



Crystals in Bag

- ◆ Individual crystals received vacuum bagged within a aluminum angle.
- ◆ Crystals stored in bags with desiccant and humidity indicators on a flat plate.



CDE MRR Slide Show - 1



Crystal on Handling Carrier

- ◆ Crystal carrier used to move crystals, whenever practical.



CDE MRR Slide Show - 2



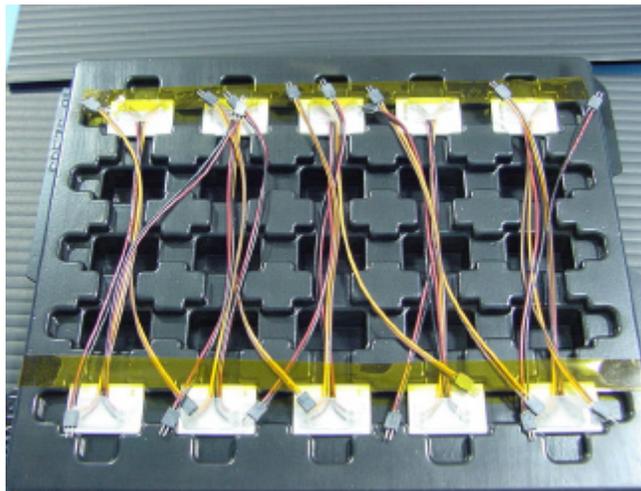
Inspection of Crystal

- ◆ Prior to bonding, crystal is visually inspected for any unusual condition and flatness is verified.



Unpackaging PDAs

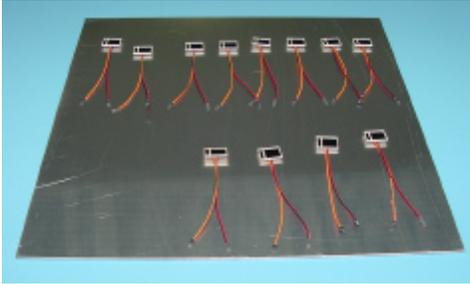
- ◆ PDAs partially unpackaged.





Bake-Out PDAs

- ◆ PDAs prior to oven drying. PDAs set-up and ready to be dried.



PDAs Ready for Oven

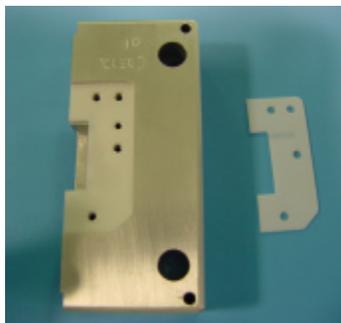


PDAs in Oven

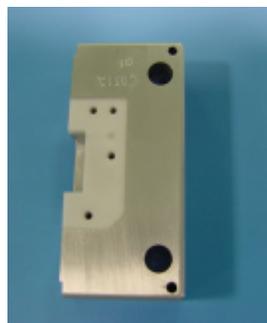


Mask & Seal in Mold

- ◆ Placement of mask and seal over one half of the mold.



Mask in Mold

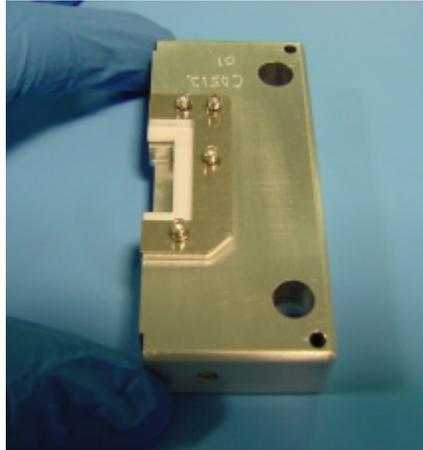


Mask & Seal in Mold



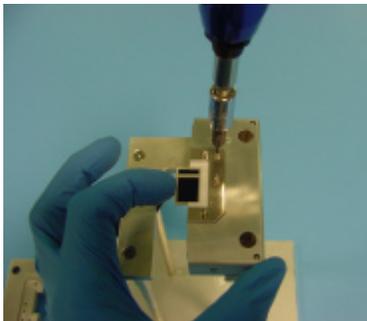
Clamp Mask & Seal

- ◆ Clamp lightly fastened over mask and seal.

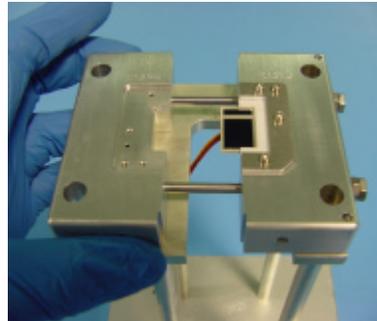


Place PDA in Mold

- ◆ Mold assembly moved to workstation. PDA being installed and fastened in place. Second half of mold joining first half.



Torque Clamp

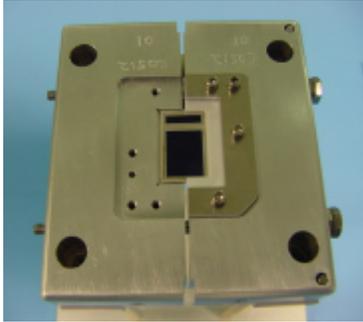


Join Mold Halves

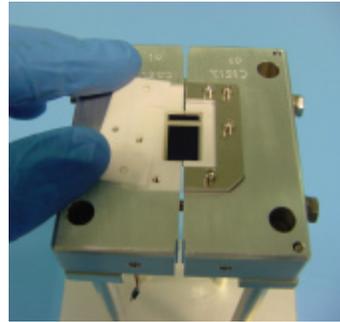


Place Mask & Seal in Second Half of Mold

- ◆ Mask and seal being assembled to second half of mold.



2nd Half Ready for Seal & Mask

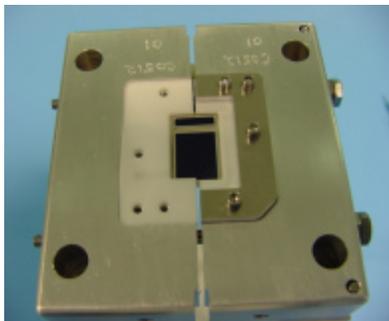


Install Seal & Mask

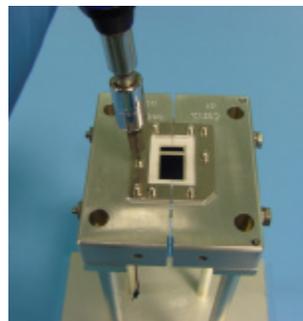


Clamp Second Mask & Seal

- ◆ Mask and seal being assembled to second half of mold.



Seal & Mask in Place

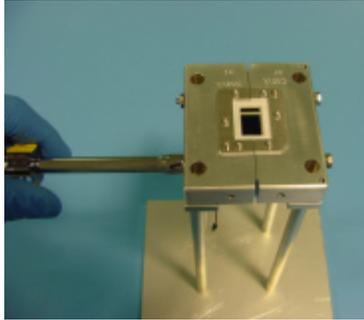


Torque Clamp

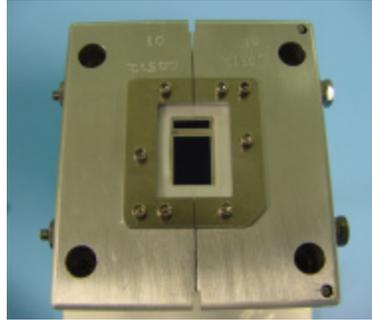


Secure Mold Halves

- ◆ Mold assembly being completed.



Tighten Pin Bolts

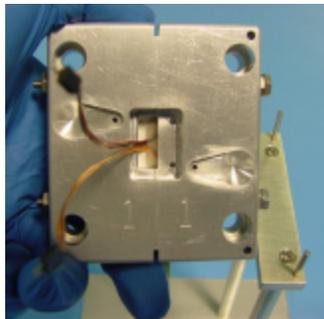


Mold Assy Complete (less Wire Holder)

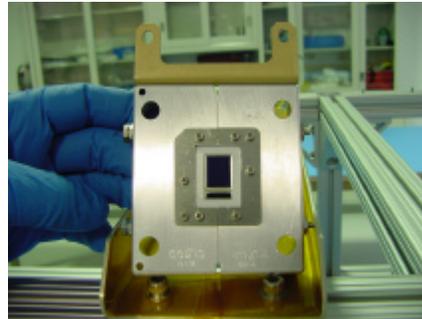


PDA in Mold

- ◆ View of PDA installed in mold assembly. View showing wire protector installed.



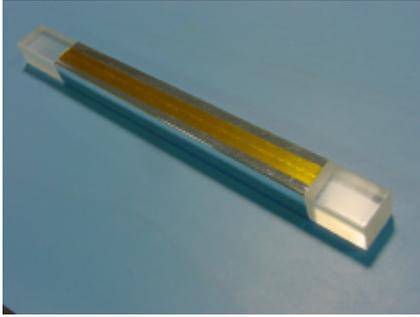
View from Bottom



Complete Mold Assy



Prepare Crystal for Support



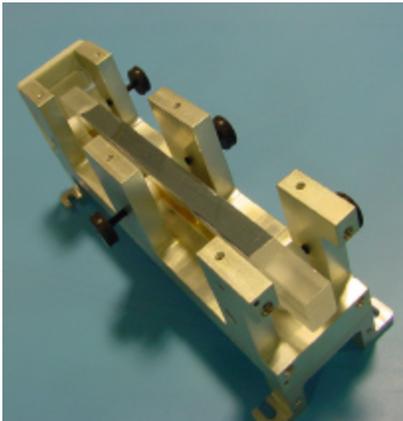
Protective Wrap on Crystal



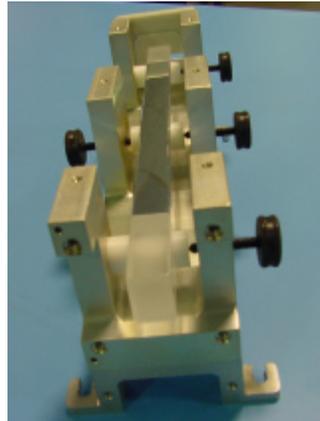
Support Tool



CDE Support Tool



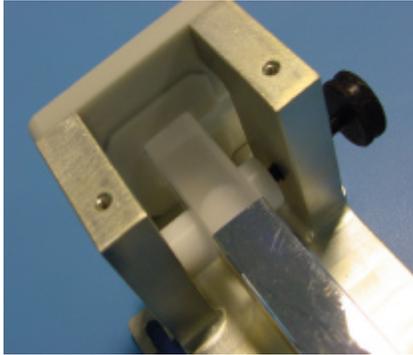
Crystal in Support



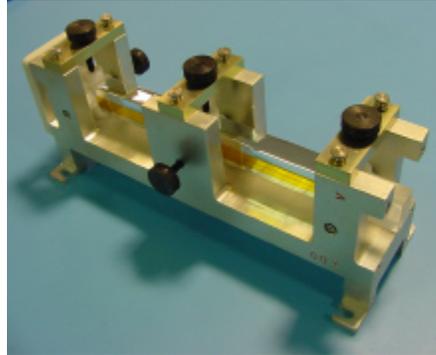
Crystal in Support



Crystal in Support



Crystal Against Backstop



Crystal in Support



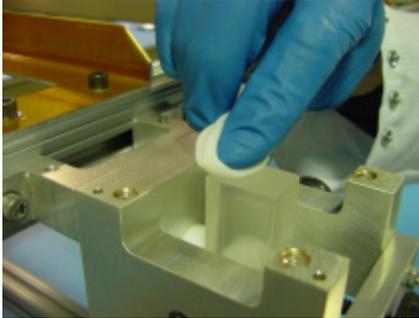
Support Tool on Workbench



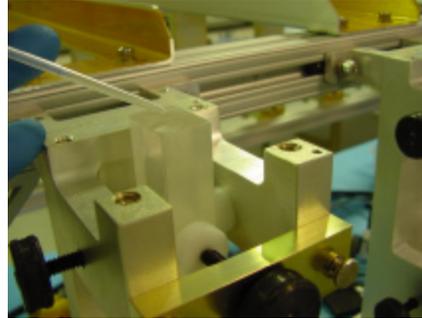


Prime Crystal

- ◆ Crystal being solvent wiped clean with 100% (200 proof) ethyl alcohol and clean room quality wiper. Crystal being primed.



Clean End of Crystal



Apply Primer

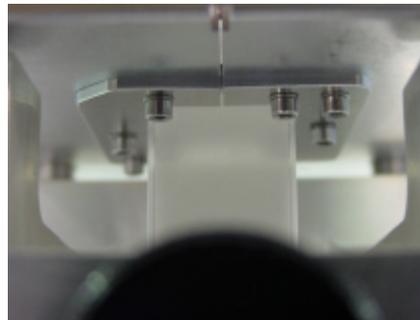


Assemble Crystal with Mold on Support Tooling

- ◆ Mold assembly fastened to crystal support channel and ready for injection bonding. View of crystal joining mold assembly.



Note Wire Holder



Detail of Mold on Crystal

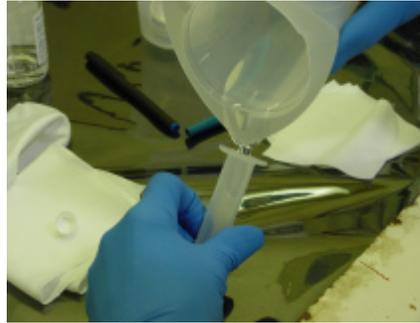


Prepare for Injection of Adhesive

- ◆ Group of tools set-up and ready for injection bonding. Syringe being filled with DC93-500 adhesive.



Set of Tools



Filling Syringe

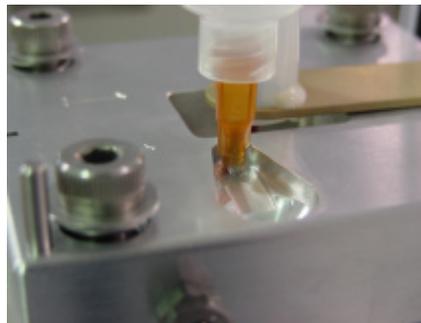


Inject Adhesive

- ◆ Bond being injected.



Injecting Adhesive



Detail View



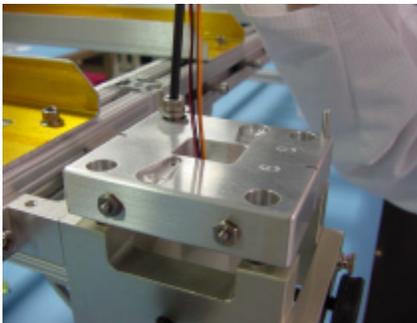
Mold Disassembly

- ◆ Disassembly. Removing wire protector after cure.

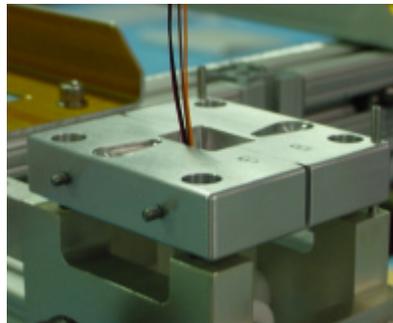


Mold Disassembly (cont.)

- ◆ Wire holder removed and pre-load fasteners being removed.



Removing Fasteners



Ready for Disassembly

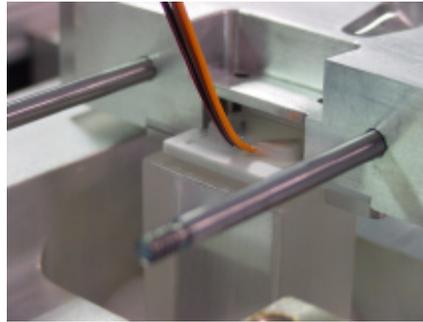


Mold Disassembly (cont.)

- ◆ Removing first mold half while other half is still pinned in place.



Separate Mold Halves

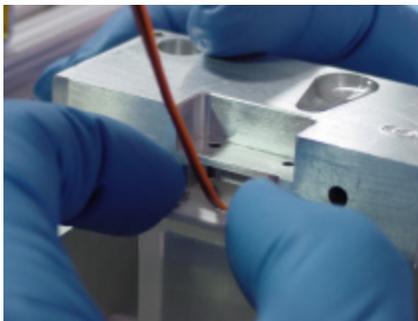


First Half Removed



Mold Disassembly (cont.)

- ◆ Removing second mold half.



Removing Mold from CDE



Different View



Remove Tool from Workbench

- ◆ Remove tooling from workbench
- ◆ Move backstop to second side
- ◆ Repeat tool setup and adhesive injection for second end of Crystal



Remove Tool



Switch Mold to Second end of Crystal



Ready for Day 2 Bond

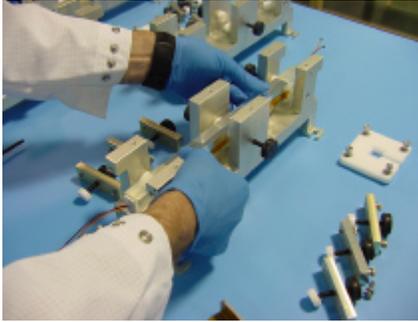
- ◆ “Day one” side changed over and ready to be mounted back onto workbench.





Day 2 Bond Complete

- ◆ “Day two” side complete and being removed from tool for complete cure.



Remove CDE from Tool

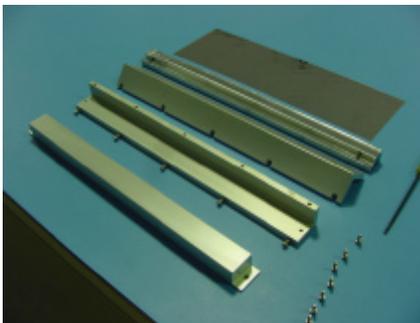


Set CDE Aside for Cure



Wrap Forming

- ◆ Wrapper Forming Tool



Tool prior to Assembly



Assembling Tool with Film



Wrap Forming (cont.)

- ◆ Wrap tool assembled and formed wrap after cure.



Wrap Tool



Formed Wrap

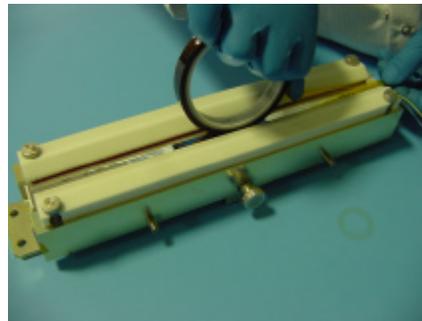


Wrapping CDE

- ◆ Taping wrap seam



CDE in Wrap Tool



Tape Seam

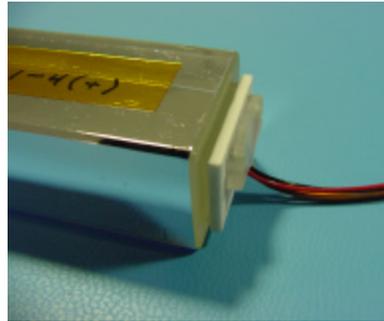


Wrapping CDE (cont.)

◆ Detail of wrapping tape seam



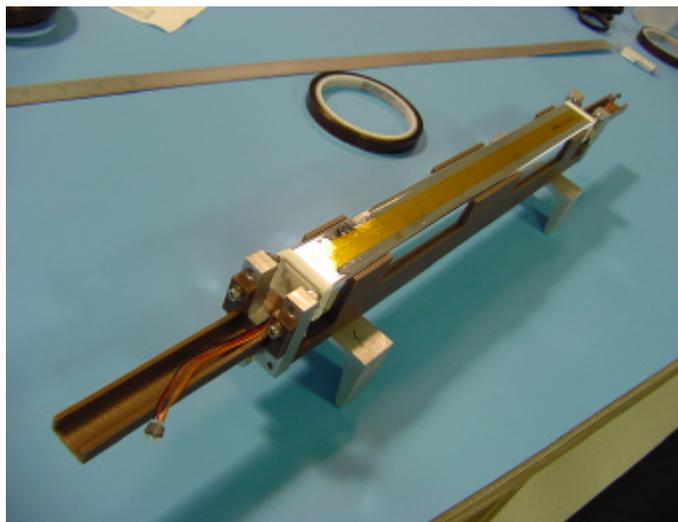
Taping Seam



Detail

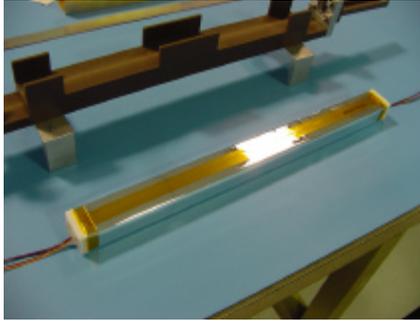


Apply End Cap

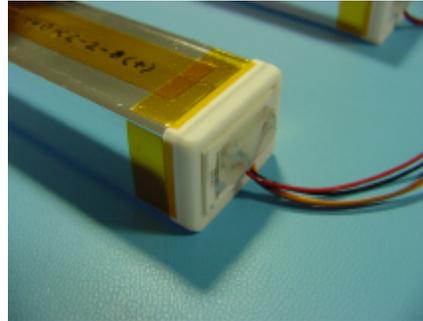




Complete CDE



Complete CDE

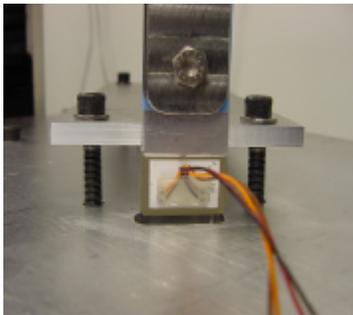


Detail

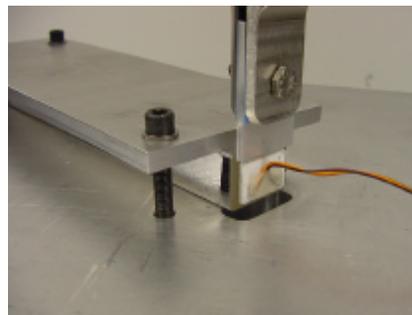


Shear Test of PDA Bond

◆ Shear test setup



PDA ready for Shear Test



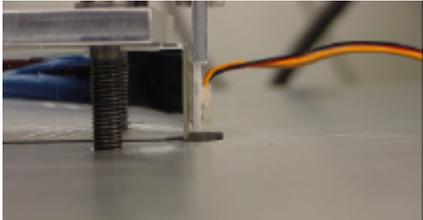
Different View



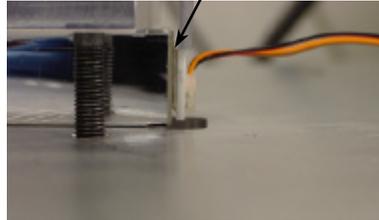
Shear Test of PDA Bond (cont.)

◆ Shear test in-process

Note deflection of PDA relative to Crystal prior to bond failure



Side View



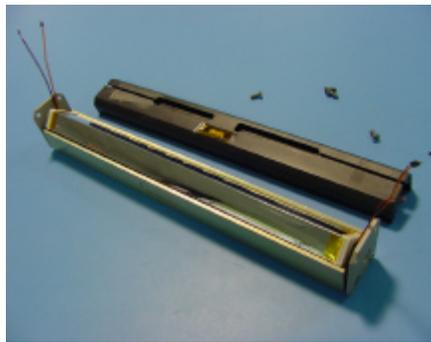
Side View



Shipping Tooling



Tool without CDE



Tool with CDE



Shipping Tooling (cont.)



Shipping Tool Closed



Tool in Bag



Shipping Container



One CDE in Container



Container with Lid