CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1998

DateRun: 10/12/1998

Experimenters: Jason Marshall

ClientType: Ceramic Decal Printer

ProjectNumber: Project #1

Substrates: Stainless Steel

PartType: Coupon

Contaminants: Inks

Cleaning Methods: Manual Wipe

Analytical Methods: Gravimetric

Purpose: To evaluate new, lower VOC, cleaning solvents for press clean-up.

Experimental Procedure: Preweighed coupons were contaminated with the client supplied ink using a hand held swab. Ink was allowed to dry for 3 hours and then the coupons were weighed.
Seven chemistries were selected based on the lab's Effective Test Conditions Database and vendor information. An eighth cleaner* was supplied by the client for comparison. Each cleaner was used at room temperature and at 100% concentration. A paper towel was soaked with each cleaner. Coupons were wiped for no more than 1½ minutes. Three coupons were cleaned with each chemistry. Final clean weights were recorded and cleaning efficiencies were calculated.

SUBSTRATE MATERIAL: Stainless Steel (304)
CONTAMINANTS: Ink-Cerdec Magenta (CAS#'s: 119-64-2 Tetrahydronapthalene; 65997-18-4 Lead Boroscilicate Frit; 1345-24-0 Pigment Red 109;20667-12-3 Silver Oxide)

Results: Almost all of the chemistries tested had complete removal of the ink. Only Oakite and WR Grace had less than 99% efficiency. The remaining six cleaners were above this value. The effectiveness of the cleaners and the amount of time required for cleaning are listed in Table 1.
Table 1. Cleaning Efficiencies and Times.

	100 Solvent	4000 T	Bio-T Max	HTF 60	Soy Gold	EP 921	1-1-02	294 XX
Coupon 1	99.83	76.66	100	99.89	99.47	99.84	99.883	82.75
Coupon 2	99.95	88.33	99.85	99.95	99.52	99.88	99.72	65.01
Coupon 3	99.94	60.15	99.85	99.93	99.34	99.62	99.93	78.51
Ave	99.91	75.05	99.9	99.92	99.44	99.78	99.84	75.42
Std Dev	0.067	14.16	0.087	0.031	0.093	0.14	0.11	9.26
Time Required (min)								
	<1	>1.5	< 1	1-1.5	1	<1	1	>1.5

The client supplied cleaner had an average cleaning of 99.91% performed in less than one minute. There were a couple other cleaners with similar efficiencies and times. BIO-T Max, HTF 60 and 1-1-2 all cleaned at or above 99.8% and within 30 seconds of the 100 Solvent. Two other cleaners removed between 99.4 and 99.8% of the contaminant in about the same time as the original cleaner.

Summary:

Substrates:	Stainless Steel				
Contaminants:	Inks				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Exxon Mobile Chemical Company	Aromatic 100 Solvent	100	99.91	☑	
Oakite Products	Inproclean 4000 T	100	75.05	☐	
Bio Chem Systems	Bio T Max	100	99.90	☑	
Tarksol Inc	Tarksol HTF 60	100	99.92	☑	
AG Environmental Products	Soy Gold 1000	100	99.44	☑	
Inland Technologies Inc	EP 921	100	99.78	☑	
Finger Lakes Chemical	1-1-02	100	99.84	☑	
Magnaflux	Daraclean 294 xx	100	75.42	☐	

Conclusion:

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Of the seven chemistries tested, five had similar cleaning action as the supplied product. The next test will be to determine the effect the cleaners have on the CDF Direct Film Coating.