CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2021

DateRun: 08/03/2021

Experimenters: Zoe Lawson, Justin Kiander, Edward Judge

ClientType: Metal Finishing

ProjectNumber: Project #3

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Oil

Cleaning Methods: Ultrasonics

Analytical Methods: Gravimetric, Visual

Purpose: The purpose of this experiment was to determine the effectiveness of alternatives using heated ultrasonic cleaning with a heated rinse.

Experimental Procedure: Cleaners were prepared to the following concentrations: Citranox 2%, Mirachem 500 20%, Water Works 7:1, SC Aircraft & Metal 20%, Aquaease 732 5%, Aquavantage 3800 GD 5%. All cleaners and an ultrasonic bath were heated to 110°F. Three stainless steel coupons were obtained and weighed for each of the coupons being tested. Coupons were then soiled with oil provided by the company and a dirty weight was recorded. Once solutions and the ultrasonic bath reached the proper temperature, coupons were submerged into their respective cleaners and ultrasonic cleaning was conducted for 15 minutes. After 15 minutes had passed, coupons were rinsed in a deionized water bath, also at 110°F, for 5 minutes. Coupons were then allowed to dry in air for 24 hours. Following the drying period, 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
Mirachem 500	0.1885	0.0065	96.55	95.90
	0.1397	0.0067	95.20	
	0.1528	0.0062	95.94	
Water Works	0.1238	0.0077	93.78	93.82
	0.1690	0.0064	96.21	
	0.1150	0.0098	91.48	
SC Aircraft & Metal	0.1776	0.0138	92.23	90.43
	0.1550	0.0154	90.06	
	0.1372	0.0151	88.99	
Aquaease 732	0.1145	0.0112	90.22	91.46
	0.1746	0.0093	94.67	
	0.1122	0.0118	89.48	
Aquavantage 3800 GD	0.1411	0.0082	94.19	95.25
	0.1598	0.0071	95.56	
	0.1651	0.0066	96.00	

Mirachem 500 was the most successful cleaner removing an average of 95.90% of the oil from stainless steel substrates. Citranox was tested in this trial. However, the beaker had spilled partway through cleaning making final weights unobtainable. However, because other on average higher performing cleaners, such as Water Works and Mirachem, still have not removed the lingering residue, it is assumed Citranox would not have removed the residue in this trial as well.

It is hypothesized that the coupons are being re-coated with the oil as they are removed from respective cleaning solutions. The TURI lab is seeking to acquire a high pressure air gun to spray the residue off the coupons during removal to better simulate industrial practices. While waiting for the air gun to arrive, testing could progress to increasing the concentration of cleaners and determine if the additional strength is enough to remove the residue.

Summary:

Substrates:	Stainless Steel				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Mirachem Corporation	Mirachem 500	20%	95.90	☑	
Keteca USA	Water Works Heavy Duty Degreaser	7:1	93.82	☑	

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Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	20%	90.43	☑	
Hubbard Hall Inc	Aquaease PL 732	5%	91.46	☑	
Brulin Corporation	Aquavantage 3800 GD	5%	95.25	☑	

Conclusion: Upon completion of testing, it was determined that Mirachem 500 was the most effective cleaner removing an average of 95.90% of oil from stainless steel substrates. With the lingering oil still present, the TURI lab is seeking to acquire a high pressure air gun to incorporate into the process. While waiting for the air gun, next steps of testing would be to determine if higher cleaner concentrations will be able to remove the residue.