University of Nebraska Lincoln CMS Pixel Phase-I upgrade	Standard Operating Procedure SOP No.: 103 Title: **Module assembly: Gluing of HDI to BBM** Revision: v0 Date: September 10, 2014

Abstract

Describes the procedures to glue HDI on bare modules using the robotic gantry. The procedure takes place in the clean room.

Contents

I. Scope

This is a regular part in the manufacturing process of pixel modules at UNL.

II. Purpose

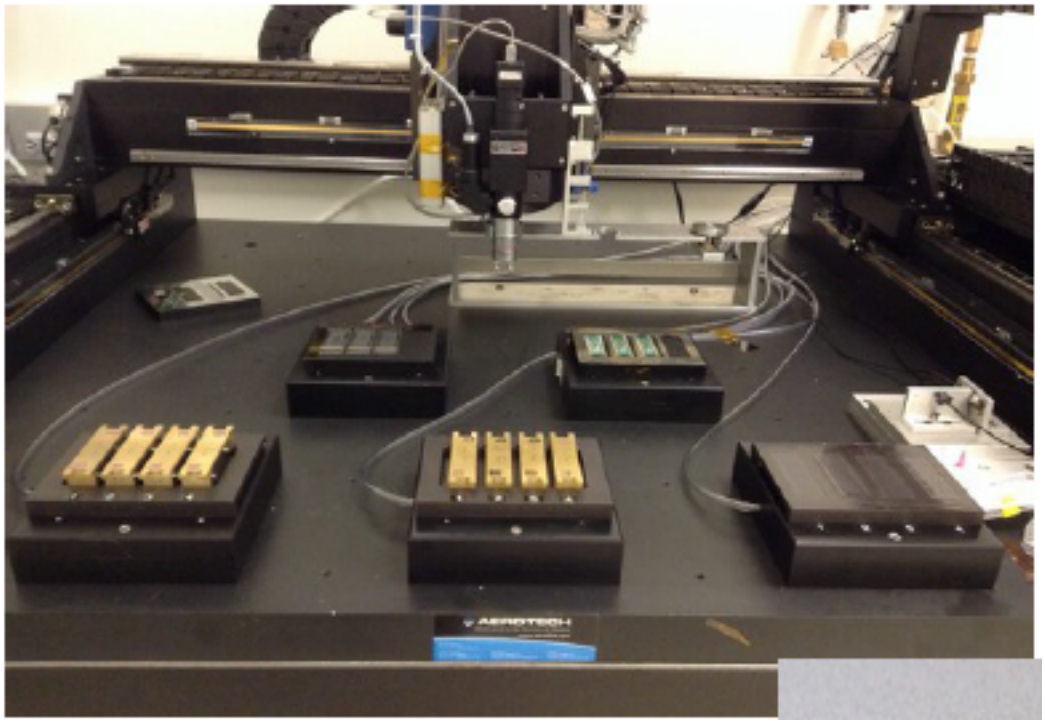
Modules require an additional

III. Definitions

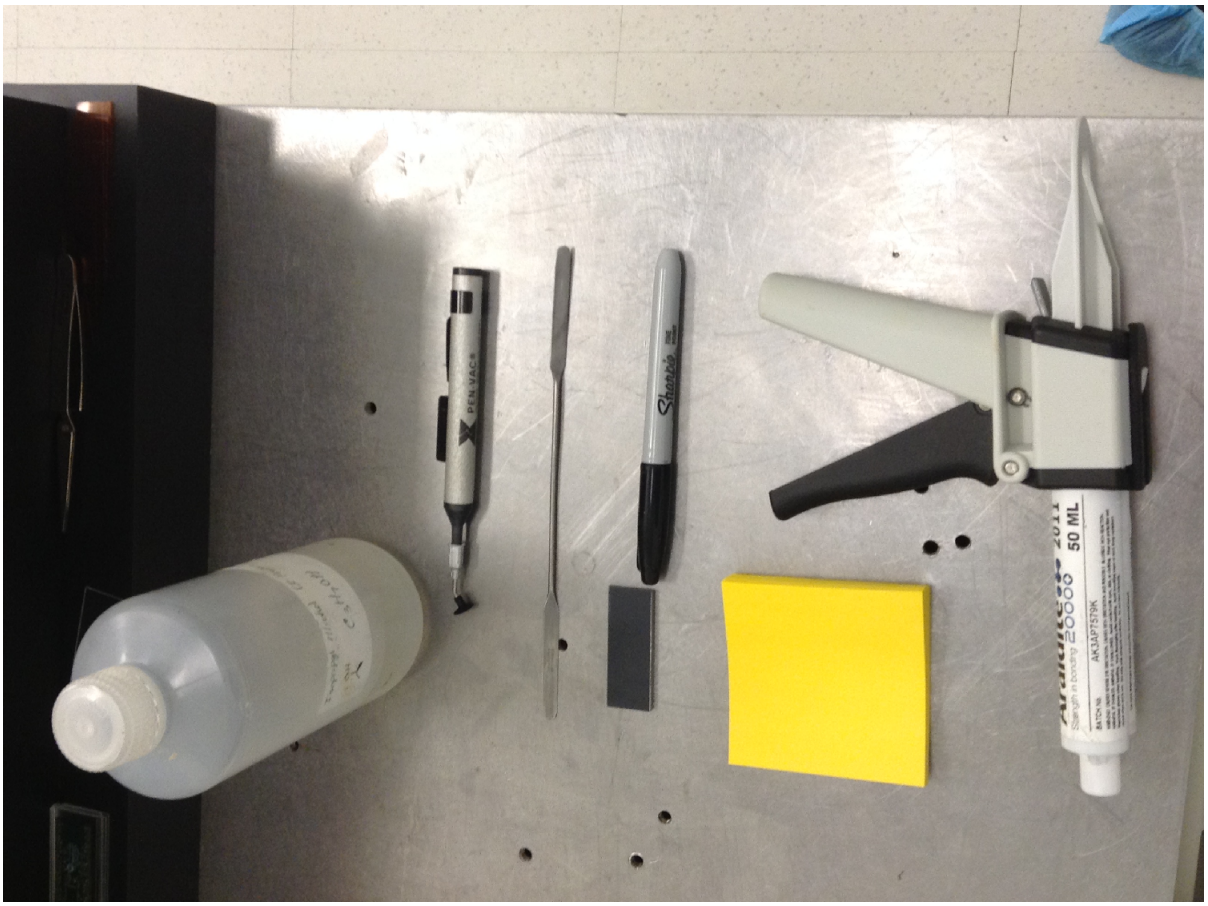
- Configuration: The glueing program can be used in 4 configurations
    1. glass + polyimide: used for testing purpose; instead of module and HDI, glass and polyimide slides are used.
    2. mocks: used for testing purpose. Module and HDI mocks are used.
    3. HDIV2 + module: for manufacturing modules using HDI V2 (rev B). May be adapted to a new HDI version.
    4. HDIV3 + module: for manufacturing modules using HDI V3 (rev C). May be adapted to a new HDI version.
- Fiducials: Reference marks used to define the orientation of the HDI's, modules and tools. Each element have 4 fiducials.
- Front panel: It is the window through which the user interact with the software. It show statistical information , status of the vacuum system, tools and elements in use and other information. Some features are:
    1. In the main front panel only two step buttons are enabled at a time: the step button and the finish button.
    2. Each step have its own front panel. Once the step button is pressed the corresponding front panel appears as a pop-up window and the main front panel becomes locked.
    3. Several pop-up windows appears along the glueing process asking for user inputs, follow the instructions given and\or provide the information needed.

IV. Responsibilities

V. Equipment



- Gantry
- Tools placed on rack: grabber and picker tool
- Chucks equipped carrier chucks for BBM, HDI, glue reservoir, stamp tools, and weight tools
- Araldite
- Post-It notes, used as surface to mix Araldite
- Spatula
- PVC squeegee, disposable
- Cleaning tools, consisting of brush and 2-Propanole; to clean glue from stamps and reservoir
- Felt tip marker, to write batch number on chuck
- Vacuum tool to release BBM from GelPak (if BBM were delivered in GelPak)



Note: the arrangement may vary as long as it matches the setup in the software

VI. Procedure

1. Perform a readiness check of the gantry:
   (a) Test presence of vaccum on the gauge, record the pressure.
   (b) Open LabView control software "Glueing_V#(main)" where # is the software version. In the Desktop, there is a shortcut to the "routine" directory; in there find the directory "Glueing V#". Use the latest version. Record version.

   $$\sim \backslash MyDocuments \backslash andres \backslash routine \backslash glueing\_V\# \backslash Glueing\_V\#(main)$$

   (c) Check the controller and power supply are turned on.
2. Pick parts from storage and identify them. Handle bare modules only with proper protection: ESD wristband, gloves, face mask. Check that the parts satisfy the quality criteria by retrieving their information in the database.
3. Assign a new batch number (`Nxxx`) and assign a unique number (`Nxxxyy`) according to the rule described in `SOP 000`.

4. Write the batch number to the BBM chuck on an edge for further identification.
5. Place the BBM on the chuck. Check if it(they) is(are) correctly aligned with the stencil.
6. Place the HDI on the chuck. Check if it(they) is(are) correctly aligned with the stencil.
7. Place at minimum the required number of stamp tools and weight tools on the respective chucks.
8. Run the control sotfware ($Glueing\_V\#(main)$) and provide the information required in the pop-up windows:
   (a) Adjust configuration in software to reflect positions in use.
   (b) identification of the HDI's and modules.

   Supervise progress and stop if needed (using the RED stop button in the joystick), especially when modules are at risk.
9. Run pattern recognition step (find fiducials button). Check if locations found are sound (statistical information in the front panel must be used for this purpose). The image showed as template gives an idea of what to look for.
10. Prepare Araldite:
    (a) Record batch number of Araldite.
    (b) Place a hazelnut-sized amount of Araldite (syringe provides both components at once) on Post-It note.
    (c) Mix glue for one minute using the spatula.
    (d) Place a portion of the glue on all the required positions of the glue reservoir. Evenly distribute and smoothen the surface using the disposable PVC squeegee.
    (e) Coarsely clean spatula, dispose off Post-It note and squeegee.
11. Run apply glue step (glue button). Some choices have to be done through pop-up windows. Comments and observations can be written anytime during the step execution.
12. Run pick and place step (pick & place button). Some choices have to be done through pop-up windows. Comments and observations can be written anytime during the step execution.
13. Run pattern recognition after glue step (find fiducials after gluing button). Some choices have to be done through pop-up windows. Comments and observations can be written anytime during the step execution.
14. Run put weight step (weight button). Some choices have to be done through pop-up windows. Comments and observations can be written anytime during the step execution.

15. Run the finish step. (finish button). Final comments and observations can be written in a pop-up window.

16. Press the "create report and finish" button to generate the final report; some information have to be provided in a pop-up window.

17. At the end of the full cycle, remove chuck with stamp tools and clean them thorougly using water and 2-propanole at sink outside the cleanroom. Let them dry and bring back to gantry.

18. Document all actions even if the curing time may not be over.

19. Finished modules shall not be handled for at least 2 hours.

20. Weight tools may be removed using the gantry after 2 hours of curing time but modules need to remain protected from any mechanical stress for a total curing time of 8 hours.

21. At the discretion of the operator, the remaining curing time can take place off the gantry provided the modules are still placed on the original chuck, on a level surface inside the cleanroom. The storage cabinets are not suitable for this (outgasing of glue). Such removal from the gantry needs to be documented.

VII. Documentation

The following information is recorded in the report generated by the glueing software:

- Date, time (start–end) and operator name
- LabView software: version
- Id of parts used:
  - HDI: S/N
  - BBM: identification on box plus identification according to naming convention
  - UNL batch number

Find the report at $\sim \backslash MyDocuments\backslash andres\backslash routine\backslash reports$. Any special observations, e.g. damage to parts not already recorded during visual inspection, deviations from normal procedures, can be added to the report, just open it and add the info. Publish it in the UNL logbook. Purdue database: Status of BBM and HDI need to be updated.