



Nano-Clear[®]

FOR INDUSTRIAL & COMMERCIAL APPLICATIONS

**EXTENDING THE SERVICE LIFE OF
COATED SURFACES BY 10+ YEARS!**



ASSERO[™] COATINGS



WHAT IS NANO-CLEAR®?

Nano-Clear® Industrial Coating (NCI) is the *only* industrial coating in the global marketplace to enhance, restore, and extend the service life of freshly coated (newly painted) and oxidized (previously painted) surfaces by **10+ years**.

***Nano-Clear® (NCI)** dramatically improves corrosion, weathering, abrasion, scratching, chipping, marring, chemical, and UV resistance. **Nano-Clear®** is a one component (1K), humidity cured, highly cross-linked, polyurethane/polyurea hybrid, protective clear topcoat.*

Engineered using nano-structuring, **Nano-Clear®** penetrates deep into the microscopic pores, holidays, cracks, and defects of painted surfaces to form a chemical bond that will enhance, improve, and recover original color and gloss.

Nano-Clear®

- Greatly improves surface hardness
- Increases the resistance to moisture and water permeation
- Provides long-term prevention of coating deterioration

The high performance levels of Nano-Clear® (NCI) reduces time & expenses related to the maintenance & management of assets. NCI extends an asset's service life, increases ROI, and provides a potentially higher resale value.

MULTI-FUNCTIONAL FEATURES & PROPERTIES

- Extreme Corrosion Resistance
- High Scratch, Abrasion & Chipping Resistance
- Extreme Chemical Resistance
- Extreme Weathering & UV Resistance
- High Impact Strength
- Large Temperature Service Range
- Low VOC
- Low Viscosity

Reduce Maintenance Time, Frequency & Expenses





WHAT MAKES NANO-CLEAR® SO UNIQUE?

Nano-Clear® NCI is manufactured using proprietary 3D nano-structured polymers (*not* nano-particles) which results in extreme crosslink density.

Crosslink Density - Why Is It Important?

Most traditional polymers use linear chain molecular groups with low crosslink density. NCI's high crosslink density results in the multifunctional surface properties and vastly improves upon the levels of performance that are achieved.

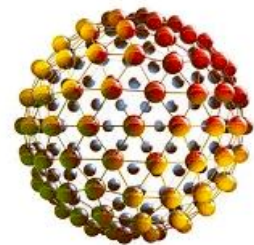
A tight-knit, crosslinked mesh also has low surface energy and water repellency (hydrophobicity) which aids in the easy release of:

- Ice
- Dirt
- Graffiti
- Oil & grease
- Soot
- Brake dust
- Concrete dust
- Numerous forms of environmental and biological surface fouling and contaminants

HIGH 3D CROSSLINK DENSITY

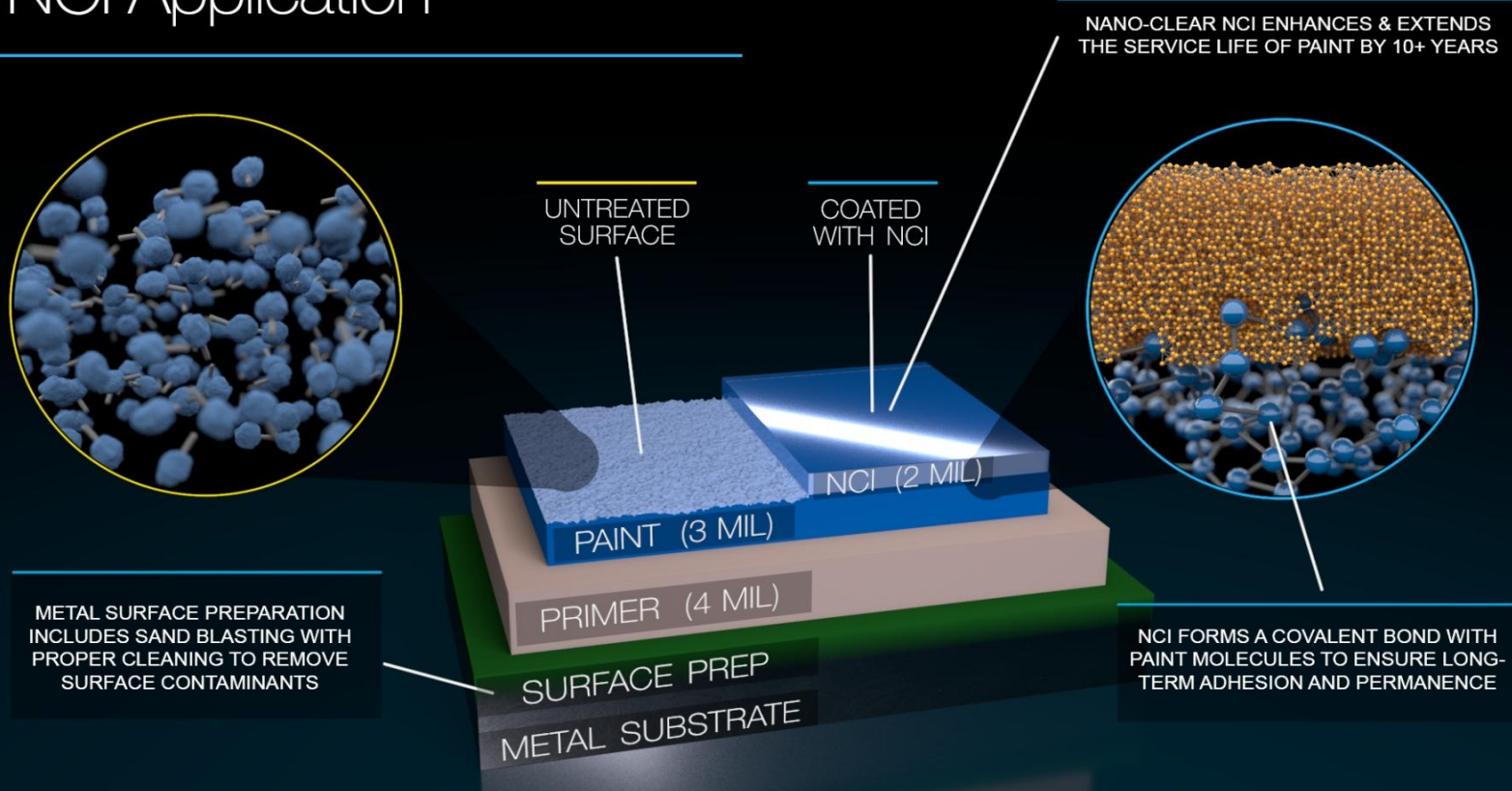


Linear chain of molecules



3D molecular architecture

NCI Application





NANO-CLEAR® Vs CONVENTIONAL COATINGS

For decades, conventional coating systems have relied on numerous variations of the same linear chain polymers as noted above. These paint systems, including epoxy coatings:

- Provide good corrosion resistance and
- Provide some initial surface hardness, but
- Their long term resilience falls short under UV rays & harsh weather & environmental conditions

As a result, in order to properly protect equipment, it's necessary for industrial customers to perform frequent, costly, labour intensive maintenance cycles every 6 months to 5 years which includes:

- Surface preparation & repair
- Repaint & recoat using the same *conventional* technology

Colour Restoration & Multi-Functional Benefits

Nano-Clear® Coatings on the other hand, are designed from the bottom up with nano-structuring properties to give it the ability to penetrate deep into the pores and voids of newly painted or highly oxidized (previously painted) coating systems. NCI's extremely high crosslink density produces a hard, protective, clear-coat surface resulting in a much more durable, longer lasting solution. NCI will:

- Quickly harden and fortify the painted surface
- Turn faded/chalked layers transparent
- Allow the original underlying colour to show through
- "Lock in" the restored color, and
- Prevent future fading/chalking with its long-term UV absorbers

EXCEEDING INDUSTRY SPECIFICATIONS

Nano-Clear® (NCI) was introduced in 2012 as the world's first clear-coat that is humidity cured at ambient temperature. NCI is engineered to exceed the technical and functional specifications required by industrial marine, fleet, aerospace, and oil & gas markets.





NANO-CLEAR® USAGE SCENARIOS

Freshly Painted Surfaces

Nano-Clear® has been engineered to be applied over “fresh” (uncured*) 2K epoxies and 2K polyurethane, as well as sanded powder coatings, fiberglass/gel coats and anodized aluminum (to prevent filiform corrosion, etc.).

***Note - Fully cured coatings require sanding before the application of NCI to allow chemical bonding to take place.**

Previously Painted / Highly Oxidized Surfaces

Nano-Clear® is also engineered to be applied over “oxidized” 2K epoxies, 2K polyurethane and powder coatings, as well as fiberglass/gel-coats and anodized aluminum (to prevent filiform corrosion, etc.).

Important Notes

Nano-Clear® must be applied over an existing coating system before the coating has deteriorated into a powdered/chalked, peeled and/or eroded state.

NCI is *not* a rust converter. Prior to the application of NCI, rust and/or peeling paints must be removed, and the surface should be spot-repaired and then painted with a coating such as a high solids 2K epoxy (eg. - Macropoxy® 646).

Nano-Clear® Is the Premiere Solution for a Diverse Range of Applications

- > Lifeboats
- > Cargo Ships / Ocean Going Vessels
- > Chemical, Oil and Gas Storage Tanks
- > Locomotives, Tank & Chemical Railcars
- > Oil & Gas Pipelines
- > Oil Field Platforms, Pipes and Tubes
- > Drinking Water Pipelines
- > Epoxy Coated Floors
- > Shipping Containers
- > Generators
- > High & Low Voltage Utility Boxes
- > Bridge Structures
- > Mass Transit Vehicles & Equipment
- > Emergency Response Vehicles & Equipment
- > Concrete Warehouse Floors
- > Painted & Concrete Building Structures
- > Interior and Exterior Concrete / Wood Architectural Structures
- > Agriculture, Construction, & Earth Moving Equipment
- > Aircraft and Equipment
- > Naval and Military Air, Ground & Marine Equipment
- > Fleet Vehicles
- > And much more.

LOOKING FOR A LEADING GLOBAL CLEAR-COAT SOLUTION?

If you're looking for the most effective, multi-functional, durable, long term, protective clear-coat solution available, ***the choice is clear!***





WE TAKE ECO-RESPONSIBILITY SERIOUSLY

We love and value our blue sphere and the people that call this planet home! Our philosophy of developing protective products doesn't just apply to the objects they're applied to, but also to the health of clients that use them, and to our entire world which includes all of the creatures we share it with. Sustainability isn't just a fancy new buzzword or a briefly trending topic ... it's our future!

NEWS

NACE study estimates global cost of corrosion at \$2.5 trillion annually

NACE International, March 8, 2016



NACE International today released the "International Measures of Prevention, Application and Economics of Corrosion Technology (IMPACT)" study, in which it estimates the global cost of corrosion to be US\$2.5 trillion, equivalent to roughly 3.4 percent of the global Gross Domestic Product (GDP). The two-year global study released at the CORROSION 2016 conference in Vancouver, B.C., examined the economics of corrosion and the role of corrosion management in establishing industry best practices. The study found that implementing corrosion prevention best practices could result in global savings of between 15-35 percent of the cost of damage, or between \$375-875 billion (USD).

Global organizations have invested billions of dollars in the quest to preserve and protect assets from corrosion and physical damage such as abrasion, chipping, chemical attack, weathering, and UV degradation. Use NCI and reduce capital expenses, reduce asset corrosion and damage, and reduce resulting harmful effects to the environment.

Preventive Options

1. **Do nothing** and allow the coated surface to degrade, potentially leaching metals, chemicals and other toxic elements into the environment (eg. - harming natural aquifers, drinking & groundwater systems, ranch lands, food crops, rivers, lakes, oceans, the atmosphere, bio-diverse habitats, etc),
2. **Frequently replace** the degraded paint / coating with the same inferior conventional coating system(s),
3. **Restore, enhance and extend** the surface life of an asset's *existing damaged* coating system by 10+ years with Nano-Clear[®], or
4. **Enhance and extend** a *new and "freshly"* painted/coated asset's coating system by 10+ years with the addition of Nano-Clear[®].

ECO/USER-FRIENDLY PROPERTIES

- Low VOC content
- The world's only plural component polymer system stable in a 1K package
- Industry leading, long term durable protection
- Less product required per project: 2 mil (DFT) coating with high surface area coverage



NANO-CLEAR® NCI TEST RESULTS & SPECIFICATIONS

PROPERTY/TEST	TEST METHOD	RESULTS	TESTING SOURCE
Crosslink Density	DMA (Dynamic Mechanical Analysis)	2.17 (X10 ³ mol/m ³)	Nippon Paint
VOC	ASTM D3960	1.25 lb/gal (150 g/l)	Nanovere
Recommended Dry Film Thickness	ASTM D5796	1 mil to 2 mils	Nanovere
Coverage	Nanovere	1122sqft/gal(at 1 mil)	Nanovere
Gloss 20°/60°	ASTM D523	86.0/92.2	Stonebridge Technical Services
ABUSE RESISTANCE			
Abrasion Resistance (CS-17, 1 kg, 1000 cycles)	ASTM D4060	8.4 mg loss	Nippon Paint
Pencil Hardness, Scratch	ASTM D3363	4H	Stonebridge
Scratch Hardness	SASO 2833	2500 gm	Saudi Standards, Metrology, & Quality Organization (SASO)
Pencil Hardness, Gouge	ASTM D3363	5H	Stonebridge
Pendulum Hardness (Persoz)	ASTM D4366	> 250 oscillations	Nippon Paint
Impact Resistance 18°C Direct in/lbs	ASTM D2794	50 Pass / 60 Fail	Stonebridge
Impact Resistance 18°C Reverse in/lbs	ASTM D2794	10 Pass / 20 Fail	Stonebridge
Impact Resistance	SASO ISO 3248	1 kg-160cm	SASO
Impact Strength	ASTM D2794	145 kg-cm	SASO
Chip Resistance 23°C (2 mils)	ASTM D3170	7A	Stonebridge
Chip Resistance -29°C (2 mils)	ASTM D3170	7B	Stonebridge
Falling Sand Abrasion 100 liters	ASTM D968	Pass	Stonebridge
Mar Resistance	ASTM D5178	5.0 kg	SASO
ENVIRONMENTAL RESISTANCE			
Xenon WOM Resistance 4000 hrs	SAE J1960 ASTM G155	100% Gloss Retention 99% Gloss Retention	Stonebridge Nippon Paint
QUV 313, >1500 hrs	ASTM D4587	100% Gloss Retention	Nippon Paint
Water Immersion Test 240 hrs @ 50°C	ISO 2812-2	Pass	Nippon Paint
Salt Spray, 4000 hrs	SASO ISO 11997	Excellent	SASO
Humidity, 100% RH, 100°F, 240 hrs	ASTM D1735-02	No loss of adhesion. No change.	American Racing Custom Wheels
CASS 240 hrs @ 50°C	JIS H8502-7	Pass	Nippon Paint
Thermal Shock (100°F 3 hrs, Freeze 3 hrs, Steam Blast 30 sec)	GM9525P	No loss of adhesion. No Change.	American Racing Custom Wheels
CHEMICAL RESISTANCE			
10% Sulfuric Acid	ASTM D 1308	No effect	Stonebridge
10% Hydrochloric Acid	ASTM D 1308	No effect	Stonebridge
10% Sodium Hydroxide	ASTM D 1308	No effect	Stonebridge
10% Ammonium Hydroxide	ASTM D 1308	No effect	Stonebridge
Isopropyl Alcohol	ASTM D 1308	No effect	Stonebridge
Xylene	ASTM D 1308	No effect	Stonebridge
Skydrol® 500 Fluid	ASTM D6943-A	No effect	Stonebridge
MEK Resistance	ASTM 4752	1500 double rubs	Stonebridge
ADHESION, FLEXIBILITY & CLEANING			
Adhesion, Direct to Metal	ASTM D4541	3 Mpa	SASO
Adhesion, Cross Cut	SASO ISO 2409	Rating 10	SASO
Flexibility, 1mm Mandrel	SASO 2833	Passed (Very Good)	SASO
Flexibility, Cylindrical Mandrel	SASO ISO 1519	3 mm Passed (Excellent)	SASO
Flammability: Fire Retardant & Flame Spread	ASTM E84 / BS476	Class 1 (Excellent)	SASO
De-Icing Aid	Coated equipment frozen in 20ft freezer	It was possible to flake off ice bits and melting was faster.	Schlumberger
Self-Cleaning Properties		Oil & Dirt Release; Hydrophobic, Brake-Dust Release	Nippon Paint
APPLICATION HIGHLIGHTS			
Pot Life	1 Component (1K)	Relative Humidity	20% to 80%
Viscosity	200 cps	Dry Time: Dust Free @ 68-72°F	30 minutes
Spray Applicators	HVLP, Conventional or Airless	Dry-To-Handle @ 68-72°F	4 hours
Wipe-On	ShurLine® Deck Pad	Recommended for small areas	Yes
Application Temp	40°F to 90°F		
Operating (Service) Temp	-40°F to 250°F		



INDUSTRIAL CLIENTS & INDUSTRY AWARDS

Nano-Clear® coatings have been developed and proven with 12+ years of intensive research & development. The technological basis of our products has been supported by in-house, field & accredited third-party laboratory testing, joint development initiatives, and international licensing agreements. NCI is award winning technology that continues to exceed global industrial and military specifications.

Our products provide unparalleled advantages to clients that span the globe across many sectors, and are utilized by a diverse range of leading companies such as:

- Toshiba
- Nippon Paint
- Odebrecht Oil and Gas
- Carnival Cruise Lines and Holland Cruise Lines
- Sterling Crane (a Berkshire Hathaway company)
- General Dynamics Land Systems
- UTC Aerospace Systems
- Chevron
- DOW
- GO Transit
- And many more!



Setting new standards in Surface Protection.

NACE MP 2019 CORROSION INNOVATION OF THE YEAR AWARD

Nashville, Tennessee, March 26, 2019 - Nano-Clear®

Industrial Coating was selected as the international winner of the prestigious "NACE MP Corrosion Innovation of the Year Award" (Coatings & Linings category).

Global nominations were rated by a panel of leading corrosion experts spanning multiple niches across the industry.

Presented at the NACE 2019 Corrosion Conference & Expo, this distinguished honour is awarded only once every two years during the world's largest event for the prevention and mitigation of corrosion.





ABOUT ASSERO COATINGS

Assero thrives on bringing bold, disruptive, innovative, and advanced coating technologies to market that follow an economical, social / eco-responsible, and sustainable approach to solutions for asset restoration and preservation.

Multifunctional Nano-coatings | Functional Nano-materials & Concepts
Application Expertise, Joint Development & Problem Solving

Research, Development & Manufacturing Processes | Synthesis of Highly Functional Nano-structured Polymers



For more information, please review the Technical Data Sheet (TDS) and Safety Data Sheet (SDS) documents available online at www.assero.co/products/nanovere, contact an Assero Representative, or visit: www.assero.co

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