SynMatter
Make. Matter.





Sustainable, Smart Corrosion Protection

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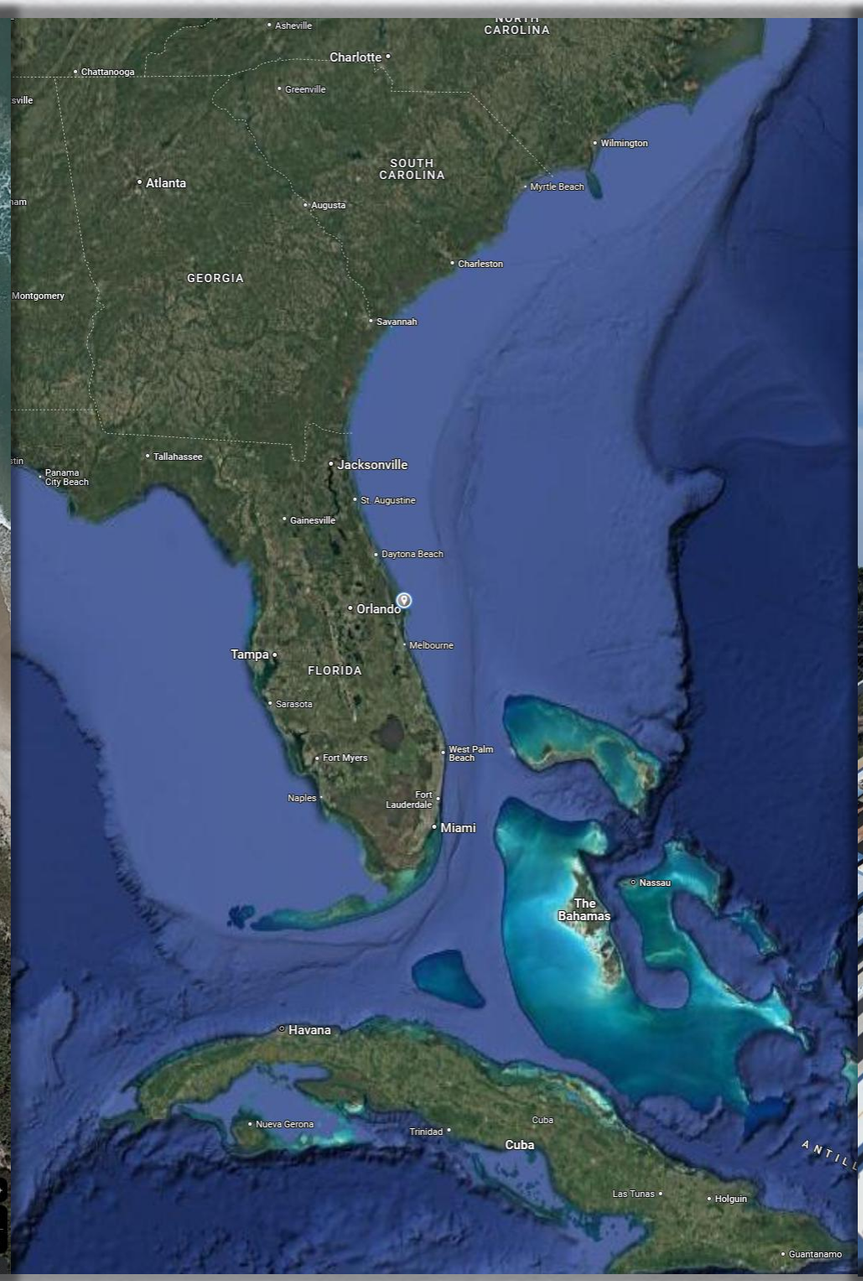
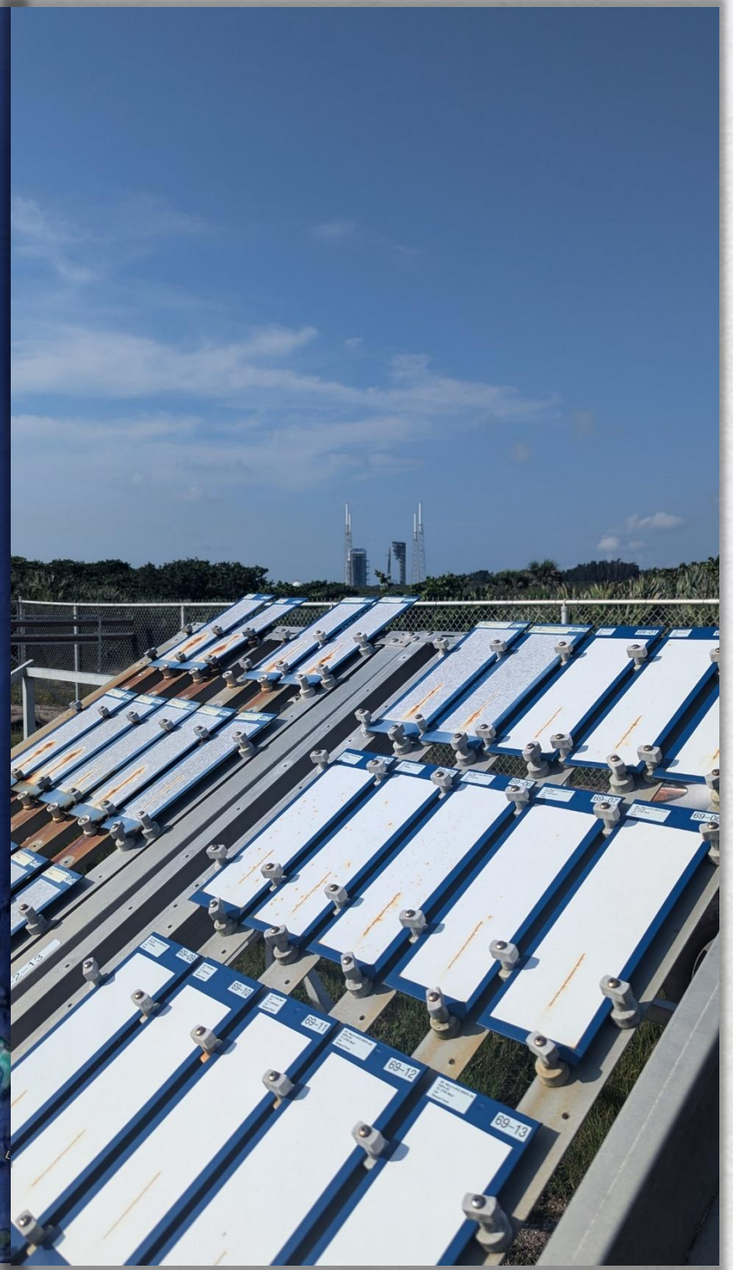
2 Corrosion Test Methods

Lowest Correlation → Highest Correlation

Steady-State	Cyclic	Cyclic	Outdoor
• 5% NaCl solution • 35°C • Continuous mist	• 1 week UV/condensation ▪ 4h of 60°C + 340nm UV ▪ 4h of 50°C + high RH • 1 week salt spray/dry ▪ 1h of 0.05% NaCl & 0.35% $(NH_4)_2SO_4$ ▪ 1h 35°C dry	• 3 days UV/condensation ▪ 4h of 60°C + 340nm UV ▪ 4h @ 50°C + high RH • 3 days salt spray/dry ▪ 5% NaCl solution ▪ 35°C ▪ Neutral pH • 1 day -20°C	• Outdoor exposure • Depends on location ▪ NASA/Key West: Hot/humid/salty ▪ New England/North Dakota/North Sea: Cold, humid, salty
• Time: 2000-5000h	• Typical time: 2000h	• Typical time: ▪ Depends on corrosivity category (C2-CX) ▪ 48-4200h	• Typical time: ▪ Depends on corrosivity category (C2-CX) ▪ 0.5-5 years
• Correlation to Atmospheric: 0.11	• Correlation to Atmospheric: 0.79	• Correlation to Atmospheric: 0.79?	• Correlation to Atmospheric: 1.00
ASTM B117	ASTM D5894	ISO-12944-9	Outdoor Exposure

3 SynMatter NASA Corrosion Testing





Corrosion Test Methods

Lowest Correlation → Highest Correlation

Steady-State	Cyclic	Cyclic	Outdoor
• 5% NaCl solution • 35°C • Continuous mist	• 1 week UV/condensation ▪ 4h of 60°C + 340nm UV ▪ 4h of 50°C + high RH • 1 week salt spray/dry ▪ 1h of 0.05% NaCl & 0.35% $(NH_4)_2SO_4$ ▪ 1h 35°C dry	• 3 days UV/condensation ▪ 4h of 60°C + 340nm UV ▪ 4h @ 50°C + high RH • 3 days salt spray/dry ▪ 5% NaCl solution ▪ 35°C ▪ Neutral pH • 1 day -20°C	• Outdoor exposure • Depends on location ▪ NASA/Key West: Hot/humid/salty ▪ New England/North Dakota/North Sea: Cold, humid, salty
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SynMatter's
Smart Corrosion Inhibitors (SCI)

Smart Corrosion Inhibitors

Use in Existing Coatings

Extend Coating Life
Reduce Maintenance Costs

NASA Invented
Smart Corrosion
Inhibitors

No Heavy Metals/Pollutants
Regulatory Compliance

Solventborne DTM Alkyd

ASTM B117 Salt Spray: DTM Alkyd: 2300h

No SCI

With 5% SCI

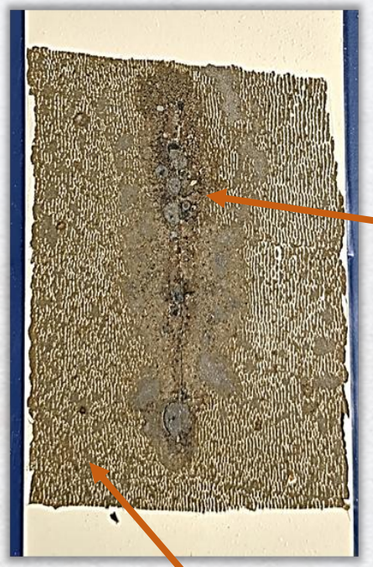
No SCI: Scraped

5% SCI: Scraped

ASTM B117 Salt Spray: DTM Alkyd: 2300h

	No SCI	5% SCI	No SCI: Scraped	5% SCI: Scraped
Scraped	Face blistering	No face blistering	Corroded metal under coating Adhesion loss	Clean metal under coating High adhesion

←High
Scribe Creep
Lower→



←High
Scribe Creep
Lower→

SCI deliver:

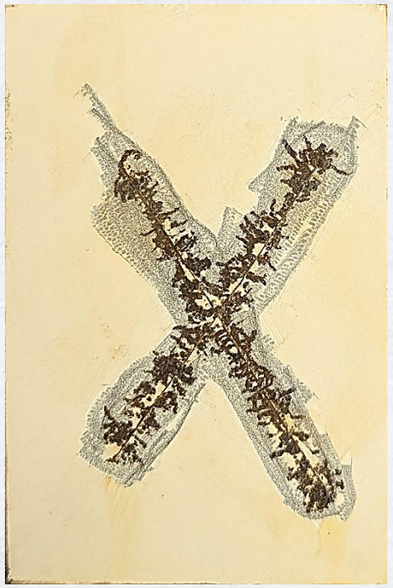
- Scribe creep: Lower
- Scribe blistering: Lower
- Face blisters: Not present

After scraping, SCI deliver:

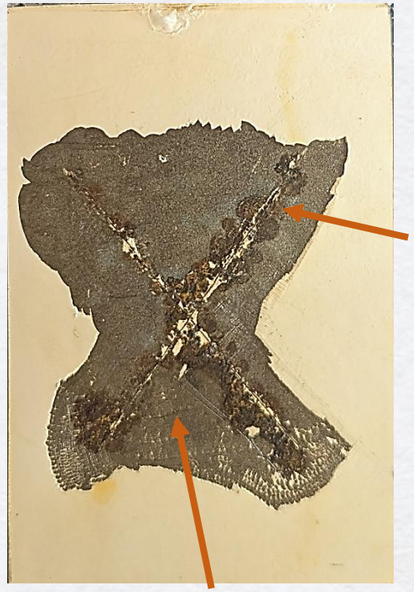
- Scribe creep: Lower
- Underfilm corrosion: Lower

Solventborne DTM Alkyd: 2 coats on hot rolled steel blasted to SSPC SP-10
1st coat with SCI; 2nd coat unmodified paint | 2300h in neutral salt spray as per ASTM B117

ASTM D5894: Cyclic: DTM Alkyd: 2000h

	Unmodified Paint	5% SCI 1	5% SCI 2	5% Zinc Phosphate
2000 h				
Scraped				

ASTM D5894: Cyclic: DTM Alkyd: 2000h

	Unmodified Paint	5% SCI 1	5% SCI 2	5% Zinc Phosphate
Scraped				
	Corroded metal under coating Adhesion loss	Clean metal under coating High adhesion	Clean metal under coating High adhesion	Corroded metal under coating Adhesion loss

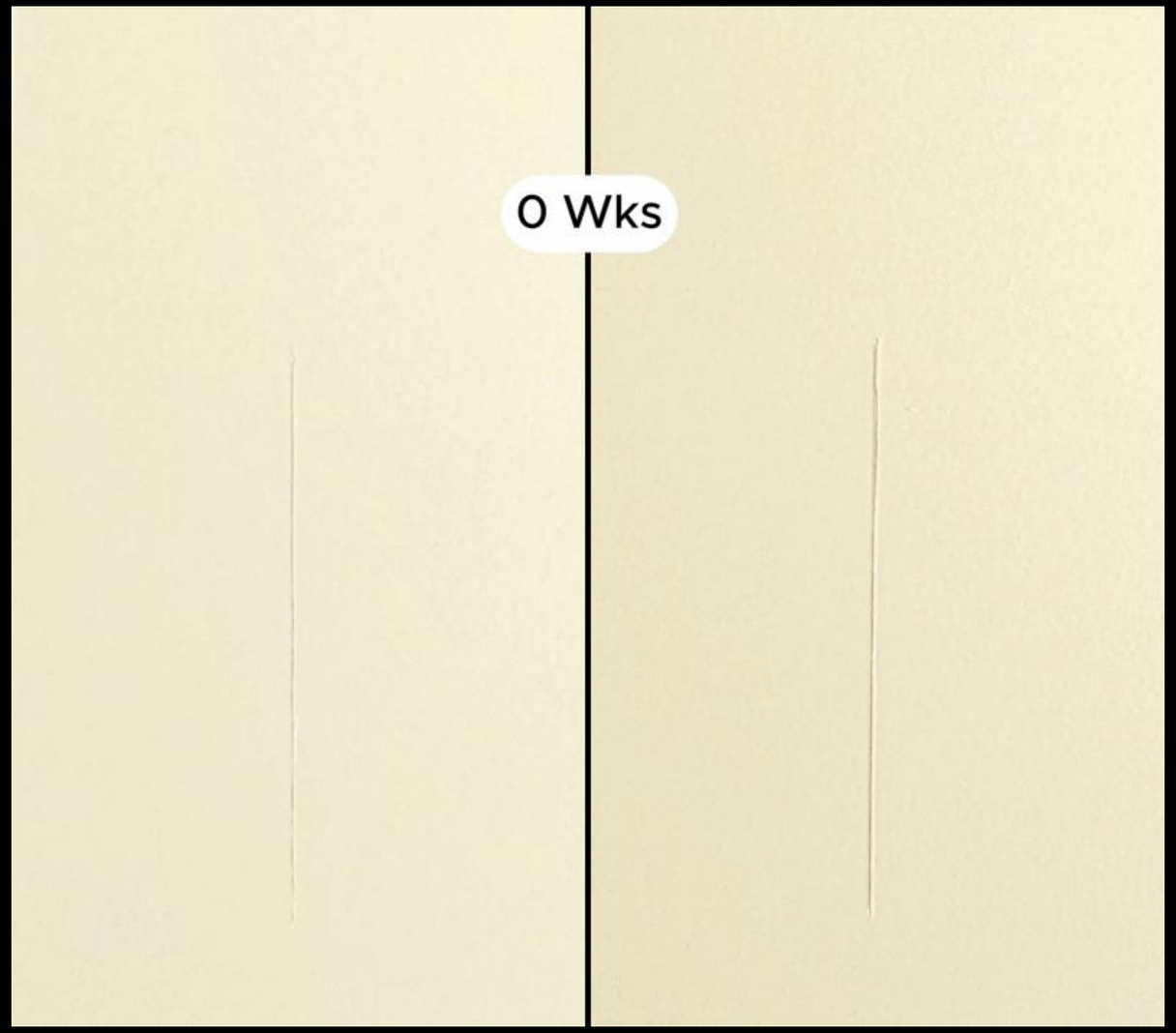
←High Scribe Creep Lower→

←Lower Scribe Creep High→

- Visual appearance of paint for all samples looks similar. However, after paint removal:
  - Scribe creep: Lower
  - SCI protect the metal further from the scribe, leaving a clean metal surface
  - SCI outperform industry standard inhibitor, zinc phosphate

Solventborne DTM Alkyd: 2 coats on hot rolled steel blasted to SSPC SP-10
1st coat with SCI; 2nd coat unmodified paint | 2000h in cyclic corrosion testing as per ASTM 5894

NASA KSC Outdoor Exposure: DTM Alkyd

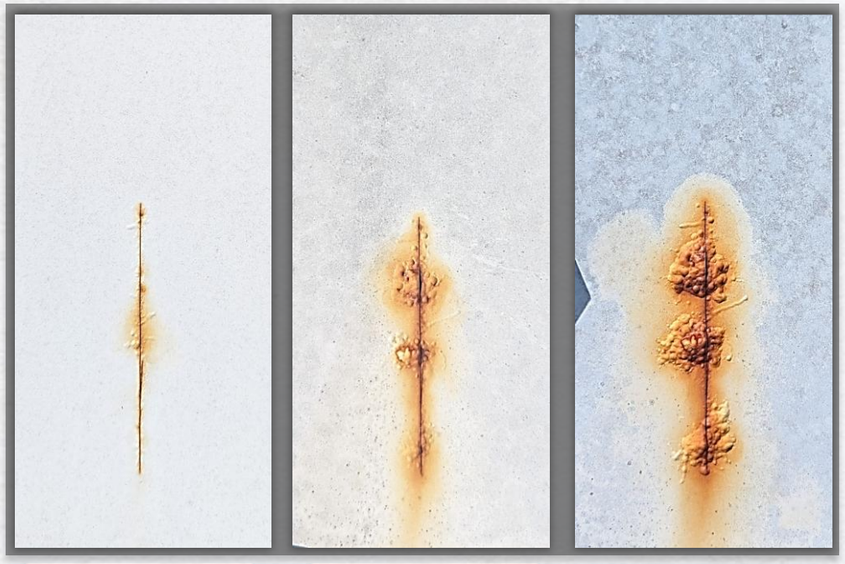


0% SCI

5% SCI

13 NASA KSC Outdoor Exposure: DTM Alkyd: 2.5 years

Commercial DTM Alkyd with NO SCI



Year 1 → Year 2 → Year 2.5

Commercial DTM Alkyd WITH SCI

NASA KSC Corrosion Factors

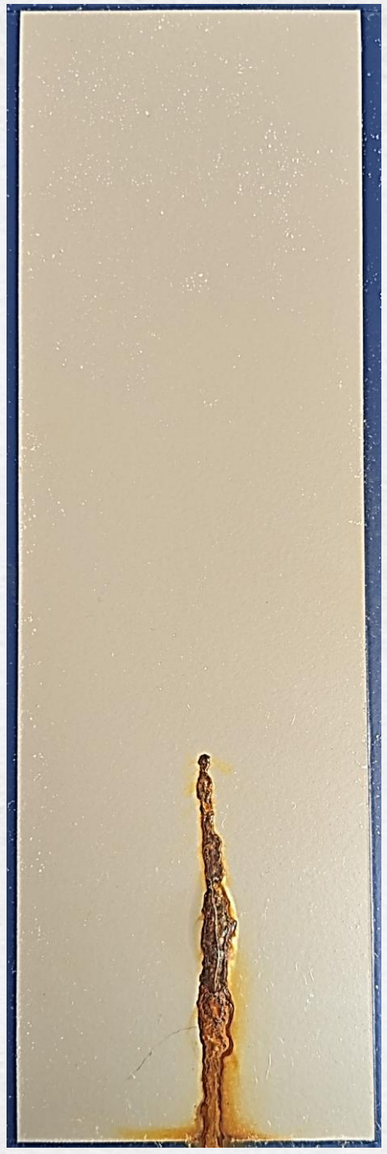
- Salty Atlantic Ocean wind
- Florida, USA, year-round intense sunshine
- High humidity most of the year
- Corrosive rocket fumes

Smart corrosion inhibitors deliver significant improvements in corrosion protection performance for post-addition into solventborne alkyd

Solventborne DTM Alkyd: 2 coats on hot rolled steel blasted to SSPC SP-10
1st coat with SCI; 2nd coat unmodified paint | 2.5 years at NASA KSC Test Site

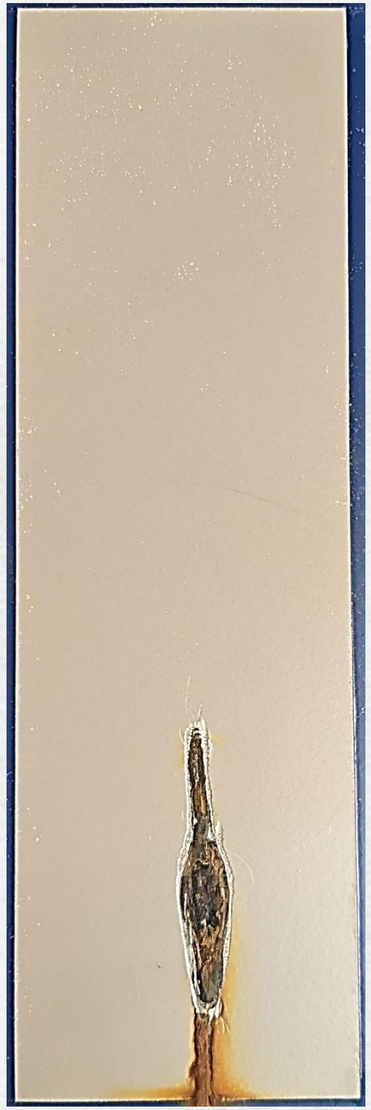
Navy Solventborne 2K Epoxy Primer (MIL-DTL-24441)

ASTM B117 Salt Spray: 24441: 5000h

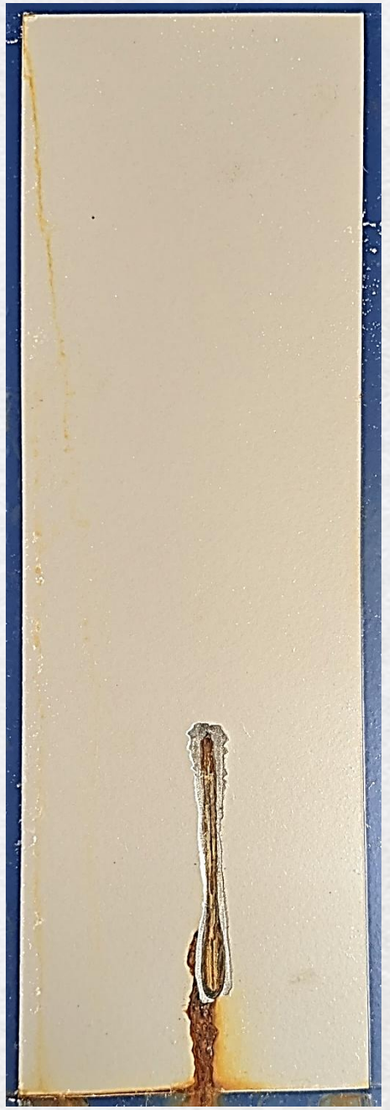


No SCI

With 5% SCI

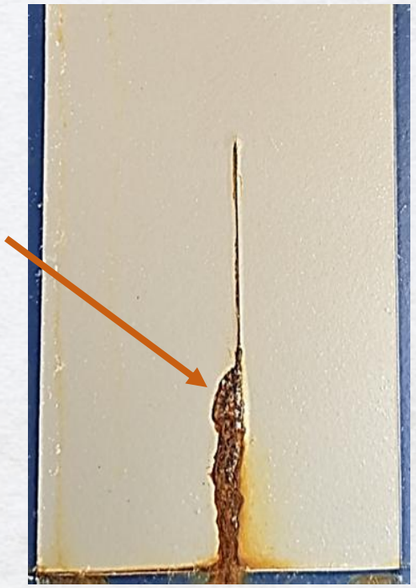
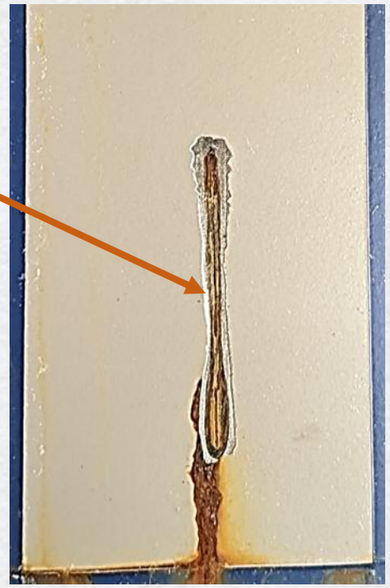


No SCI: Scraped



5% SCI: Scraped

ASTM B117 Salt Spray: 24441: 5000h

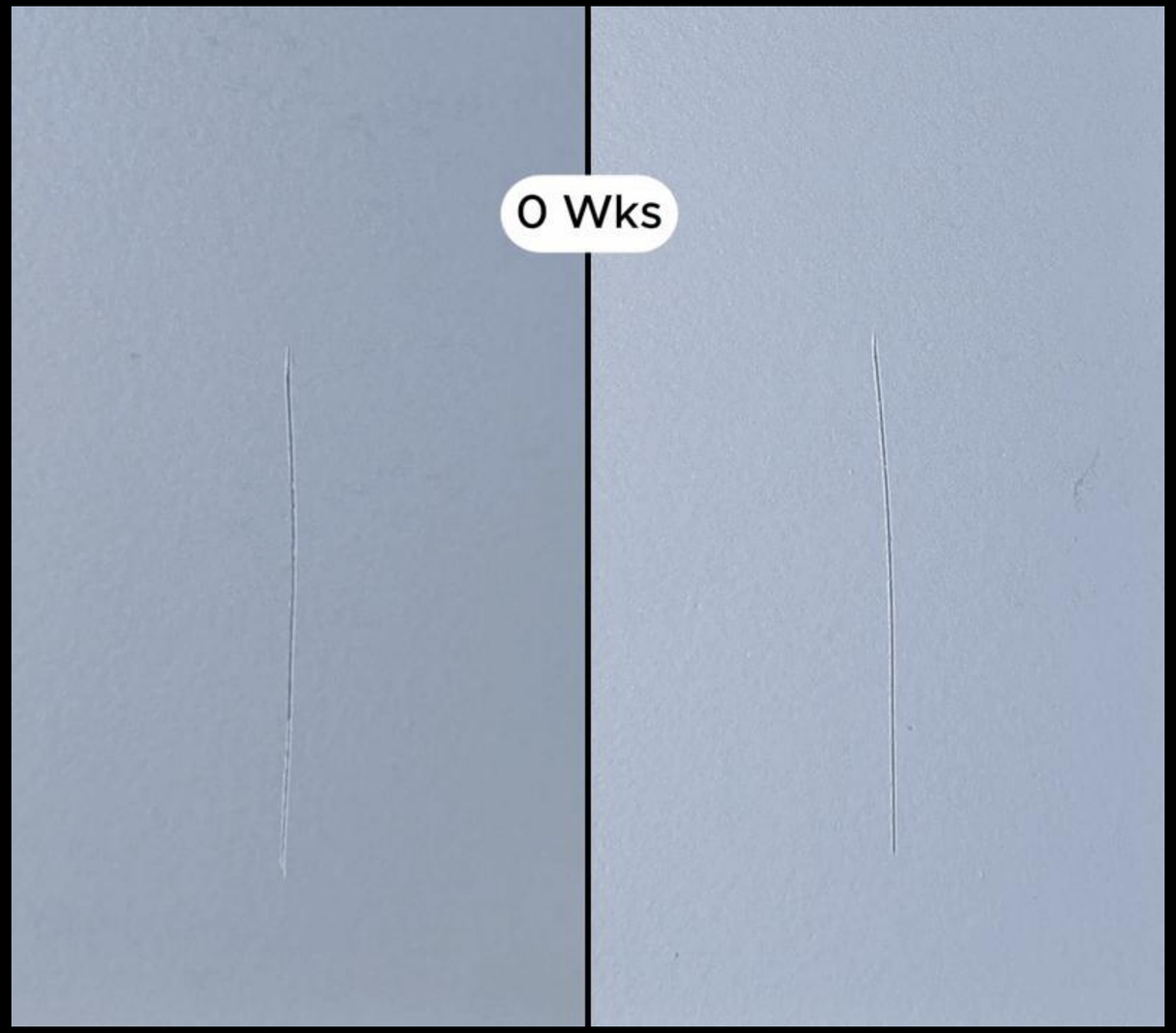
	No SCI	5% SCI	No SCI: Scraped	5% SCI: Scraped
Scraped				

SCI deliver:

- Reductions in scribe creep

Solventborne 2K Epoxy primer as per MIL-DTL-24441: 2 coats on hot rolled steel blasted to SSPC SP-10
1st coat with SCI; 2nd coat unmodified paint | 5000h in neutral salt spray as per ASTM B117

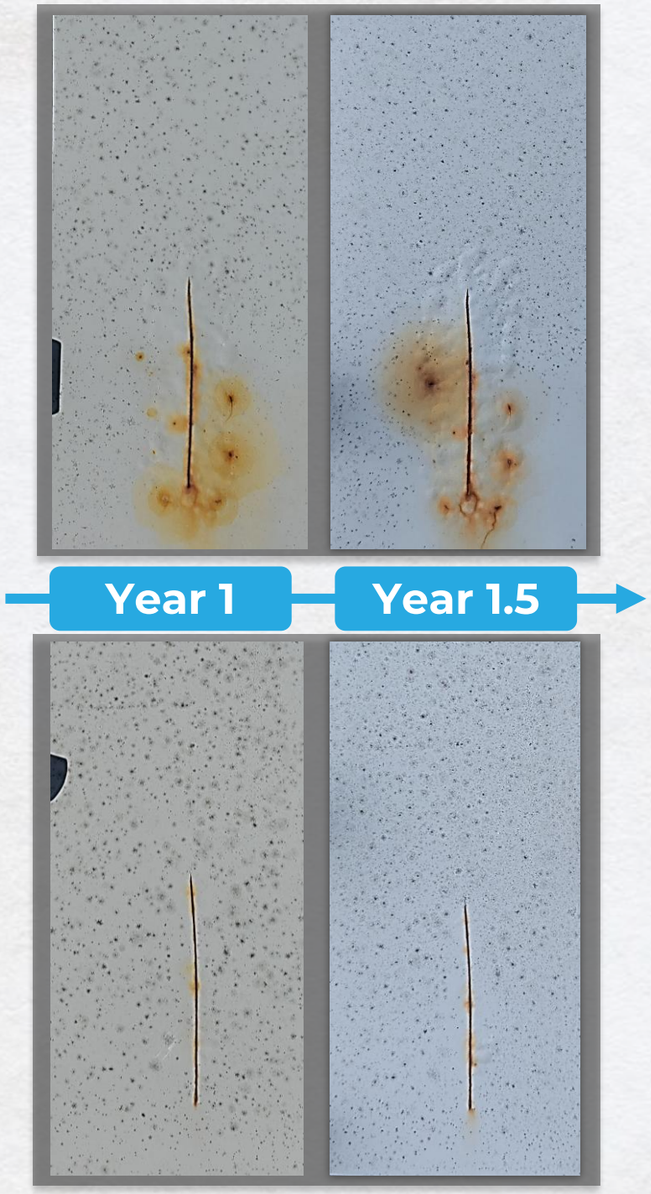
NASA KSC Outdoor Exposure: 24441



0% SCI	5% SCI

NASA KSC Outdoor Exposure: 24441: 1.5 years

MIL-DTL-24441 with NO SCI



MIL-DTL-24441 WITH SCI

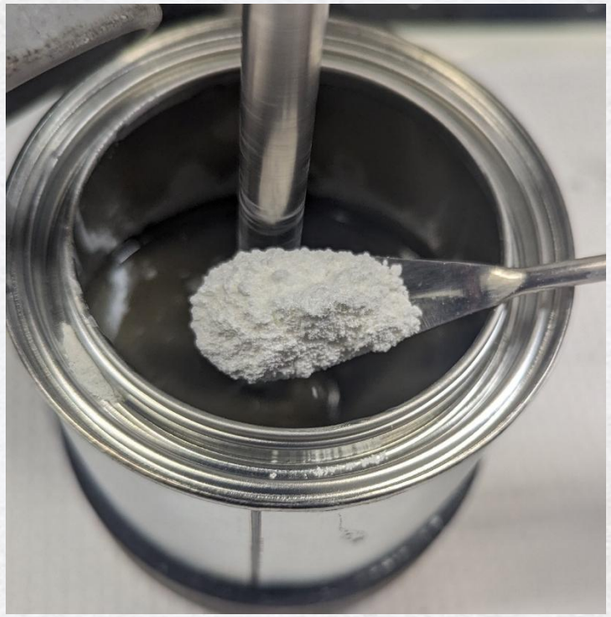
NASA KSC Corrosion Factors

- Salty Atlantic Ocean wind
- Florida, USA, year-round intense sunshine
- High humidity most of the year
- Corrosive rocket fumes

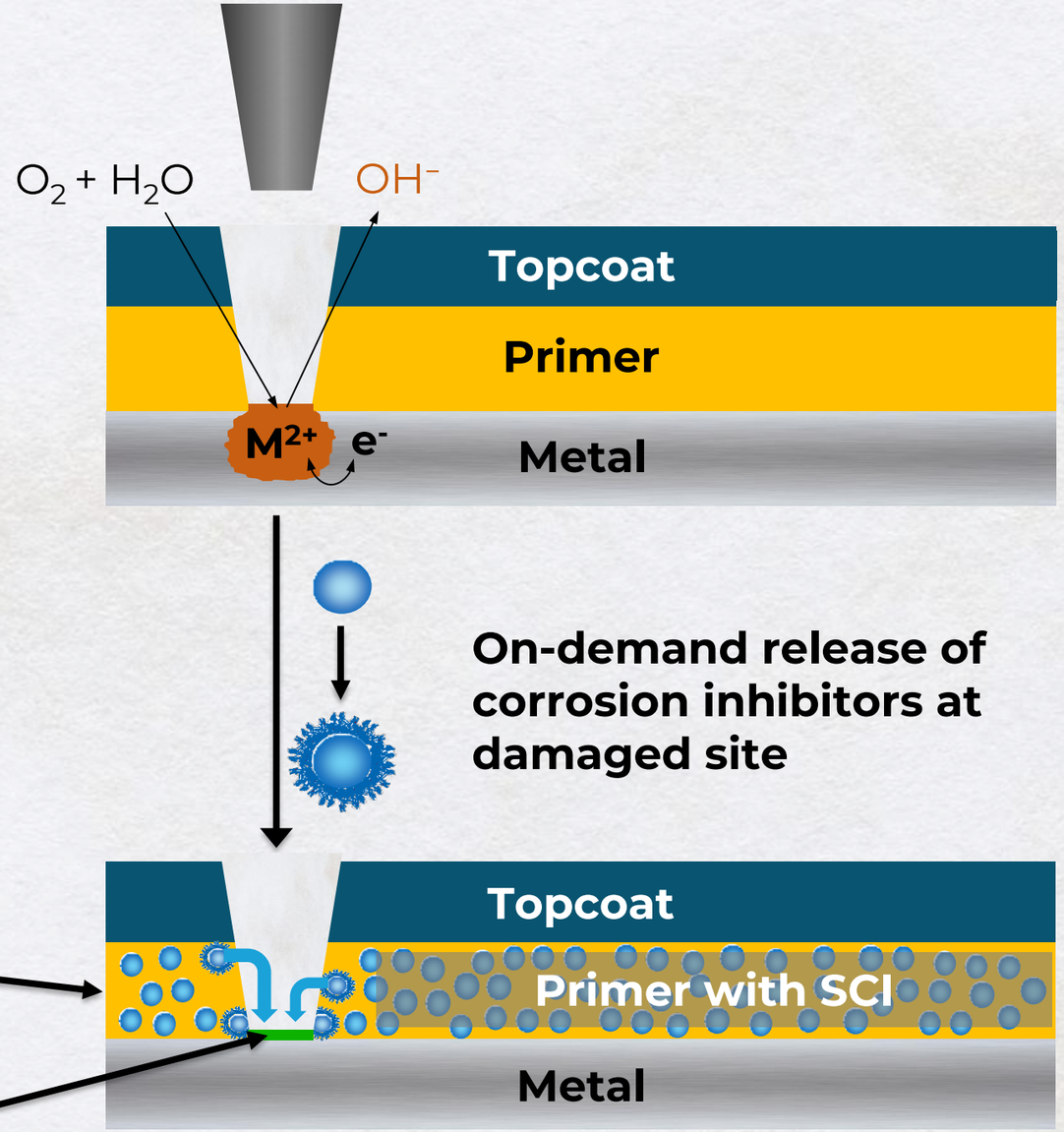
Smart corrosion inhibitors deliver significant improvements in corrosion protection performance into a MIL-Spec solventborne epoxy primer

Solventborne 2K Epoxy primer as per MIL-DTL-24441: 2 coats on hot rolled steel blasted to SSPC SP-10 1st coat with SCI; 2nd coat unmodified paint | 1.5 years at NASA KSC Test Site

How it Works



Silica particles with entrapped corrosion inhibitor



Protective inhibitor layer

Business

The Business Model

Committed Team

Benny Pearman, PhD
Founder, CEO
SP Inventor

Jun Zhang, PhD
Founder, CTO
SP Inventor

Dillon Campbell, BS
Coating Formulator

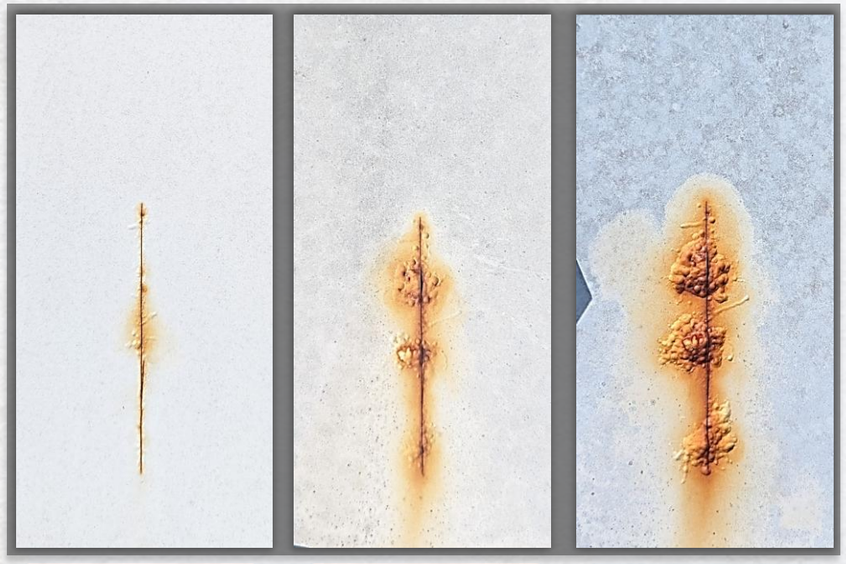
Vickie Scarborough, PhD
Commercialization Consultant

Steve Dickey, BS
Business Consultant

Funding

NASA Outdoor Exposure: Gold Standard!

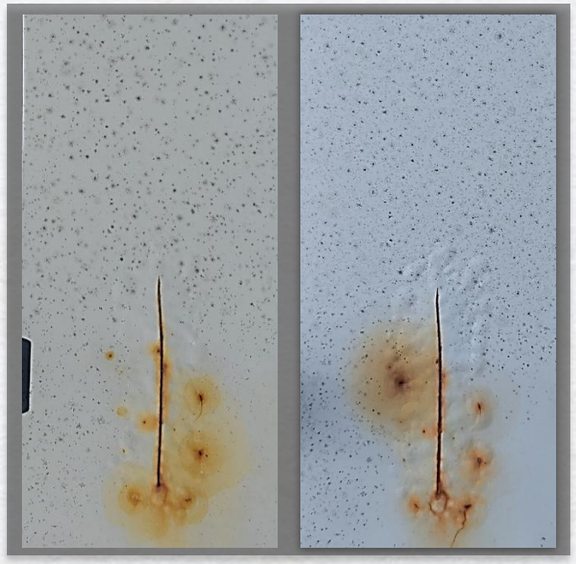
Commercial DTM Alkyd with NO SCI



Year 1 → Year 2 → Year 2.5

Commercial DTM Alkyd WITH SCI

MIL-DTL-24441 with NO SCI



Year 1 → Year 1.5

MIL-DTL-24441 WITH SCI

- Drop-in to Current Coatings
- Extend Coating Life up to 2x
- Reduce Maintenance Costs up to 50%
- No Heavy Metals or Pollutants

SCI Benefits

The Future

Scale Production

Scale Toll Manufacturing to Commercial Quantities

Find Customers

Coatings Companies and End Users

Make SCI Primer

Develop SCI Primers

Investment

Raising Investment to Scale Business

Invest in Our Planet

- Smart Materials Platform
- Anticorrosion
- Antimicrobial
- Controlled Curing
- Custom Applications

Syn Matter

Make. Matter.

NASA Technology
Protecting Earth

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