CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 01/07/2021

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 purpose of this experiment was to determine the effectiveness of alternative cleaners on removing soil via unheated immersion.

Experimental Procedure: Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Dimethyl Glutarate 100%, Ozzy Juice SW-3 100%, SC Aircraft & Metal Cleaner 20%, SC Supersolve 20%, Crystal Simple Green Industrial Cleaner 30 parts water. 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. Coupons were submerged into their respective cleaners for 15 minutes at room temperature. After 15 minutes had passed, coupons were dried in air for 24 hours. Once dry, a clean weight was recorded. Effectiveness of the cleaners was then determined.

Results:

Cleaner	Initial wt of cont	Final wt of cont	%Cont Removed	%AVG
Metalnox 6386	0.0079	-0.0014	117.72	103.16%
	0.0069	0.0001	98.55	
	0.0059	0.0004	93.22	
Dimethyl Glutarate	0.0072	-0.0009	112.5	110.88%
	0.0062	-0.0008	112.9	
	0.0083	-0.0006	107.23	
Ozzy Juice SW-3	0.0062	0.0037	40.32	55.39%
	0.0108	0.0031	71.3	
	0.0066	0.003	54.55	
SC Aircraft & Metal	0.0064	0.0016	75	68.33%
	0.005	0.001	80	
	0.0046	0.0023	50	
SC Supersolve	0.0039	0.0038	2.56	32.93%
	0.0047	0.0034	27.66	
	0.0035	0.0011	68.57	
Crystal Simple Green Industrial	0.0027	0.0002	92.59	103.07%
	0.0041	0.0006	85.36	
	0.0032	-0.001	131.25	

Dimethyl Glutarate was the most effective cleaner removing an average of 110.88% of soil from aluminum coupons. Metalnox 6386 was the second most effective removing 103.16% followed closely by Crystal Simple Green removing 103.07%. After 24 hours of drying, coupons cleaned with Dimethyl Glutarate still had solvent left behind, so additional time was allowed for a complete dry. The excess solvent most likely removed existing soil above the cleaned area adding to the excess soil removal. An improvement to the experiment would be to include an additional drying step, most likely a heat gun, for Dimethyl Glutarate to fully dry. Excess existing soil was also removed from Metalnox and Crystal Simple coupons adding to the increased removals.

For the remaining cleaners, although there was no visible oil residue after the cleaning process, removal was very poor. Removal could be increased by adding heat starting at 100°F. The SC products may benefit from a rinse step with deionized, as this has aided in previous experiments as well.

Summary:

Substrates:	Aluminum				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**

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Kyzen Corporation	Metalnox M6386	100%	103.16	☑	
Fisher Scientific	Dimethyl glutarate (CAS:1119-40-0)	100%	110.88	☑	Coupons were allowed to dry over 24 hours, a heat gun is necessary to improve drying time.
Chem Free Corporation	SW-3 Ozzy Juice (Improved Low Odor)	100%	55.39	☐	Adding heat would benefit removal performance
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	68.33	☐	Adding heat and a deionized water rinse would be beneficial to removal performance.
Gemtek Products	SC Supersolve Safety Solvent	20%	32.93	☐	Adding heat and a deionized water rinse would be beneficial to removal performance.
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	30 parts water	103.07	☑	

Conclusion:

Upon completion of testing, it was determined that Dimethyl Glutarate was the most effective cleaner followed by Metalnox 6386 and Crystal Simple Green Industrial. Next steps would be to conduct heated immersion to improve removal for remaining cleaners. A retest of unheated immersion to verify top cleaner performance without any preexisting soils would also be beneficial. A heat gun dry step is necessary for Dimethyl Glutarate to dry in a timely fashion.