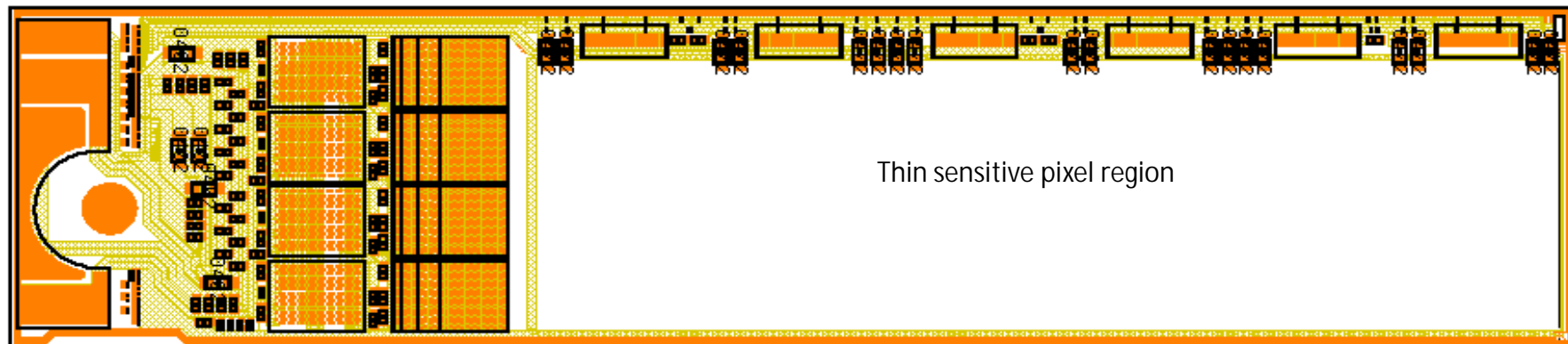


A microscopic view of a substrate, likely a printed circuit board, showing several surface-mounted components. The components are arranged in a grid-like pattern. The substrate has a reddish-brown color. The components are dark and rectangular. The text "SMD Assembly at HLL" is overlaid on the image.

SMD Assembly at HLL

- status report May 2015 -

- The task



w Placement of *0201/0402* caps and *01005* term. resistors: **in total 111 SMDs**

w Process steps:

- 9 Apply solder (ball jetting or dispense)
- 9 Place SMDs
- 9 Reflow

w Idea: use existing automated flip-chip equipment at HLL

- 9 All process steps already done at Finetech (manually so far) on all EMCs

● Equipment

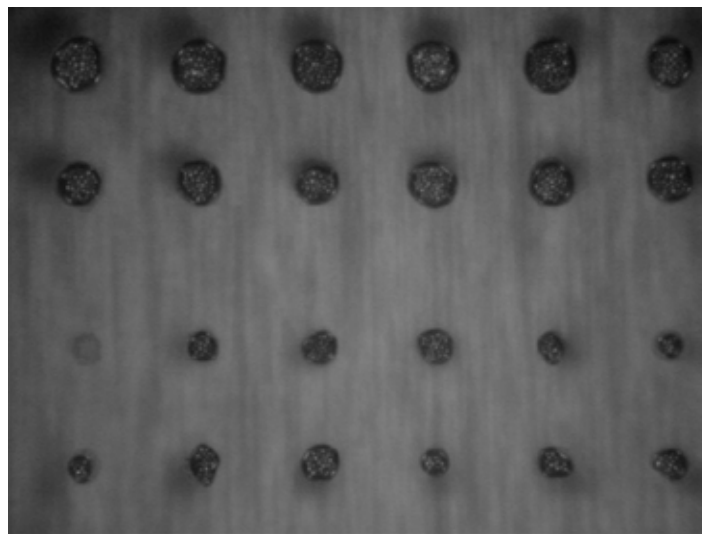
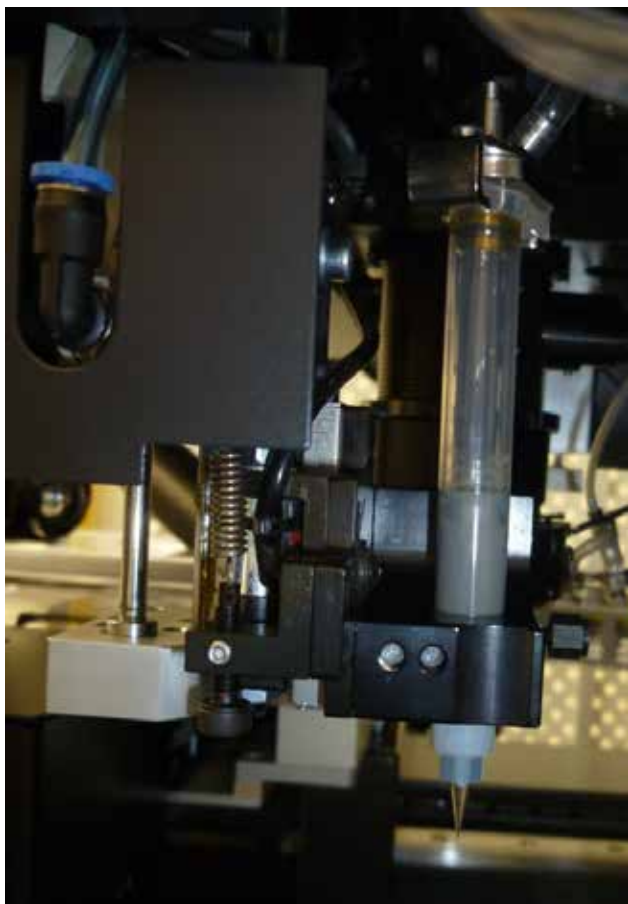


- w Automated micro-assembly tool Finetech "femto"
- w Dispense, pick&place tool, flip-chip arm, heat plate ...
 - 9 Fully programmable, automated and versatile
 - 9 Sophisticated pattern recognition for automated placement/alignment
 - 9 Heat/cool plate, process chamber with N2 and HCOOH
- w Dedicated tools for SMD placement installed April 2015 (at Finetech first)

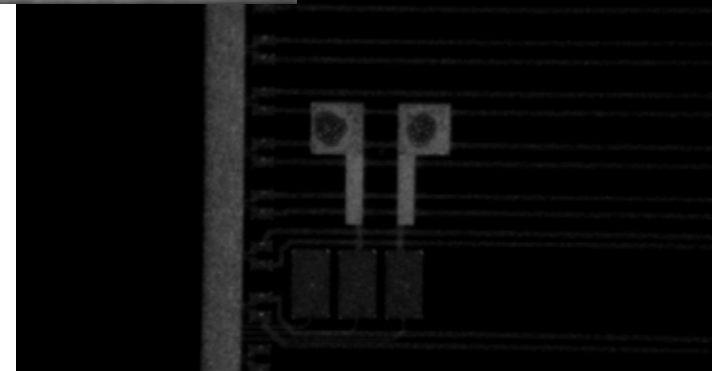
Strategy: install process at Finetech, test, transfer process to HLL, qualify ..

- Test at Finetech - Dispense

- w 29.04.2015, HLL process engineer + Finetech crew
- w Test vehicles: EMCM dummy and W31-3 EMCM with all ASICs
- w All in automatic mode (with option of user intervention)

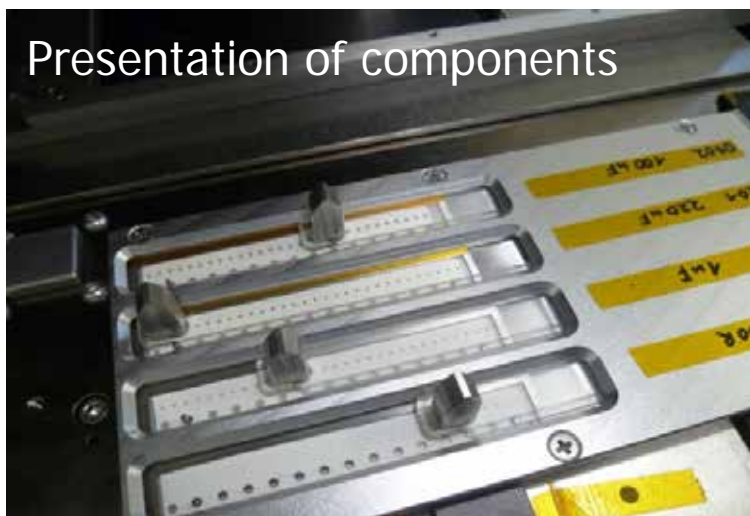


01005 dispense

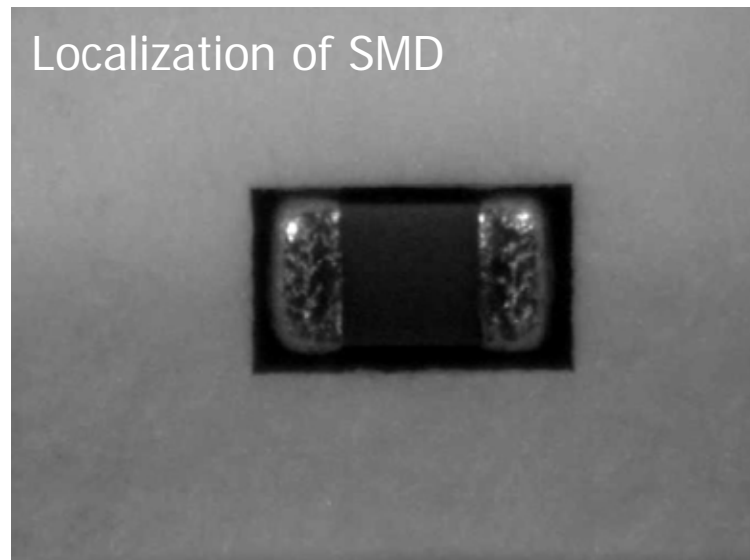


- Test at Finetech – pick&place

Presentation of components



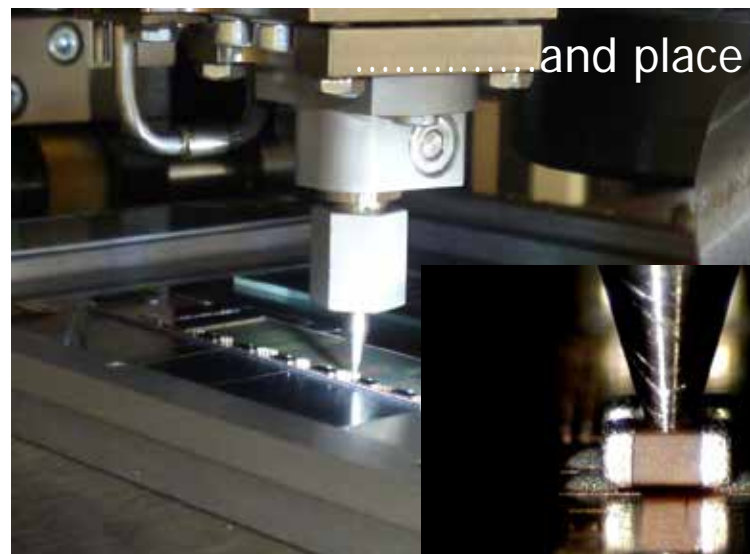
Localization of SMD



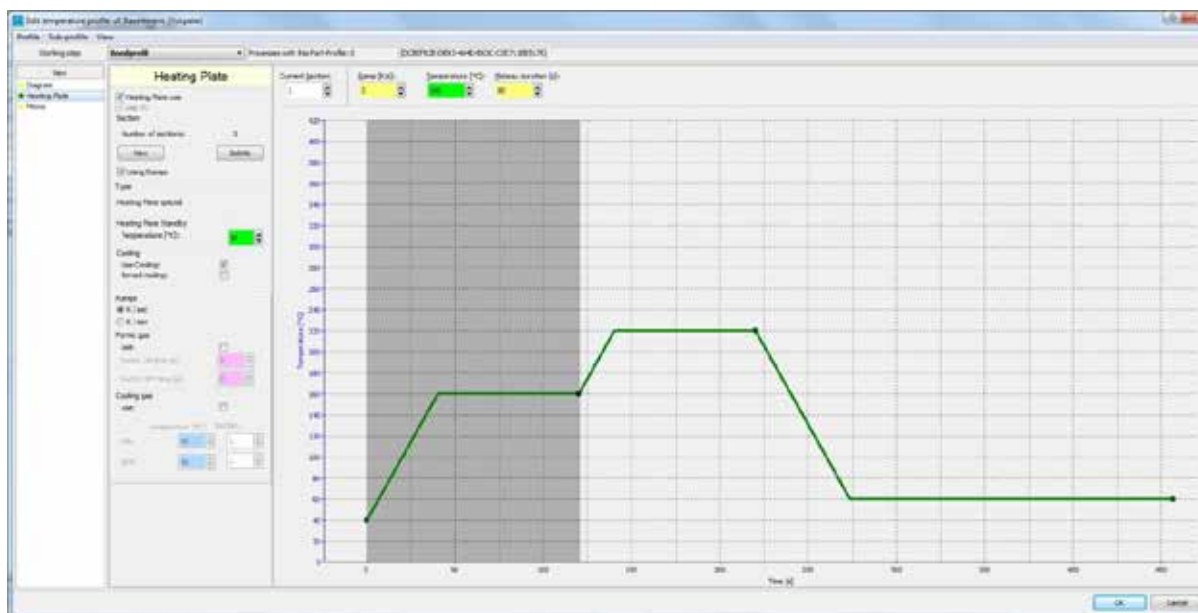
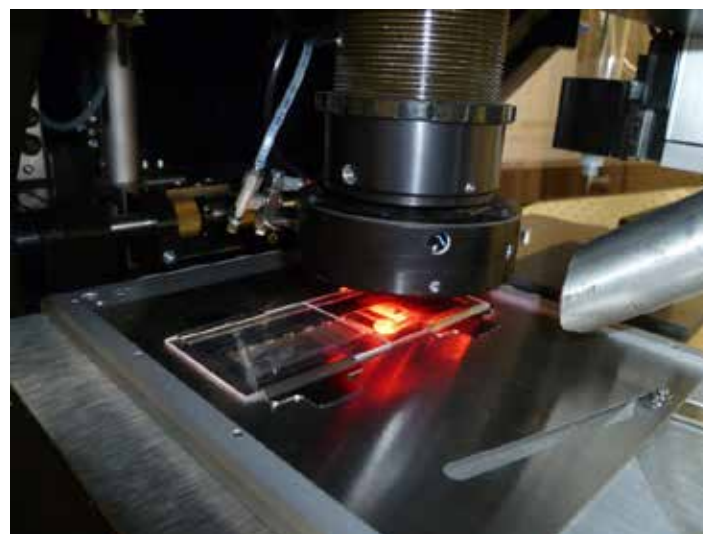
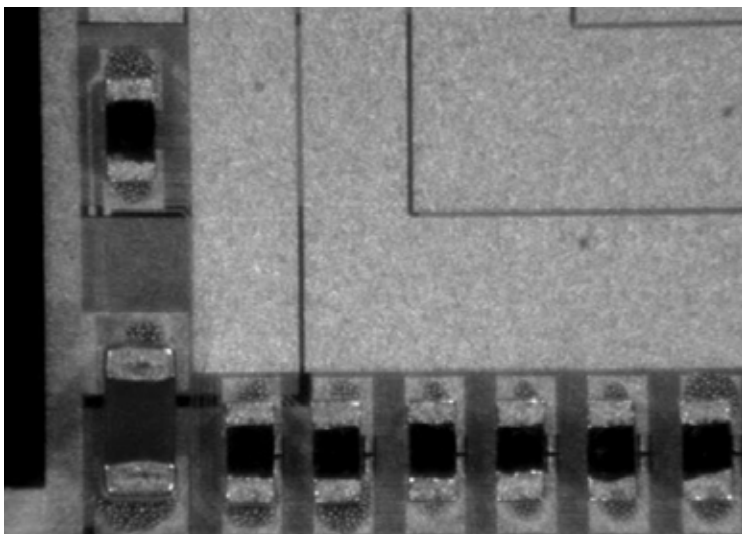
pick.....



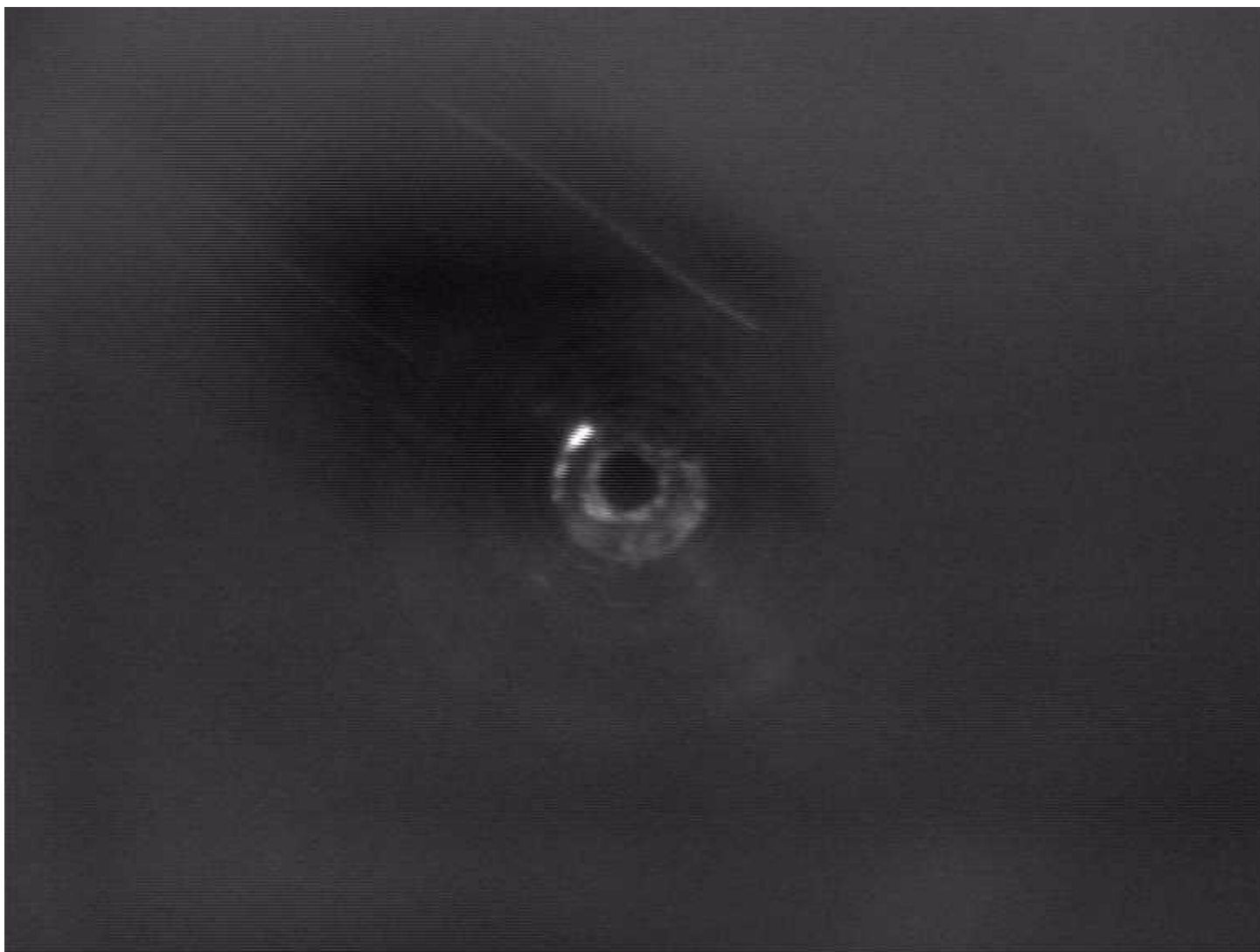
.....and place



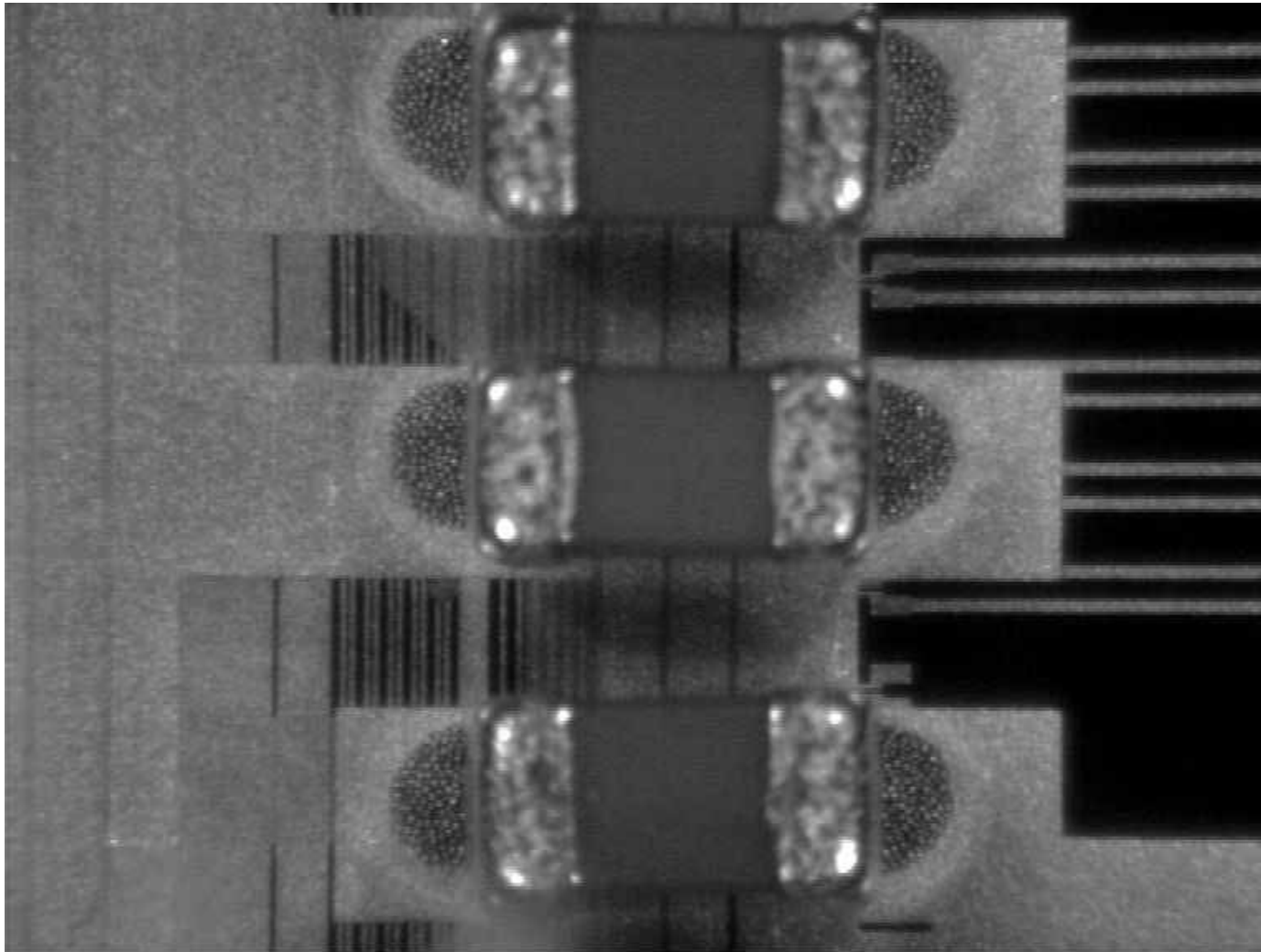
- Test at Finetech – reflow



- Videos

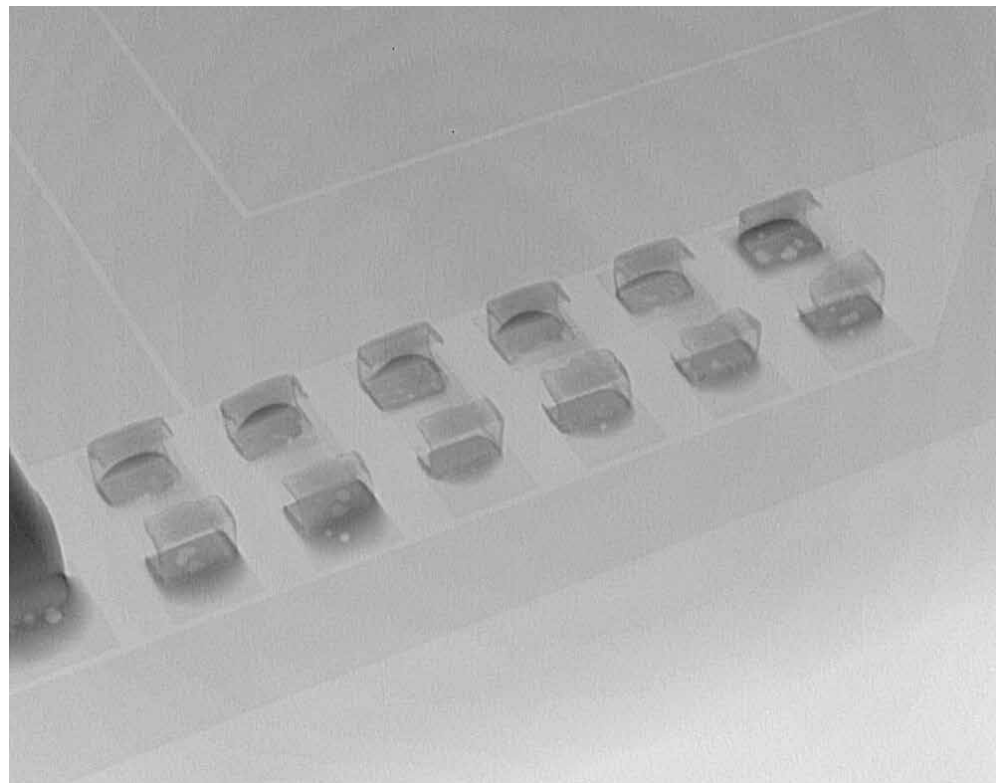
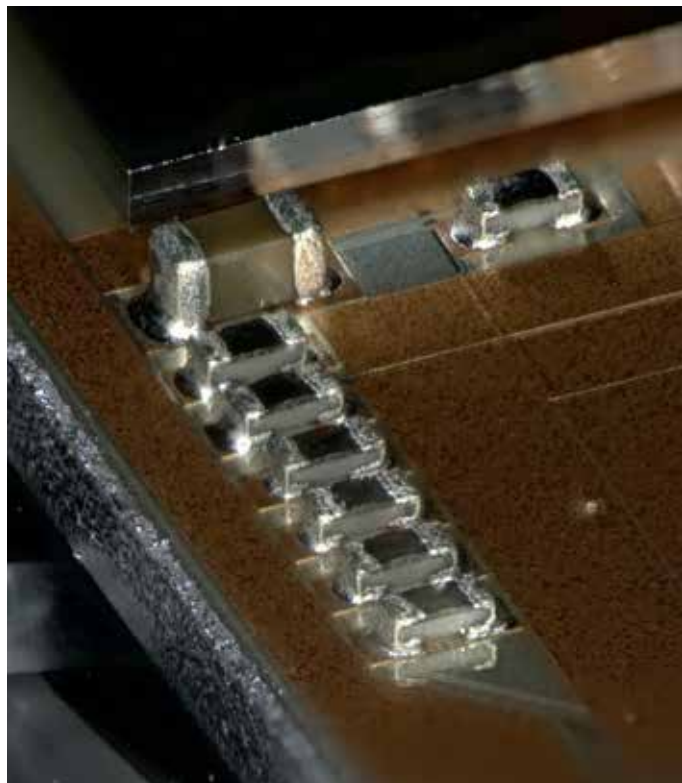


- Videos



● Results and status

- w Test at Finetech passed, "femto" is the right machine!
- w Dispense: volume has to be optimized
- w Pick&place: tool has to be re-worked (non-magnetic material..)
- w Reflow: minimize O2 content in chamber (oxidation of copper ..)



● Summary

w Work in progress ...

w Process installation at HLL 2nd week of June

9 Tests on dummy EMCM

9 Optimize

9 Prepare jigs for PXD9 modules

9 Program PXD9 layout à SMD on dummies

w Although procedure already qualified (manual SMD on all EMCM) still one open issue:

9 Thermal cycling and shear test after (before already okay..)

w (wo)man power available at HLL à would be ready for pilot run end of June