CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2022
DateRun:	03/22/2022
Experimenters:	Zoe Lawson, Tatyanna Moreland Junior
ClientType:	General
ProjectNumber:	Project #2
Substrates:	Copper
PartType:	Part
Contaminants:	Oil
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric, Visual
Purpose:	To evaluate the removal of Oak FR-529 from copper fin stock.
Experimental Procedure:	18 samples of copper fin stock were weighed and set aside for 4 hours, 1 day, and 7 days. They were all dipped in the Oak FR-529 oil and all excess oil was allowed to drip off. They were then weighed for dirty weights. The 1 day and 7 day samples were set aside. After four hours, six of the coupons were ready to be cleaned. The cleaners were heated to their vendor recommended temperatures (Mirachem 500 at 33% concentration and 140F and Waterworks at 33% concentration and 105F) and were placed in the heated ultrasonics tank. Three coupons per cleaner were immersed and the ultrasonics tank was run for 15 minutes at 40 KhZ. They were then placed on trays and left to dry. After drying, they were weighed for clean weights. The 1 day samples were weighed the next day before and after the same method of cleaning. The 7 day samples were weighed after 1 day and weighed at 7 days before and after cleaning.
Results:	Gravimetric Results:

Cleaner	Time	Initial wt. of cont.	Final wt. of cont.	%Cont Removed	% Average
Mirachem 500	7 days	0.0151	0.0024	84.11	89.01
		0.0234	0.0023	90.17	
		0.0235	0.0017	92.77	
Waterworks	7 days	0.0324	-0.0002	100.62	96.65
		0.0200	0.0003	98.50	
		0.0120	0.0011	90.83	
Mirachem 500	1 day	0.0164	0.0002	98.78	97.43
		0.0191	0.0004	97.91	
		0.0205	0.0009	95.61	
Waterworks	1 day	0.0272	0.0002	99.26	97.87
		0.0227	0.0002	99.12	
		0.0293	0.0014	95.22	
Mirachem 500	4 hours	0.0267	0.0085	68.16	68.58
		0.0236	0.0098	58.47	
		0.0244	0.0051	79.10	
Waterworks	4 hours	0.0200	0.0100	50.00	61.81
		0.0222	0.0060	72.97	
		0.0221	0.0083	62.44	

The table below demonstrates the changes in weight of the contaminant on the copper fin stock over 1 day and 7 days before any cleaning occurred.

Changes In Cont. Weight Overtime

Cleaner	Time	Initial Day wt.	Change in wt. after 1 Day	Change in wt. after 7 days	Remaining wt. to be cleaned
Mirachem 500	7 days	0.0151	-0.0131	-0.0003	0.0017
		0.0234	-0.0207	0.0000	0.0027
		0.0235	-0.0216	-0.0002	0.0017
Waterworks	7 days	0.0324	-0.0294	0.0000	0.0030
		0.0200	-0.0174	-0.0004	0.0022

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		0.0120	-0.0093	-0.0005	0.0022
Mirachem 500	1 day	0.0164	-0.0147	-	0.0017
		0.0191	-0.0171	-	0.0020
		0.0205	-0.0181	-	0.0024
Waterworks	1 day	0.0272	-0.0210	-	0.0062
		0.0227	-0.0205	-	0.0022
		0.0293	-0.0267	-	0.0026

Summary:

Substrates:	Copper
Contaminants:	Oil

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Mirachem Corporation	Mirachem 500	33%		☐	Not effective after 4 hours. Efficiency increased after 1 day as the majority of the contaminant evaporated.
Keteca USA	Water Works Heavy Duty Degreaser	33%		☐	Not effective after 4 hours. Efficiency increased after 1 day as the majority of the contaminant evaporated.

Conclusion:

Both cleaners were not very effective at removing the oil after 4 hours. Removal results improved greatly from 4 hours to 1 day. After 1 day the majority of the contaminant on the copper fin stock had evaporated and both cleaners were effective. Between 1 and 7 days there was little change between the amount of contaminant that remained on the substrate. Removal results after 7 days was consistent with Waterworks and very effective. Mirachem 500 results after 7 days had decreased slightly and was less effective overtime at removing the contaminant.