CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 02/07/2021

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 retest heated ultrasonic cleaning on three potential top cleaners.

Experimental Procedure: Cleaners were prepared to the following concentrations: Dimethyl Glutarate 100%, Water Works Heavy Duty Degreaser 7:1, SC Aircraft & Metal Cleaner 20%. An ultrasonic bath was set to 100°F and cleaners were heated to the same temperature. 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 and heated ultrasonic cleaning was conducted for 15 minutes. After the 15 minutes had passed, coupons cleaned with SC Aircraft were submerged into a deionized water bath also at 100°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
Dimethyl Glutarate	0.182	0.165	9.34	33.49%
	0.1331	0.0832	37.49	
	0.113	0.0524	53.63	
Water Works	0.1141	0.0079	93.08	92.07%
	0.1539	0.0081	94.74	
	0.1016	0.0118	88.39	
SC Aircraft & Metal	0.187	0.1118	40.21	71.27%
	0.1226	0.0198	83.85	
	0.1374	0.0141	89.74	

By increasing the beaker size to give more space between the substrates, removal performance significantly increased for Water Works and SC Aircraft, although SC Aircraft did not reach the same removal performance as in the unheated ultrasonic trial. This could be due to the current solution becoming over saturated with use; however, the cleaner will be progressed to next steps of testing. Dimethyl Glutarate did not increase in removal performance and has had poor performance overall in removing the grease from aluminum substrates. Therefore, Dimethyl Glutarate will be discontinued from further testing. Next steps will be to test current best cleaners and methods with the vanishing oil soil on aluminum substrates.

Summary:

Substrates:	Aluminum				
Contaminants:	Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Fisher Scientific	Dimethyl glutarate (CAS:1119-40-0)	100%	33.49	☐	
Keteca USA	Water Works Heavy Duty Degreaser	7:1	92.07	☑	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	71.27	☐	

Conclusion: Upon completion of testing, it was determined that using larger beakers to give more space between the substrates significantly benefited Water Works and SC Aircraft. Both cleaners will be progressed to the next phase of testing. Dimethyl Glutarate did not increase in performance and will be discontinued from further testing. Next steps of testing will be to determine the performance of best cleaners and methods on the vanishing oil soil.