CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 02/09/2021

Experimenters: Zoe Lawson, Justin Kiander

ClientType: Precision Instrument Manufacturer

ProjectNumber: Project #1

Substrates: Copper

PartType: Coupon

Contaminants: Greases

Cleaning Methods: Ultrasonics

Analytical Methods: Gravimetric, Visual

Purpose: The purpose of this experiment was to determine the effectiveness of best cleaners and method on copper substrates.

Experimental Procedure: Cleaners were prepared to the following concentrations: Metalnox 6386 100%, Water Works Heavy Duty 7:1, SC Aircraft & Metal 20%. Solutions and an ultrasonic bath were heated to 100°F. Three copper 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 15 minutes, coupons cleaned with SC Aircraft were rinsed in a deionized water bath at 100°F for 30 seconds. All coupons were then partially dried with a heat gun to remove excess solution 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	0.1998	0.0044	97.8	98.85%
	0.1082	0.0009	99.17	
	0.1156	0.0005	99.57	
Water Works	0.0982	0.0114	88.39	88.73%
	0.1023	0.0124	87.88	
	0.1229	0.0124	89.91	
SC Aircraft & Metal	0.1272	0.0587	53.85	40.74%
	0.1325	0.0783	40.91	
	0.2079	0.1508	27.47	

It was verified that the cleaners and ultrasonic method were compatible with copper substrates. Although SC Aircraft performed lower than in previous trials, this could be due to the solution becoming saturated with use. The coupons cleaned with SC Aircraft did not sustain any damage or alterations indicating that the cleaner is stripping the metal. Next steps would be to progress all three cleaners to parts testing using fresh solutions.

Summary:

Substrates:	Copper				
Contaminants:	Greases				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Kyzen Corporation	Metalnox M6386	100%	98.85	☑	
Keteca USA	Water Works Heavy Duty Degreaser	7:1	88.73	☑	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	40.74	☑	Although the removal performance is lower, the cleaner did not damage copper substrates. Decreased performance could be attributed to over saturation. The cleaner should be progressed to parts testing with a fresh solution.

Conclusion: Upon completion of testing, it was determined that all cleaners were compatible with copper substrates in heated ultrasonic cleaning. With an established set of cleaners and an optimized method that is compatible with company substrates, next steps would be to progress to parts testing with fresh solutions.