CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2023

DateRun: 09/15/2023

Experimenters: Alexander Symko, Amelia Wagner

ClientType: University

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Paints

Cleaning Methods: Immersion/Soak

Analytical Methods: Visual

Purpose: Determining the effectiveness of selected cleaners for removing aerospace paint from a stainless steel substrate

Experimental Procedure: 4 alternatives were identified and selected for testing. These were; Diethyl Carbonate, Dimethyl Sulfoxide, 1,3-Dioxolane, and Methyl Acetate. Stainless Steel 316 alloy coupons were rated on a visual cleanliness scale, with 5 being completely dirty, and 1 being completely clean, with 3 coupons for each cleaner for experimental redundancy. Paint and Primer mixture provided by client were mixed in a 1:1 ratio and applied to the bottom section of the stainless steel coupons as per industrial testing standard procedure. The coupons were then rated with the wet paint present to get dirty rating values. The coupons were then immersed in the cleaner such that the painted portions were completely submersed, and a magnetic stir bar was used to stir the solution for 30 minutes. After 30 minutes had passed, the coupons were removed and allowed to dry overnight. The following day, the coupons were once again rated for visual cleanliness, and the least effective options were eliminated for subsequent testing.

Results:

Cleaner	Coupon	Average Initial Visual Ratings	Average Dirty Visual Ratings	Average Clean Visual Ratings
Diethyl Carbonate	5	1	5	4.5
	13	1	5	4.75
	17	1	5	4.25
Dimethyl Sulfoxide	21	1	5	2
	22	1	5	3.25
	26	1	5	3.25
1,3-Dioxolane	27	1	5	3.5
	28	1	5	3.5
	31	1	5	3.5
Methyl Acetate	33	1	5	4.5
	34	1	5	4.5
	36	1	5	4.75

Summary:

Substrates:	Stainless Steel				
Contaminants:	Paints				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Acros Organic	Diethyl Carbonate, 99%			☐	

Conclusion: Both the 1,3-Dioxolane and Dimethyl Sulfoxide started removing paint immediately after the coupons were immersed, but ultimately were unable to remove the entirety of the paint. Diethyl Carbonate and Methyl Acetate ultimately struggled to remove any of the paint, while Dimethyl Sulfoxide was marginally more effective than 1,3-dioxolane, with both not performing to the degree that is satisfactory. Further testing will examine Hansen Solubility Parameters and their application to removal of the paint and substrate compatibility testing.