CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2000

DateRun: 02/16/2000

Experimenters: Jason Marshall

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)

Results: The new cleaning system performed as well as the old system and better than the laboratory model. Table 1 lists the calculated efficiencies for each coupon cleaned using the proposed system. Table 2 compares the results from the three systems.

Table 1. New Process Efficiency

C #	Initial wt	Cont wt	Clean wt	wt cont	Final cont	% Removed
14	5.9823	6.0601	5.9824	0.0778	0.0001	99.87
15	5.9969	6.0963	5.9969	0.0994	0.0000	100.00
16	5.9921	6.0089	5.9917	0.01679	-0.0004	102.38
17	6.0073	6.1175	6.0072	0.1102	-0.0001	100.09
18	5.9688	6.0427	5.9682	0.0739	-0.0006	100.81
19	6.0076	6.088	6.0073	0.0804	-0.0003	100.37
20	5.9935	6.0578	5.9936	0.0643	0.0001	99.84
21	5.9878	6.0722	5.9877	0.0844	-0.0001	100.12
21	5.9948	6.0868	5.9945	0.092	-0.0003	100.33
23	5.9527	6.0202	5.9526	0.0675	-0.0001	100.15
24	5.9584	6.0478	5.9584	0.0894	0.0000	100.00
25	5.9896	6.0774	5.9898	0.0878	0.0002	99.77
26	5.9847	6.0763	5.9848	0.0916	0.0001	99.89

Table 2 Comparison of Systems

	Lab Trial	New System	Old System
Average	99.99	100.28	100.1
Std Dev	0.2	0.69	0.26

Summary:

Substrates:	Ceramics, Alumina				
Contaminants:	Alcohol				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**

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International Products Corporation	Micro 90 Conc.	0	100.28	☑	

Conclusion: The new system yielded similar results as the current system.