

CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021
 DateRun: 02/03/2021
 Experimenters: Zoe Lawson, Justin Kiander
 ClientType: Precision Instrument Manufacturer
 ProjectNumber: Project #1
 Substrates: Aluminum
 PartType: Coupon
 Contaminants: Greases
 Cleaning Methods: Ultrasonics
 Analytical Methods: Gravimetric, Visual
 Purpose: The purpose of this experiment was to determine the effectiveness of cleaners via unheated ultrasonic cleaning.

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 Cleaner 30 parts water. Three aluminum coupons were obtained and weighed for each of the cleaners being tested. Coupons were soiled with aviation grease and a dirty weight was recorded. Cleaners were placed into an ultrasonic bath at room temperature. Coupons were submerged into their respective cleaners and unheated ultrasonics was conducted for 15 minutes. After 15 minutes, coupons cleaned with SC Aircraft were rinsed in a deionized water bath at room temperature for 30 seconds. All coupons were then partially dried with a heat gun to remove excess solution and finished 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	0.099	0.0059	94.04	92.33%
	0.117	0.0191	83.68	
	0.1115	0.0008	99.28	
Dimethyl Glutarate	0.1609	0.1212	24.67	25.14%
	0.0975	0.0722	25.95	
	0.125	0.094	24.8	
Water Works	0.1155	0.0091	92.12	94.84%
	0.1578	0.0059	96.26	
	0.1761	0.0068	96.14	
SC Aircraft & Metal	0.1543	0.0127	91.77	93.22%
	0.1124	0.0097	91.37	
	0.1153	0.004	96.53	
Crystal Simple Green	0.1378	0.1111	19.38	26.42%
	0.1405	0.0828	41.07	
	0.1488	0.1208	18.82	

Water Works Heavy Duty Degreaser was determined to be the most effective cleaner with an average removal of 94.84%, followed closely by SC Aircraft 93.22% and Metalnox 92.33%. Significant improvement was achieved via unheated ultrasonics for many of the cleaners. All cleaners have now developed a pink color indicating the removal of the grease. Dimethyl glutarate slightly decreased in performance, but adding heat could help to improve both this cleaner and Crystal Simple Green. Next steps would be to conduct heated ultrasonics at 100°F.

Summary:

Substrates:	Aluminum				
Contaminants:	Greases				
Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Kyzen Corporation	Metalnox M6386	100%	92.33	<input checked="" type="checkbox"/>	
Fisher Scientific	Dimethyl glutarate (CAS:1119-40-0)	100%	25.14	<input type="checkbox"/>	
Keteca USA	Water Works Heavy Duty Degreaser	7:1	94.84	<input checked="" type="checkbox"/>	

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Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	93.22	<input checked="" type="checkbox"/>	
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	30 parts water	26.42	<input type="checkbox"/>	

Conclusion:

Upon completion of testing, it was determined that unheated ultrasonics provided significant improvement for almost all cleaners. Water Works Heavy Duty Degreaser was the most effective with an average removal of 94.84%. There is, however, still some room for improvement, and next steps will be to conduct heated ultrasonics at 100°F for all cleaners.