

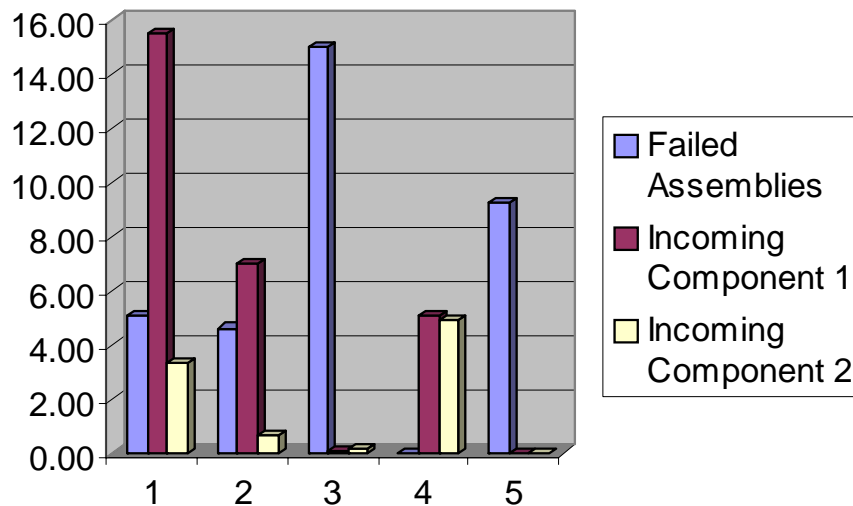
Incoming Components as a Source of Contamination

The cleanliness of no-clean assemblies can become compromised
by dirty incoming components
Foresite Inc.

Recent Studies of cleaned water soluble flux (WSF) and no-clean assembly processes showed that residues found on incoming components could cause electromigration and electrical failures. To determine that incoming components were the driving factor of such failures, ion chromatography was used to separate, identify and quantify ionic residues.

Is No-Clean Really Clean?

In the first case study, a no-clean assembly process was investigated. Bare boards, components (as received), finished assemblies and field returns were evaluated. Data from the analysis revealed that the incoming parts had high concentrations of methane sulfonic acid (MSA), chloride, bromide and high sulfate levels, posing a significant risk for electrical corrosion & electromigration (Table 1).



Sample Description	Ion Chromatography				
	MSA	Cl ⁻	Br ⁻	SO ₄ ²⁻	WOA
Failed Assemblies (Mean)	5.11	4.61	15.04	0.00	9.28
Incoming Component 1 (Mean)	15.50	7.00	0.04	5.05	0.00
Incoming Component 2 (Mean)	3.34	0.65	0.17	4.90	0.00

Clean Boards Don't Always Stay Clean

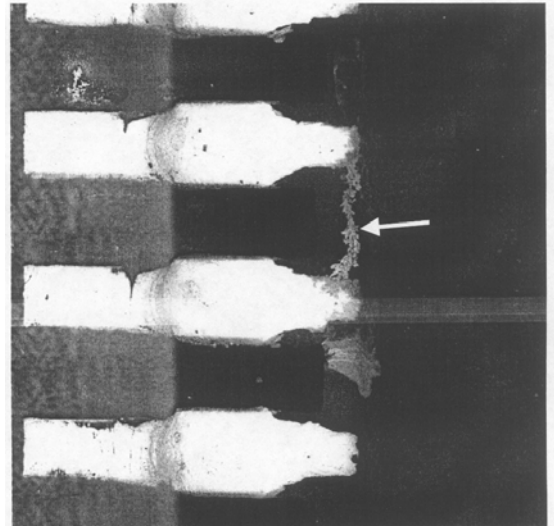
The second case study researched the transference of ionic residue from incoming connectors to the surface of the failed assembly board. Ion chromatography showed that the bare boards were ionically clean before assembly, while the connectors had bromide values of 34.0 µg/in² and sulfate values of 15.0 µg/in² (average). These residues will absorb and accelerate the potential for electrical failure due to electrical leakage. By integrating a saponified wash into the cleaning processes for incoming components, a positive reduction in ionic residue can be achieved.

A Simple Solution

The source of chloride and MSA ions is found on the body and leads of the incoming package (Figure 1). Cleaning incoming components prior to assembly in a saponified wash, rather than a tap water wash and deionized water rinse, will greatly reduce the possibility of electromigration and electrical failure. Continually review and monitor cleaning processes to assure that unwanted residues are kept in check.

Conclusion

Problems can occur no matter what type of assembly process is in use. Both case studies conducted prove that, if contaminated incoming components are not cleaned before assembly, these components can, and will, cause electromigration, leakage problems and failures.



Complete electromigration (dendrite growth) between leads across component body