CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1999
DateRun:	09/13/1999
Experimenters:	Jason Marshall, Nicole Vayo
ClientType:	Consultant
ProjectNumber:	Project #1
Substrates:	Ceramics, Alumina
PartType:	Coupon
Contaminants:	Alcohol
Cleaning Methods:	Ultrasonics
Analytical Methods:	Black light, Gravimetric
Purpose:	To evaluate cleaning at 100 F using ultrasonic cleaning.

Experimental Procedure:

A 2% solution was made of the cleaner using DI water in 600 mL beakers. Three concentrations of the contaminant were added to different beakers of the cleaner and DI water, based on volume percent (5, 10 and 15). DI water samples were also contaminated with the same Evanol amounts. Each were heated to 100 F on a hot plate.
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 coupons were coated with the Evanol and dried overnight at room temperature. Four coupons were cleaned in the Evanol loaded solutions and three coupons were cleaned in the straight cleaning solutions for five minutes using ultrasonic cleaning at 40 kHz using a Crest ultrasonic tank model 4Ht 1014-6. Parts were rinsed for two minutes in DI water. Rinsing was performed for two minutes with heated DI water at 100 F. 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 signs of contamination.

Solutions examined were:
Micro 90 @ 2% with 5, 10, 15% soil loading
DI Water with 5, 10, 15% soil loading

SUBSTRATE MATERIAL: Ceramic-Alumina coupons
CONTAMINANTS: DuPont Evanol Concentrated (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)
CONTAMINATING PROCESS USED: Dip coupons into contaminant solution and dry overnight at room temperature.

Results:

All three levels of Evanol loaded cleaners were effective in removing the contaminants from the coupons. An initial look at the data shows that a majority of the coupons may have been over cleaned. Table 1 lists the results calculated for cleaning efficiencies.
Table 1. Initial Cleaning Results

	Micro 90 2%				DI Water			
Evanol %	5	10	15	0	5	10	15	0
Coupon 1	99.73	100.21	100.33	100.3	100.4	99.95	99.83	100.27
Coupon 2	100.11	100.19	100.49	100.17	100.22	100.00	100.00	100.45
Coupon 3	100.00	100.08	100.56	100.11	99.94	100.21	100.03	100.16
Coupon 4	100.17	99.86	100.53	99.93	100.08	99.86		
Average	100.00	100.09	100.48	100.19	100.12	100.06	99.93	100.29

After comparing the baseline levels for the cleaned coupons with previous trials, the over cleaning could be associated with the fact the coupons were not completely pre-cleaned. Table 2 lists the average values using the data from trial number 10 and compares it to the data from this trial. As can be seen from the comparison, there was less over cleaning (or damage).

Table 2 Corrected Efficiencies

	Micro 90 2%				DI Water			
Evanol %	5	10	15	0	5	10	15	0
Ave trial12	100	100.09	100.48	100.19	100.12	100.06	99.93	100.29

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Trial 10 base	99.8	99.93	99.95	99.98	99.69	99.6	99.54	99.19

Summary:

Substrates:	Ceramics, Alumina				
Contaminants:	Alcohol				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
International Products Corporation	Micro 90 Conc.	2	100.40	☑	
Water	DI Water	100	100.29	☑	

Conclusion: