CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 01/20/2021

Experimenters: Justin Kiander

ClientType: Precision Instrument Manufacturer

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Greases

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric, Visual

Purpose: The purpose of this experiment was to determine the effectiveness of optimized cleaning methods on the new soil provided by the company.

Experimental Procedure: Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Dimethyl Glutarate 100%, Water Works Heavy Duty Degreaser 7:1, SC Aircraft & Metal Cleaner 20%, Crystal Simple Green Industrial 30 parts water. SC Aircraft was heated to 100°F while the remaining cleaners were kept at room temperature. Three aluminum coupons were obtained and weighed for each of the cleaners being tested. Coupons were soiled with the secondary soil aviation grease and a dirty weight was recorded. Once solutions reached the proper temperature, coupons were submerged into their cleaners for 5 minutes. However, this was determined to not be enough time to dissolve the soil, so time was extended to 15 minutes of immersion. Coupons cleaned with SC Aircraft were rinsed in a deionized water bath at 100°F for 30 seconds. All coupons were then initially dried with a heat gun and allowed to finish drying in air. 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	0.1508	0.1208	19.89	31.99%
	0.1369	0.0959	29.95	
	0.0902	0.0486	46.12	
Dimethyl Glutarate	0.1183	0.1138	3.8	3.68%
	0.1438	0.1285	10.64	
	0.0939	0.0971	-3.41	
Water Works	0.1317	0.1291	1.97	4.09%
	0.1373	0.1293	5.83	
	0.1452	0.1387	4.48	
SC Aircraft & Metal	0.1591	0.152	4.46	2.89%
	0.1502	0.1448	3.6	
	0.1841	0.183	0.6	
Crystal Simple Green	0.1791	0.1685	5.92	6.36%
	0.2127	0.2009	5.55	
	0.3063	0.283	7.61	

No cleaner was effective at removing the soil from aluminum coupons. Metalnox 6386 and Dimethyl Glutarate did have the best visible removal of soil. Both clear solutions had turned to a pink following the cleaning process indicating that soil had been dissolved. The negative removal value for Dimethyl Glutarate is most likely caused by solvent being absorbed into the soil left behind. All other solutions had remained clear with very little visible signs of actually dissolving the soil. Heated immersion will be necessary to improve performance of all cleaners.

Summary:

Substrates:	Aluminum				
Contaminants:	Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Kyzen Corporation	Metalnox M6386	100%	31.99	☐	
Fisher Scientific	Dimethyl glutarate (CAS:1119-40-0)	100%	3.68	☐	
Keteca USA	Water Works Heavy Duty Degreaser	7:1	4.09	☐	

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Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	2.89	☐	
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	30 parts water	6.36	☐	

Conclusion: Upon completion of testing, it was determined that no cleaner was effective at removing the soil from aluminum substrates. Next steps will be to conduct 15-minute heated immersion at 100°F for all cleaners except SC Aircraft. SC Aircraft will be raised to 120°F for potential optimization.