CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 01/13/2021

Experimenters: Justin Kiander

ClientType: Precision Instrument Manufacturer

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Oil

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric, Visual

Purpose: The pupose of this experiment was to verify the effectiveness of cleaners after compatibility testing.

Experimental Procedure: Compatibility testing was conducted before the experiment to ensure cleaners were compatible and not damaging the aluminum substrates. Pieces of aluminum foil were cleaned through the same process as coupons would be, but without soil. All cleaners were determined to be compatible with aluminum. Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Dimethyl Glutarate 100%, SC Aircraft & Metal Cleaner 20%, Crystal Simple Green Industrial 30 parts water. SC Aircraft & Metal was heated to 100°F while the rest remained at room temperature. Three aluminum coupons were obtained and weighed for each of the cleaners being tested. Coupons were then soiled with V-4B oil and a dirty weight was recorded. Once solutions reached the proper temperature, coupons were submerged into their respective cleaners for 15 minutes. After 15 minutes, coupons cleaned with SC Aircraft were submerged into a deionized water bath at 100°F for 30 seconds. All coupons were then dried with a heat gun to remove excess solution and allowed to finish drying in air for 24 hours. Following the drying step, coupons were weighed and a clean weight was recorded. Effectiveness of the cleaners was determined.

Results:

Cleaner	Initial wt of cont	Final wt of cont	%Cont Removed	%AVG
Metalnox 6386	0.0140	-0.0024	117.14	109.35%
	0.0147	-0.0008	105.44	
	0.0128	-0.0007	105.47	
Dimethyl Glutarate	0.0112	-0.0010	108.93	107.68%
	0.0096	-0.0011	111.46	
	0.0113	-0.0003	102.65	
SC Aircraft & Metal	0.0081	-0.0007	108.64	124.09%
	0.0062	-0.0005	108.06	
	0.0072	-0.0040	155.56	
Crystal Simple Green	0.0069	-0.0010	114.49	109.98%
	0.0049	-0.0005	110.20	
	0.0057	-0.0003	105.26	

All cleaners were effective at removing the oil from aluminum substrates. However, % removals have exceeded 100. There was no visual damage to the coupons at any stage in the cleaning process. Additionally, prior compatibility testing ensured that these cleaners are not stripping the aluminum coupons. Solutions have also mostly retained their original clear colors, with a hint of cloudiness due to the removal of the oil. While optimal testing conditions have been determined, total time of cleaning still requires optimization to get % removals at or just below 100. Next steps would be to test effectiveness after 10 minutes of immersion.

Summary:

Substrates:	Aluminum				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Kyzen Corporation	Metalnox M6386	100%	109.35	☑	
Fisher Scientific	Dimethyl glutarate (CAS:1119-40-0)	100%	107.68	☑	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	124.09	☑	
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	30 parts water	109.98	☑	

Conclusion:

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All cleaners were effective at removing the oil, however, % removals remain above 100. The total time to clean could be too long leading to the increased removal values. Next steps would be to test effectiveness after 10 minutes of immersion to determine an optimal cleaning time.