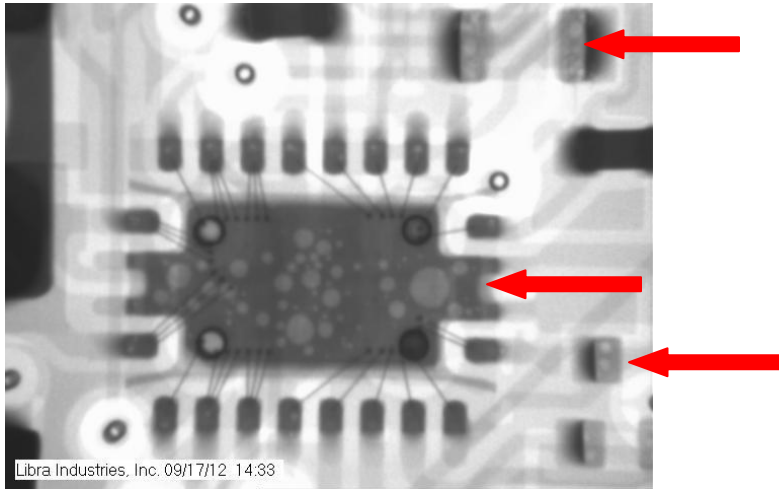


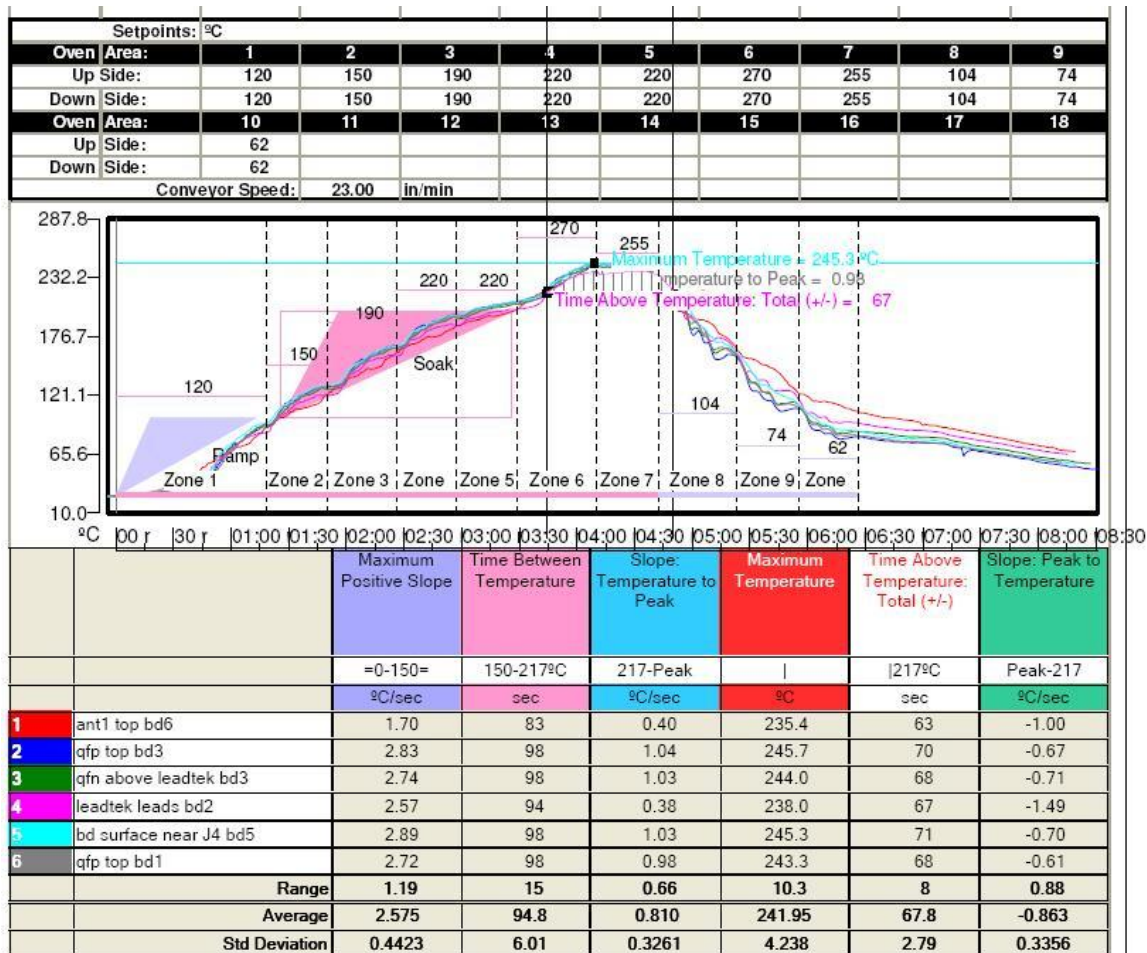
# General voiding in lead free no-clean bottom terminations

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On our customers boards we were seeing wide spread voiding across all parts with any form of bottom side termination; chips, gull wing, QFN, etc (figure 1). We decided to run tests to try to reduce or eliminate any voiding. DI batch wash with chemistry, ultrasonic cleaning with chemistry, 4 hour bake at 120C, 24 hour bake at 120C, multiple vendor recommended reflow profiles and a UV bump were all attempted and subsequently had no affect on our voiding issue. To run further tests a final reflow profile was created that gave us the best results (figure 2).

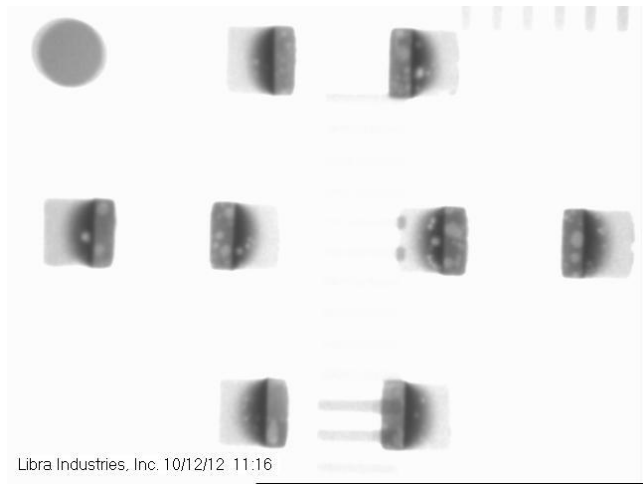
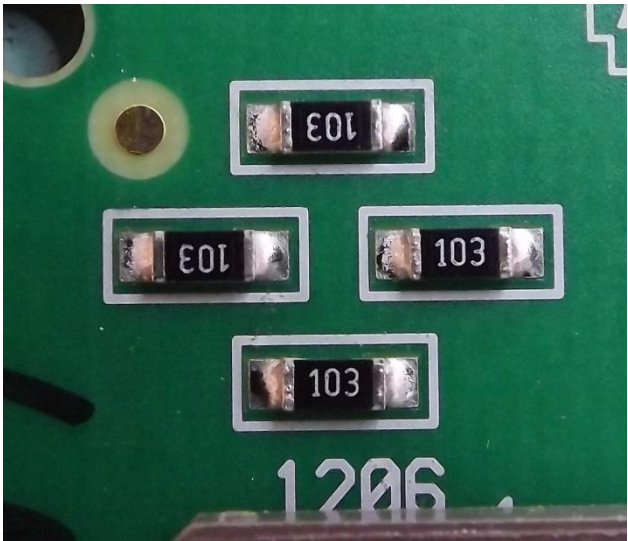


(Figure 1)



(Figure 2)

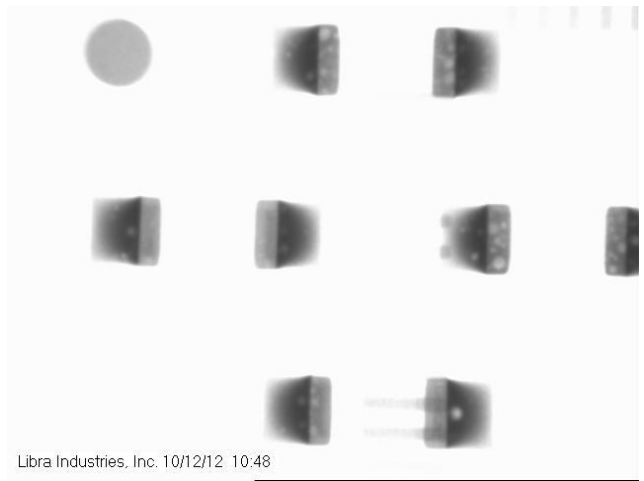
The next step was to try “low voiding” solder pastes from different vendors to see if there would be an improvement. The examples below show the results of the different solder pastes on our sample boards. All boards and parts used were identical, one ENIG and one ImAg. Each board was put through a DI batch wash to eliminate any possible contamination and then put through a 24 hour bake cycle. We used 1206 chip resistors to show the difference in voiding between pastes on the bottom of the end caps.



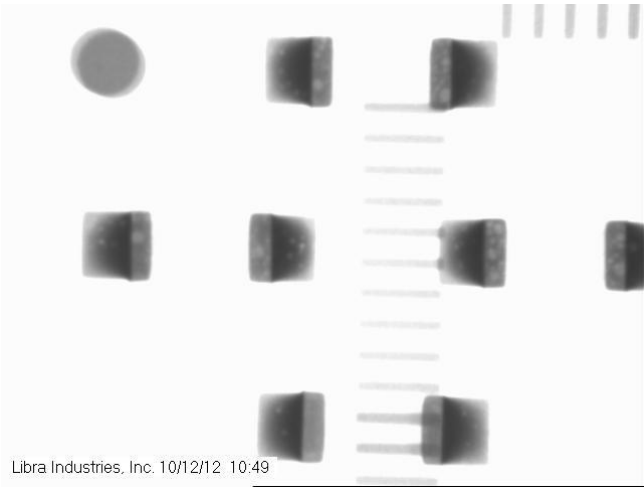
Paste #1 on ENIG



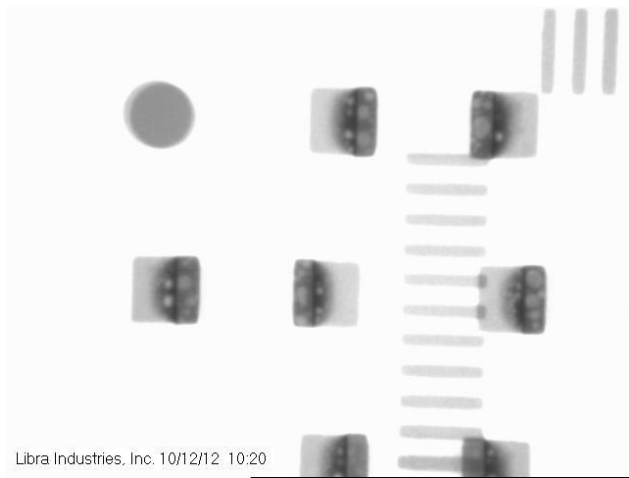
Paste #1 on ImAg



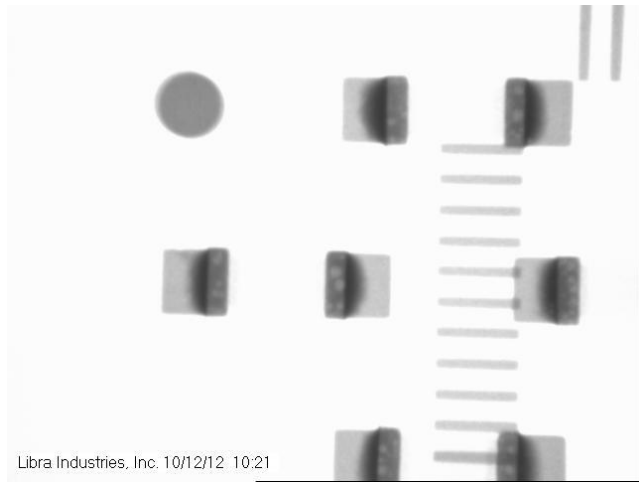
Paste #2 on ENIG



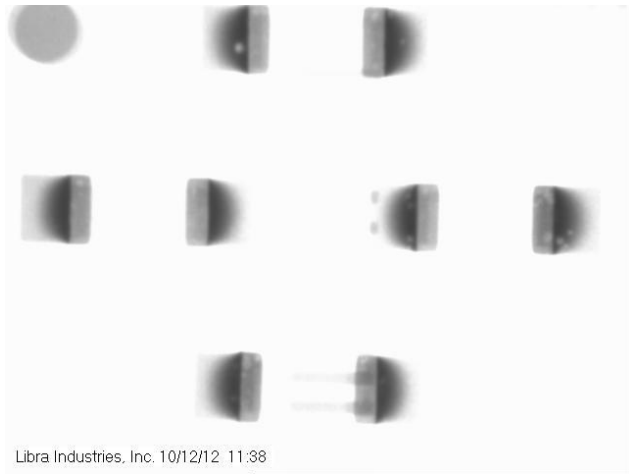
Paste #2 on ImAg



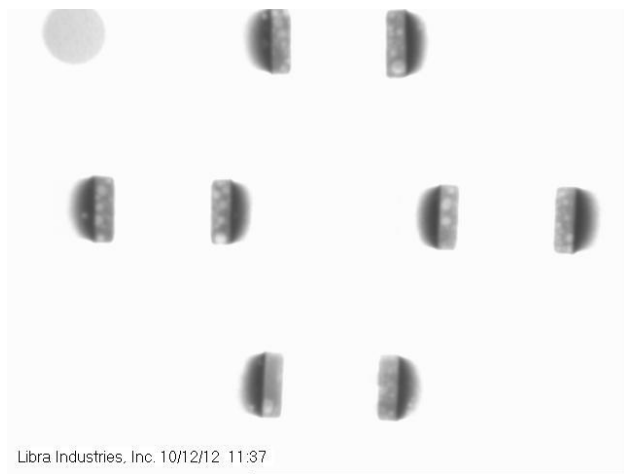
Paste #3 on ENIG



Paste #3 on ImAg

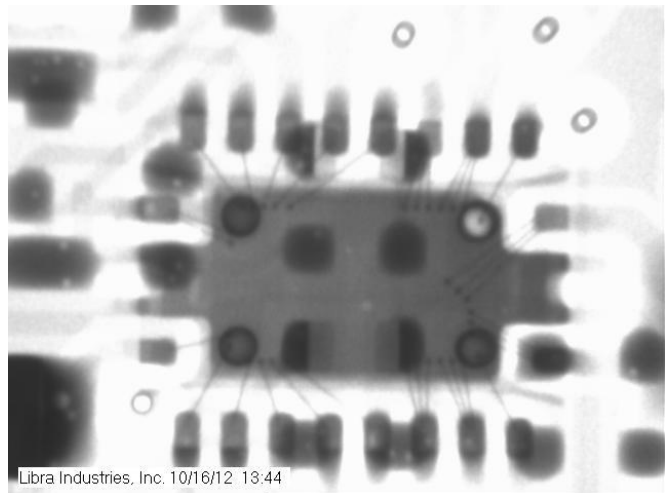
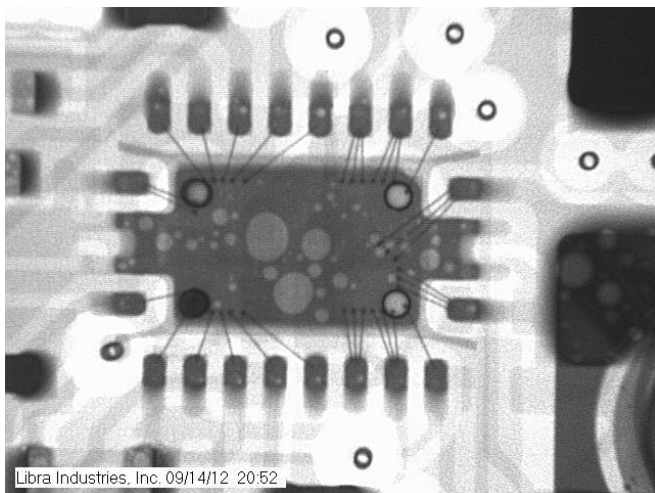


Paste #4 on ENIG



Paste #4 on ImAg

We found that all pastes performed relatively the same on both ENIG and ImAg surfaces with the exception of one. Paste #4 saw a reduction of 70-80% in voiding on an ENIG surface, however there was little to no improvement on the ImAg surface. The testing was then moved to an ENIG production board using paste #4 on a QFN component as shown below.



Again an immense reduction in voids can be seen on the QFN. We plan to start using #4 paste immediately for production and monitor the results.