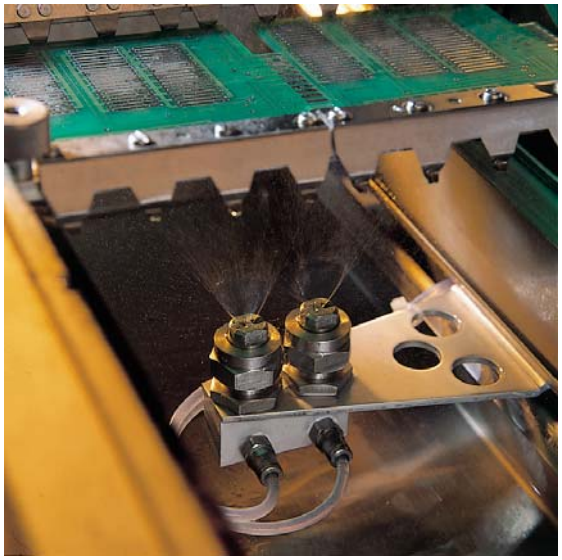
Wave Soldering Adapts with new Flux Technology

by Mark Currie, Ph.D., Henkel Electronic Materials LLC

Over the last few decades, the electronics assembly process has seen many changes. We've witnessed the transition from through hole to SMT, the elimination of CFCs, the move to lead-free and the continued trend toward ever more miniaturized devices and finer pitches. All of these have challenged the industry to find new, better and more environmentally acceptable manufacturing methodologies. And, while many of the sub processes – screen/stencil printing and component placement, among others – have seen dramatic changes to adapt to tighter dimensions and greater demands for speed, I contend that the one process that hasn't changed much is wave soldering.

I'm not suggesting that wave soldering hasn't improved; it certainly has. But the basic process of boards traveling on a conveyor over a molten wave of solder to create through hole solder joints has remained fairly constant. Sure, we've seen the move to dual wave to improve throughput and the adaptation to higher lead-free processing temperatures and those are important modifications. But, by and large, the basic mechanics of the wave soldering process have stayed steady for nearly 60 years.

However, while the methodologies and the function of the wave soldering process have been relatively stable, the expectations of what it needs to achieve have become far more demanding. As assembly technology has evolved, the wave soldering process has also had to embrace all of these changes and adapt. Technologists now want a process that delivers everything including a wide process window, improved speed, better through hole penetration, capability with multiple surfaces, lead-free and tin-lead capability and one that does all of this reliability and consistently. Central to the success of wave soldering performance is the capability of the flux system, which must also embrace all of the technology requirements of modern manufacturing.



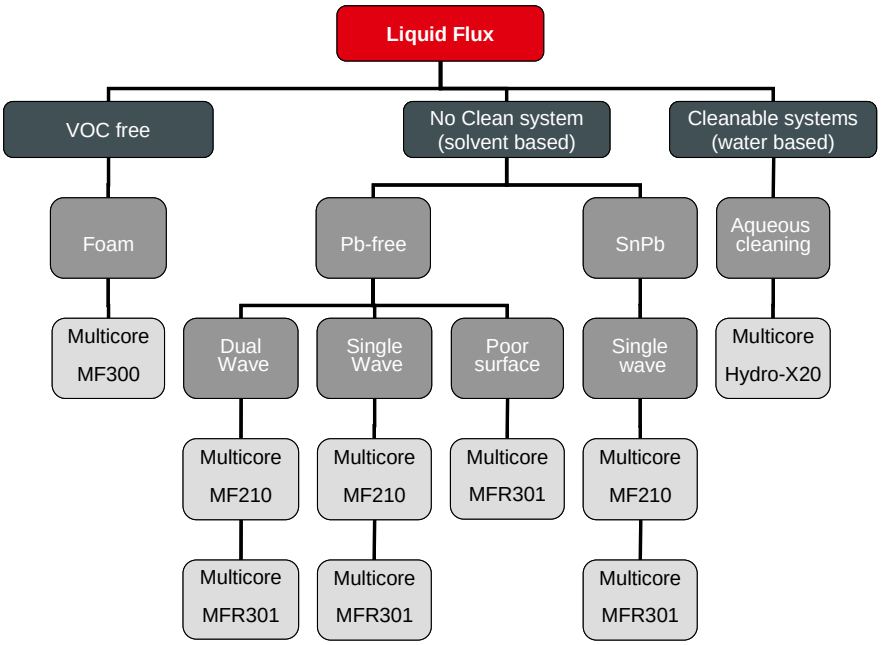
Assembly specialists need flux materials that deliver on all of the stringent process criteria while providing formulations that are adaptable, easily processable and, of course, highly reliable. In short, they have to make manufacturers' jobs easier. No longer do technologists want a flux for this and a flux for that; they want a single product that will work (and work well!) with a variety of different applications. And, this is precisely what the materials experts at Henkel have delivered.

In a flux formulation breakthrough, Henkel has developed Multicore MF210, a no-cleaned sustained activity flux that offers outstanding performance with both lead-free and tin-lead

processes. The material is halide-free, resin-free and can be used on a wide variety of solder resists, as well as rosin and OSP-based protectants. Not only do these characteristics offer exceptional process adaptability, but Multicore MF210 also affords a very wide process window to accommodate both lead-free and tin-lead conditions. With a pre-head temperature range of 80°C to 130°C and a one- to three-second contact time on the wave, Multicore MF210 delivers sustained activity without resin, making it suitable for the most demanding environments. The flux removes residues quickly and enables fast wetting so as to facilitate today's high-speed operations.

Flexibility in-process and in the manufacturing facility are also key attributes of Multicore MF210, as the material can be used with spray, foam or wave fluxing systems as well as single- or dual-wave soldering equipment. Once the assembly has moved through the wave soldering process, the other benchmark for the flux is its appearance which, in line with solder pastes, is now trending toward lower residues for a cosmetically friendly result. The low solids content (and therefore low residues) of Multicore MF210 not only provides for a visually appealing product, but limited residues also enable higher first pass yields for pin testing

Of course, Henkel recognizes that some applications simply don't require the full range of capability that Multicore MF210 can offer and, as such, has a complete portfolio of advanced liquid flux solutions to accommodate varying process preferences. (**See chart below**.)



So, while wave soldering hasn't changed much in function, it has evolved dramatically in technology adaptation and results. And, with a large percentage of today's assemblies incorporating applications that have large thermal capacity requirements or need extremely high reliability, wave soldering and requisite flux materials will continue their technology evolution for years to come!