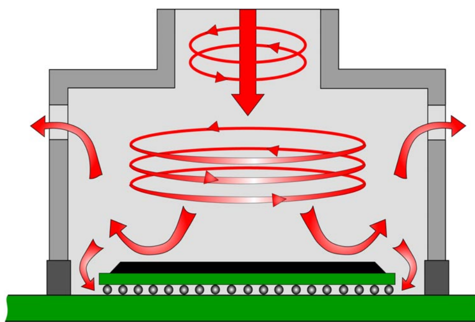
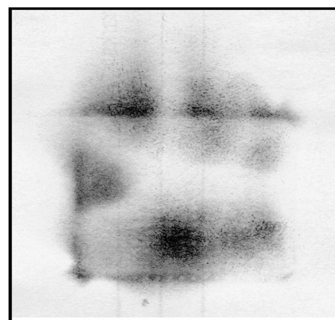
Lead Free Reflow Process Considerations:
New demands on Rework Equipment

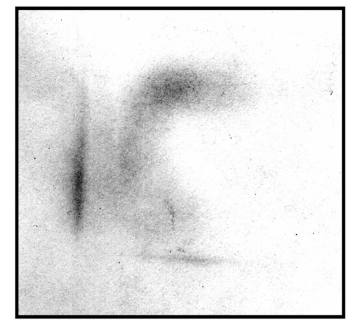
Lead free solder is a subject that must be addressed today because it will be a requirement tomorrow. The process parameters required for high reliability solder joints put new and tougher demands on reflow and rework equipment. The hot air rework systems currently used for BGA rework will have a difficult time trying to achieve a proper lead free profile.
The ERSA IR Technology is perfectly suited to meet these lead free demands.

Forced convection reflow systems are the standard in the industry for production. Quality lead free BGA reflow can be achieved in the enclosed environment of a reflow oven. Rework, however, cannot be done in a completely enclosed environment. The heating conditions required for lead free BGA reflow are difficult to achieve when blowing hot air through a nozzle!



The air flow dynamics in a hot air rework nozzle are difficult to control and, depending on the nozzle construction, can lead to hot and cold spots on the package.

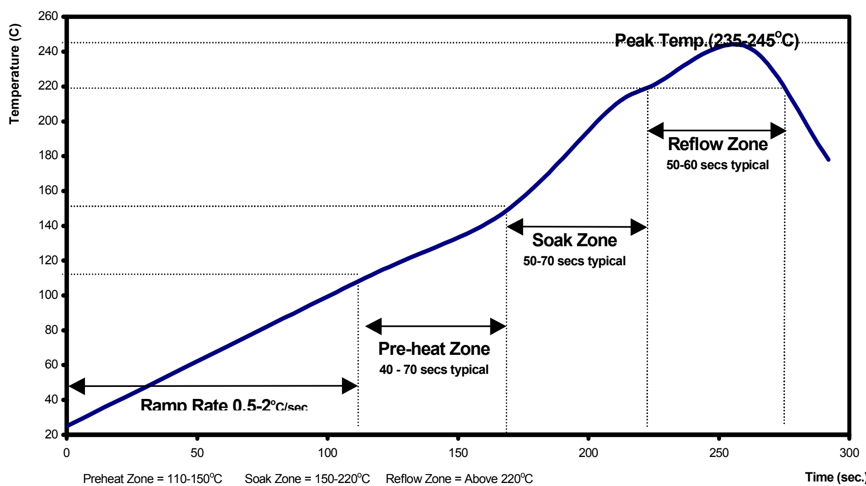




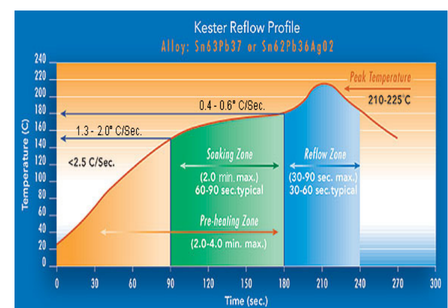
Two separate hot air rework nozzles were lowered down to a heat sensitive surface and the reflow program was started. The burn patterns shown above indicate how the heated air molecules move in the nozzle and transfer heat to the component. Dark areas are hotter.

The process window for lead free solder paste reflow is much tighter than for eutectic or low melt alloys. The activation time is sacrificed in order to reduce the oxidation which takes place much faster in the absence of lead.

Kester Reflow Profile for Lead-Free Alloy (SnAgCu)



Typical eutectic paste profile.



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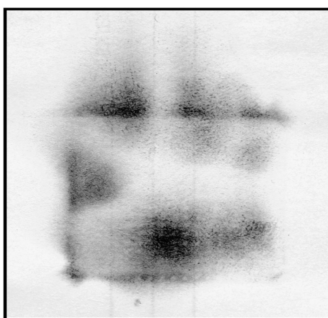
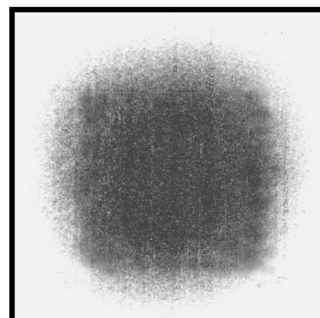
ERSA GLOBAL CONNECTIONS

The reflow or rework heating system must be able to achieve the optimal soak from 150 to 220° C in 50 seconds also on heavy thermal mass PCBs. Slow heat rework systems, like hot air, can take too long in this critical phase, causing oxidation to form during soak.

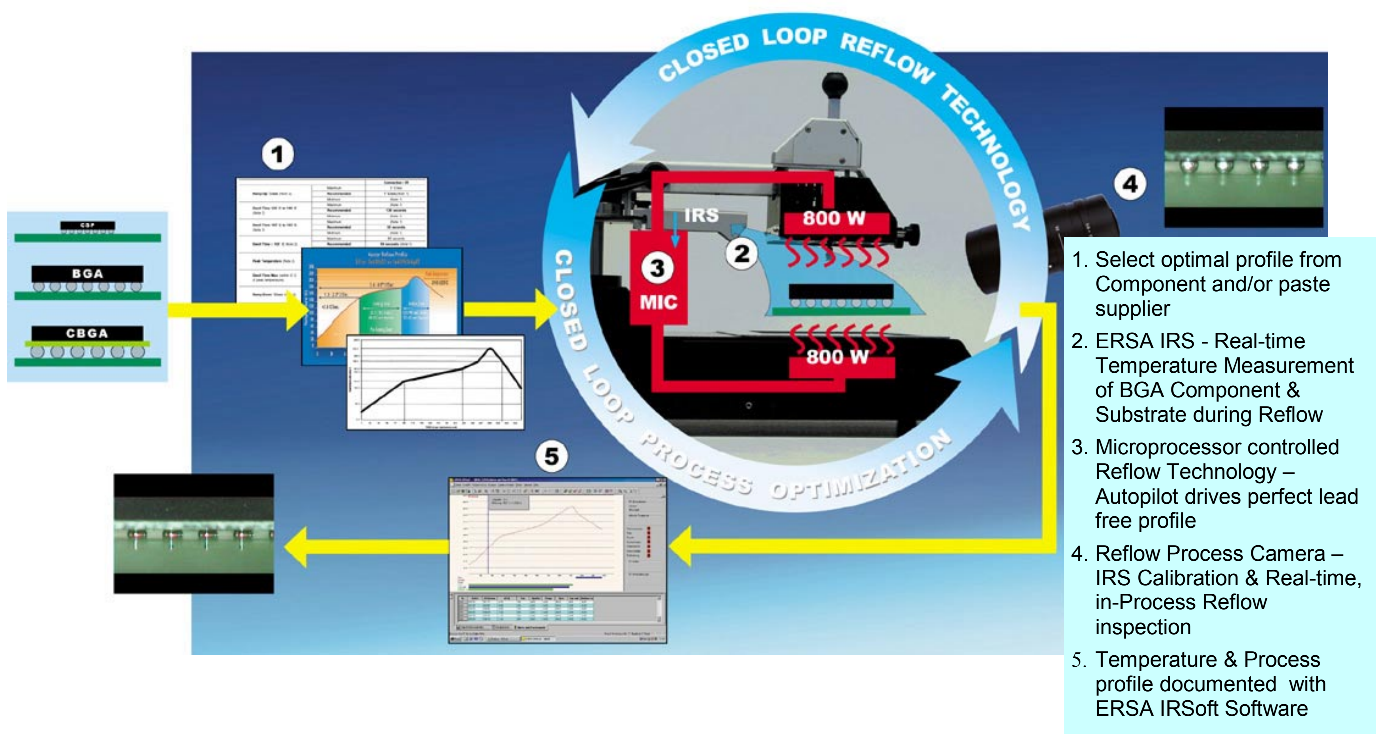
Due to the increase in temperature range and the tight process window, controlling the *ΔT* across the entire PCB in reflow and across the complete area array package in rework will be the ultimate challenge. Most Hot air rework systems are poorly suited to meet these tougher demands. The 2nd generation proprietary ERSA IR technology was specifically designed for lead free BGA rework.



The dark areas are hotter, revealing non-uniform heat distribution across the package. This *ΔT* is unacceptable for lead free and will cause oxidation to form in the lighter areas.



The ERSA IR technology guarantees minimum *ΔT* across the entire BGA package.



The 1600 W ERSA IR Closed-loop reflow technology of the ERSA IR 550 A guarantees a perfect process window, uniform heat distribution with minimum *ΔT* and proper peak temperature for high reliability lead free solder joints!