CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2002

DateRun: 03/31/2002

Experimenters: Jason Marshall

ClientType: Optical Manufacturer

ProjectNumber: Project #1

Substrates: Aluminum

PartType: Coupon

Contaminants: Waxes

Cleaning Methods: Immersion/Soak

Analytical Methods: Gravimetric

Purpose: To evaluate eight lab selected and two client provided cleaners for beeswax removal.

Experimental Procedure: Eight Cleaners were selected from the lab's database of cleaning trials and vendor information based on client supplied data. Six aqueous based products were diluted to 5% using DI water in 600 ml beakers. The other two products were terpene based solutions and were used at full strength. In addition to the eight lab selected products, two additional products were supplied by the client to be evaluated. Both were terpene based and used at full strength. All ten products were heated to 110 F on a hot plate. Thirty preweighed coupons were coated with beeswax. The wax was applied by heating with a Master Appliance hot air gun and then wiped with a hand held swab. After the wax cooled, the coupons were then weighed again. Three coupons were cleaned in each solution for 5 minutes using stir-bar agitation. After cleaning, the coupons were rinsed in tap water for 15 seconds at 110 F and dried with the heat gun for 30 seconds at 300 F. Once the coupons cooled, final weights were recorded and cleaning efficiencies were calculated.

Results: Three of the four terpene products were very effective in removing the wax in the 5 minutes. Opti Clean had the highest efficiency 98.74%. The fourth terpene, Uni Clear caused the weight of the wax to increase, as did four of the aqueous cleaners. These solutions were beginning to be dissolved into the wax. Further cleaning time or the addition of mechanical energy (ultrasonics or spray washing) may aid these cleaners in removing the wax. The following table lists the results for each coupon and cleaner.

Cleaner	Coupon 1	Coupon 2	Coupon 3	Average	Std Dev
Bio T 200 A	97.28	95.08	94.00	95.45	1.67
EXP 1400	-3.72	-2.95	-4.51	-3.73	0.78
SC Air & M	0.00	5.24	0.56	1.93	2.88
Micro 90	2.70	21.55	4.00	9.42	10.53
Inproclean	-11.60	-4.91	-12.49	-9.67	4.14
Texolite	-12.55	-7.56	-12.41	-10.84	2.84
Polyspray	-13.91	-4.18	-7.54	-8.54	4.94
Uni Clear	-0.75	-4.84	-7.71	-4.43	3.50
Histo Clear	97.33	97.30	99.28	97.97	1.13
Opto Clear	98.50	98.83	98.88	98.74	0.20

Summary:

Substrates:	Aluminum
Contaminants:	Waxes

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Bio Chem Systems	Bio T 200 A	100	95.45	☑	
Brulin Corporation	Aquavantage 1400	5	-3.73	☐	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	5	1.93	☐	
International Products Corporation	Micro 90 Conc.	5	9.42	☐	
Oakite Products	Inproclean 3800	5	-9.67	☐	
Texo Corporation	Texolite 1734 XL	5	-10.84	☐	
US Polychem Corporation	Polyspray Jet 790 P	5	-8.54	☐	

CLEANING LABORATORY EVALUATION SUMMARY

Universal Photonics	Uni Clear	100	-4.43	☐	
National Diagnostic	Histo Clear	100	97.97	☑	
National Diagnostic	Opti Clear	100	98.74	☑	

Conclusion: The five products that caused the weights to increase will be re-evaluated using ultrasonics to determine if efficiencies can be improved.