CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	1995
DateRun:	05/15/1995
Experimenters:	Donald Garlotta, Jay Jankauskas
ClientType:	Stamping Company
ProjectNumber:	Project #1
Substrates:	Copper
PartType:	Part
Contaminants:	Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil
Cleaning Methods:	Ultrasonics
Analytical Methods:	Gravimetric, Wipe
Purpose:	Further evaluation of positioning during cleaning
Experimental Procedure:	Testing the how the positions of the tubes will effect the cleaning inside the tubes. Two cleaners will be used, 10% Skyproducts Cleaner #10 and 4% ManGill #0650. For Each Cleaner. three position of the copper rods will be used. First the tubes will be filled with water and pointed hole side up (about a 60 degree angle). Second, the tubes will be filled with water and lie on their side. Finally, the tubes will be filled with water and pointed hole side down. Samples were cleaned using Crest Ultrasonics in a beaker for 15 minutes at 140 degrees. For all three testing conditions we made sure that the tubes were totally filled with cleaner solution before cleaning. The samples were rinsed in a beaker filled with tap water at 140 degrees and agitated with a stirbar. The tubes were rinsed with the hole side up so that the oil was allowed to escape. After rinsing the water was drained out of the tubes and they were placed in a convection oven set at 160 for an hour and then in a vacuum oven set at for one hour. The tubes were then left out through the night in a desiccator. All samples were weighed before cleaning and after drying. The amount of residual oil on the inside of the tubes was checked by inserting a cotton swab in the hole and noticing the oil buildup on it. The amount of oil buildup will be termed: none, slight, moderate, heavy.
Results:	Gravimetric Analysis

sample # and positioning	amount of oil inside tubes (swab test)	weight with contamination(g)	weight after cleaning (g)	weight change (g)
73,upward	slight	15.6945	15.6683	0.0262
74, upward	slight	15.7376	15.7181	0.0195
75, upward	slight	15.562	15.5396	0.0224
76,upward	slight	15.6617	15.6134	0.0483
77, upward	slight	15.5974	15.5769	0.0205
78, upward	slight	15.6204	15.6098	0.0106
79, upward	none	15.6362	15.6256	0.0106
80, upward	moderate	15.5382	15.4963	0.0419
81, sideways	moderate	15.6331	15.6114	0.0217
82, sideways	slight	15.5534	15.5463	0.0071
83, sideways	slight	15.5617	15.5293	0.0324
84, sideways	heavy	15.5791	15.5556	0.0235
85, sideways	slight	15.4786	15.4661	0.0125
86, sideways	slight	15.6695	15.6598	0.0097

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87, sideways	moderate	15.5421	15.5358	0.0063
88, sideways	slight	15.6569	15.6247	0.0322
89, downward	slight	15.6124	15.5965	0.0159
90, downward	heavy	15.631	15.6305	0.0005
91, downward	moderate	15.656	15.6271	0.0289
92, downward	heavy	15.6042	15.5612	0.0430
93, downward	moderate	15.6173	15.5832	0.0341
94, downward	moderate	15.5984	15.5929	0.0055
95, downward	heavy	15.6092	15.6122	-0.0030
96, downward	moderate	15.6375	15.6071	0.0304

Notes and Observations:
Hole side up-Oil removal from the inside of the tubes was very noticeable upon insertion into the ultrasonic bath. Water easily entered the tubes during cleaning and rinsing. Average removal was .025 grams with a standard deviation of .0136.
Hole side down-No noticeable removal during cleaning, but when emptying the cleaner out of the tubes after cleaning, a lot of oil came out. The same observation was made after draining out the tubes after rinsing. Average removal was .0226 grams with a standard deviation of .0157. Sideways-After about ten minutes in the Ultrasonic bath, oil started to come out of the tubes and
continued for the duration of the cleaning. A bunch of oil came out of the tubes when drained after cleaning and rinsing. Probably would achieve better removal with either tubes pointed up slightly or with a longer cleaning time. Tubes were harder to fill up in the cleaner solution, they needed to be tipped up a bit and shaken around. Average removal was .0182 grams with a
standard deviation of .0107

Summary:

Substrates:	Copper				
Contaminants:	Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Man Gill Chemical Company	Gillite 0650 Cl	10	0.00	☑	
Sky Products Company Inc	Cleaner #10	10	0.00	☐	

Conclusion:

Tubes looked pretty clean but there seemed to be a slight amount of white, tacky residue left on the tubes. There was also a bit of copper chips noticed on the bottom of the beaker of Mangill cleaner solution. I believe this wasn't caused by the Ultrasonic cleaning but was just the removal of small copper chips that were on the tubes prior to cleaning. Swab tests showed that the upright positioning of the tubes did a better job of removing oil from the inside. The Mangil Gillite 0650 cleaner was not as effective as the Skyproducts cleaner despite removing a larger mass in all three positions.