CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 1999

DateRun: 11/15/1999

Experimenters: Jason Marshall, Nicole Vayo

ClientType: Bellows Mfr

ProjectNumber: Project #1

Substrates: Brass

PartType: Part

Contaminants: Fluxes, Resins/Rosins

Cleaning Methods: Ultrasonics

Analytical Methods: Gravimetric

Purpose: To evaluate displacement drying as a way to remove the moisture from inside the parts after rinsing.

Experimental Procedure: Four products were selected based on the previous testing performed for the client. All products were heated to 130 F on a hot plate. Table 1 lists the products evaluated and the corresponding concentrations.

The cleaning solution/beaker was placed in a Crest 40 kHz ultrasonic tank model 4Ht 1014-6 filled with water heated to 130 F and degassed for five minutes.
Parts were weighed prior to submersion into the flux. After contamination, parts were dried in an oven for one hour at 140F. Once parts were cooled to room temperature, dirty weights were recorded. Two parts were placed into the suspended beaker and cleaned for five minutes. Rinsing used DI water at 130 F for 30 seconds. Drying took place in two stages. The first half consisted of immersing parts in Isopropanol for 30 seconds followed by hot air blow off using a Master Appliance Corp, Hot-air gun model HG-301A at 300 F for one minute. After the hot air blow off, parts were dried in an oven at 140 F for 20 minutes. Parts were analyzed for water content after cooling to room temperature. Final weights of the parts were recorded and cleaning efficiencies were calculated.

SUBSTRATE MATERIAL: Brass parts-bellows
CONTAMINANTS: Kester Solder 1544 Rosin Flux-(Ethanol CAS#64-17-5;2-Butanol CAS#78-92-2*;Modified Rosin
CAS#8050-09-7)

Results: Bio-T 300 B resulted in the highest average cleaner efficiency, 88% followed by the Armakleen and Safety Wash. Inproclean had one part that gained weight after cleaning. Upon visual observation, the part appeared to have green fluid stuck within the expandable rings. Table 2 lists the results for the parts cleaned.

Table 2. Gravimetric Results

Cleaner	Armakleen	Safety Wash	Bio-T	Inproclean
Part 1	85.26	88.55	90.47	-16.29
Part 2	78.82	67.49	85.50	78.84
Ave	82.04	78.02	87.98	31.27

The results listed above do not reveal that the displacement drying (use of Isopropanol and heat gun) was not completely effective in eliminating the moisture inside the parts. The method did reduce the water remaining in the parts after drying, but it was deemed unsatisfactory.

Summary:

Substrates:	Brass				
Contaminants:	Fluxes, Resins/Rosins				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Church & Dwight Co Inc.	Armakleen E 2002	10	82.04	☑	
Bio Chem Systems	Bio T 300 B	100	87.98	☑	
Oakite Products	Inproclean 4000 T	10	31.27	☐	
Emkay Chemical Company	Safety Wash CRC	10	78.02	☑	

Conclusion: Most of the cleaners were moderately successful in removing the flux from the parts. Displacement drying did serve to reduce the excess moisture trapped inside the parts. Vacuum drying will be evaluated next as a way to eliminate the water/cleaner remaining within the bellows.