CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2002
DateRun:	05/30/2002
Experimenters:	Jason Marshall
ClientType:	Optical Manufacturer
ProjectNumber:	Project #1
Substrates:	Glass/Quartz
PartType:	Coupon
Contaminants:	Inks
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Gravimetric
Purpose:	To identify possible alternatives to acetone for ink removal
Experimental Procedure:	Nine products were selected from the lab's databases based on supplied information. Six cleaners were used at 10% solutions diluted in 600 ml beakers using DI water. The other three products were used at full strength. All nine products were heated to 130 F on a hot plate. Twenty-seven preweighed glass coupons were coated with a layer of Essilor Yellow Ink Y368 Akyl resin printing ink (107-87-9, 123-86-4, 108-65-6, 1330-20-7) using a hand held swab. Once the ink was dry, a second weighing was recorded. Three coupons were cleaned in each solution for 5 minutes using only stir-bar agitation. After cleaning, the coupons were rinsed in a tap water bath for 15 seconds at 120 F and dried for 15 seconds using a Master Appliance Heat Gun at 500 F. Final weights were recorded and efficiencies calculated.
Results:	None of the aqueous products selected were effective in cleaning the ink from the glass (ND 17, Crystal Simple Green, Shopmaster LpH, Daraclean 235). In two cases the ink weight was increased due to the cleaners penetrating into the ink causing swelling (ND 17, Crystal Simple Green). The two terpenes removed over 90% of the ink (Bio T Max, OptiClear). The two esters used removed similar amounts as the terpenes (7360, Methyl Ester 1816). The alcohol based product removed around 70% of the ink (Misprint Stencil Remover). The table below lists the amount of contaminant applied and removed. For the terpene and esters, there were some issues with obtaining proper rinsing. This issues may be improved by using a spray in place of the tap water bath rinse.

Table 1. Contaminant Cleaning

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Cleaner	Applied	Remaining	% Removed
Bio T Max	0.0354	0.0019	94.63
	0.0124	0.0025	79.84
	0.0641	0.0034	94.70
OptiClear	0.0352	0.0012	96.59
	0.0371	0.0004	98.92
	0.0366	-0.0005	101.37
7360	0.0120	0.0013	89.17
	0.0180	0.0011	93.89
	0.0116	0.0013	88.79
ND 17	0.0109	0.0137	-25.69
	0.0152	0.0230	-51.32
	0.0236	0.0297	-25.85
Crystal SG	0.0268	0.0306	-14.18
	0.0170	0.0273	-60.59
	0.0139	0.0341	-145.32
1618	0.0259	0.0019	92.66
	0.0224	0.0009	95.98
	0.0182	0.0000	100.00
Shopmaster	0.0222	0.0221	0.45
	0.0271	0.0267	1.48
	0.0129	0.0126	2.33
Misprint	0.0415	0.0197	52.53
	0.0372	0.0033	91.13
	0.0144	0.0054	62.50
Daraclean	0.0253	0.0233	7.91

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	0.0334	0.0293	12.28
	0.0305	0.0217	28.85

Summary:

Substrates:	Glass/Quartz
Contaminants:	Inks

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Bio Chem Systems	Bio T Max	100	89.72	☑	
National Diagnostic	Opti Clear	100	98.96	☑	
Loctite Corporation	7360	10	90.62	☑	
MacDermid Industrial Products	ND 17	10	-34.28	☐	
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	10	-73.36	☐	
Twin Rivers Technologies	Methyl Ester 1618	10	96.22	☑	
Buckeye International	Shopmaster LPH	10	1.42	☐	
Kyzen Corporation	Misprint Stencil Remover	100	68.72	☐	
Magnaflux	Daraclean 235	10	0.00	☐	

Conclusion:

The four successful products will used in the second trial. The next trial will attempt to improve efficiencies through increased concentrations for the esters and tap water spray rinse for all.