CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 01/26/2021

Experimenters: Zoe Lawson, 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 cleaners via heated immersion with agitation.

Experimental Procedure: Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Dimethyl Glutarate 100%, Water Works Heavy Duty 7:1, SC Aircraft & Metal Cleaner 20%, Crystal Simple Green 30 parts water. All cleaners, except for Crystal Simple Green, were heated to 120°F with a stir bar added for agitation. Crystal Simple Green was heated to 100°F with a stir bar added for agitation. Three aluminum coupons were obtained and weighed for each of the cleaners being tested. Coupons were then soiled with aviation grease and a dirty weight was recorded. Once solutions reached the proper temperature, coupons were submerged into their respective cleaners for 15 minutes with stir bars activated for agitation. After 15 minutes, coupons cleaned with SC Aircraft were submerged into a deionized water bath at 120°F for 30 seconds. All coupons were then partially dried with a heat gun and allowed to finish drying in air for 24 hours. Following the drying step, coupons were weighed again 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	0.1051	0.0172	83.63	89.57%
	0.074	0.0095	87.16	
	0.0672	0.0014	97.92	
Dimethyl Glutarate	0.0968	0.0608	37.19	32.5%
	0.0923	0.0701	24.05	
	0.0637	0.0406	36.26	
Water Works	0.0953	0.0722	24.24	18.21%
	0.0814	0.0694	14.74	
	0.0773	0.0652	15.65	
SC Aircraft & Metal	0.0846	0.0616	27.19	15.03%
	0.0653	0.0639	2.14	
	0.1328	0.1119	15.74	
Crystal Simple Green	0.0934	0.091	2.57	6.88%
	0.1182	0.1053	10.91	
	0.1423	0.1321	7.17	

Increasing the temperature and adding agitation drastically improved the removal percentage for Metalnox 6386. However, there is still a small mixture of red and white grease left behind on the coupons. The white grease is simply grease which only the color dissolved away. While other cleaners did not perform drastically better, there was still improvement in removal for each one. Metalnox 6386 and Dimethyl Glutarate continue to develop a deepened pink color indicating effectiveness at removing the grease. Other cleaners still remain clear, but do slightly dissolve the grease. Next steps will be to test all cleaners under unheated ultrasonic conditions.

Summary:

Substrates:	Aluminum				
Contaminants:	Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Kyzen Corporation	Metalnox M6386	100%	89.57	☑	Still room for optimization as grease remains on the coupons
		100%	32.50		

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Fisher Scientific	Dimethyl glutarate (CAS: 1119-40-0)			☐	
Keteca USA	Water Works Heavy Duty Degreaser	7:1	18.21	☐	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	15.03	☐	
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	30 parts water	6.88	☐	

Conclusion: Upon completion of testing, it was determined that increasing the heat and adding agitation provided consistent improvement for all cleaners. Metalnox 6386 was the most effective with an average of 89.57% removal, but visible grease was still left behind on the coupons following the cleaning process. Next steps will be to progress all cleaners to unheated ultrasonic testing.