CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1998
DateRun:	02/24/1998
Experimenters:	Jason Marshall, Prashant Trivedi
ClientType:	Manufacturer of Ceramic Capacitors
ProjectNumber:	Project #1
Substrates:	Alumina
PartType:	Part
Contaminants:	Inks, Paints
Cleaning Methods:	Immersion/Soak
Analytical Methods:	Visual
Purpose:	Preliminary test of selected aqueous cleaners

Experimental Procedure:

Preliminary test of selected aqueous cleaners to replace TCE in the current cleaning system.

Five cleaners were selected from the lab's database based on the ability to clean inks from a wide range of the client's substrates. Five percent solutions of each cleaner were made in 100mL beakers. Equal amount of the Al2O3 beads were distributed into 50 mL beakers (approximately 10 mLs of beads). At ambient temperature, each cleaner was poured into a beaker containing beads. The beaker was covered with parafilm. Next, the beaker was swirled for about 30 seconds and inverted a couple of times to ensure even cleaning. After the cleaning, the cleaners were decanted out of the beakers. Parts were rinsed five times with DI water at room temperature. Each rinse consisted of filling the 50 mL beaker to the top with the DI water and dumping the water off. The parts were dried with an Original Disc Furnace portable heater (model #1500IV) for ten minutes and allowed to finish drying at ambient temperatures. Once the parts were completely dry, they were visually observed for cleanliness.

SUBSTRATE MATERIAL: Al2O3 beads
CONTAMINANTS: Ink/paint

Results:

As the cleaning chemistry was poured into the beaker with the beads, the initial cleaning effectiveness was noted by the color of the beads. Also, observations were made during the rinse cycle as to how quickly the remaining ink was washed away. Each cleaner was then ranked by two lab personnel in order of apparent cleanliness. Table 1 lists all of the observations made during the preliminary trial.

Table 1 Cleaning Efficiency and Observations

CLEANER	RANKING	INITIAL OBSERVATION	RINSING OBSERVATION
Inpro-Clean	3	good removal	great rinsing
De-Ox	2	good removal	good rinsing
Daraclean	1	good removal	good rinsing
Mirachem	5	poor removal	okay rinsing
ND-17	4	okay removal	great rinsing
DI Water	6	no removal	not applicable

The top two cleaners appeared to remove a most of the ink/paint from the beads. The next two removed a majority of the contaminant. The last cleaner and the DI water removed very little of the ink/paint. In addition to cleaning effectiveness, the compatibility of the cleaners needs to be addressed. Table 2 lists the cleaners and the substrates that these chemistries can be used with.

Table 2 Cleaner-Substrate Compatibility

Cleaners	Inpro-Clean	De-Ox	Daraclean	Mirachem	ND-17
Al	X	X	X	X	X
Brass	X	X	X	X	X
Cd	X	X	X	X	X
Carbon Steel	X	X	X	X	X
Ceramic	X				
Circuit Board	X		X		
Cu	X	X	X	X	X
	X	X	X	X	X

CLEANING LABORATORY EVALUATION SUMMARY

Galvanized Steel					
Glass	X				X
Ni	X		X	X	X
Plastic	X				
Rubber	X				X
SS	X	X	X	X	X
Zinc			X	X	

Summary:

Substrates:	Alumina
Contaminants:	Inks, Paints

Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Oakite Products	Inproclean 3800	5	0.00	☑	
US Polychem Corporation	Polychem DEOX 007	5	0.00	☑	
Magnaflux	Daraclean 282	5	0.00	☑	
Mirachem Corporation	Mirachem 500	5	0.00	☐	
MacDermid Industrial Products	ND 17	5	0.00	☐	
Water	Water	100	0.00	☐	

Conclusion:

Several cleaners were identified as being capable of removing the ink/paint contamination from the Al2O3 beads. The best three cleaners were Daraclean 282, De-Ox 007 and Inpro-Clean 3800. Inpro-Clean can be used with more substrates than Daraclean and De-Ox. In additional test using a 40kHz Crest Ultrasonic unit and the three best cleaners will be conducted next. Another phase of testing will be to find a cleaner that can clean plastic bottles. Only Inpro-Clean from trial #1 will be used since it is the one formulation that can be used with plastics. Other cleaners not yet examined for this company that can clean inks from plastics will also be tested.