



Foam

Foam is a common issue in the aqueous cleaning world. 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: Flux Selection (wave soldering and hand soldering / rework)

Most wave soldering machines are equipped with a foam 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 aqueous cleaning system.

Solution A: Check your soldering profiles. You may find a data profiler such as an ECD "Mole" or a KIC 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 flux's 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.

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: Failing solution A or B, use a chemical de-foamer. Most chemicals companies offer a de-foamer. This addition of a de-foamer in the wash solution will likely solve the foam problem. Keep in mind that the de-foamer's life may be less than the chemical's useful life. You may need to add de-foamer more frequently than you change chemicals.

Cause: Flux Selection

All fluxes have a solids content. Generally, the higher the solids content, the greater the potential for foam. Specify a lower solids content flux (15% or less).

Cause: Chemistry Selection

In many instances, the chemical you choose can contribute to a foaming problem. Be sure to use cleaning chemicals that are specifically designed for spray-in-air systems. These types of chemicals contain de-foamers.

Solution: Use only spray-in-air compatible chemicals.

Cause: Equipment Parameters

In many cases, foam can occur if specific equipment parameters are out of specifications. For example, the primary equipment-related foaming problem is caused by operating the cleaner at a

low temperature. All chemicals require an elevated operating temperature. The best cleaning and de-foaming occur at specific temperatures. If the wash solution temperature is set too low, the result may be foam.

Solution: Program the wash solution temperature to a level compatible with the chemical. Consult with the chemical manufacturer or data sheet to determine the proper operating temperature. Most all chemicals require operating temperatures to be at least 140 F.

Cause: Additional Board Additives

In some instances, temporary solder mask (spot mask) can cause foam.

Solution: Specify non-foaming spot masks or use latex (peelable) mask.

Cause: Wash Tank Loaded

The machine's wash tank is capable of holding about 12 gallons of wash solution. Depending on the chemical being used, the solution may be "loaded". A solution is loaded when it is no longer capable of "holding" and more contaminates (like a full sponge).

Solution: Change the wash solution and re-charge it with fresh chemistry. You may wish to determine why many boards were cleaned prior to changing the solution. Depending on the specific chemical, loading capacities vary. Both high-loading and low-loading chemicals are available.