

NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND

Tank Car Lessee

Industrial Customer:

A chemical company.

Project:

Top coat the center band of tank cars transporting pMDI with Nano-Clear Industrial Fluoropolymer (NCIF) coating - a very low surface energy coating that allows pMDI that has cured onto the center band to be easily removed.

Applicator & Project Locations:

Arkansas
Louisiana
Oklahoma
Texas

Coating Formulation:

Nano-Clear Industrial Fluoropolymer (NCIF) coating

Application System:

Airless spray equipment

Dates:

Applications: March – July 2016

Conditions:

All applications took place inside a spray booth.



PROJECT OVERVIEW:

Nano-Clear Industrial Fluoropolymer (NCIF) coating was applied to the center band of 8 new tank cars after the tank car had been painted (including the center band) and to 4 tank cars which were already in service that had the existing oxidized paint on the center band cleaned before the application of NCIF. The type of paint currently used on the center band of the tank car does not allow for the easy release of the pMDI once it cures on the center band surface. This has created significant maintenance costs – greater resources needed to clean the center band and an increased number of re-painting cycles.

NCIF was presented to an industrial chemical company in October 2015 as a candidate coating solution to remedy the cured pMDI maintenance problem. Testing was initiated in November 2015 at the chemical company's testing laboratory. The tests were conducted on aromatic epoxy paint coupons that had been coated with NCIF. The results confirmed NCIF was very effective at preventing cured pMDI from binding to the surface of the cured NCIF coating – in fact, better than all alternative coatings tested to date.

The next phase was to conduct field testing of NCIF on tank cars which would allow the NCIF to be exposed to "service environment" conditions including temperature extremes, UV, weather and locomotion factors such as vibration, yaw, and impact. Twelve tank cars were selected for field testing; NCIF was applied to these tank cars between April & July of 2016. All twelve cars were not photographed however the photos contained in this report are representative of the NCIF applications.

NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND

CURRENT SITUATION:

The chemical company's tanks cars that transport pMDI are exposed to spilled pMDI in the course of product loading and unloading. These small spills are, practically speaking, unavoidable.

When the liquid pMDI is exposed to the air and humidity it cures into an inert solid polyurea foam which bonds strongly to the epoxy paint used on the center band (and all exterior areas) of the tank car. Over time these small spills continue to build up until the amount of cured material must be removed.

Removing the cured pMDI requires mechanical means such as media blasting, scraping or sanding. In all cases, when the cured pMDI is removed from the epoxy paint, the bond between the cured pMDI and the epoxy paint is so strong that removing the cured pMDI takes a portion of the paint profile with it compromising the remaining paint film. This results in the paint having to be top-coated or the center band re-painted.

Preparing the center band for top coating with paint (if the remaining paint film is suitable) or re-painting (if the remaining paint is not suitable for top coating) requires significant expenses in terms of labor, materials and asset time out of service.



NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND

ISUSA SOLUTION:

NCIF - a crystal clear, aliphatic, moisture cured, one component polyurethane/polyurea/fluoropolymer hybrid formulation with extreme cross-link density for UV, chemical, and abrasion resistance.

NCIF is formulated to penetrate and fortify existing paint systems (newly painted or highly oxidized), *not replace them*.

NCIF is new cross-linking formulation technology. This cross-linking creates a “tough” coating that combines with existing paint systems forming a long lasting protection solution.

NCIF chemically bonds to the paint with adhesion promoters and also bonds mechanically by penetrating into the porosity of the underlying coating.

The fluoropolymer component gives the cured coating the property of not bonding to other materials easily – think of Teflon except a lot tougher. In addition, the **NCIF** fluoropolymer hybrid provides excellent corrosion and chemical resistance.



NCIF is formulated to work in tandem with existing paint systems (oxidized and new) to enhance the protective properties of the paint system – eliminating at least one maintenance cycle.

NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND

After NCIF



After NCIF



NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND



NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND



NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND

APPLICATION:

Preparation:

- New paint was allowed to cure as per the manufacturer's instructions prior to being top coated with **NCIF**.
- The oxidized paint was cleaned with blasting media to remove the contaminants e.g. cured pMDI, oil grease, etc.
- The surface of the newly painted center bands was not media blasted prior to the application of **NCIF**.

Application:

The application of **NCIF** was done with an airless spray system.

The recommended process is:

- Spray two wet-on-wet coats of **NCIF** allowing several minutes between coats to allow solvents to flash off.
- Accomplish this by spraying a section of the center band with **NCIF** then move to an adjacent section for spraying.
- When finished with that section return to the previous section and apply the second wet-on-wet coat of **NCIF** in a cross hatch pattern from the original application pattern.
- Move to the adjacent section and apply the second coat in a cross-hatch pattern and repeat over the entire center band.
- Once two wet-on-wet coats of material have been applied stop working the area and allow the **NCIF** to "level". Because of the low viscosity of **NCI** (100cps), the finish will "smooth" out.
- On oxidized painted surfaces, it is important to watch the previous section that has had the **NCIF** applied to because, on oxidized paint surfaces, the **NCIF** will absorb into the oxidized paint at different rates. When specific areas absorb more of the **NCIF** than other areas simply go back and apply another light coat (but thoroughly wet out the surface) of **NCIF** to even the finish.



The **NCIF** was applied at the top of the tank car working down to the bottom.

Result:

Approximately 4-5 gallons of **NCIF** was used to cover the tank car center band.

Review of the coated asset:

- The overall finish was very good, the **NCIF** penetrated and fortified the existing paint system creating an excellent monolithic coating film protecting the center band of the tank car.
- The finish has high gloss.
- The original paint color was enhanced.
- The resulting protective dry film thickness was approximately 1 mil.

NANO-CLEAR INDUSTRIAL FLUOROPOLYMER COATING FOR TANK CAR CENTER BAND

SUMMARY & CONCLUSION:

NCIF was applied to the center band of the chemical company's tank car to provide a very low surface energy protective coating for easy cleaning of cured pMDI while providing enhanced corrosion and chemical resistance beyond what is being provided by the epoxy paint currently being used.

The **NCIF** was applied to both new paint and oxidized paint.

NCIF is crystal clear so it can be applied over any color paint.

The substrate preparation prior to the application of **NCIF** was the same preparation methods required for top coating.

NCIF penetrated and fortified both the new and oxidized paint on the center bands. The **NCIF** imparted superior physical properties to the existing paint creating a protective coating system with much better physical properties than the original paint exhibited.

The combined **NCI**/paint coating system extends the protection of the chemical company's tank car for many years, eliminating at least one re-painting maintenance cycle costs which more than pays for the application cost of the **NCIF** coating.

NCIF does not replace paint systems - **NCIF** is formulated to work with them. **NCIF** is the economical solution *to extend the performance life* of paint systems.

CALL TO ACTION:

Inspect the following tank cars coated with NCIF throughout 2016 and 2017:

Incorporating **NCIF** into the chemical company's maintenance program will extend the service life of all tank car assets and save significant money over the current paint system(s) alone.

Industrial Solutions USA
develops and sells
"tough"
ELASTOMERIC LININGS & COATINGS
to help industrial customers protect their assets from destructive elements