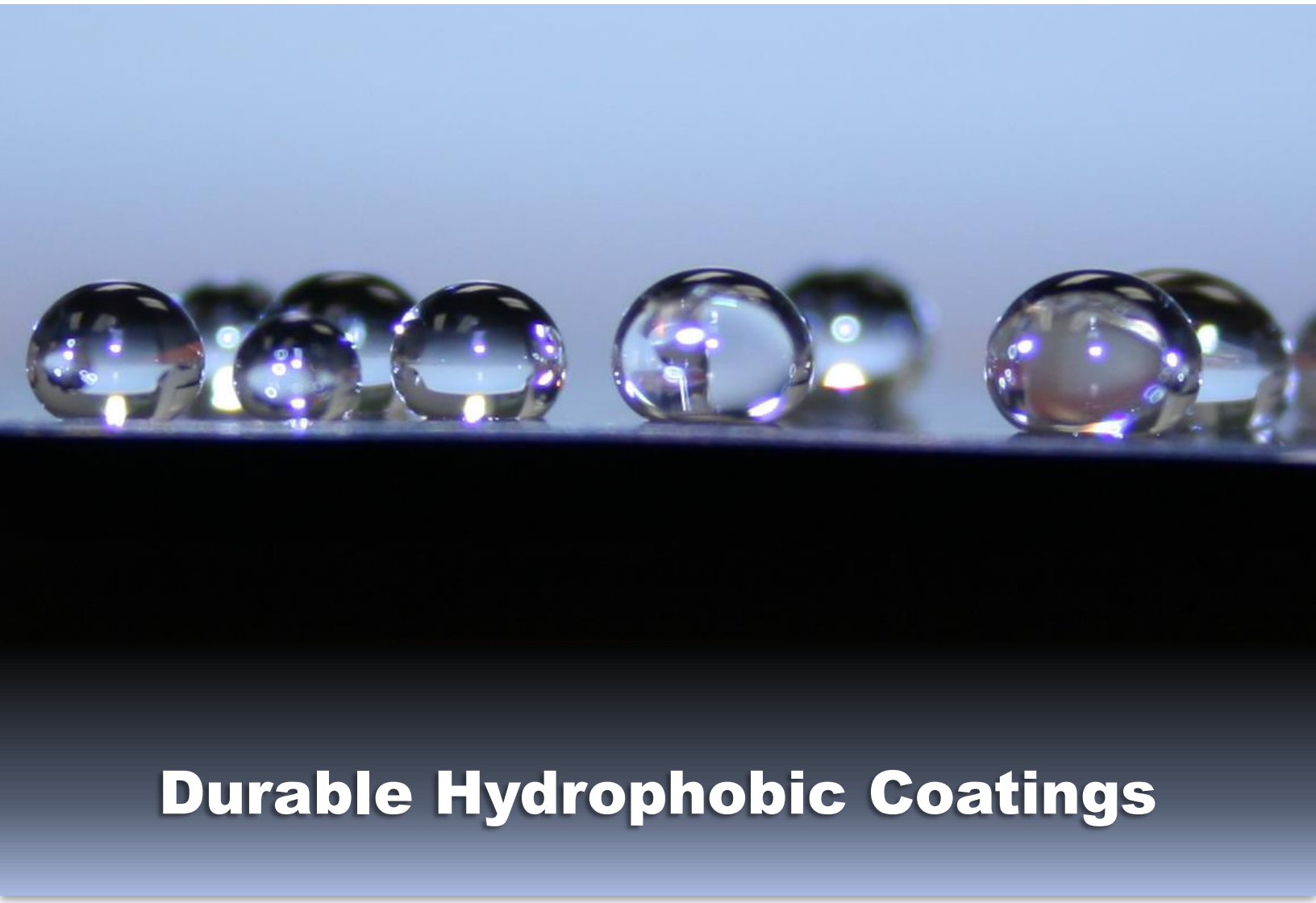
NEI Corporation

NANOMYTE® SuperCN™



Durable Hydrophobic Coatings

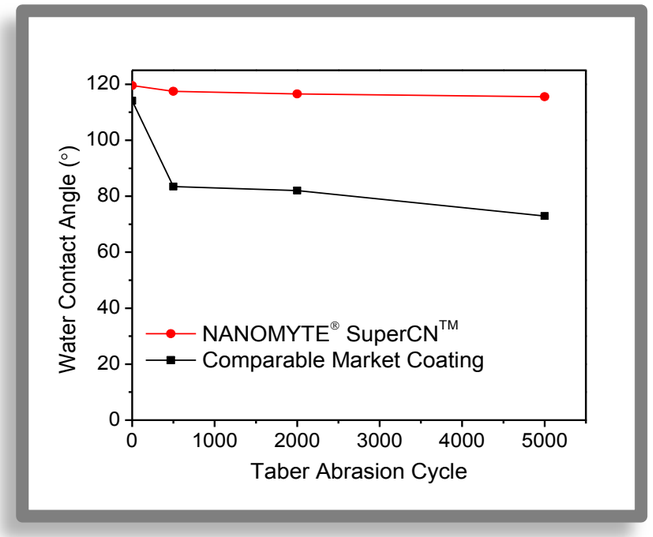
Improving Efficiency and Saving Energy Through NEI's SuperCN™ Hydrophobic Coating

NEI Corporation

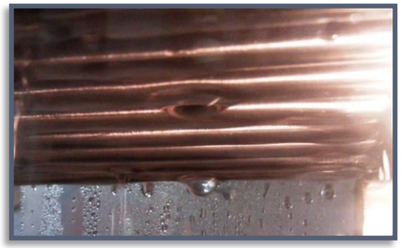
TECHNOLOGY DESCRIPTION

NANOMYTE® SuperCN™ is a new class of durable hydrophobic coating designed specifically for metal surfaces. The patent pending coating has a unique combination of properties that includes hydrophobicity and oleophobicity, specifically good adhesion to stainless steel, superior abrasion and erosion resistance. While the coating was originally developed for promoting dropwise condensation on stainless steel condenser tubes to enhance heat transfer efficiency, it can also be used to impart anti-fouling and easy-to-clean properties to other metallic surfaces such as brass and titanium.

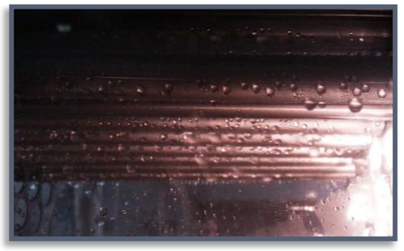
The figure below shows the water contact angles as a function of abrasion cycles from a Taber abrasion test for NANOMYTE® SuperCN™ as compared with a comparable market coating on a stainless steel substrate. Note that the SuperCN coating maintained high water contact angles after 5000 cycles of Taber abrasion test, whereas a comparable coating in the market lost its hydrophobicity after only 500 cycles.



Water Contact Angle as a function of Abrasion Cycle with a Taber Test (Testing Conditions: 316 stainless steel substrate, Model 5135 Taber Abraser, CS-5 Felt wheel, 500 gram load).



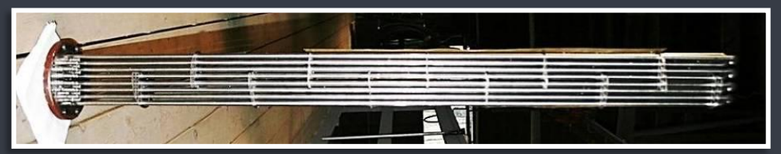
FILMWISE CONDENSATION



DROPWISE CONDENSATION

APPLICATIONS

NANOMYTE SuperCN is applicable to industrial condensers in general, and more particularly surface condensers in power plants. The durable hydrophobic coating can also be used to impart anti-fouling and easy-to-clean properties to the metallic surfaces of a variety of commonly used consumer products, such as kitchen appliances, shower heads, and hand rails, to name a few.

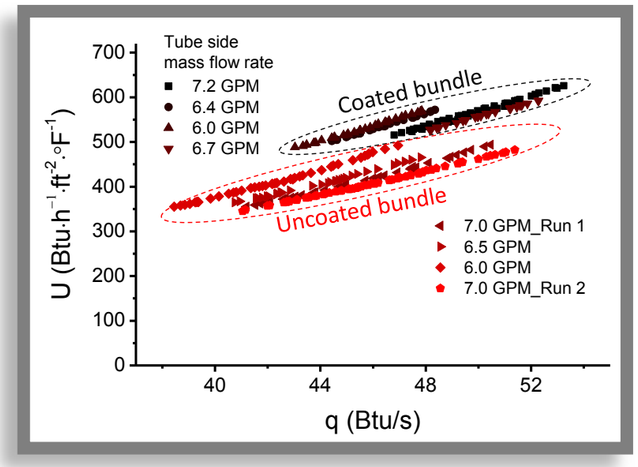


DROPWISE CONDENSATION

Industrial heat exchanger designs are based on filmwise condensation, a process in which steam condenses to form a layer of water on heat exchanger tubes. The water film acts as a barrier for heat transfer because of its lower thermal conductivity (0.613 W/m-K) relative to the walls of the heat exchanger tubes (~400 W/m-K for copper).

The occurrence of dropwise condensation, a process in which steam condenses to form droplets atop condensing surfaces, can improve the heat transfer coefficient by over an order of magnitude. The formation of small water droplets that quickly roll off heat exchanger tubes, as opposed to films, lowers the thermal resistance caused by the moisture. Imparting superhydrophobicity to condensing surfaces promotes dropwise condensation.

The graph below shows the result of heat transfer coefficient testing under simulated end-use conditions with a prototype U-tube bundle coated with NANOMYTE® SuperCN™. A consistent ~30% increase in the overall heat transfer coefficient (U) over a range of heat transfer rates and cooling water flow rates was observed while confirming dropwise condensation under dynamic steam loading. Post-test measurements revealed no measurable coating degradation through the entire main section of the heat exchanger.



COATING SERVICES & PRODUCTS

NEI offers coating services to tube suppliers, as well as coated tubes for interested end-users. NANOMYTE® SuperCN™ easy-to-clean coating solutions are also available to the consumer product market.

Contact us to see how we can engineer our hydrophobic surface treatment to your needs

NEI Corporation

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