GREEN TECHNOLOGY ACCELERATOR CENTER

CASE STUDY

NYSP2I Performs Assessment of Enercoat® Conductive Coating on Air Conditioning Condensers

Ener.co, founded in 2009, is a data driven, clean tech surface technology company that focuses on increasing air conditioning efficiencies. Ener.co concentrates on lifecycle deficiencies that develop in cooling systems as they are exposed to the elements. Specifically the inefficiency caused by the debris in the unit and corrosion of air-cooled condensers.

CHALLENGE

Ener.co identified a significant issue with energy efficiency reduction in air conditioning compressors related to the fouling and corrosion of the air conditioning condenser fins over time. Ener.co states that 10 years exposure to the elements can impair thermal performance in a coil by 30% to 50%. Weather, environmental conditions, dirt and debris can contribute to damaging the outdoor cooling equipment. Ener.co claims that their proprietary coating, Enercoat®, restores and protects the surface of the heat exchanger coils to prevent damage from occurring.

SOLUTION

With the goal of improving energy efficiency, Ener.co developed the Enercoat® graphene nanomaterial technology (Enercoat®) and application process to reduce energy efficiency losses in existing air conditioning condensers. Ener.co claims noticeable efficiency improvements based on existing building applications and metrics in their cloud-based dashboard. Ener.co requested that the New York State Pollution Prevention Institute (NYSP2I) assist with lab testing to assess the impact of Enercoat® conductive coating on heat exchangers with exposure to a neutral corrosive environment.

NYSP2I constructed a custom lab test apparatus to evaluate Ener.co's coating as applied to a heat exchanger vs. a standard uncoated unit. NYSP2I's testing accelerated a corrosive environment in the lab to evaluate eight (8) heater coil units for heat transfer effectiveness, and document physical degradation. The heat exchangers were lab tested as new, then with Ener.co coating applied, followed by exposure to neutral salt fog for up to 1000 hours, per ASTM B117. NYSP2I lab testing did not evaluate the impact of dirt and debris contamination on condenser coil degradation and performance.

Uncoated Unit

Coated Unit

CHALLENGE

- Evaluate heat exchanger efficiency before and after corrosive environmental exposure, with and without Enercoat® conductive coating and estimate the impact of corrosion fouling on rooftop condenser units

SOLUTION

- NYSP2I assisted with lab testing to assess the impact of Enercoat® conductive coating on heat exchangers with exposure to a neutral salt-fog environment
- NYSP2I developed a test apparatus to test eight heat exchangers for heat transfer effectiveness under accelerated corrosive environmental conditions

RESULTS

- The work performed by NYSP2I led to key findings that will assist Ener.co to further develop, optimize and commercialize their system
- Ener.co's coating survived 1000 hours of accelerated corrosive exposure as applied to condenser coils
- Ener.co's coating was shown to significantly decrease galvanic corrosion on the coils evaluated and reduced the rate of heat exchanger performance degradation

ener.co A/C Efficiency

RESULTS

The work performed by NYSP2I led to key findings that will assist Ener.co to further develop, optimize and commercialize their system.

- After 1000 of salt fog testing, the performance degradation resulted in only a 2% efficiency drop for a coated unit compared to a 4.2% or higher for the uncoated unit.
- A significant visual improvement was documented for the Ener.co coated coil compared to a baseline uncoated unit relative to galvanic corrosion. The coating survived 1000 hours on the aluminum fins without observable flaking.
- Based on salt fog testing, it can be inferred that Enercoat® will extend the life of a unit that is exposed to a corrosive environment if galvanic corrosion exists.
- The heat transfer efficiency slightly decreased with the application of Enercoat® as applied to a new unit, but there was less measurable performance degradation after corrosion exposure for the Enercoat® heat exchangers vs. uncoated units.
- Further benefits may be realized in the field by applying Ener.co's cleaning and coating process, addressing dirt and debris contamination.

TESTIMONIAL

"The NYSP2I third party assessment has been very helpful to our organization. The study instilled independent analytical rigor around our product's value propositions which gave us confidence to proceed to commercialization and assistance in seeing how we can further refine our product and its testing protocols."

– Patrick Manian, Director of Operations
Ener.co, LLC

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R·I·T

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