CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2004
DateRun:	02/09/2004
Experimenters:	Jason Marshall
ClientType:	Manufacturer of Ceramic Capacitors
ProjectNumber:	Project #1
Substrates:	Ceramics
PartType:	Coupon
Contaminants:	Waxes
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric
Purpose:	To evaluate alternatives to TCE for wax removal

Experimental Procedure:

Eight cleaners were selected from the laboratories database of past testing based on supplied data from client. Four aqueous based cleaners were diluted to 10% using DI water in 600 ml beakers. Three semi-aqueous products were used at full strength also in 600 ml beakers. A fourth semi-aqueous product was diluted to 20% as recommended by the vendor. A ninth product was added as the client's current cleaner. Six of the nine products were heated to 130 F on a hot plate.

Twenty-seven preweighed ceramic coupons were coated with client supplied wax, Zopher Mills Inc No 1563 Wax (mixture of waxes and resins). The wax was first melted using a Master Appliance heat gun in a beaker and applied directly to the coupon surface. The coupons were allowed to cool to room temperature before weighing a second time. Three coupons were cleaned in each solution for 30 minutes using stir-bar agitation. Coupons were rinsed in tap water for 15 seconds at 120 F, followed by air blow off at room temperature. Once dry, coupons were weighed a final time and efficiencies for each cleaner were calculated.

Results:

Only one product, Uni Clear, was capable of removing a majority of the wax from the ceramic coupons. The table lists the amount of soil added, removed and percent efficiency for each coupon.

Cleaner	Initial wt	Final wt	% Removed
Bio T V 50	0.3038	0.3040	-0.07
	0.3118	0.3166	-1.54
	0.5682	0.5694	-0.21
Citrus Bust 7	0.4880	0.4505	7.68
	0.4585	0.4144	9.62
	0.3884	0.3475	10.53
Uni Clear	0.2603	0.0841	67.69
	0.3940	0.1561	60.38
	0.6682	0.0692	89.64
Ionox HC 2	0.4853	0.4816	0.76
	0.4377	0.4326	1.17
	0.2556	0.2456	3.91
Aquavantage 1400	0.3331	0.3359	-0.84
	0.2299	0.2341	-1.83
	0.3766	0.3788	-0.58
SC Aircraft	0.2978	0.3000	-0.74
	0.3640	0.3655	-0.41
	0.2136	0.2170	-1.59
Inproclean 3800	0.4532	0.4546	-0.31
	0.3022	0.302	0.07
	0.4336	0.4335	0.02
Polyspray Jet 790 XS	0.5337	0.5307	0.56
	0.3631	0.3592	1.07
	0.3574	0.3567	0.20
Liquinox	0.3141	0.3171	-0.96
	0.3899	0.3913	-0.36

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	0.3985	0.4003	-0.45

Summary:

Substrates:	Ceramics
Contaminants:	Waxes

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Bio Chem Systems	Bio T V 50	20	-0.61	☐	
Florida Chemical Company	Citrus Burst 7	100	9.28	☐	
Universal Photonics	Uni Clear	100	72.57	☑	
Kyzen Corporation	Ionox HC 2	100	1.95	☐	
Brulin Corporation	Aquavantage 1400	10	-1.08	☐	
Gemtek Products	SC Aircraft & Metal Cleaner Super Concentrate	10	-0.91	☐	
Oakite Products	Inproclean 3800	10	-0.07	☐	
US Polychem Corporation	Polyspray Jet 790 XS	10	0.61	☐	
Alconox Inc	Liquinox	10	-0.59	☐	

Conclusion:

Uni Clear, a d-limonene based product, was the only alternative that removed most of the wax during the 30 minute immersion cleaning. The next trial will look to evaluate more products on the wax removal.