Subject: Excessive Foam

Foam is a common issue in the cleaning world. If left unchecked, foam can cause the following symptoms:

- Leaks
- Excessive Rinsing
- Pump Cavitation
- Pump Seal Failure

Fortunately, it is among the easiest problems to correct.

There are several causes for foam. They include equipment parameters, flux selection, chemical selection, and process control.

Cause A:

- Liquid flux out of specification (solids content)
- Inadequate preheat

Cause B:

Liquid flux added to top side of assembly (on wave solder applications)

Cause C:

Inadequate volume of defluxing chemical

Cause D:

Liquid temporary solder masks

Cause E:

Inadequate segregation of fluids between wash and rinse

Cause F:

Wash solution loaded

Solution A:

Most wave soldering machines are equipped with a foam or spray fluxer. A foam fluxer utilizes an air-stone placed at the bottom of a liquid flux reservoir. A small volume of air is injected into the air-stone causing the flux to develop a foam "head". The flux develops the head of foam due to a foaming agent that is added to the flux during manufacturing.

This foaming agent is designed to be burned off the board during the preheat and soldering process. If the foaming agents are not completely burned off, they will be carried into the cleaning system on the board's surface. Foaming agents will foam when presented with high pressure water sprays like those in an spray-in-air cleaning system.

Check your soldering profiles. You may find a data profiler helpful. Ensure that your boards are preheated properly and that the dwell time with the solder is sufficient. You may wish to contact the flux manufacturer for specific temperature profile requirements. You may also want to check the fluxes specific gravity. All fluxes have a solids content. The only way to maintain that solids content is to monitor and adjust the fluxes specific gravity at least twice per day. If the flux's specific gravity is not maintained, the solids content will rise, increasing the likelihood of foam. Be sure to maintain the flux's specific gravity religiously.

If foam occurs in a water soluble flux removal application using water only as a cleaning agent, consider cleaning the assemblies with a defluxing chemical additive. Most defluxing chemicals contain de-foaming agents which will reduce or eliminate foam.

Solution B: If you are hand soldering assemblies (including hand rework), be sure that you are not using a squeeze bottle full of foaming flux. Application of foaming flux will cause the board to produce foam during the wash or rinse cycles. Be sure to use only a non-foaming flux in all hand soldering / rework applications.

Solution C:
If a defluxing chemical is being utilized, be sure that there is an adequate percentage of chemical being added to the wash solution. Most defluxing chemicals contain a de-foaming agent. If the percentage of chemical is too low, there may not be enough de-foaming agent to prevent foam. Frequently, the solution is to increase the percentage if defluxing chemical being used in the wash cycle. Consult with your chemical supplier for advise.

Solution D:
Liquid "spot masks" that are soluble in water are notorious for causing foam. A better approach is to use a latex spot mask and peel it off after reflow and prior to cleaning.

Solution E:
Excessive foam frequently appears in the rinse section of a machine (inline) or in the rinse cycle (batch). If there is insufficient segregation of the wash solution from the rinse water, low percentages of wash solution can be dragged-out into the rinse water. This low volume wash solution's volume may be sufficient enough to create foam an insufficient enough to combat it. The solution is to increase fluid segregation between wash and rinse. Contact your equipment manufacturer for advice.

Solution F:
If the wash solution in your cleaner is being reused cycle after cycle, there is a possibility that the solution is loaded. A highly loaded wash solution may lead to inadequate cleaning and foaming.

Basic Mitigation:
If the suggestions above do not help, one may control the foam by using a de-foaming chemical. Most defluxing chemical suppliers sell a liquid de-foamer which may be added to the wash solution to prevent or reduce foam. Contact your chemical supplier for details.