

## Curran's Plate and Frame Exchanger Coating Significantly Increases Thermal Conductivity

Quality Control dry film thickness gauge used to perform coating thickness analysis. Our target coating DFT for all plates was 25 microns and the average was calculated to be 24.6.

### Scaling and fouling in plate and frame (PFE) heat exchangers results in significant loss of performance and negatively affects energy efficiency of the system.

In severe cases, the buildup could be so thick that it results in a clogged exchanger – unable to be cleaned in place (CIP) with acidic cleaning techniques. This leads to production stoppages for cleaning and ultimately results in increased production costs.

Recent studies from the chemical, district heating, oil and gas, and power plant industries have introduced compelling evidence that altering the surface of the plate with a thin layer of antifouling coating mitigates the buildup of fouling and, thus, reduces maintenance stoppages.

### Conversely, a thin layer of coating no matter how thin still creates a thermal insulating barrier.

Important considerations with this approach revolved around the negative effects on thermal resistance and heat transfer. The same studies also focused on this topic, and indicated a thin thermally-conductive-antifouling-coating-layer allows for far more heat transfer than a layer of scaling and fouling material of the same thickness.

### Curran International recently successfully completed a PFE coating project for a large PFE heat exchanger in the oil and gas industry.

The scope included the application of a thin layer of antifouling-conductive-coating to both sides of each plate, while ensuring that the gasketed areas were protected and left uncoated.

The gaskets are placed onto the plates after coating with a specific type of adhesion and although it was never tested, it was agreed not to apply the anti-fouling coating over the areas where the gasket's adhesive was to be placed.

### To ensure the coating material was applied to the proper thickness, each plate went through a quality control process.

Dry film thickness measurements were taken using an Elcometer® with an angled probe placed in a Probe Placement Jig to verify that specified thicknesses of the Curran Coating were achieved.

### The goal was to utilize a thin film coating specifically formulated for antifouling – applied as thin as the specification would allow.

This would ensure the coating adhesion and curing mechanisms would not be affected while ensuring the most thermal-conductivity was achieved.

Although this first-time plate and frame project completed by Curran also came with a long list of lessons-learned, it was ultimately completed successfully while exceeding customer expectations.

### To learn more

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Plates with gasket areas properly masked off prior to coating.

# Curran Coatings

## The Highly-Functional Family of Products

**The Curran coating product line offers industrial applicators high performance protective coatings for a wide range of immersion services.**

Curran 1000T is the landmark technology, developed to resist periodic plant steam cycling to 365F immersion. 1000T has been used widely in cooling water systems at industrial complexes around the globe.

While the 1000T exchanger tube coating is applied by Curran technicians, other high performance 100% solids Curran coatings are available to industrial applicators. The materials are manufactured and shipped from stock in Houston. Contact your Curran rep for pricing, coating data sheets, SDS, and performance test data.

Curran protective coatings have been applied to fixed equipment in service at refinery, petrochemical and power plants around the globe.

**Curran 500** — A two-part 100% solids epoxy applied by brush or roller, and in a trowel applied high build for tubesheet epoxy cladding. Used for condenser and chiller tube sheets, waterboxes/marine boxes, channels, circulation piping. Available in a 3-quart kit.

**Curran 1000T** — Curran-applied heat exchanger tube ID coating, two-part 100% solids epoxy hybrid coating designed for all cooling water services, and for many hydrocarbons and process streams. Coating suitable for steam cycling to 365 °F; passed immersion testing to 400 °F. Curran applied downtube to 8-14 mils total DFT, used for refinery, petrochemical shell and tube exchangers, straight and U bend designs.

**Curran 1000R** — A two-part 100% solids epoxy hybrid, a brush and roll re-formulation of Curran tube coating. Having the same performance properties, but formulated for client use for coating repairs of tubesheets. Available in a 2-liter kit.

**Curran 1200** — An advanced two-part (100% solids) epoxy coating designed specifically for high temperature immersion service in water and process streams (365 F, 185 C). Formulated for high volume, airless spraying using a heated hose, 1200 can be applied to 20-30 mils in a single coat. Suitable for vessels, storage tanks, large diameter pipe, and waterboxes in high temperature service. Contact Curran for kit sizes and requirements.

**Curran 1500** — A two-part (100% solids) hybrid epoxy coating, high performance paste grade material, and resistant in services with a potential for “cold wall” failure. 1500 can be used to repair pitted substrate, and when fully cured is machinable. Used for exchanger channels, bonnets, floating heads, and as a build material for corroded/pitted steel. Immersion service to 365F. Available in 1kg and 4 kg kits.

**Curramix 2500** — An ultra-low DFT advanced ambient-cure anti-coking coating system, having excellent hydrophobic and oleophobic performance, superior thermo cycling performance. Suitable for services to 1200°F. Applied by Curran technician on critical service heat exchanger tube IDs and ODs, plate & frame exchangers, tube sheets, channels, exchanger components and crude heaters.

**To learn more**, please contact Ed Deely, (281) 339-9993 [edeely@curranintl.com](mailto:edeely@curranintl.com)



# There's a Coating for Equipment in Severe Service You Want It Expertly Applied!

**There is a range of protective coatings that are designed to tolerate hot corrosive services where the use of low cost mild steel meets most fabrication design requirements.**

PFA, PTFE, and ETFE are short acronyms to identify commonly used fluoropolymers; baked phenolic is a thermoplastic; all are applied in multiple thin coats, heat catalyzed, and when final cured provide a dense protective barrier.

Thermoplastic and fluoropolymer coatings slow permeation and protect carbon steel and low grade stainless from hot organic and inorganic acids, and many solvents. These coatings are used to protective carbon steel welded pressure vessels, internal components, valves and chemical transport containers also known as ISO Tainers.

**Experience is the difference when applying engineering coatings.**

The application of these engineered materials requires experience, and a curing oven capable of greater than 650F heating capacity. The materials are applied in a liquid or powder form, and each coat to a precise thickness.

Curran International has benefitted from great collaboration with globally recognized coating manufacturers as we jointly developed an application procedure to apply these coatings inside a small diameter heat exchanger tube.

From imparting a surface profile, through applications of primer, mid and top coats, the entire system requires discipline to precise specifications. The applicator should provide the client with a QC record so verification of all phases of the application can be verified against the manufacturer specifications.

Hot flocking is a common coating application method for some fluoropolymer and thermomelt powder coatings. Applicators, in heat resistance protective gear, flock coating onto hot steel substrate, applying multiple coats while at near melt temperatures of 530F.

**Gas fired curing oven large enough for a flatbed trailer!**

When Curran International plant was designed and constructed in 1999 we made sure to have large capacity curing oven. Our natural gas fired oven is more than 5800 cubic feet; we can arrange several exchanger bundles, pipe, or large vessels in the oven. It is among the largest ovens on the Gulf Coast.

A portable natural gas fired burner and heating fixture enables bake-cured coatings to be applied inside large, insulated vessels. Baked phenolic coatings are commonly used for ISO Tainers, typically a 8' diameter x 20' L portable chemical transport tank seen regularly on the transported on road.

Every day the Curran shop is applying state of the art engineered polymers. Curran International has experience with coatings from manufacturers such as Chemours, Saekaphen, and Carboline, contact us your corrosion protection challenges for equipment in severe service.

**To learn more**, please contact Ed Deely, (281) 339-9993  
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Baked phenolic coated air cooler



PFA coated exchanger channel



Curran techs applying PTFE coating using "hot flock" method

# Catch Curran

## Plant Maintenance, Inspection, and Engineering Society's Expo & Conference

March 22

Pasadena Convention Center, Pasadena, TX



PLANT MAINTENANCE, INSPECTION  
AND ENGINEERING SOCIETY

## NACE Corrosion 2018 Conference & Expo

April 15 – 19

Phoenix Convention Center, Phoenix, AZ

**CORROSION** 2018  
Conference & Expo

## American Fuel & Petrochemical Manufacturers (AFPM) 2018 Reliability and Maintenance Conference and Exhibition

May 22 – 25

Henry B. Gonzalez Convention Center, San Antonio, TX



**AFPM**

American  
Fuel & Petrochemical  
Manufacturers