CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2003
DateRun:	05/04/2003
Experimenters:	Jason Marshall
ClientType:	Electromagnetic Manufacturer
ProjectNumber:	Project #5
Substrates:	Sterling/Silver
PartType:	Part
Contaminants:	Lubricating/Lapping Oils
Cleaning Methods:	Ultrasonics
Analytical Methods:	OSEE
Purpose:	To evaluate cleanliness using OSEE of a series of parts that have been cleaned with different processes.
Experimental Procedure:	Thirteen supplied parts were analyzed using a Photo Emission Tech. Inc Surface Quality Monitor SQM 100. Five readings were made on one side from each of the 13 parts submitted for analysis. OSEE: Optically Stimulated Electron Emission or PEE, Photo Electron Emission is based on the principle that metals and certain surfaces emit electrons upon illumination with ultraviolet (UV) light. These electrons can be collected, measured as current, converted to a voltage and digitally displayed. A surface contaminant will enhance or attenuate this signal, depending on it own photoemissive nature. While OSEE will not identify a contaminant, it is a good comparative tool to determine the degree of contamination. This method is best suited for thin films (oils, etc.) and not particulate matter (dust, for example).
Results:	Standard cleaning with Oakite Inproclean 1300 at 5% with ultrasonics and two rinse baths at 8 feet per minute rate. Non standard cleaning with Oakite Inproclean 1300 at 5% with ultrasonics and two rinse baths at 4 fpm rate. Part # Group 1 Standard cleaning 2 Standard cleaning + isopropyl wipe 3 Standard cleaning + Reno 12 applied (dirty) 4 Standard cleaning + C510 applied (dirty) 5 Standard cleaning + electroclean 6 Standard cleaning + acid etch 7 Standard cleaning + K2SO4 applied (dirty) 8 Nonstandard cleaning 9 Electroclean 11 As drawn, no cleaning (dirty) 5A, 6A & 9A same as 5, 6 & 9 with the addition of vacuum process.

Part #	Reading 1	Reading 2	Reading 3	Reading 4	Reading 5	Average	Std Dev
1	794	846	673	676	482	694	126
2	1004	1002	1003	1006	1000	1003	2
3	122	128	141	131	115	127	9
4	97	112	102	104	107	104	5
5	991	1000	1001	1003	1002	999	4
6	779	359	710	852	1001	740	214
7	142	144	120	137	115	132	12
8	1000	1000	619	522	729	774	196
9	116	146	133	425	253	215	116
11	98	87	80	88	95	90	6
5A	980	987	989	984	984	985	3
6A	984	983	986	982	987	984	2
9A	985	993	991	987	985	988	3

Method 2 was found to have the highest average OSEE reading (1003), followed by method 5 (999). The three processes subjected to the vacuum after cleaning resulted in nearly the same readings (5A-985, 6A-984 and 9A-988).

Summary:

Substrates:	Sterling/Silver
Contaminants:	Lubricating/Lapping Oils

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Company Name:	Product Name:	Conc.:	Efficiency:	Effective:	Observations:
Oakite Products	Inproclean 1300	5	0.00	☑	

Conclusion: OSEE was shown to be an effective analysis method in comparing the various cleanliness of the 13 supplied parts.