CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2002
DateRun:	10/23/2002
Experimenters:	Jason Marshall
ClientType:	Metal
ProjectNumber:	Project #1
Substrates:	Aluminum
PartType:	Part
Contaminants:	Oil
Cleaning Methods:	Ultrasonics
Analytical Methods:	Goniometry, OSEE
Purpose:	To evaluate two parts using OSEE and contact angle goniometry.

Experimental Procedure:

Two cleaned parts were analyzed using OSEE and contact goniometry.
Background
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 either enhance or attenuate this signal, depending on it own photo emissive 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).

Goniometry: Like OSEE, laser or optical contact angle goniometry is the measurement of a secondary effect to extrapolate surface cleanliness. A small drop of deionized water is placed on the substrate of interest. A light is shown to reflect the droplet's interface with the surface. Usually, the higher the contact angle (that is, the height of the bubble), the greater the contamination. Conversely, water dropped on a clean surface generates a much smaller, flatter contact angle. An example of this effect is noticeable after waxing and then washing a car; the remaining wax acts as a contaminant and the residual water on the surface of the car 'bubbles up.' The technique is limited in that only the cleanliness under the tiny drop is measured so that several readings must be taken. Flat surfaces are more conducive to accuracy with this method.
OSEE readings were taken on five of the six sides for the smaller part (part 1) and on all six sides for the larger part (part 2). Five readings were recorded on each side. Overall averages were calculated for each of the two cleaned parts and the dirty part as well.
Contact angle measurements were taken from four of six sides for both cleaned parts. Eight readings were made for Part 1 and 7 for Part 2. Average values were calculated and compared.

Oil- Blaser Swisslube Inc Blasocut 2000 Universal (64742-52-5, 68608-26-1, 61790-44-1, 61791-12-6, 61789-76-9, 8016-28-2, 61788-66-7)

Results:

Table 1 lists the OSEE readings for all three parts

OSEE Readings			
	Dirty	BCS Cleaned	Evercycle Cleaned
Side 1	267	984	483
	258	959	498
	283	896	494
	295	515	459
	323	531	597
Side 2	277	656	392
	230	982	471
	310	805	430
	291	536	406
	268	983	484
Side 3	274	982	494
	309	721	547
	316	555	594
	290	984	404
	284	508	574
Side 4	262	793	284
	294	848	269

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	300	895	304
	289	513	361
	327	939	326
Side 5	227	529	481
	224	295	300
	278	265	367
	220	951	348
	211	707	245
Side 6			416
			525
			199
			301
	276	733	416

Table 2 lists the measured contact angle for the two cleaned parts.

Table 2. Contact Angle Measurements

BCS	Evercycle	
69	72	
68	72	
70	64	
59	63	
65	62	
67	73	
72	72	
68		
67	68	Average

Summary:

Substrates:	Aluminum				
Contaminants:	Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
BCS Company	Ultra Blue 100	5	0.00	☑	
CAE Cleaning Technologies - No Longer Exists	Evercycle UCI - For Comparative Purposes Only	3	0.00	☑	

Conclusion:

Contact angle measurements of both parts resulted in nearly identical readings. The BCS cleaned part had an average angle of 67 and the Evercycle cleaned part had an average angle of 68. No difference in cleanliness can be found using this methodology. OSEE measurements resulted in higher values for the BCS cleaned part than for the Evercycle part. The dirty part had a lower reading than both cleaned parts. From this comparison, the results would suggest that the BCS cleaned part was cleaner than the Evercycle part. The BCS part had an average OSEE reading of 733, the Evercycle part reading was 416 and the dirty part had a reading of 276.