KYZEN
Where Science and Care Converge.

CASE STUDY

Aquanox A4727 – Batch Case Study

Overview:

An Electronics Manufacturing Service (EMS) company that provides prototype to production printed circuit board assembly services (PCB, PCBA) to regional OEM companies recently implemented a new cleaning process. The high reliability requirements of the medical, industrial, telecommunications and aerospace customers they serve require an effective stable cleaning process, while employees appreciate a pleasant and safe work environment. In an effort to meet their objectives, KYZEN addressed challenges, offered a superior solution, reduced cost and increased overall effectiveness.

Situation:

A pH neutral cleaning agent was qualified for use in production. Since implementation, the EMS has identified and struggled to resolve numerous challenges.

- Inconsistent cleanliness
- Long cycle wash (15 minutes for days 1-3, then increase to 20 min until end of bath)
- Excessive foam during rinse cycle
- Rinse cycle (6 Rinses and does not always reach 2,000Kohms)
- Short bath life (130 cycles),
- Labels removed during wash cycle
- Ink markings removed during wash cycle
- Strong smell associated with wash process concerns operators. Coughing, sore throat, painful red eyes, headache and nausea were reported.
- High material cost and consumption

Process / Procedure:

	Current Process	KYZEN Process
Machine	Aqueous Technologies Trident Duos	Aqueous Technologies Trident Duos
Chemistry	Vigon N-600	Aquanox A4727
Concentration	Chamber A@ 10-12% Chamber B@ 6-8%	Chamber A@ 10-12% Chamber B@ <5%
Temperature	74˚C ~ 165˚F	60˚C ~ 140˚F
Wash Cycle Time	Day 1-3 @ 15 Min. Day 4-21 @ 20 Min.	Day 1-20 @ 15 Min.
Rinse Count	6	5
Flux/Paste	Indium 8.9 & Water Soluble	Indium 8.9 & Water Soluble
Bath Life	Chamber A 300 cycles Chamber B 130 cycles	Chamber A 380 cycles Chamber B 225 cycles
Verification	Visual & Omegameter	Visual & Omegameter

Definition of Success:

- Better cleaning – no visible residue
- Equal or lower concentration
- Stable process parameters for the life of the wash bath.
- Greater than 3 weeks bath life
- Equal or improved material compatibility (labels and part markings)
- Acceptable R.O.S.E. Test readings
- Pass visual inspection

Results and Conclusions:

Over a four (4) month evaluation period this High Rel EMS Company ran various tests and collected data comparing cleanliness, operator experience and usage. It was determined that the Aquanox A4727 cleaning process was stable from day 1 and inspections detected no white residues over the course of **3 weeks** with initial process parameters of 15 minute wash, 10-12% concentration, 74ºC. It should also be noted both Trident chambers were able to reach the 2000 Kiloohm (kΩ) set point within 5 rinses, whereas the N600 required all 6 programmed rinses and often did not reach the desired set point.

3 Week Observations:

- Operators reported no adverse physical reaction to the chemistry
- Quality/Inspection department reported NO white residue and NO ink removal
- Some labels continued to be removed from the assemblies.
- Consumption was reduced
- R.O.S.E. Test results were equal or lower than assemblies processed with the N600.
- Wash solution maintained cleaning performance at the 135/300 cycle marks, with no need to increase time or concentration to maintain cleaning.

Shop Order	Cleanliness	Ionograph results	Photo
58938	351KOhms	0.95 UG/SQ in	
59610	695 KOhms	0.15 UG/SQ in	

Shop Order	Cleanliness	Ionograph results	Photo
63457	2000 KOhms	0.17 UG/SQ in	
63447	2000 KOhms	0.11 UG/SQ in	

Overall, Aquanox A4727 achieved excellent cleaning results, while decreasing the frequency of bath changes and the wide process window allowed for further optimization. KYZEN recommended a reduction in temperature (65°C) to reduce cost and minimize machine wear and tear. Critical inspection of assemblies verified that cleaning results were maintained at the lower operating temperature and data collection continued for a period of 4 months. After testing was complete, it was determined that the Aquanox A4727 not only improved cleanliness but also offered significant process improvements; reduced consumption by 42%, eliminated label/ink issues, improved rinsing and eliminated operator health and safety concerns.

More information on Aquanox A4727 is available by contacting your KYZEN Sales Representative directly.