CLEANING LABORATORY EVALUATION SUMMARY

SCL #: 2001

DateRun: 08/29/2001

Experimenters: Jason Marshall

ClientType: Electronics Manufacturer

ProjectNumber: Project #2

Substrates: Ceramics, Gold

PartType: Part

Contaminants:

Cleaning Methods:

Analytical Methods: FTIR

Purpose: To identify contaminants on rejected parts.

Experimental Procedure: Background on FT-IR Spectrometry: Fourier Transform Infrared spectroscopy correlates vibrational energy to a compound's molecular signature. Similar to other high-tech methods such as GC (gas chromatography), the curves generated in this analytical technique are both quantitative for species identification (the placement of the curve on the electromagnetic spectrum) and qualitative for amounts (the area under the curve). A relatively expensive instrument, a FT-IR spectrometer requires special training and care in sample preparation. Not all contaminants can be analyzed this way and interpretation of graphs can be difficult due to the presence of interfering peaks. It may be used in cleanrooms or disk drive manufacture where the origins of contamination may be entirely unknown and the amounts of contamination very low.

Initially, a background was run on the FT-IR, followed by a IPA blank. Working with the supplied rejected parts, several IR cards were made up by wiping the parts with a IPA soaked swab. The IPA was used to dissolve and transfer any materials on the surface to the IR cards. After wiping the parts, the “dirty” swab was used to coat the IR card window. Each card made up was then analyzed in the instrument. The generated spectra were then compared with several other cards that were made up with possible sources of contamination. These included toluene, wax and a combination of the two.

Results: The following table details the source of the sample, the observations made and which spectrum was generated by the sample. Figure 1 shows all of the samples and the possible contaminants analyzed. Samples 1 and 2 taken from the same source closely matched the Toluene spectrum. A third sample, #8, from source A revealed a close match to the Wax & Toluene mix. Sample 3 was slightly different than Samples 1 and 2, with a round peak at the beginning of the line. This peak was in the same area as wax and toluene, but with some other interference that may be IPA. Sample 4 closely matches the wax and toluene mix. Samples 5 and 6 from source C had similar characteristics as wax spectrum and the IPA spectrum. Sample 7 was another that followed the wax and toluene curves.

Table 1. FT-IR Analysis Observations.

FT-IR Analysis			
Sample	Source	Observations-Comparison	Line Color
1	A	Toluene	light purple upper
2	A	Toluene	black
3	B	Toluene & IPA & maybe Wax	yellow
4	B	Wax & Toluene	light blue
5	C	Wax & IPA	dark purple
6	C	Wax & IPA	thin dark green
7	D	Wax & Toluene	dark blue
8	A	Wax & Toluene	medium blue
Toluene			medium blue upper
Wax			light green

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Toluene & Wax			light purple
Isopropyl Alcohol			thick dark green
Background			red

Summary:

Conclusion: It appears that several of the supplied contaminated parts did have some of the wax remaining on them after the toluene cleaning. In addition most of the parts had toluene residue as well. The FT-IR readings made by SCL should not be considered as a final determination as to the identification of the source of contamination.