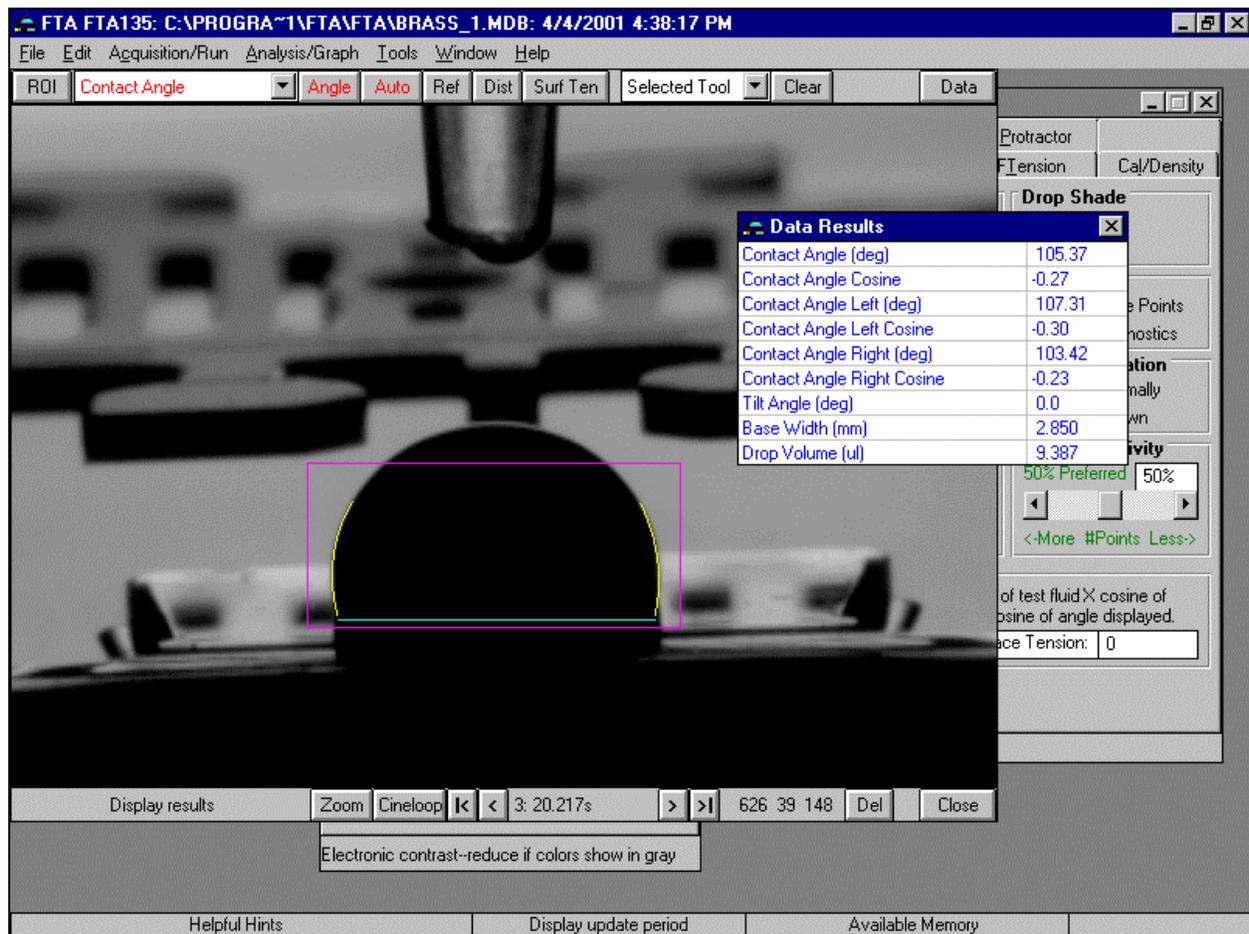


Contact Angle Measurements on Transistor Leadframes

April 4, 2001

Transistor leadframes were characterized by contact angle analysis using an FTÅ135. The leadframes were attached to their original stamping strip and it was desired to make the measurements without detachment. The FTÅ instrument demonstrated its ability to measure on "real world" samples. The resulting images were complex but the Region of Interest (ROI) capability allowed most of the image to be excluded so the correct drop profile could be determined.

Two types of leadframes were tested: plain brass and tin-plated. The plated samples exhibited a lower contact angle, indicating superior wettability. This is to be expected since the purpose of the plating is to improve solderability. All of the samples of each type yielded very similar results, with a spread of only about two degrees. The average brass contact angle for water was 105° and the average plated sample contact angle was 90°. The image immediately below shows a brass (unplated) lead frame. The box around the lower portion of the drop is the ROI. Non-spherical analysis was used so the profile fits would be made only on the sides and not the top.



The drop was placed on the active area of the leadframe, i.e., the portion to which the transistor die will be attached. The structure rising up behind this is the remainder of the stamping frame, which holds the twenty or so leadframes themselves as they are stamped and plated. The leadframes are later broken free. If the ROI were not used, the automatic analysis would not be able to identify the drop profile from the other edges in the image. The user must click to indicate the location of the ROI box, but the location is remembered for the remainder of the movie.

The image below shows a plated leadframe. This structure was a little different from the previous one, so the image is not the same. The difficulty is the same though: the image does not provide a clear, unobstructed, backlight. In this case, the tab mounting hole of the leadframe appears in the background and overlaps the drop profile. The ROI eliminates this interference. The dispense tip appears above the drop in the upper third of the image. The tip is lowered to touch-off the drop on the surface.

In this analysis only water was used. Often more complete characterization requires using two or three test fluids, but the actual measurement process is the same.

