CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1999
DateRun:	12/12/1999
Experimenters:	Jason Marshall, Off Site
ClientType:	Consultant
ProjectNumber:	Project #1
Substrates:	Ceramics, Alumina
PartType:	Coupon
Contaminants:	Alcohol
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric
Purpose:	To qualify the proposed cleaning method to current process and laboratory system.

Experimental Procedure:

Laboratory baseline evaluation was performed using a 0.5% solution made up of the cleaner and DI water in the ultrasonic tank (total volume of solution was approximately 16 liters). The solution was heated to 110 F.

Thirteen coupons were cleaned in Micro 90 at 0.5% using ultrasonic energy for 10 minutes. The coupons were weighed to establish a baseline level of cleanliness.
The coupons were coated with the Evanol and dried for ten minutes at room temperature and then for 20 minutes at 212 F in an oven. All thirteen coupons were placed in a holder and submersed in the solution. Cleaning was performed in the solutions for five minutes using ultrasonic cleaning at 40 kHz using a Crest ultrasonic tank model 4Ht 1014-6. Two stage rinsing was used. The first rinse was for two minutes in DI water at 110 F and the second was for one minute at the same temperature. The parts were dried in a convection oven at 212 F for 20 minutes. After allowing parts to cool to room temperature, final weights were recorded.

The other two cleaning systems were performed off site. All coupons were weighed and contaminated at the laboratory using a Denver Instrument Co Analytical Balance model A-250.

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 dried at room temperature for 10 minutes and then for 20 minutes at 212 F in oven.
CLEANING METHOD: Ultrasonics-40kHz (on and off site) Spray Wash (off site)

Results:

The laboratory testing yielded a 99.99% cleaning efficiency. Previous Process 100.1%

Lab Test

C #	Initial wt	Cont. wt	Clean wt	cont. wt	Final wt	% Removed
1	5.9882	6.064	5.9883	0.0758	0.0001	99.87
2	5.9803	6.0737	5.9803	0.0934	0.0000	100.00
3	5.9703	6.0496	5.9702	0.0793	-0.0001	100.13
4	5.9827	6.0849	5.9827	0.1022	0.0000	100.00
5	6.0110	6.1362	6.0111	0.1252	0.0001	99.92
6	5.9846	6.0884	5.9852	0.1038	0.0006	99.42
7	5.9766	6.0694	5.9766	0.0928	0.0000	100.00
8	5.9915	6.1043	5.9914	0.1128	-0.0001	100.09
9	5.9900	6.0514	5.9899	0.0614	-0.0001	100.16
10	5.9952	6.1068	5.9950	0.1116	-0.0002	100.18
11	5.9928	6.1004	5.9926	0.1076	-0.0002	100.19
12	5.9834	6.0736	5.9835	0.0902	0.0001	99.89
13	5.9943	6.0736	5.9943	0.0793	0.0000	100.00
Old Process						
27	5.9866	6.0673	5.9868	0.0807	0.0002	99.75
28	5.9770	6.0338	5.9771	0.0568	0.0001	99.82
29	5.9466	6.0504	5.9466	0.1038	0.0000	100.00
30	5.9716	6.075	5.9718	0.1034	0.0002	99.81
31	5.9731	6.0283	5.9729	0.0552	-0.0002	100.36
32	5.9594	6.0283	5.9592	0.0689	-0.0002	100.29

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33	5.9606	6.0289	5.9604	0.0683	-0.0002	100.29
34	5.9577	6.0531	5.9579	0.0954	0.0002	99.79
35	5.9794	6.0779	5.9791	0.0985	-0.0003	100.30
36	5.9600	6.0519	5.9600	0.0919	0.0000	100.00
37	5.9720	6.0804	5.9715	0.1084	-0.0005	100.46
38	5.9804	6.0866	5.98	0.1062	-0.0004	100.37
39	5.9823	6.0603	5.9823	0.0780	0.0000	100.00

Summary:

Substrates:	Ceramics, Alumina
Contaminants:	Alcohol

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
International Products Corporation	Micro 90 Conc.	0	99.99	☑	Laboratory process
International Products Corporation	Micro 90 Conc.	0	100.10	☑	Old process at client

Conclusion: The results of the final test of the new system will be conducted at a future date.