



Advanced Topcoat System

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Need

- Enhanced corrosion protection
- Improved weathering resistance
 - Gloss stability
 - Color stability
- Improved coating and application properties
- Reduced toxicity and improved safety
 - Elimination of isocyanate chemicals
 - Increase flash point to at least 100 F
 - Decrease VOCs to at least 250 grams/liter





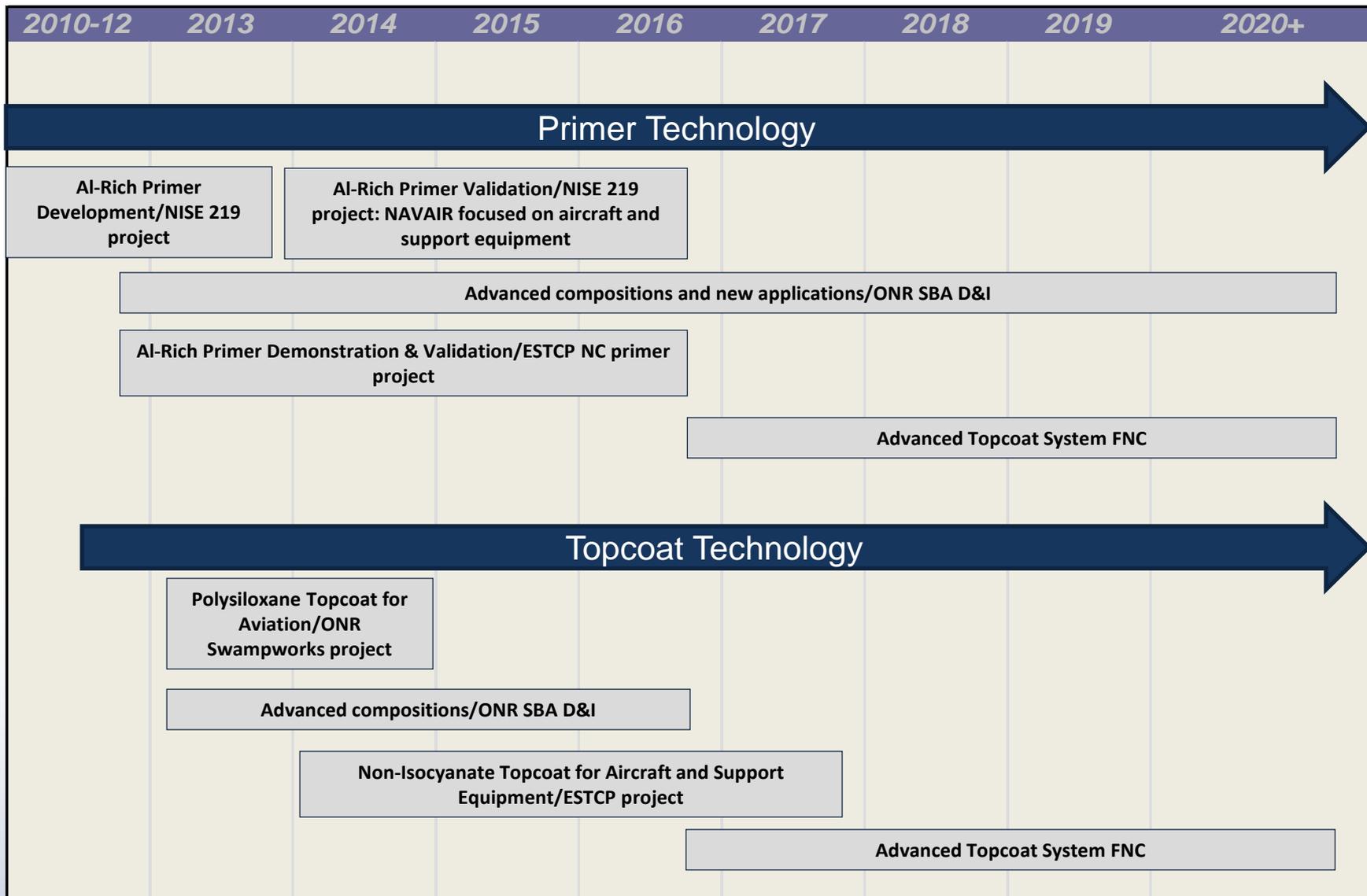
Approach

- **Advanced Topcoat System**
 - Funded by the Office of Naval Research (ONR) Future Naval Capability (FNC) Program
 - Two “products”: air vehicle and ground vehicle
 - Brief focuses on the air vehicle product





Development Path





Primer Goals

**Corrosion
Resistance**

ESOH

Wet install
Exterior Components
Primer
Touch up Interior

**Application
Properties**

**Coating
Properties**



Primer Goals

Prioritization	Requirement	Minimum	Threshold	Goal
1	Filiform corrosion	MIL-PRF-23377/85582	No filiform beyond 1/8" from scribe and majority less than 1/16" long	No filiform corrosion
	Galvanic corrosion (1)	Equal to MIL-PRF-23377/85582 Class C control	Better than Class C control by 10% (3)	Better than Class C control by 25%
	Scribed panel corrosion (2)	Equal to MIL-PRF-23377/85582 Class C control	Better than Class C control by 10%	Better than Class C control by 25%
2	VOC	340 g/L	250 g/L	100 g/L
3	Flammability/Flash Point	n/a	100 F	150 F
4	Chemical Strippability	MIL-PRF-23377/85582, 90% stripped by either Method A or B	50% stripped with TT-R-2918	90% Stripped with TT-R-2918 or equivalent to Methylene chloride based paint stripper
5	Drying time	MIL-PRF-23377 (5 hr/8hr)	3 hr/8 hr	1 hr/6 hr
6	IR reflectance	MIL-PRF-23377/85582	TBD	TBD
7	Fluid resistance	MIL-PRF-23377/85582	Minimal adhesion loss with Skydrol exposure	Current resistance + Skydrol
8	Application	MIL-PRF-23377/85582 @ 1.5 mils	MIL-PRF-23377/85582 @ 1.0 mils	MIL-PRF-23377/85582 @ 1.0 mils
9	Solvent Resistance	MIL-PRF-23377/85582	100 double rubs	200 double rubs
10	Thickness Tolerance	n/a	2x thickness (2-3 mils)	4x thickness (4-6 mils)
11	Application Method	Bulk spray (HVLP)	Brush	Aerosol spray
12	Packaging	1K or 2K	1K or 2K	1K & 2K

Approved for public release; distribution is unlimited. SPR #2015-465



Topcoat Goals

ESOH

Coating
Properties

A/C: Interior
A/C: Exterior Touch up
Topcoat
Support Equipment

Weathering
Resistance

Application
Parameters



Topcoat Goals

Prioritization	Requirement	Minimum	Threshold	Goal
1	Non-Isocyanate	MIL-PRF-81352	MIL-PRF-85285, Ty I	MIL-PRF-85285, Ty IV
2	VOC	MIL-PRF-85285/81352	250 g/L	100 g/L
3	Flammability/Flash Point	N/A	100 F	150 F
4	Strippability	MIL-PRF-85285	50% stripped with TT-R-2918	90% Stripped with TT-R-2918 or equivalent to Methylene chloride based paint stripper
5	Cleanability	MIL-PRF-85285, L-value	MIL-PRF-85285, $\Delta E < 1.0$	MIL-PRF-85285, $\Delta E < 1.0$
6	Fluid resistance	MIL-PRF-85285	No adhesion loss w/Skydrol exposure & measured ΔE	No adhesion loss w/ Skydrol, pencil hardness (no more than $\Delta 1$ pencil change) & $\Delta E < 1.0$
7	Color Matching: #17925 & #36375	MIL-PRF-85285	TBD – dependent on SAE	TBD – dependent on SAE
8	Color Matching: addition of USN Orange #TBD	Document ΔE from manufacturers	$\Delta E < 3.0$	$\Delta E < 1.0$
9	Solvent Resistance	MIL-PRF-23377/85582	100 double rubs	200 double rubs
10	Thickness Tolerance	N/A	2x thickness (4-5.5 mils)	3x thickness (5-7 mils)
11	Application Method	Bulk spray (HVLP)	Brush	Aerosol spray
12	Packaging	1K or 2K	1K or 2K	1K & 2K

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FNC Execution

- Product scale up and maturation
 - Broad agency announcement partner(s)
 - Support from NRL and NAWCAD
- Product verification and validation
 - DoD labs and engineering authorities
 - Focus on quart and gallon quantities to feed field tests
- Field testing
 - Selected aircraft and support equipment based on validated products
 - Builds on low-risk field testing to date
- Requirements development
 - Will feed material specifications for new primer and topcoat
 - Anticipated to be modified MIL-PRF-23377 and MIL-PRF-85285





Takeaway

- Advanced primers and topcoats are a strong need for naval aviation
- Products in development will improve corrosion, ESOH, application and coating properties
- Commercial versions of these new products are currently available but need to be matured for authorization and implementation
- Improved products are anticipated to start being used in the next 2-5 years



Questions?
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