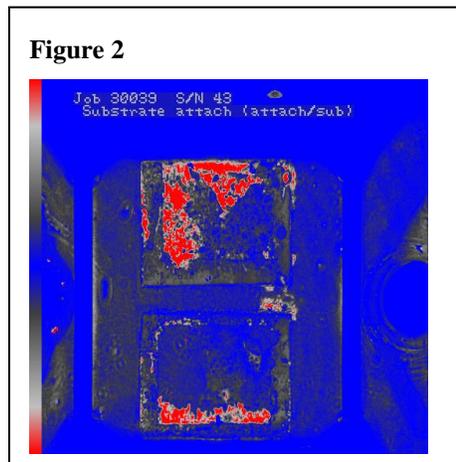
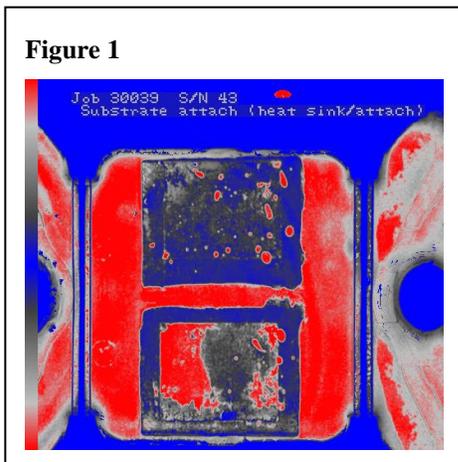


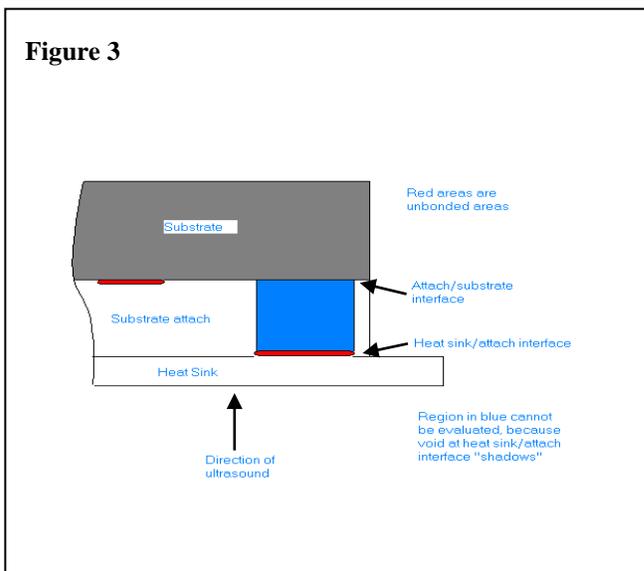


## ACOUSTIC MICROIMAGING OFFERS WHAT ADVANTAGES OVER X-RAY?

Many potential users of acoustic micro imaging do not understand what the technique can offer above and beyond traditional x-ray inspection. Consider this example, where two rectangular substrates are soldered to a large heat sink. Because of the acoustic microscope's ability to study interfaces, each interface can be examined separately.



**Figure 1** shows the interface of the heat sink to the solder attach. Red indicates a lack of bonding. Notice the top substrate appears to be reasonably well-bonded, while the bottom one does not. This is only part of the story, however, and **figure 2** shows the interface of the solder attach to the substrate. Now a large area is visible in the top substrate which is very poorly bonded. On the bottom substrate, some of the areas that were well-bonded at the first interface are not bonded at the attach/substrate interface.



**Figure 3** is a sketch of the cross-section of the area under study. Notice that any area that is not bonded at the first interface, the heat sink/attach interface, cannot be evaluated at the second interface, the attach/substrate interface. This is because any "air gap" stops all the ultrasound, and it will not penetrate further into the device.

In traditional x-ray inspection, this type of analysis would only be possible with very thick layers, and with voids of a reasonable thickness.



This is because x-ray is sensitive to density changes. An unbonded interface will look similar to a bonded one in x-ray, unless some volume of material is missing.

To troubleshoot this process, it is important to know which interfaces are not bonded, and acoustic microscopy can give this information nondestructively. The drawback is inspection of the second interface is dependent on the quality of the first interface. Furthermore, whether an attach layer can be “split” into two interfaces is dependent on the materials and their thicknesses; it cannot always be accomplished.

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