Have you seen the Light?

How do you decide which Rework system you should purchase?

There are basically three types of technologies currently used in Rework systems; these are hot gas, dark IR and PDR’s Focused IR. Some companies have now combined hot gas and dark IR to create a hybrid system. The idea of combining two technologies is you get the best of both technologies, but if you look at it another way, you get the worst of both.

In reality all the main manufacturers systems work well, they melt solder and they accurately remove and place components. So how do you decide?

Do you buy a system that is quoted as being the most powerful?

As an engineer, life would be very simple if we could just buy the right system based on one factor, such as going for the one that quotes the highest wattage. Sadly life is not like that and you have to look closer at what these powers actually mean. If you look at a Hot Gas system that has a 2.4kw top heater and compare it to a PDR’s Focused IR, which is 150w, you would think it’s a done deal. However, these figures are very misleading to the actual heat reaching the component.

The reason why the hot gas system powers have to be so much higher than a PDR system is to compensate for the losses from the heating element to the component. If PDR increased our system to a 2.4kw focused IR heater we would probably burn a hole not only through the PCB, but also through the table.

As I said before all these systems work. So how do you choose what system to buy?

The two most important factors to consider are ease of use and yield.

Since we first developed the Focused IR system in 1986, we have always worked closely with our customers to develop and evolve our products to meet the new challenges in the electronics Industry. We have paid special attention to the operator’s needs and produced systems that are intuitive and easy to use. We have made many different types of specials for customers with very specific needs, for example, we even made a system for an operator who only had 25% vision in one eye. This was critical for him as he needed a system that he could use to continue doing his job, otherwise he wouldn’t have a job anymore. It was a pleasure to be of assistance. Though we are able to modify and create specials, usually our systems have more than enough flexibility designed into them to deal with most modern rework applications.

The elements that determine the yield are the operator’s knowledge, chemistry and heating. The mechanics and software interface make our systems mean any person with basic training will achieve the same high standard.
In my experience of selling and supporting the PDR Focused IR systems worldwide, I find the same problem always arises. This is the issue of different fluxes creating a cocktail that prevents the solder balls (in the case of a BGA) making a metallic bond with the pads. Consider the following: one flux is used to solder the device originally; a second to remove the device; a third may be used if you are using solder braid to remove the old solder and a fourth to place the new device. The solder melts but the mix of different fluxes leaves a skin that prevents the ball flowing onto the pad and making an electrical contact. This one leaves a lot of engineers scratching their heads. They usually (and incorrectly) point the finger at the rework system as they can’t believe it’s a chemical issue, or the thought never even crosses their mind.

The last element to producing the perfect rework process is the temperature profile (heating). We use a combination of short wave focused IR from the top and medium wave IR from the underneath, controlled by our bespoke Automatic Profile Management system, to duplicate the temperature profiles used in the original production. If you can accurately reproduce the temperature profile used in production, you will always get the best results.

The medium wave IR preheats the PCB and prevents delamination and PCB warping, and overcomes the heat sink effect of the ground planes. Rule of thumb is, the bigger the area of the PCB preheated, the better.

The Focused IR works like light. There are two main advantages; firstly, what you see is what you get, or more importantly, you can see exactly where you are getting it. So there is no direct heating of adjacent components that fall outside of the beam. Secondly, as it works just like light, it can be controlled zero-to-maximum and maximum-to-zero instantaneously or incrementally to whatever power is needed. Therefore there is no time lag for the heater to heat up or cool down. This means you can follow a temperature profile closer than any other reworking heating technology.