Nano-Clear®

Nano-Clear® NCI for Industrial Applications

Extend Newly Painted or Existing Paint by 10+ Years

Achieve Unmatched Topcoat **Durability**

http://www.nanocoatings.com

Nano-Clear®

Industrial Markets

Industrial asset owners commonly apply protective topcoatings over steel surfaces to mitigate the effects of environmental exposure to the sun including oxidation, chemical attack damage, corrosion and desire for better appearance. Conventional industrial coatings "alone" are currently very susceptible to;

- UV degradation
- weathering
- acid rain
- water damage
- corrosion
- normal use

What is needed?

An improved surface coating that protects industrial assets more thoroughly than any existing technology. A permanent surface coating that will extend the surface life of newly painted or in-service painted assets by 10+ years.

Nano-Clear NCI Coating

Nano-Clear NCI Industrial Coating is designed to dramatically improve the surface life of painted assets by significantly improving corrosion resistance, chemical attack, abrasion, UV damage and weathering. Nano-Clear NCI improves the **surface protection of paint** and improves **brand image** while significantly reducing surface maintenance costs.

- **Extreme Corrosion Resistance**
  No Rust After 5000 Hour Salt Spray Testing
- **Extreme Abrasion Resistance**
  Only 8.4mg loss after 1000 cycles, 1kg
- **Weatherproof Gloss**
  99% Gloss Retention after 4000 Hours. Xenon WOM
- **1K Coating, Humidity Cured**
  Dry-To-Handle in 4 hours; Return to Service in 24 hours
- **Reduce Re-Paint Cycle by 2X - 3X**
  As Documented in Production Case Studies
- **Improve Brand Appearance**
  Achieve Deeper Colors & Dramatically Higher Gloss
- **Achieve Lower Operating Costs**
  By Reducing Maintenance Time & Extending Your Recoat Cycle By 10 Years…

Guaranteed!

What Makes NCI Unique?

Nano-Engineering (not nano-particles) **Creates Exceptional Crosslink Density**

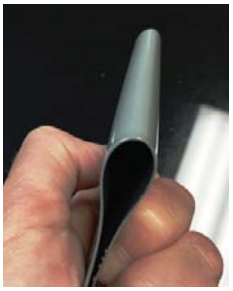
Nano-Clear® NCI is manufactured using proprietary 3D nanostructured polymers - producing extreme crosslink density.

NCI provides extreme corrosion resistance, abrasion, chemical & UV resistance and reduced surface maintenance. NCI penetrates deep into the pores of freshly painted or in-service paints to enhance color, improve gloss, dramatically increase surface hardness, improve chemical and long-term UV resistance.

Nano-Clear is a one-component humidity cured / highly cross-linked polyurethane/ polyurea hybrid nanocoating.

With this exceptionally high crosslink density, we have the test data to prove that NCI is the world's best all-around clearcoat for resistance to scratches, chips, abrasion, chemicals, weathering, and more. Please see the back cover for test results or http://www.nanocoatings.com.

BMW validated Nano-Clear coating to have the highest gloss levels and DOI of any clear coating system they had ever tested.

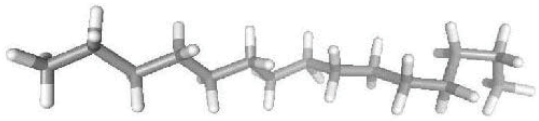


Before

Even with its remarkably high surface hardness (4H), NCI stays flexible. This iron-phosphated steel panel, painted with Macropoxy® 646 Epoxy and then coated with NCI, bends in-half without cracking or any other failure to the coat. Call 810-227-0077 for technical questions.

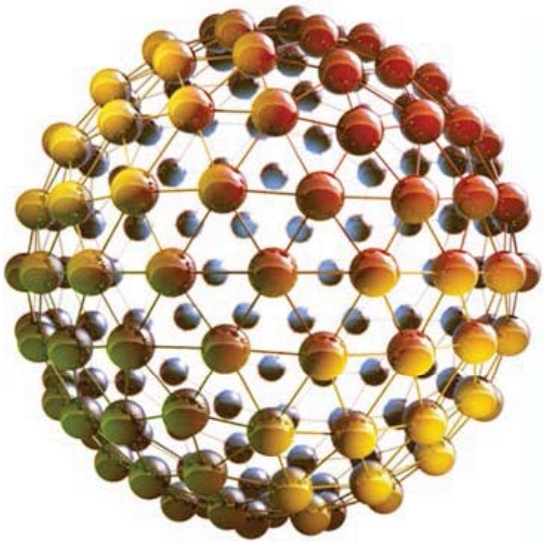
Why is Crosslink Density So Important?

Coatings contain "building blocks" with functional groups. The chemical reaction of these groups during curing forms a network. In most traditional polymers, the network is a linear chain of molecules with low crosslink density.



Linear chain of molecules

Conversely, we "nano-structured" our clearcoat to have a 3D molecular architecture. The 3D polymer network has an exponentially higher number of crosslinked sites. The result is a tightly knit mesh with unprecedented DMA density.



3D molecular architecture

High crosslink density provides highly functional surface properties, including unmatched corrosion resistance, scratch resistance, chemical resistance and UV durability. It also means low surface energy, repelling water (hydrophobic) and aiding in the release of ice, dirt, brake dust, and even concrete dust.

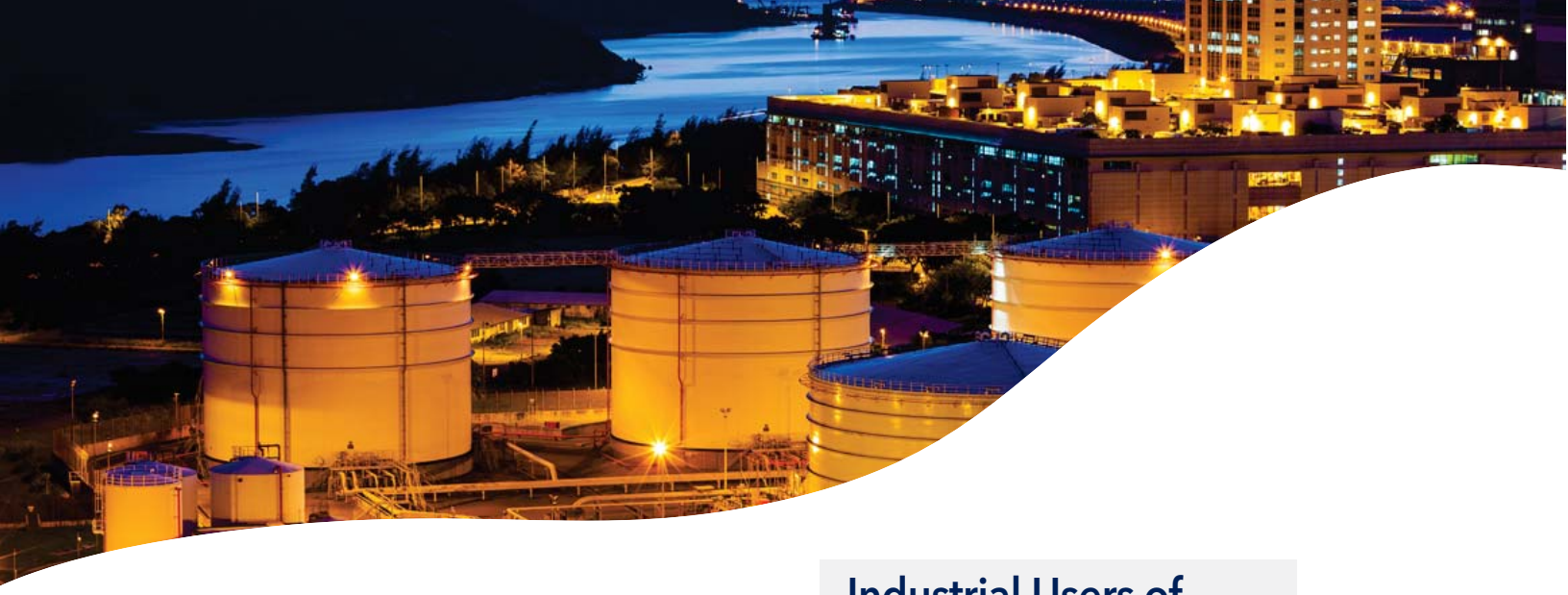
Even sticky concrete dust releases easily from Nano-Clear NCI

Unrivaled Performance / Enhancement

For the last 30+ years, coating chemistries have been variations on the same (linear chain) polymer themes. As a result, industrial customers are on an endless treadmill: Painting, then watching the subsequent oxidization, loss of gloss, corrosion, and paint failure… requiring, in turn, labor-intensive surface prep and repainting with the same conventional coating technology.

Put simply: NCI restores the color, gloss, surface hardness and extends the surface life of conventional coatings by 10 years.

Nano-Clear NCI is designed to be applied directly directly over freshly coated surfaces including 2K epoxies, 2K polyurethanes and powder coatings.



How Does NCI Enhance Color & Physical Properties?

NCI has a low (200 cps) viscosity, so it penetrates deep into the smallest pores of newly painted or oxidized coatings, **turning the white, chalked layers transparent,** allowing the original underlying color to show through while fortifying/hardening the surface.

Humidity-cured at ambient temperatures, NCI quickly hardens and fortifies the painted surface, "locking-in" color and preventing future chalking with its long-term UV absorbers.

Please note: NCI must be applied over the existing coating system before the coating has deteriorated into a powdered, peeled and/or eroding state. *NCI is not a rust converter*. Rust or peeling paints must be removed and repainted first with a coating such as a high solids, two-component epoxies, prior to applying NCI.

For additional details please review the Nano-Clear NCI Technical Data Sheet http://www.nanocoatings.com/ncitds.pdf

Industrial Users of Nano-Clear NCI

OSG

Altec

CASE CONSTRUCTION

STERLING CRANE

DOW®

Chevron

Where Could You Use NCI?

On New or In-Service Coatings:
e.g., 2K epoxies, 2K polyurethanes, powder coatings, polyesters, gel coats, e-coats, latexes, fiberglass, and anodized aluminum (to prevent filiform corrosion, etc.).

For Industrial Equipment: e.g., rail tank cars, fuel tanks, heavy duty equipment, earth moving equipment, ships, fleet vehicles, plant floors, painted building structures, light posts, transformer housings, pumps, valves, lifeboats, oil platforms, pipelines, shipping containers, etc.

Problem: *Leading soda pop company owns a global fleet of distribution trucks in need of paint restoration.*

Solution: *NCI is used to dramatically improve the overall image of this leading soda brand, while reducing the re-paint cycle and reducing fleet maintenance. See other Nano-Clear case studies* http://www.nanocoatings.com/casestudies

Call Nanovere at **810-227-0077** to arrange a Nano-Clear NCI application demonstration

info@nanocoatings.com

Nano-Clear® NCI Coating Specifications

Recommended Uses: Newly Painted or Oxidized Painted Surfaces
Chemistry: Nano-Structured Polyurethane / Polyurea Hybrid

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	1122 sq ft/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 - 160 cm	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 D 1735-02	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 20 ft 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 Application	ShurLine® Deck Pad	Recommended for small areas	Yes
Application Temp	40°F to 90°F		
Operating (Service) Temp	-40°F to 250°F		

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