CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1999
DateRun:	08/08/1999
Experimenters:	Jason Marshall, Nicole Vayo
ClientType:	Consultant
ProjectNumber:	Project #1
Substrates:	Ceramics, Alumina
PartType:	Part
Contaminants:	Alcohol
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Black light, Gravimetric
Purpose:	To further evaluate the effectiveness of the two best cleaners based on previous testing results.

Experimental Procedure:

Two cleaning solutions and DI Water were selected for testing based on their performance from the previous trials. Two sets of the cleaning solutions were made into two percent solutions using DI water in 600 mL beakers. One set was evaluated at room temperature and the other set was heated to 130 F on a hot plate. Table 1 lists the cleaning solutions used.

Thirty coupons were wiped with Isopropyl Alcohol and air dried. The coupons were weighed to establish a baseline level of cleanliness. All 30 coupons were observed for particulate matter using an UVP Inc. Black light, Model UVL-56 longwave UV-366nm. The contaminant was sprayed onto the coupons for five seconds. Again, all 30 coupons were observed for fluorescence under the black light.

Fifteen coupons were cleaned in each solution for five minutes using stir-bar agitation. Parts were rinsed for two minutes in DI water also with stir-bar agitation. The group cleaned at room temperature were rinsed in DI water at room temperature and the heated cleaning was rinsed with heated DI water at the same temperature.
The parts were dried in a convection oven at 212 F for 15 minutes. After allowing parts to cool to room temperature, final weights were recorded. All coupons were observed again under black light for particulate matter and any remaining Evanol. Visual observations were made on all the coupons for any visible signs of contamination.

SUBSTRATE MATERIAL: Ceramic-Alumina coupons
CONTAMINANTS: DuPont Evanol (Vinyl Alcohol Polymers & Copolymers CAS#s: 9002-89-5, 25213-24-5, 54626-91-4; Methanol Bulk/Packaged CAS #: 67-56-1; Sodium Acetate CAS#: 127-09-3) with fluorescent tag added (Spectronics Corporation's AR-GLO® 1)

Results:

All three cleaning solutions removed over 99.7% of the contaminant from the coupons at room temperature and over 99.96% at 130 F. Table 2 lists the average cleaning efficiencies calculated using gravimetric analysis.

Table 2. Cleaning Efficiency Averages

Cleaner	Micro 90		3800		DI Water	
Temp	RT	130 F	RT	130 F	RT	130 F
Ave	99.99	99.96	99.95	100	99.72	99.96

Black light fluorescence was used to determine if there was any particulate matter remaining on the coupons after cleaning and to locate the position of any PVA left behind on the coupons. Table 3 lists the observations made for each coupon at both temperatures.

Table 3. Observations using Fluorescent Light

Black Light Observations @ Room Temperature					
Micro 90		Inproclean 3800		DI Water	
Particle	Evanol	Particle	Evanol	Particle	Evanol*
2	none	1	none	0	All over
1	on #	1	none	1	on #
2	on #	1	none	0	on #
0	none	2	on #	0	
1	on #	2	on #	0	on #
0	on #	1	on #	0	on #
0	on #	0	on other	1	on # and other
0	none	1	none	1	

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0	on #	0	none	1	on # and other
2	on #	0	on # and other	0	
1	other	0	on # and other	1	on #
1	none	0	on # and other	1	
1	none	1	none	0	on other
2	on #	2	on #	0	on other
1	on #	0	none	0	on #
*All had some orange deposit. The ones listed had high concentrations.					

Black Light Observations @ 130 deg F

Micro 90		Inproclean 3800		DI Water	
Particle	Evanol	Particle	Evanol	Particle	Evanol
0	on other	1	on other	0	on other
3	none	0	none	0	on other
0	none	0	on other	0	on # and other
0	on # and other	0	none	0	on #
0	on other	1	none	0	on #
1	on other	0	on #	0	on #
0	on # and other	0	on other	0	on # and other
0	on other	0	none	0	none
0	on other	1	on other	0	none
0	on # and other	0	on #	0	on other
0	none	0	on other	0	on other
2	on # and other	0	none	0	on #
0	none	0	on # and other	1	on other
0	on # and other	0	on #	0	on #
1	on # and other	0	none	0	none

Most of the coupons had very little particulate matter on them after cleaning. A lot of the coupons had trace amounts of the PVA around and in the laser markings used for numbering the coupons. Very few spots were observed elsewhere on the coupons except for the DI water at room temperature. The spots observed were small.

Summary:

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Substrates:	Ceramics, Alumina				
Contaminants:	Alcohol				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Oakite Products	Inproclean 3800	2	99.95	☑	
International Products Corporation	Micro 90 Conc.	2	99.99	☑	
Water	DI Water	100	99.72	☑	

Conclusion: All three solutions removed nearly all of the contaminant from the ceramic coupons at both temperatures.