditioned spaces can be immense in a warehouse that has several hot ovens, steam pipes or similar equipment causing continuous high temperatures.

The only way to reduce the amount of heat that equipment radiates into the surrounding environment is to surround it with an insulation barrier.

The problems with older forms of insulation like mineral wool or fiberglass wrap, are many, and include:

- Difficult to adhere to large equipment
- Degrades easily in factory environments
- Is easily infiltrated by moisture, significantly reducing the performance
- Needs to be covered with another material and tapped or screwed into place
- Causes corrosion
- Takes up additional space
- Fibers could potentially contaminate food manufacturing processes.

One type of insulation that can be easily deployed onto any type of heat process equipment, including over large surfaces and areas that bend and are odd shaped, is a Thermal Insulation Coating.

Benefits of thermal insulation coatings include:

- Can be spray-applied to any size or shape equipment

- Are extremely durable and hold up well in factory environments
- Are moisture-resistant, and some are also chemical-resistant
- Do not need any exterior covering
- Prevent corrosion and CUi
- Very thin and does not take up additional space
- Do not flake or peel and are water-based and non-toxic
- Can be sprayed on while equipment is in operation.

Addressing the 3 Key Challenges of Environmental Heat

The three key challenges of environmental heat caused by heat process equipment



Figure 1: Insulated dyeing machine.



Figure 2: Insulated pipes.

can each be addressed by insulating that equipment with a thermal insulation coating.

Below, we will discuss the problems with an environment that has a high ambient temperature due to non-insulated or poorly insulated equipment and the ways that Synavax™ thermal insulation coatings have solved these issues for manufacturers around the world.

Employee Safety in Hot Working Conditions

According to the US Occupational Safety and Health Administration (OSHA), risk levels for workers go from moderate to high at temperatures of 39.4°C to 46.1°C (103°F to 115°F) and additional safety precautions should be taken. Temperatures higher than that are considered extreme risk conditions.

Workers can face multiple heat related health issues when working in hot environmental conditions, such as heat stroke, dehydration, heat exhaustion, heat cramps and heat rash.

Case Study (1) for Thermal Insulation Coatings

The City of Cocoa, Florida's water reclamation facility came to thermal

insulation coating manufacturer Synavax with an employee safety problem. The exhaust pipes that ran from an industrial blower were radiating heat and making the environment inside the building they were housed within too hot and very uncomfortable for the workers.

A 7-coat (1.75-mm) application of the Heat Shield™ EPX-H2O heavy-duty thermal insulation coating was recommended. The pipes had an operating temperature of 67°C (152°F). The coating was spray applied while the pipes were hot and in operation for a faster application.

After application, the surface temperature of the piping was reduced to below 38°C (100°F).

This accomplished two objectives:

- 1) Reducing the ambient temperature inside the building where the pipes are housed, and
- 2) Providing a safe-to-touch temperature on the pipe surfaces.

After using Synavax coating technology, the facility manager said that the EPX-H2O thermal insulation coating was "Working perfectly, exactly what we wanted it to do."

Equipment Heat Stress

Equipment such as sensors or circuits that are located near heat process equipment can suffer damage due to the higher ambient temperature. This can decrease equipment lifespans and cause equipment to malfunction due to being subjected to constant high temperatures.

Two ways to address this issue with thermal insulation coatings is to either insulate the equipment that is radiating the heat and/or insulate areas around the other equipment to protect it from the radiated heat exposure.

Case Study (2) for Thermal Insulation Coatings

Seshasayee Paper & Boards was looking for a way to reduce the temperature on their scanner sensor unit. It was heating up due to the conditions in the paper mill and high environmental heat and causing problems with the sensor's functionality.

They used the Heat Shield™ Translucent PT coating to coat the exterior of the sensor unit to reduce the heat inside where the sensors were located. The coating successfully lowered the sensor unit surface from 63°C to 46°C (145.4°F to 114.8°F), a reduction of 17°C (30.6°F).

The benefits achieved were:

- Effective sensor functioning due to lowered temperature and reduced heat stress
- Improved comfort for workers approaching and operating the sensor unit
- Increased longevity of the scanner unit.

Load on the HVAC Unit Trying to Cool Hot Areas

Uninsulated heat process equipment is not only losing energy during the process itself if it isn't insulated, in a conditioned space it is causing the HVAC to run overtime trying to cool the hot ambient air.

Insulating large pieces of equipment reduces the ambient temperature in a factory space, thus requiring less energy to cool the area, lowering HVAC costs.



Figure 3: Insulation coating applied to oven.

Case Study (3) for Thermal Insulation Coatings

A large texture manufacturer in Europe had initially decided to apply the Heat Shield EPX-H2O thermal insulation coating on the exterior of their dyeing machines to lower the process energy use and reduce heat in the environment for personnel safety.

They reduced their dyeing process energy consumption by over 30 per cent and achieved project payback in just 5 months. Another area of energy savings they had not anticipated, but observed after the coatings significantly reduced the ambient air in the dye house, was

that their electricity consumption for cooling the area also went down due to the reduced heat being emitted by the equipment.

Control Environmental Heat with Insulation Coatings

Because of the versatile nature of thermal insulation coatings and their ability to be sprayed onto multiple surfaces, they can be used on virtually any type of heat process equipment or heat radiating surface up to 204°C (400°F).

Because they do not require special equipment to apply and are easy to work with, thermal insulation coatings are an

economical and long-term way to control environmental heat. Standard application is either with a paint sprayer or texture sprayer, and the application can be either all done at once or spread out as team scheduling allows.

Controlling the ambient heat in any environment improves worker safety, reduces heat stress for other equipment nearby, and helps lower HVAC energy needs for cooling the hot air... one product offering multiple benefits.

And it is not just indoor heat process equipment that affects worker safety and productivity. Large outdoor heated storage tanks like those used in chemical manufacturing facilities radiate massive amounts of heat into the surrounding environment and work areas. Insulating these tanks with thermal insulation coatings, like those from Synavax, provides the multiple benefits of:

- Increasing worker safety
- Decreasing heat radiating into the surrounding work environment
- Preventing corrosion of the tanks (a common problem in tank farms).

Steps for using Thermal Insulation Coatings

Common questions when using thermal insulation coating to insulate heat process equipment are:

- How many layers should I use?
- Which coating is best for my needs?
- How much temperature reduction can I expect?

By contacting the thermal insulation coating supplier, you can get all those questions answered in a project specification. At Synavax we offer complimentary Sustainability Simplified™ Project Specifications which include the recommended product and number of layers for the equipment, the expected temperature reduction, and if applicable, the expected energy savings and payback period.

The only information needed for a project specification is:

- 1) Type of equipment being insulated



Figure 4: Uncoated pipes.

- 2) Operating surface temperature of the equipment
- 3) Dimensions of the equipment
- 4) Goals for the application (ie, reduce ambient heat, safe touch temperature, energy savings, etc).

Requesting a project specification up front can save you a lot of time and give

you a presentation with product data and case studies that you can present to the decision makers in your company.

When it comes to corporate sustainability mandates, high ambient temperatures are not always the first thing on a plant or facility manager's mind, but it is one that can be taken

care of at the same time as other energy efficiency initiatives when you use the right technology. ■

References

<https://www.osha.gov/SLTC/heatstress/>
<https://www.synavax.com>



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