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:	Testing how the positions of tubes effect 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 positions will be used. First the tubes will be filled with cleaner and pointed hole side up. Second, the tubes will be filled with cleaner and lie on their side. Finally, the tubes will be filled with cleaner 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 the tubes were filled with cleaner or water before washing and rinsing. The samples were rinsed in a beaker filled with tap water at 140 degrees and agitated with a stirbar. During rinsing the tubes were positioned 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 162 degrees for one hour and then placed in a vacuum oven set at for 1 hour. 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:	GRAVIMENTRIC ANALYSIS

sample # and tube positioning	amount of oil inside tubes (swab)	weight with contamination(g)	weight after cleaning (g)	weight change (g)
49, upward	none	15.5557	15.5474	0.0083
50, upward	slight	15.5749	15.5621	0.0128
51, upward	slight	15.589	15.5616	0.0274
52, upward	none	15.5391	15.5261	0.0130
53, upward	heavy	15.6068	15.5875	0.0193
54, upward	slight	15.5993	15.5917	0.0076
55, upward	slight	15.5775	15.5629	0.0146
56, upward	moderate	15.5349	15.5084	0.0265
57, sideways	light	15.5567	15.5436	0.0131
58, sideways	moderate	15.637	15.6264	0.0106
59, sideways	none	15.6652	15.6527	0.0125
60, sideways	slight	15.5549	15.5319	0.0230
61, sideways	moderate	15.5600	15.5523	0.0077
62, sideways	slight	15.6249	15.6082	0.0167
63, sideways	moderate	15.6576	15.6504	0.0072

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64, sideways	heavy	15.6700	15.6602	0.0098
65, downward	none	15.6240	15.6129	0.0111
66 downward	moderate	15.6230	15.6204	0.0026
67, downward	none	15.5223	15.5005	0.0218
68, downward	heavy	15.6682	15.6283	0.0399
69, downward	moderate	15.6268	15.6101	0.0167
70, downward	slight	15.6653	15.6494	0.0159
71, downward	heavy	15.6077	15.5739	0.0338
72, downward	none	15.5691	15.5604	0.0087

Notes and Observations:
Hole side up-Oil was released from the hole of the tube immediately after insertion into the ultrasonic bath. Tubes filled up easily in the cleaner but needed some aggitation to fill the tubes totally up with rinse water. Average removal was .0162 grams with a standard deviation of .0075.

Hole side down-No noticable removal of oil during cleaning. But after draining the tubes after cleaning and rinsing, alot of oil was released. Average removal was .0188 grams with a standard deviation of .0126. Sideways-Due to cloudiness of cleaner solution could not see if any oil was being released. Tubes needed to be shaken up in order to allow cleaner solution to fill the tubes. Alot of oil was released from the tubes during draining. Average removal was .0126 grams with a standard deviation of .0052.

Summary:

Substrates:	Copper				
Contaminants:	Cutting/Tapping Fluids, Lubricating/Lapping Oils, Oil				
Company Name:	**Product Name:**	**Conc.:**	**Efficiency:**	**Effective:**	**Observations:**
Sky Products Company Inc	Cleaner #10	10	0.00	☑	
Man Gill Chemical Company	Gillite 0650 Cl	4	0.00	☐	

Conclusion:

Copper tubes looked very clean after drying. Some residual copper buildup was noticed on the bottom of the beaker of Skyproducts cleaner solution after cleaning. This is believed to be copper chips that were on the tubes prior to cleaning. The swab tests show that the Skyproducts #10 cleaner was superior to the Mangil Gillite 0650. The best oil removal was obtained when the tubes were placed upright. Better removal can be obtained with a longer cleaning time and better rinsing (most likely tumbling).