Assembly/Testing: Panels & ½ Disks

Outline:

1. Parts and adhesives
2. Procedures
3. Fixtures
4. Quality assurance:
   part inspection and testing
   survey
5. Testing and repairs

Assembly/Testing: Panels & ½ Disks

Panel parts:

HDI flex;
beryllium panel;
plaquettes;
bias wires;
Kapton tape.

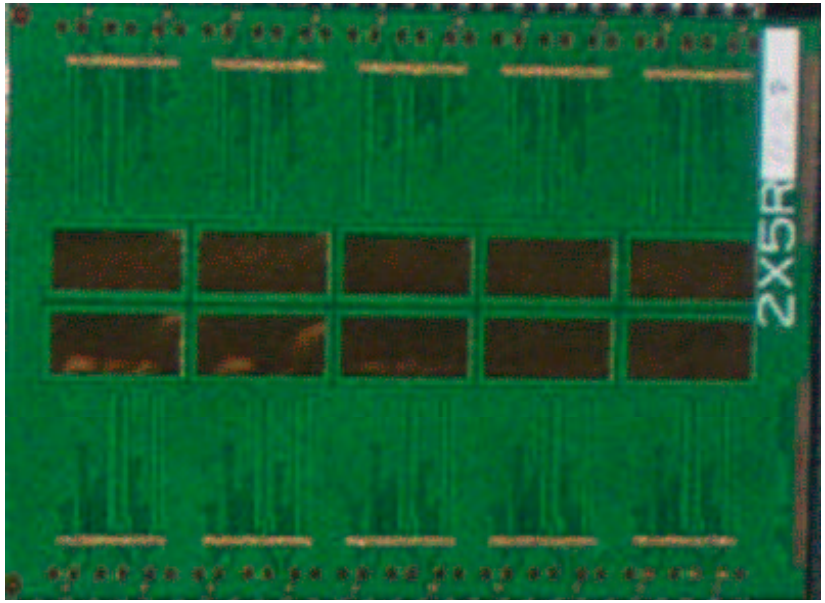
Adhesives:

Cho-Therm 1680 &3M9882 adhesive tape:
R&D has been completed;
silver epoxy;
HEXEL epoxy;
encapsulant Sylgard 186: R&D has been completed.

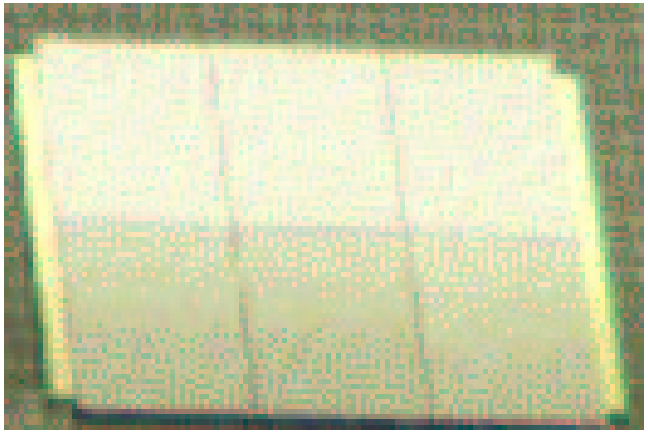
Assembly/Testing: Panels & ½ Disks

Plaquette parts:

VHDI laminated on silicon (200 micron)



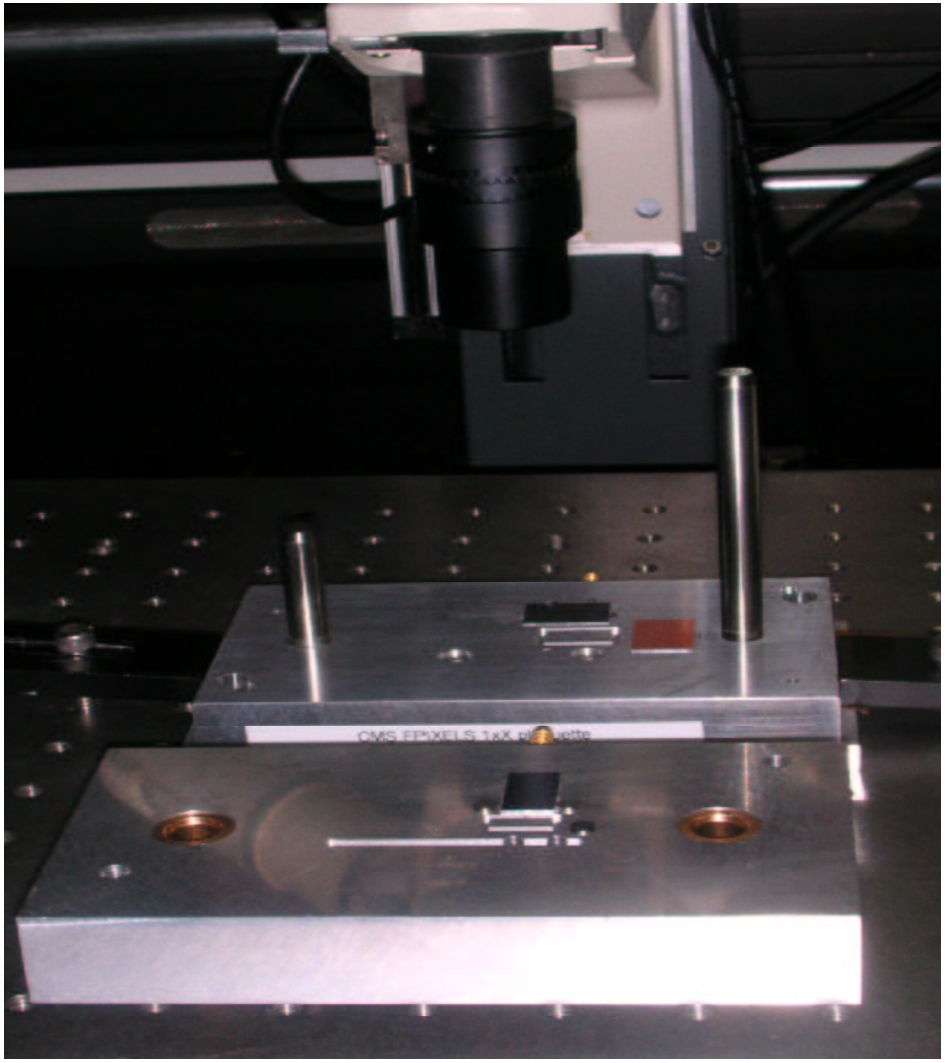
bump-bonded module



Assembly/Testing: Panels & ½ Disks

Plaquette assembly:

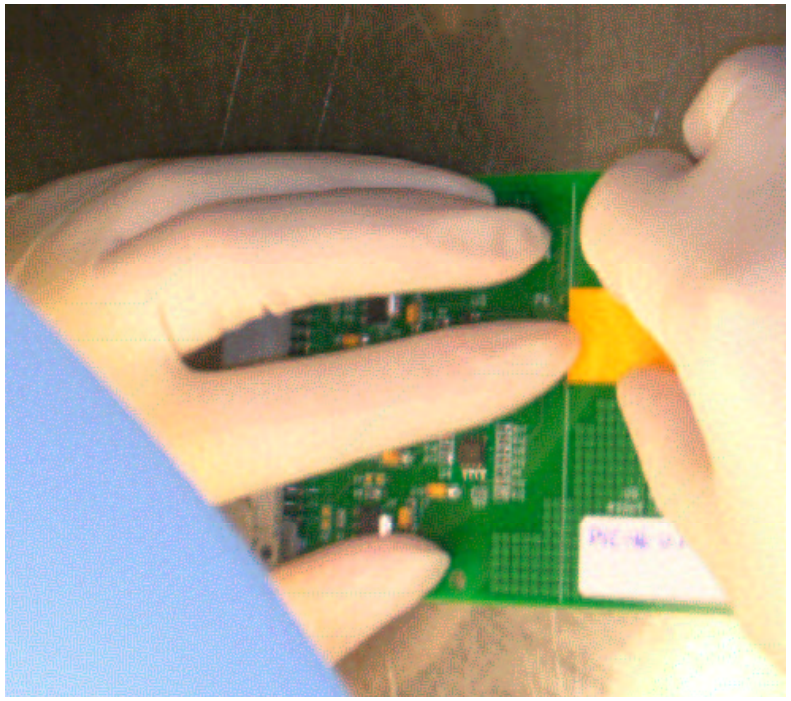
assembly fixture on the OMIS CMM



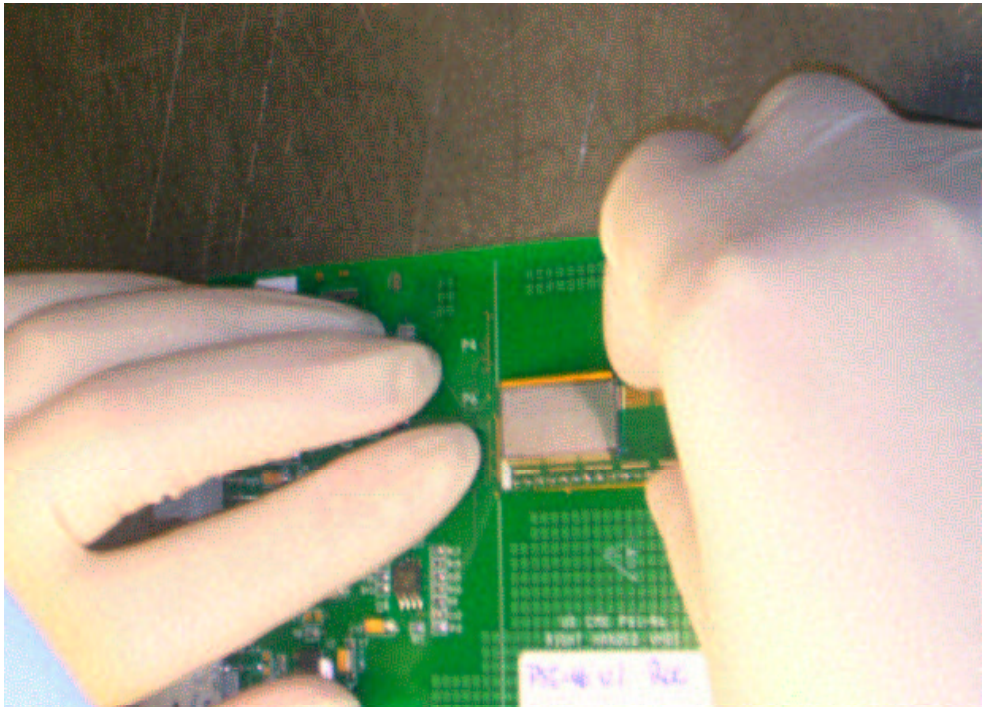
Assembly/Testing: Panels & ½ Disks

Plaquette assembly on test boards

Application of adhesive

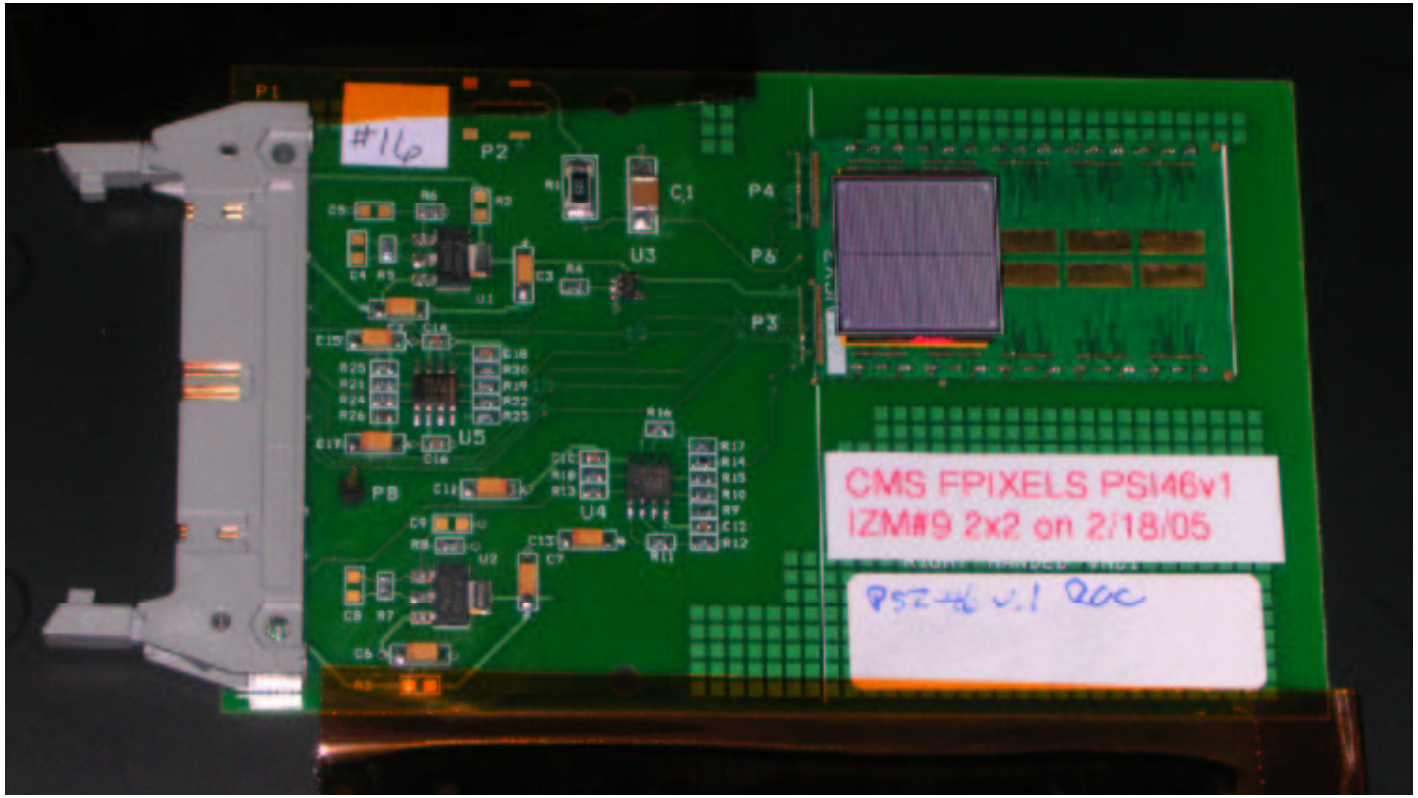


Attachment of plaquette



Assembly/Testing: Panels & ½ Disks

Plaquette installed on the test board:

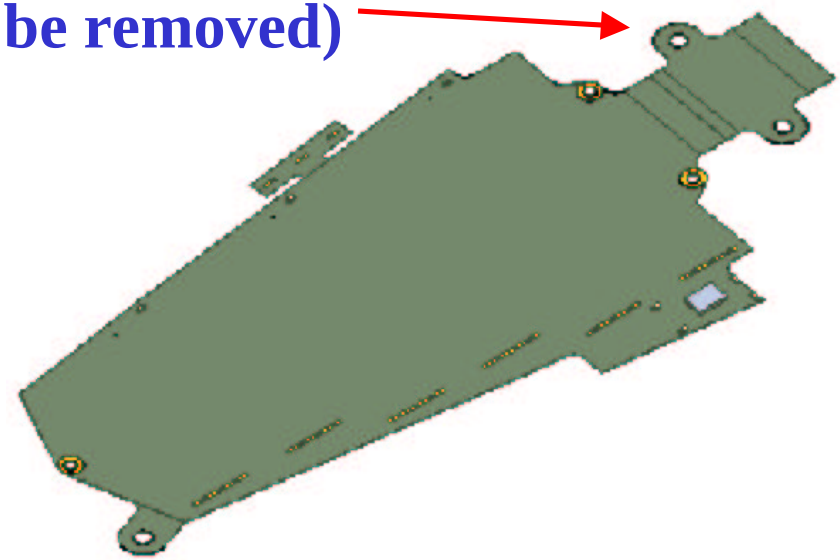


Assembly/Testing: Panels & ½ Disks

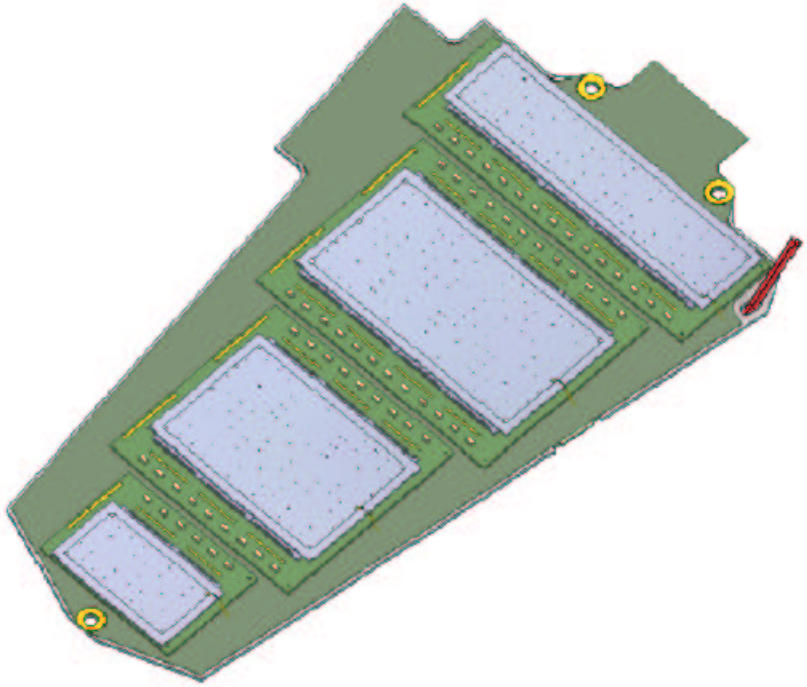
Panel:

Panel HDI flex circuit:

Tail for testing (to be removed)



Assembled panel:



Assembly/Testing: Panels & ½ Disks

½ disk parts for assembly:

panel of 4 types: 3R,3L,4R,4L;
cooling channel with outer ring;
inner ring;
screws.

No adhesives required:

using screws for simplification of installation and repairs

Assembly/Testing: Panels & ½ Disks

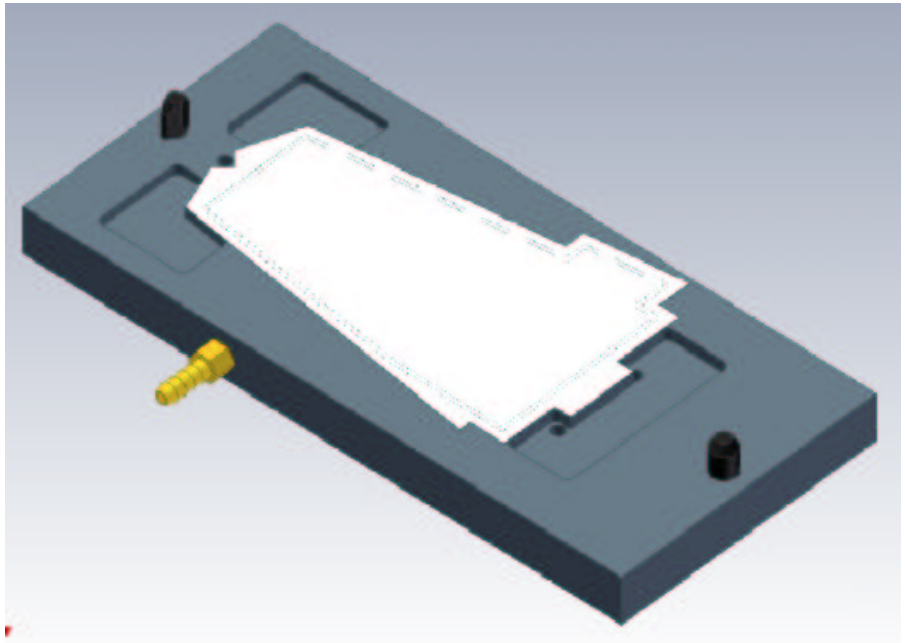
Panel assembly procedures
(working on instructions and details):

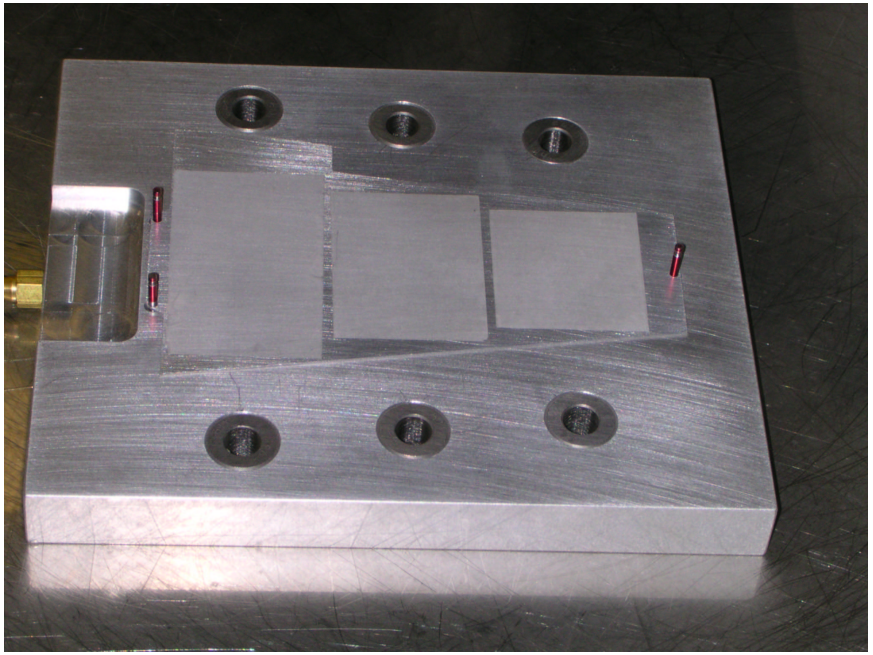
parts inspection and control;
cleaning;
HDI lamination;
bias wire attachment;
HDI electrical testing;
plaquette installation;
wirebonding;
storage;
testing.

Assembly/Testing: Panels & ½ Disks

Panel assembly fixtures:

HDI-panel lamination **Plaquette installation (adhesive application)**

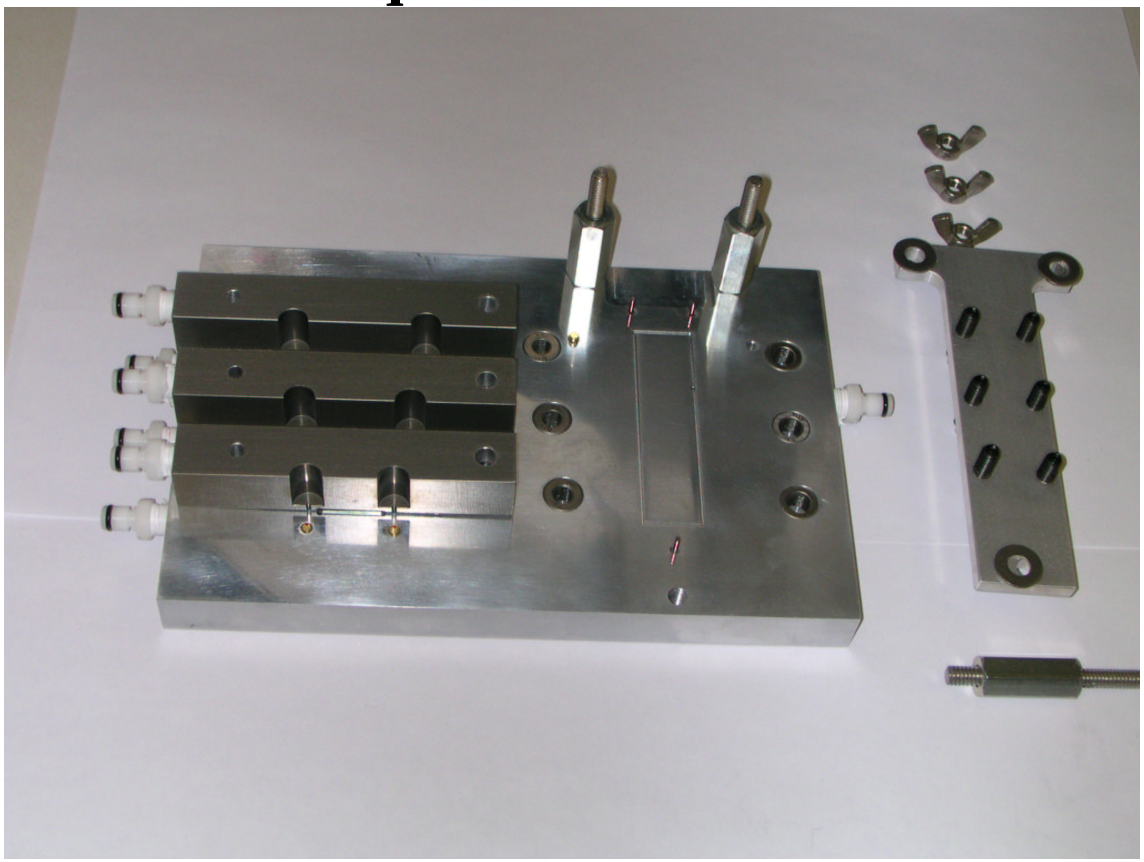




Assembly/Testing: Panels & ½ Disks

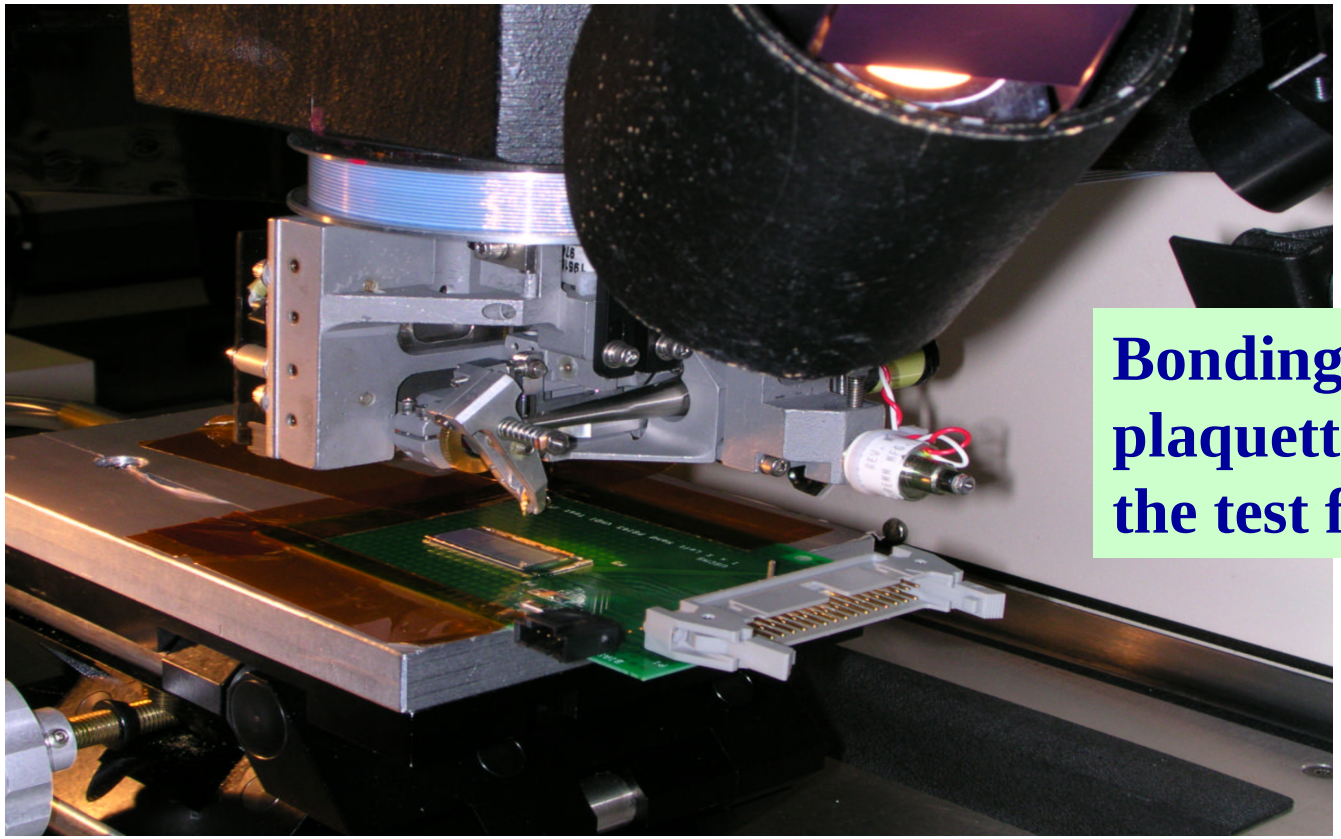
Panel assembly fixtures:

Plaquette installation



Assembly/Testing: Panels & ½ Disks

Panel wire bonding between Plaquette – HDI and TBM- HDI (K&S1478 bonding machine is used):



Bonding plaquette to the test fixture

Assembly/Testing: Panels & ½ Disks

Panel wire bonding:

Plaquette – HDI.

K&S159 bonding machine is used

Testing and burning in:

(addressed in other presentation)

Wire bond encapsulation:

wire bonding inspection/repair;

panels:

wire bonding inspection/repair;

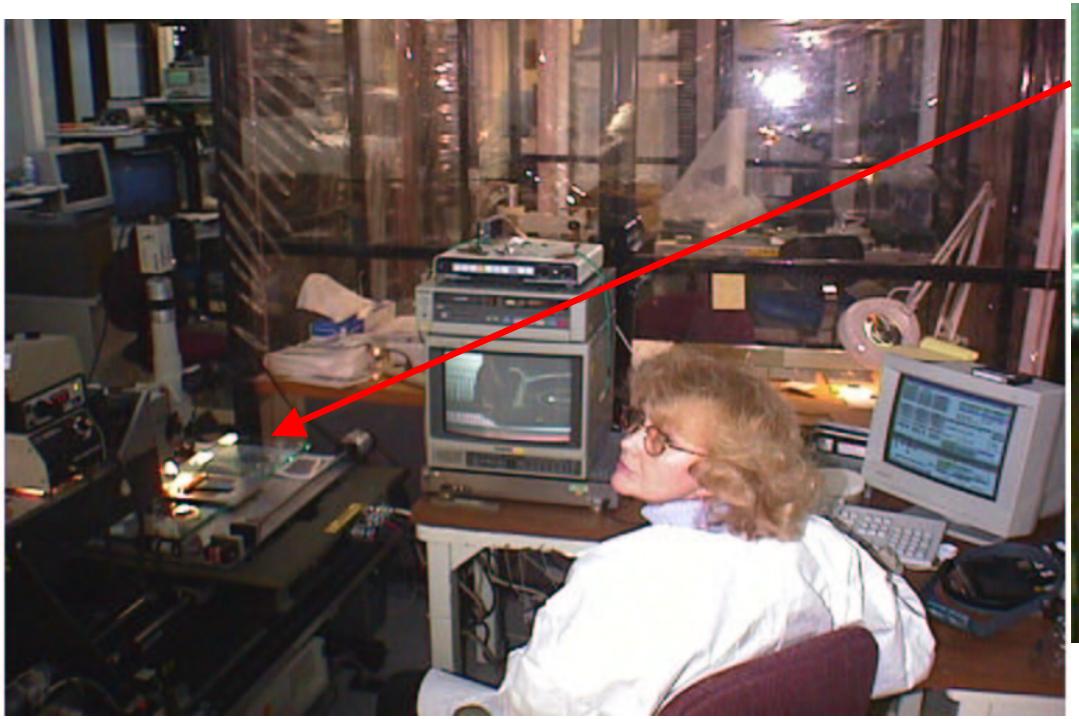
substrates, VHDI and HDI laminations:

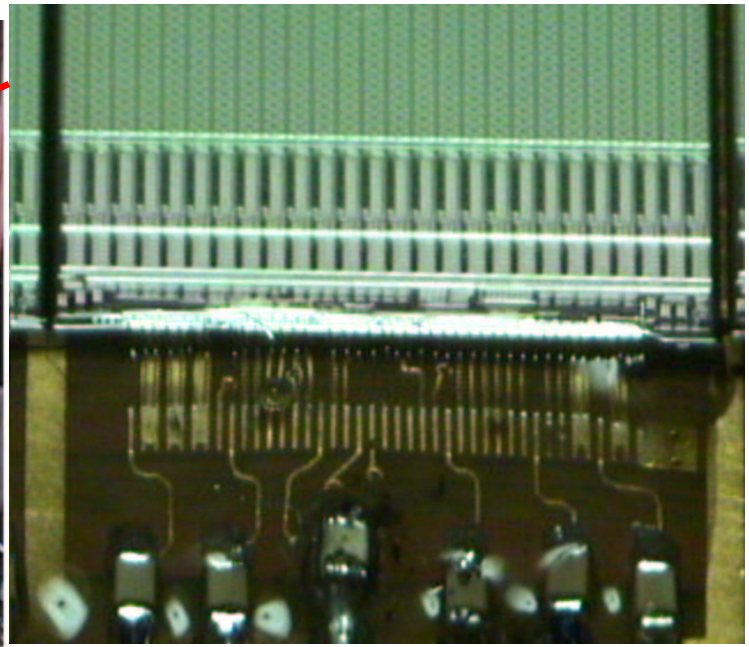
replace plaquettes on panels

Assembly/Testing: Panels & ½ Disks

Wire bond encapsulation:

Sylgard-186 encapsulant is applied to VHDi and HDI wire bonds with semi-automatic machine





Blow-out of encapsulated ROC on VHDI

Assembly/Testing: Panels & ½ Disks

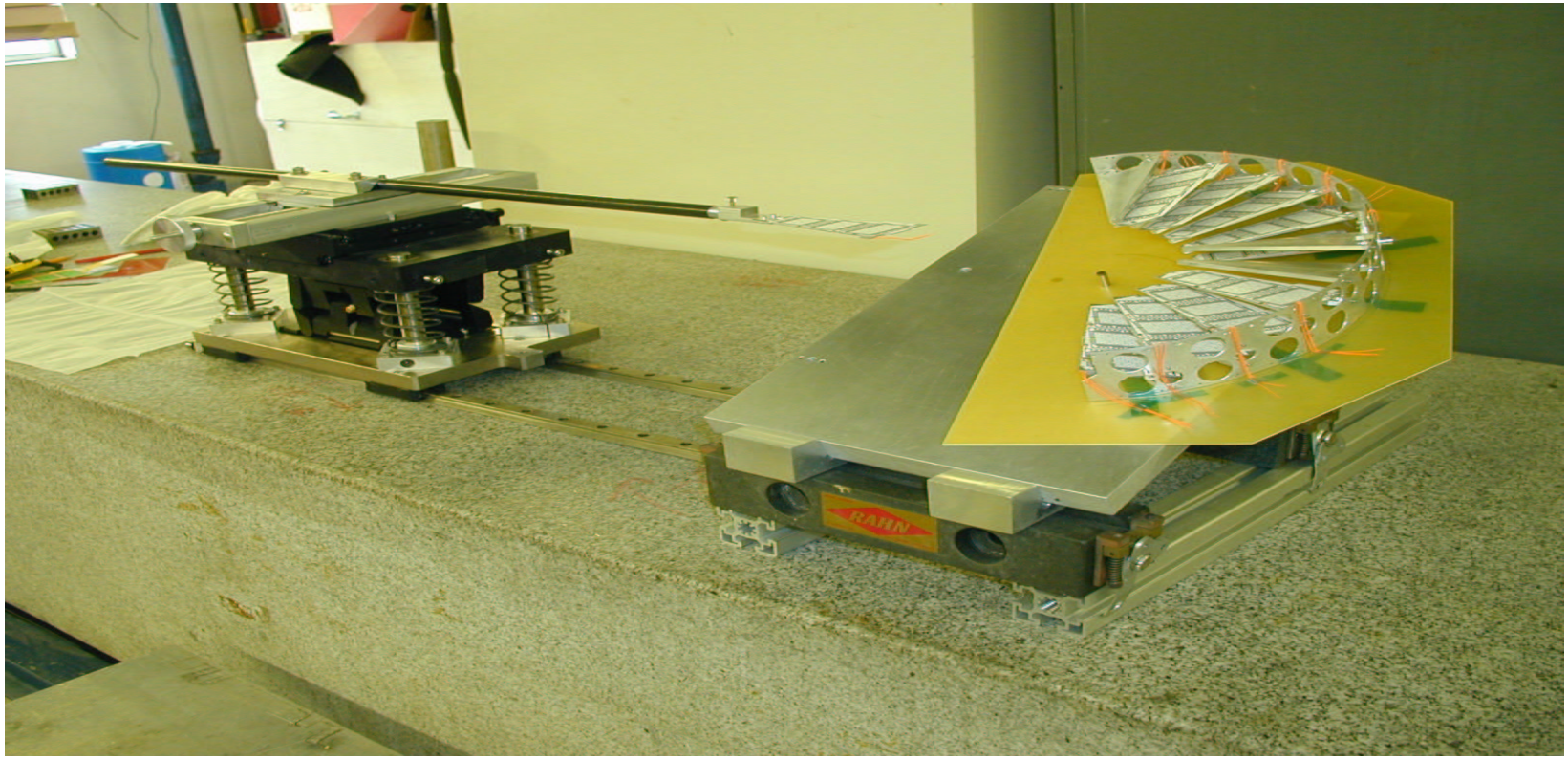
½ disk assembly procedures:

installation and alignment of cooling channel with outer shell;
installation and connection of panels;
installation of inner shell.

Assembly/Testing: Panels & ½ Disks

½ disk assembly procedures:

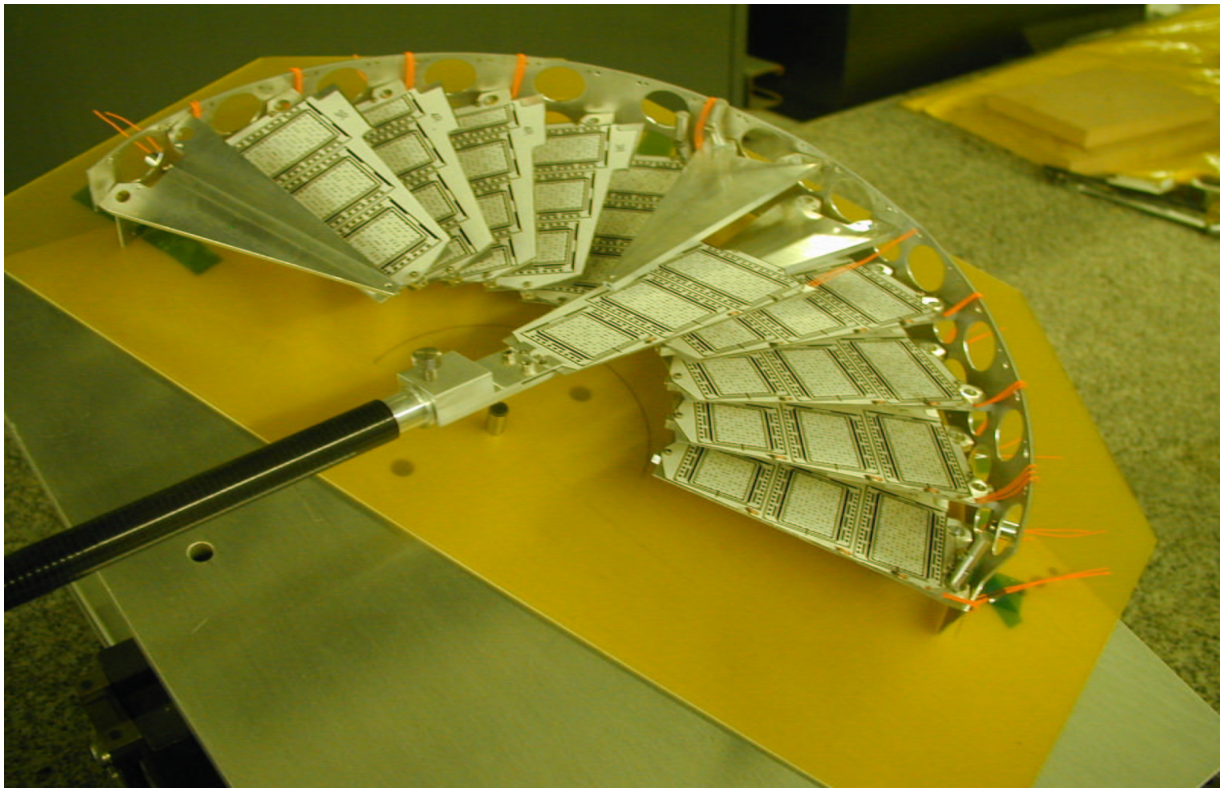
installation and connection of panels



Assembly/Testing: Panels & ½ Disks

½ disk assembly procedures:

installation and connection of panels



Assembly/Testing: Panels & ½ Disks

Quality assurance:

visual inspection of parts:

bump bonded modules, flex circuits, silicon and beryllium substrates;

mechanical control measurements:

substrates, VHDI and HDI laminations;

electrical testing:

VHDI and HDI flex circuits, plaquettes;

Assembly/Testing: Panels & ½ Disks

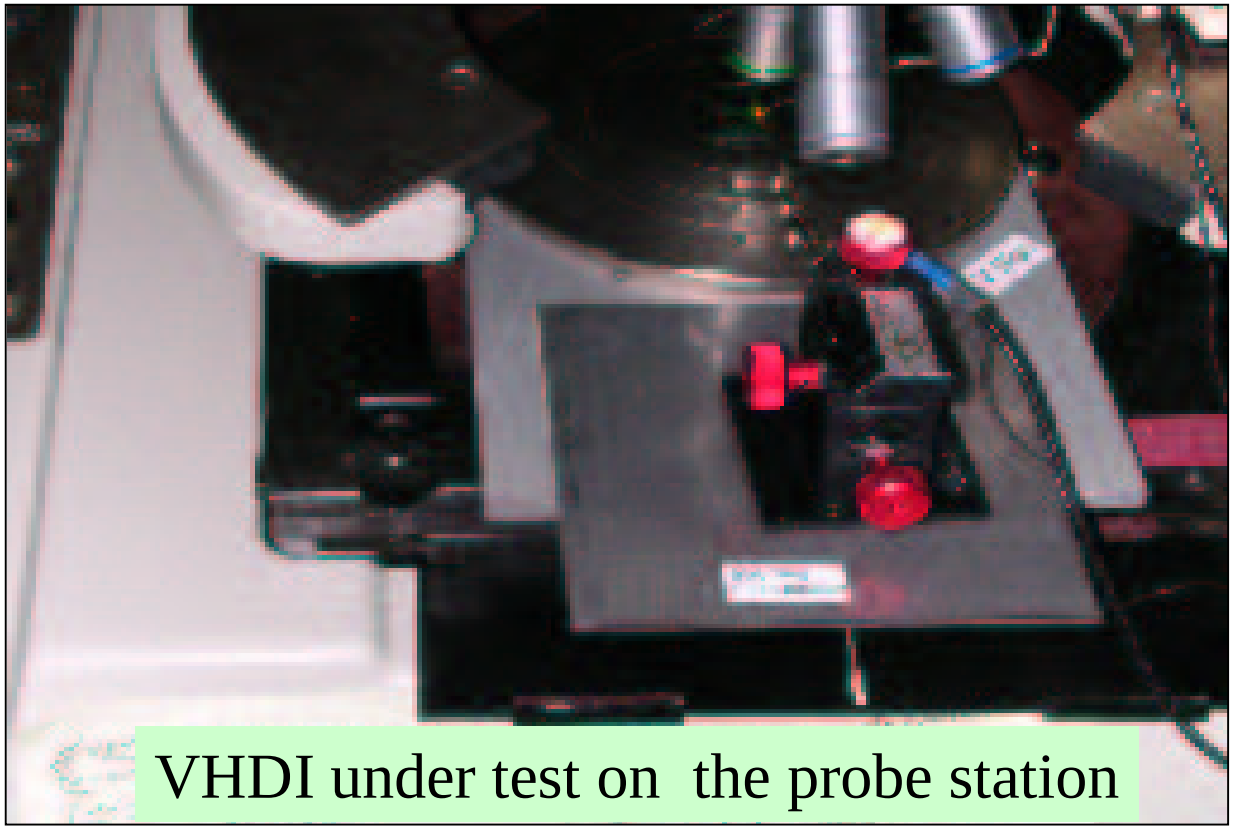
Quality assurance:

electrical testing of VHDI flex circuit with a probe station:

Assembly/Testing: Panels & ½ Disks

Quality assurance:

electrical testing of VHDI flex circuit with a probe station:

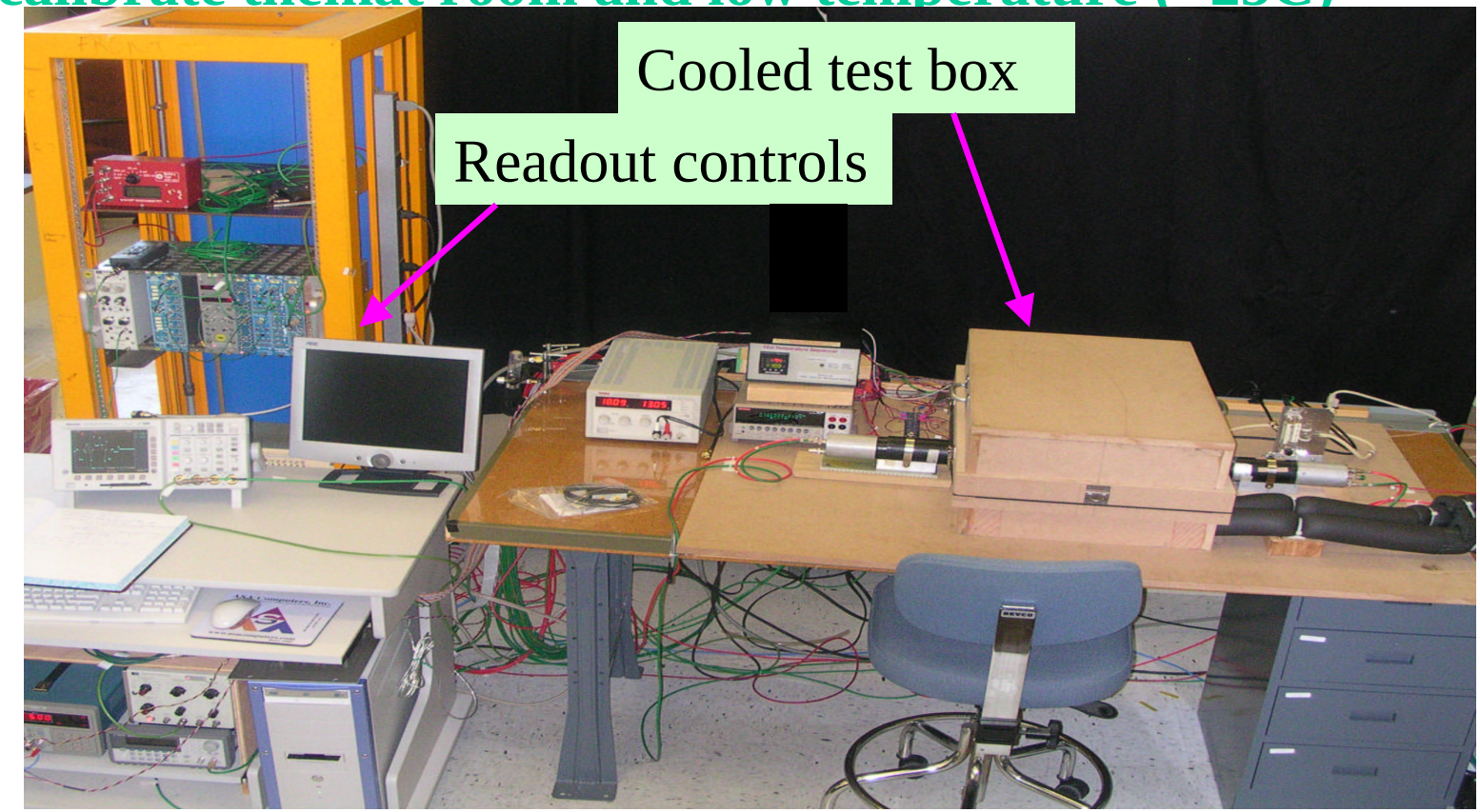


VHDI under test on the probe station

Assembly/Testing: Panels & ½ Disks

Status of testing at Fermilab:

the test stand to test bump-bonded modules with source and calibrate themat room and low temperature (-25C)



Assembly/Testing: Panels & ½ Disks

Repairs:

plaquettes:

wire bonding inspection/repair;

panels:

wire bonding inspection/repair;

substrates, VHDI and HDI laminations:

replace plaquettes on panels

Assembly/Testing: Panels & ½ Disks

Summary:

all assembly procedures are defined;
most fixtures are designed;
pre-production assembly is under way.