CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2002
DateRun:	01/30/2002
Experimenters:	Jason Marshall
ClientType:	Electromagnetic Manufacturer
ProjectNumber:	Project #2
Substrates:	Sterling/Silver
PartType:	Part
Contaminants:	Lubricating/Lapping Oils
Cleaning Methods:	Ultrasonics
Analytical Methods:	OSEE
Purpose:	To evaluate OSEE as a method for determining cleanliness.
Experimental Procedure:	Four of the top eight cleaners from previous trial were selected for testing. Each was diluted to 5% using DI water in 600 ml beakers. Water was used as a control. The solutions were heated to 140 F in a Crest 25 kHz ultrasonic tank. Four, 3 inch pieces of silver tape were cut from the supplied materials. Optically Stimulated Electron Emission (OSEE) readings were recorded to establish a baseline. Then each piece of tape was thinly coated with Richard Apex D644 CPD drawing compound. The contaminant was applied with a hand held swab and then wiped with a second tissue to simulate the amount of contaminant present after the drawing process. A second set of readings were recorded to determine the effect of the drawing compound on the OSEE readings of the silver tape. Next, each piece of tape was cleaned in a solution for two 1 second intervals and rinsed in a ultrasonic tap water bath for 1 second. Parts were dried for 10 second using a heat gun at 500 F. Final OSEE readings were recorded and compared to the dirty and baseline levels to determine cleanliness.
Results:	After establishing a baseline level for the tape, the effect of the drawing compound was found to decrease the OSEE readings substantially. Average baseline level for all pieces was found to be 960 (after adjusting for lower numbers) and the average dirty readings was 191. Cleaning in each solution revealed that the OSEE readings increased, returning near to the initial baseline level. Some readings improved over the initial baseline. This would be due to the pieces of tape being somewhat dirty to begin with. The Beyond 2005 appears to only have cleaned one side of the silver part as shown in the table below. Some of the parts had readings that were not consistent with the majority of the other values for the same piece. All these readings were located at one end of the tape. It was determined that this was were the pieces were held while cleaning, rinsing and drying.

Initial Readings										
	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom		
Cleaner	1	1	2	2	3	3	4	4		
	839	972	801	615	237	983	648	987		
	990	975	989	841	241	960	721	981		
	974	980	879	704	251	697	291	986		
	978	980	990	510	411	986	985	983	Overall Initial Ave	Adj Initial Ave
					298	975	387		772.14	960.62
Average	945.5	977	915.25	668	288.2	920.8	607.2	985.25		
Dirty Readings										
	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom		
Cleaner	1	1	2	2	3	3	4	4		
	215	134	754	200	211	199	161	165		
	171	190	194	221	162	151	142	136		
	172	174	177	190	161	132	140	178		
	164	191	232	209	171	145	142	130	Overall Dirty Ave	
Average	180.75	172.5	339.75	205.5	177	157.5	147.25	153.25	191.06	
Clean Readings										
	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom		
Cleaner	1	1	2	2	3	3	4	4		
	958	976	972	187	965	965	964	968		

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	966	960	977	176	976	969	974	969		
	967	963	969	232	975	972	964	967		
	611	598	634	180	975	553	969	966		
	958	692	808			759			Overall Clean Ave	Adj Clean Ave
Average	892.2	838	872.4	194.25	973.5	844.2	968.75	968.5	823.17	962
Adj Ave	962.25	897.75	931.5			916.25				
Top Bottom Ave		865.1		533.325		908.85		968.625		
Top Bottom Adj Ave		930		562.875		942.5		968.625		

Summary:

Substrates:	Sterling/Silver
Contaminants:	Lubricating/Lapping Oils

Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Brulin Corporation	Aquavantage 1400	5	0.00	☑	
Today & Beyond	Beyond 2005	5	0.00	☐	
Simple Green	Crystal Simple Green Industrial Cleaner & Degreaser	5	0.00	☑	
Oakite Products	Inproclean 3800	5	0.00	☑	

Conclusion:

Three products, Oakite Inproclean and Sunshine Makers Crystal Simple Green and Brulin EXP 1400 were successful in removing the drawing compound from the silver tape under the described operating conditions. OSEE was also found to be a practical analytical method for determining cleanliness.