



List of Materials for Initial Setup of Immersion Glass technology

Green Color Designates – “ Lexus Standard Shipment”		
Yellow Color Designates – “ Available in Local Market – Lexus can ship at an extra cost (Shown Approx in €), if required)		
Red Color Designates – “ Available in Local Market – Lexus cannot supply due to restrictions)		
Apparatus to be provided by Lexus		
Immersion Heater ³		Lexus (Standard Shipment)
Temperature Controller ³		Lexus (Standard Shipment)
iG HASP for M-Box		Lexus (Standard Shipment)
Immersion Glass ¹		Lexus (7 € Per Gram)

¹ Initially a fixed amount of glass will be provided by Lexus. For further quantity, have to be purchased separately at Euro 7 per Gram.








Immersion Moulds ² (12 Pcs)		Lexus (€ 50 to € 150 depends on Size)
Stand for Multiple Moulds		Lexus (Standard Shipment)
Teflon Funnel		Lexus (Standard Shipment)
Teflon Melting Funnel		Lexus (Standard Shipment)
Teflon Melting Bowl		Lexus (Standard Shipment)
Diamond Holder pin		Lexus (Standard Shipment)

² Lexus will provide standard set of Moulds (5 Nos.) Additional Moulds have to be purchased separately.


³ Glass / Rubber / Electric parts do not carry any guarantee or warranty.



Miscellaneous Hardware (Allen key, Spanner etc.)		Lexus (Standard Shipment)
Colin Glass Cleaner ³		From Local Market (€ 5)
Acetone		From Local Market [we can't supply overseas]
Ultrasonic Cleaner ³		From Local Market Made in China (Approx. cost € 95)
Red RTV Silicon Gasket Maker		From Local Market (€ 5 per tube of 85 Grams - Easily Available in Automobile store)

³ Colin water must not be diluted with water/distilled water. It must be used it is available in concentrated form.









<p>Borosilicate Beakers 5pcs X 25ml, 5pcs X 50ml, 2pcs X 200ml³</p>		<p>From Local Market (Glass beakers - Various size Approx. cost € 10 / Pcs)</p>
<p>Tweezers</p>		<p>From Local Market (€ 4)</p>
<p>Paper Cutter</p>		<p>From Local Market (€ 2)</p>
<p>Cutting Blades</p>		<p>From Local Market (€ 2)</p>
<p>Tissue Papers</p>		<p>From Local Market (€ 2)</p>
<p>Oven with Temperature Indicator³</p>		<p>From Local Market (€ 95)</p>
<p>Double Distilled Water (TDS=0 & pH = 7, Deionized and Demineralized water)</p>		<p>From Local Market (€ 7 / 5 Ltr.)</p>



6x4 mm Polyurethane Pipe ⁴		From Local Market (€ 4 / 5 meter)
Mica Sheet Size: 5" X 5" High Quality		From Local Market (€ 7 / Sheet)
Bostik Blu tack gum		From Local Market (€ 5)
Sodium Hydroxide Pellets		From Local Market (€ 15)
Helium Pins and Stage		Lexus (Approx. € 50 for Stage and € 4 for Pin)
Permanent Maxi Glue		From Local Market (€ 5)
Argon Gas Cylinder (High Grade argon without impurity of Oxygen or any other gas)		From Local Market [we can't supply overseas]

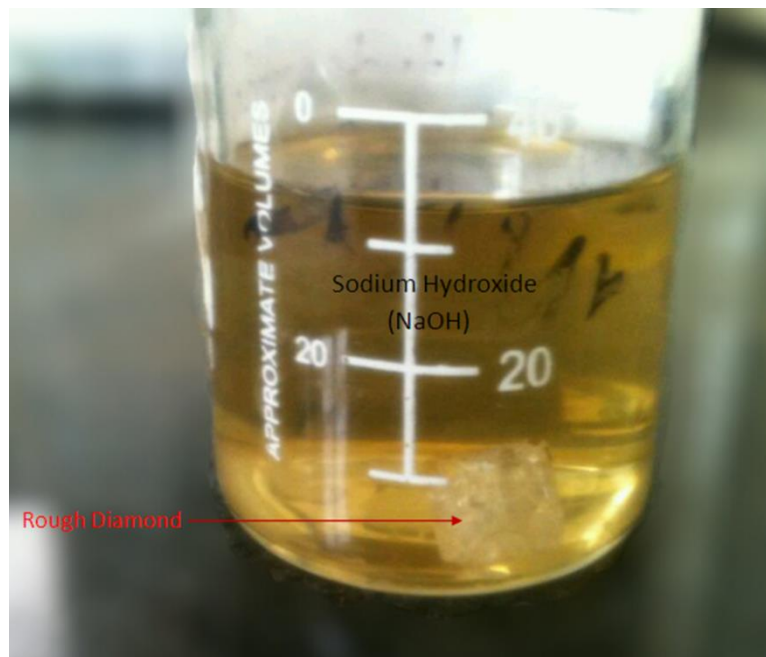
⁴ Length pipe should be as per the distance between Argon gas bottle and iG heater.



Argon Flow Control Valve		From Local Market [we can't supply overseas]
Ethanol		From Local Market [we can't supply overseas]
Scale		From Local Market
Digital Micrometer		From Local Market
Helium iG Scanner		Lexus (Standard Shipment)
Helium Rough		Lexus (Standard Shipment)

Immersion Glass Molding Process Flow

1. If diamond has traces of earlier IG in Cavities (If it was earlier processed through IG molding), then follow step a and b otherwise skip it.
 - a. Clean diamond in 20% aqueous Sodium hydroxide (NaOH) solution heated to 100°C.



- b. Clean diamond in double distilled water in ultrasonic cleaner.



2. Analyze the diamond and do the marking. No inclusion and cavities should be upside and downside.

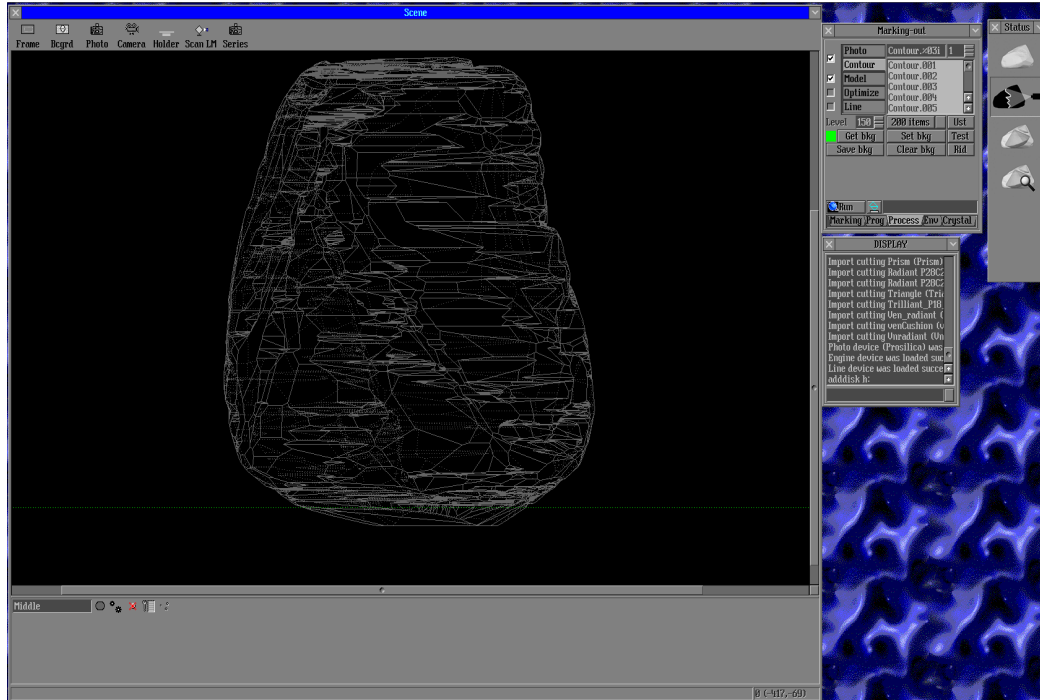


3. Glue the diamond, using quick Glue, on stainless steel scanner pin.





4. Scan shadow model on helium rough.

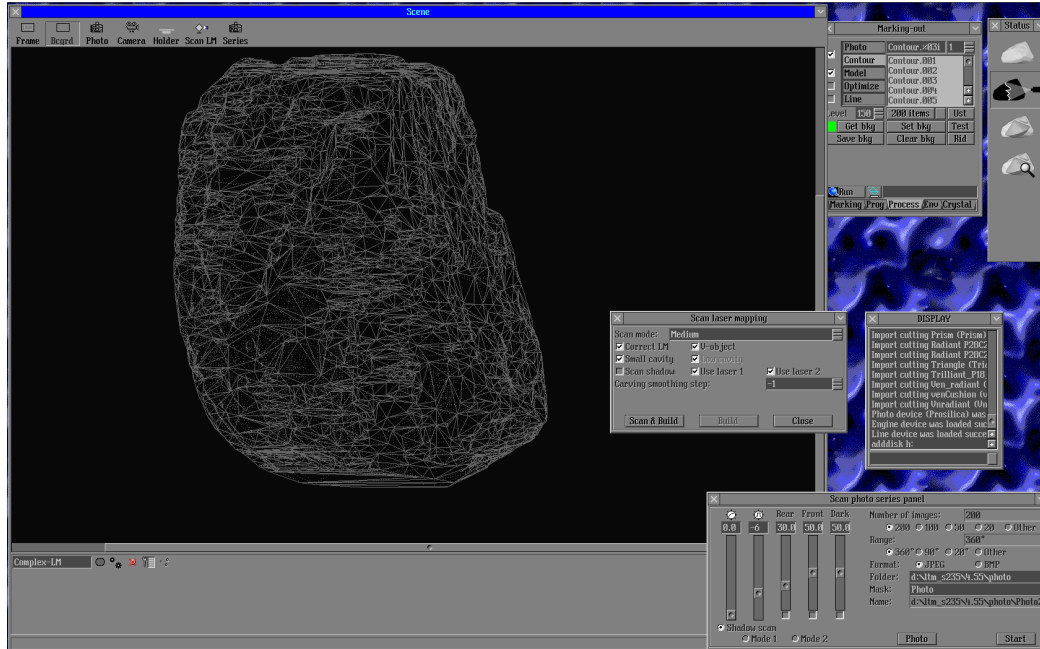


5. Paint the diamond using whitener to cover all surfaces.

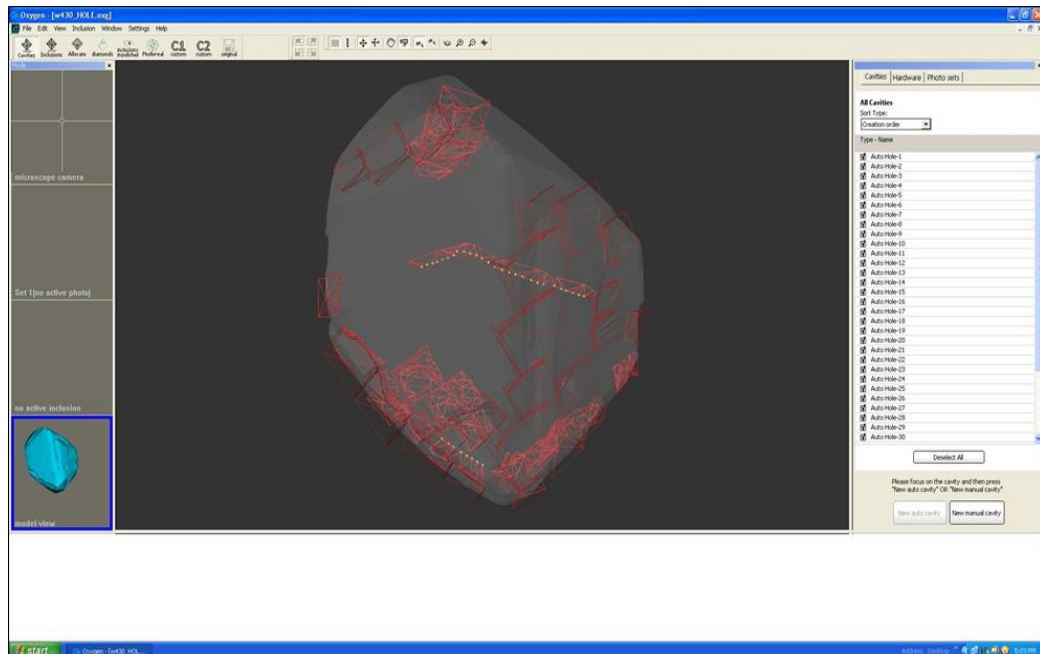




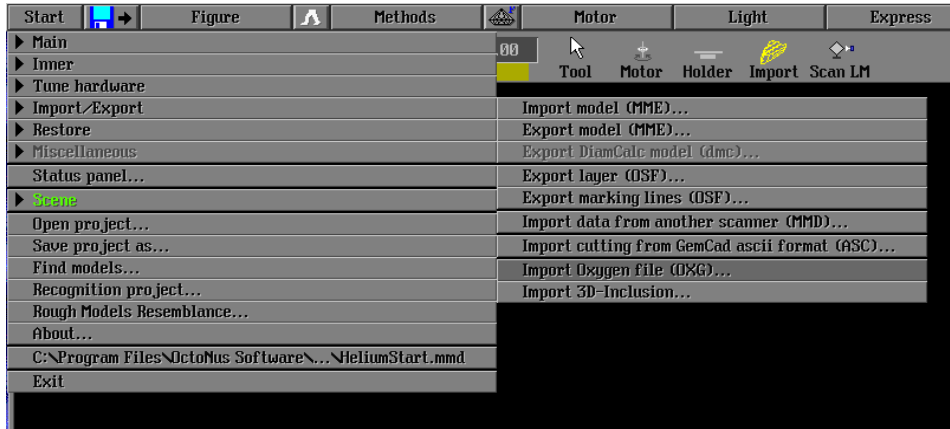
6. Scan concave model on helium rough.



7. Build cavities on M-Box if dip cavities which are not scanned on Helium Rough.



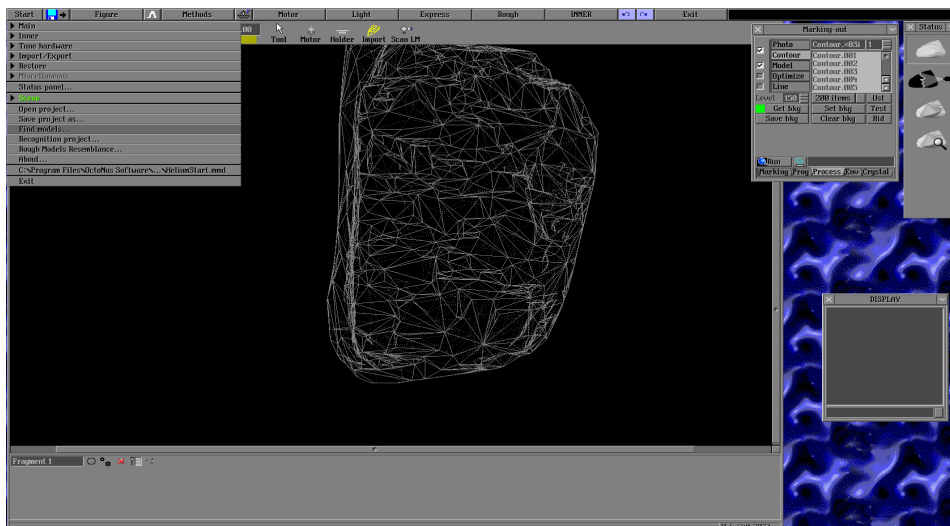
8. If step #7 did then follow below step otherwise skip step #8.
 - a. Import .oxg (Cavity built in M-box) file in helium/Pacor software.



- b. Select cavity plotting file.

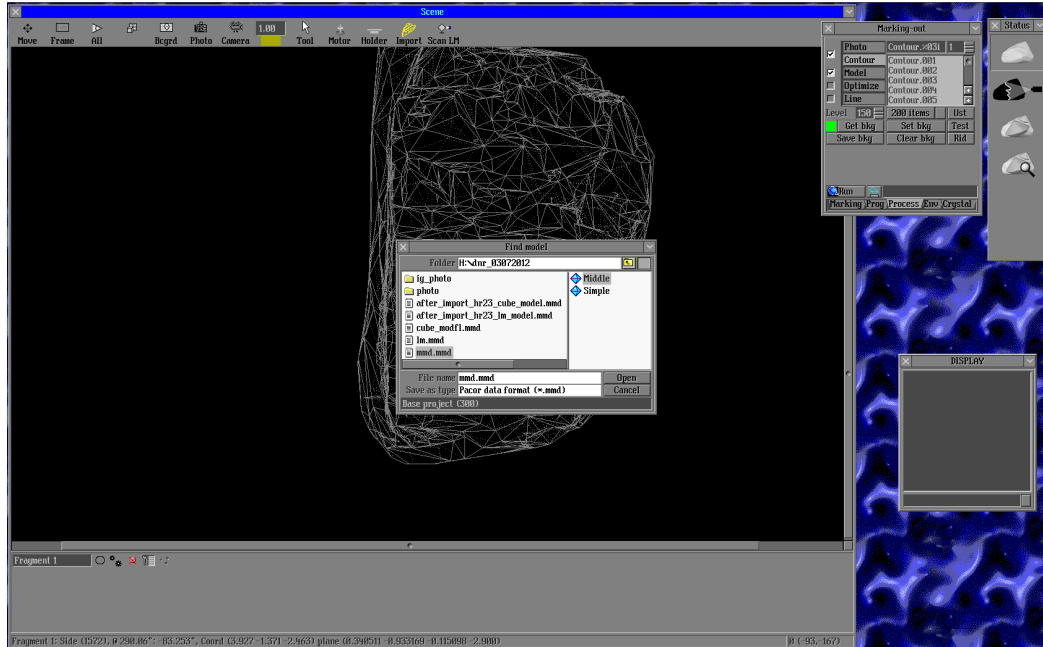


- c. Select find model from Start → Find models.

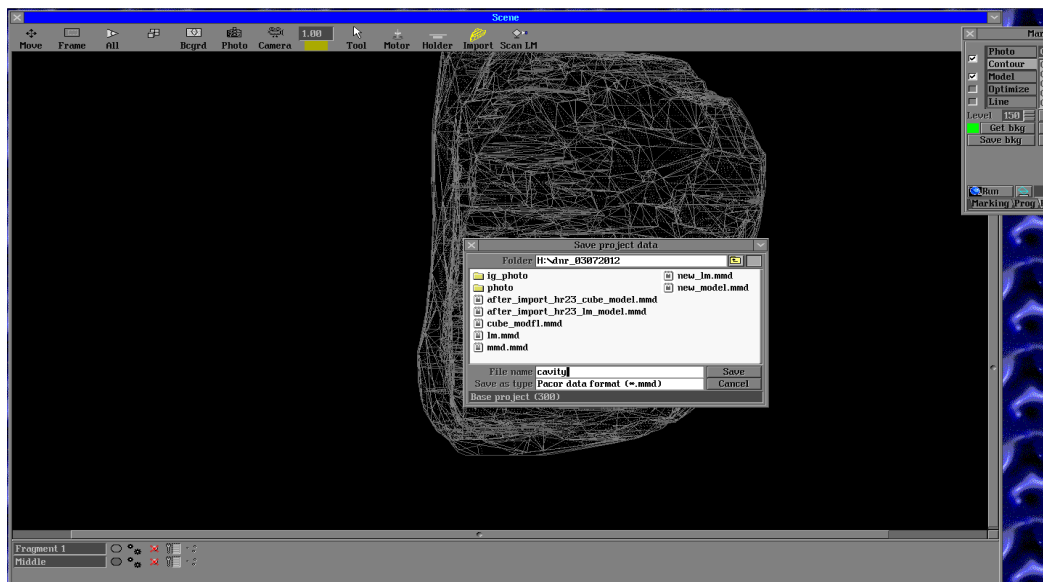




d. Select shadow model (Middle).



e. Save file.



- Remove diamond from pin; clean diamond in acetone and double distilled water in ultrasonic cleaner.



Figure 1 Diamond in Acetone

Figure 2 Diamond in Double distilled water

- Dip diamond in Nitric Acid heated to 100°C and clean diamond in double distilled water in ultrasonic cleaner.

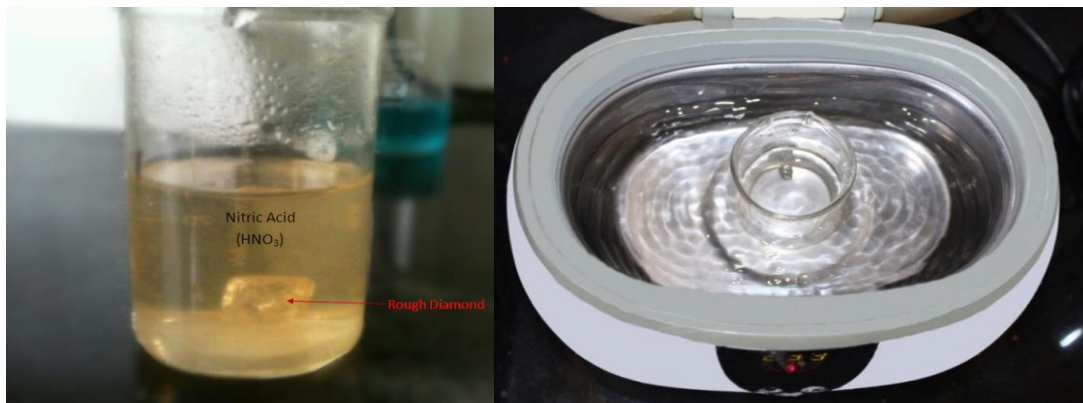


Figure 3 Diamond in Nitric Acid

Figure 4 Diamond in double distilled water

- Apply a thin layer of ESP 110 Adhesive on stainless steel scanner pin. Use stand to press hard the diamond on to the holder pin as shown in Fig.

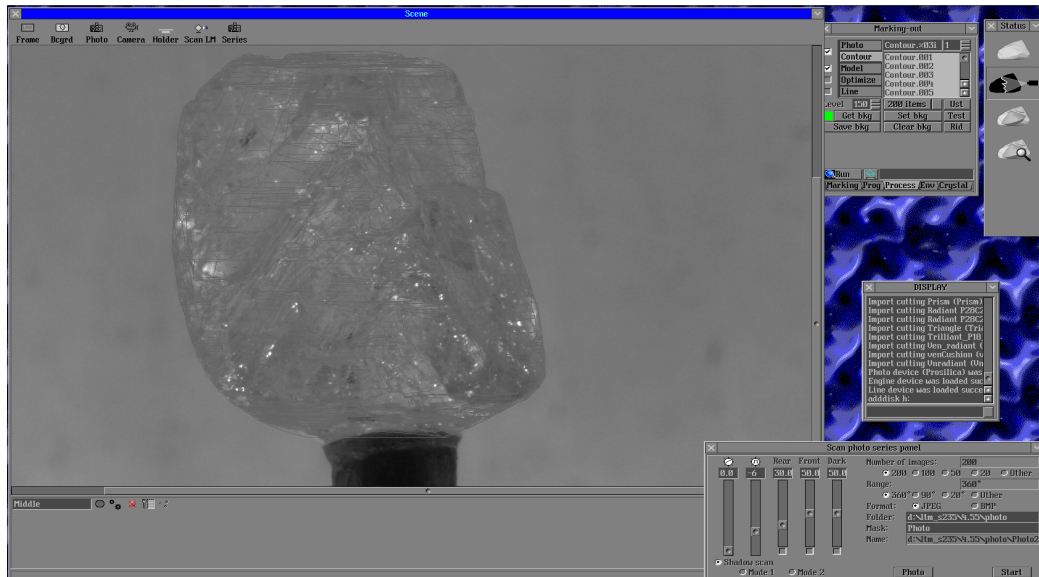




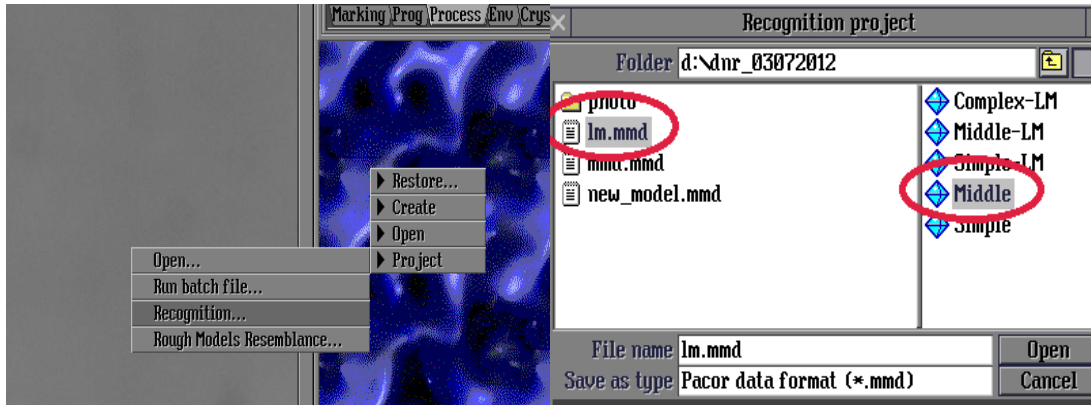
- Place the installation into the dry oven and keep it for 20 minutes at temperature of 180°C. DO NOT USE BOSTIK FOR DIAMOND ATTACHING, because a thin Bostik layer cannot be removed with Sodium hydroxide (NaOH). If, however, Bostik sticks to the diamond, it can be removed by washing in acetone for 10 minutes in ultrasonic cleaner.



- Scan photo (Photo is not compulsory) and scan shadow model.



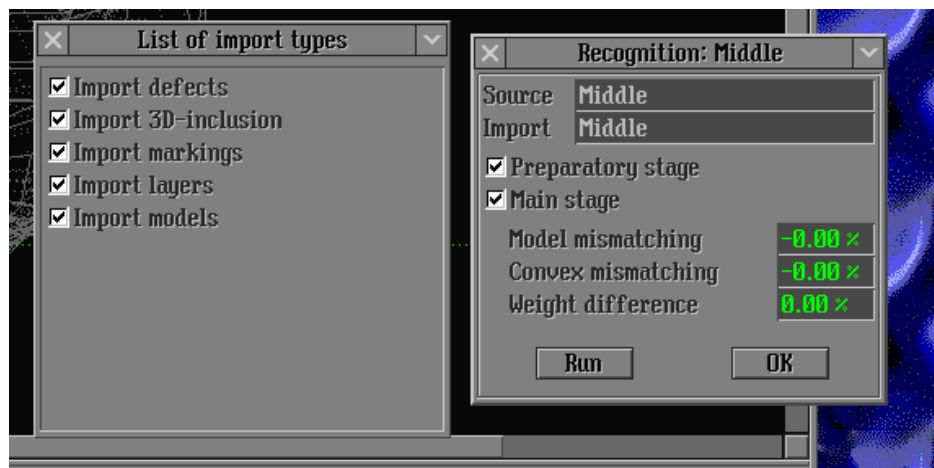
- Recognize previously scanned concave model with current model. For that open recognition project window (right click on screen) and import previously scanned concave model (Middle).



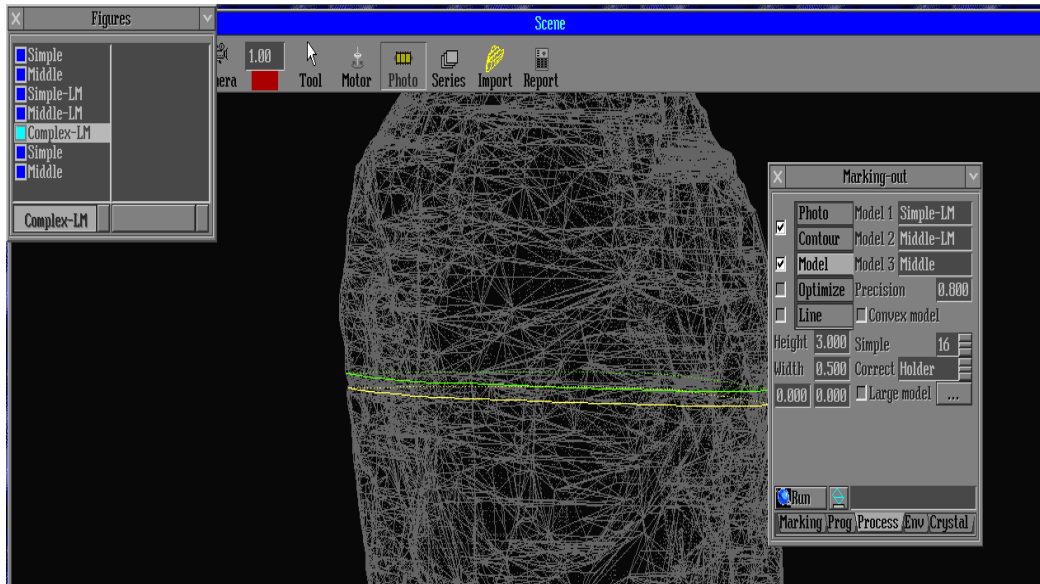
- Click Run button, click cross bar from Recognition: Middle window and open list of import types.



- Select Import models in list of import type window and click OK.



17. Drag Simple-LM, Middle-LM, and Complex-LM from figures and drop it in Model 1, Model 2, and Model 3 respectively in section of marking out panel and then save project data.



18. Clean diamond in 20% aqueous Sodium hydroxide (NaOH) in ultrasonic cleaner for 10 minutes.



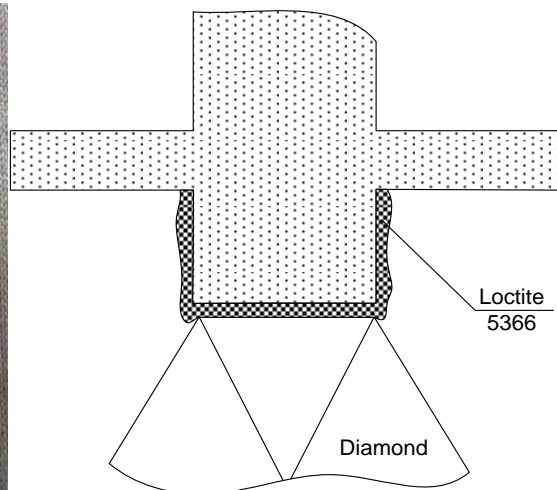
19. Clean diamond three times serially in double-distilled water in ultrasonic cleaner.



20. Apply Steam on diamond.

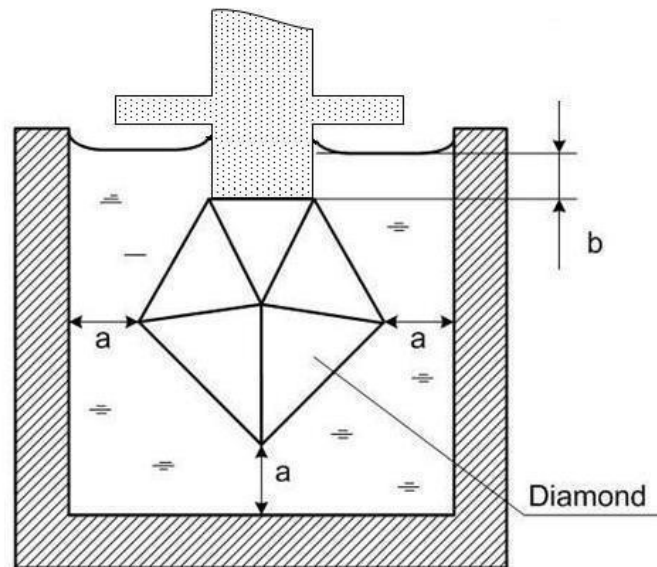


21. Cover a holder pin and ESP 110 Adhesive with Loctite 5366 sealant.



22. Choose the Mold size depending on the diamond size and the following condition:

- ✓ For diamond 6 – 10 ct, then $a = 5$ mm;
- ✓ For diamond 3 – 6 ct, then $a = 4$ mm;
- ✓ For diamond < 3 ct, then $a = 3$ mm;
- ✓ $b = \text{constant} = 2$ mm

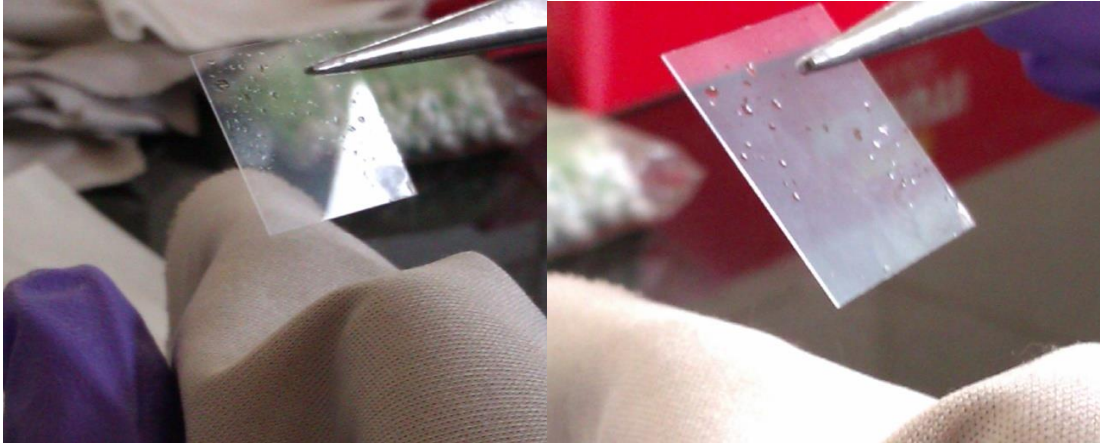


a and b CANNOT be less than above mentioned values, but they can exceed those values. It is IMPORTANT to take into account at further placement the diamond into the mold (see Fig.). This means that the diamond must be placed right at the center, or the « a » distance may be violated.

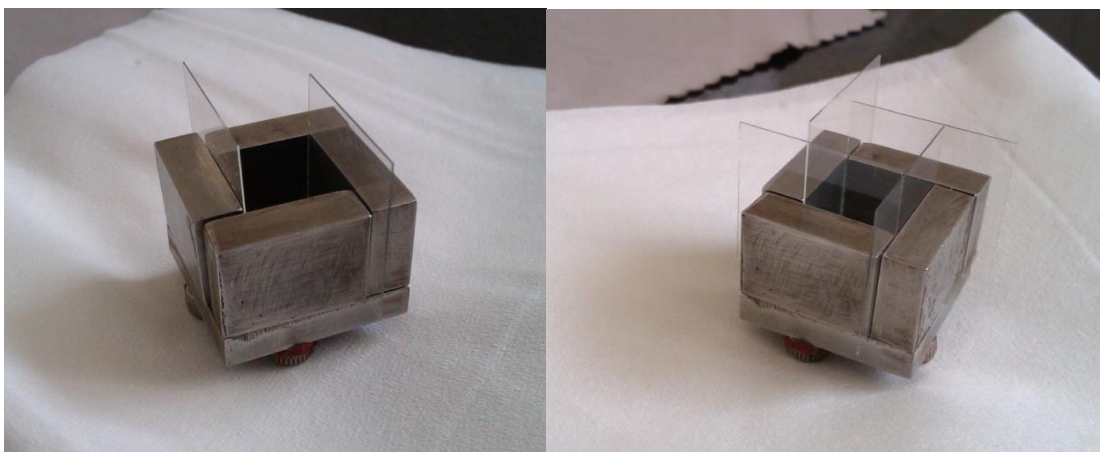
23. Now based on the Mold size, cut mica piece for bottom side of mold. We use glass for rest of the side. Use hand surgical gloves to avoid the finger-prints on Mica.



24. Use Acetone to clean the mica piece and glass.



25. Make mold, to make a mold release parallel side of mold and fit glasses into the mold. Repeat the same for other parallel side.



26. Clean Teflon funnel in normal water and double distilled water in ultrasonic cleaner.



Figure 5 Teflon funnel in normal water

Figure 6 Teflon funnel in double distilled water

27. Measure a Mold size height, width and length using digital venire calipers. Insert all the measured parameters including weight of the stone, in carat, into the Immersion Glass calculator. Find the require quantity of glass in grams.



Figure 7 Height



Figure 8 Width



Figure 9 Length

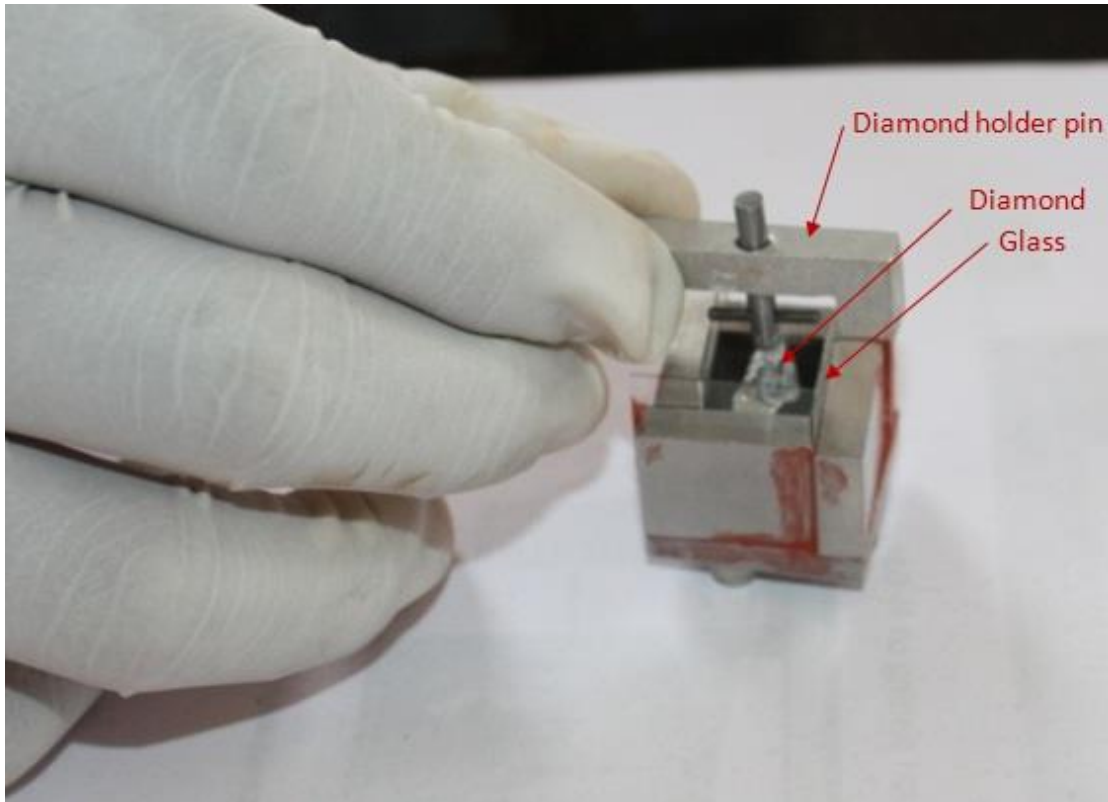


Figure 10 IG Calculator

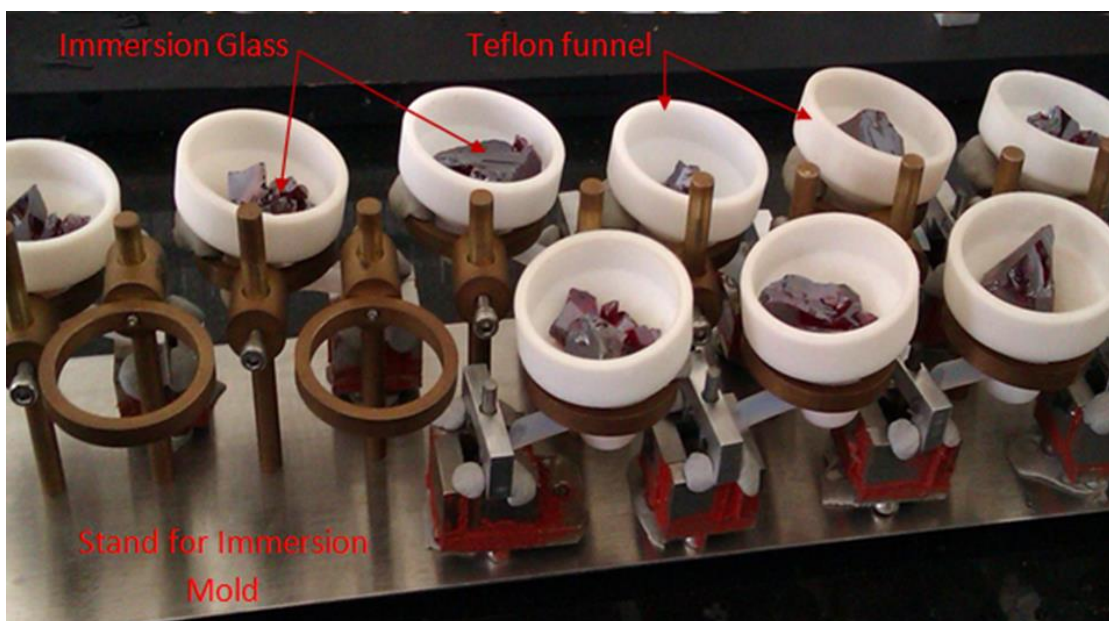
28. Clean Immersion glass using clean clothes. Here, you can use acetone on clothes.



29. Arrange the diamond in mold (Make sure that diamond bottom face should not touch bottom side of mold surface and some part of pin should remain inside mold during setting of diamond pin holder).



30. Arrange the Teflon funnel and mold in stand.



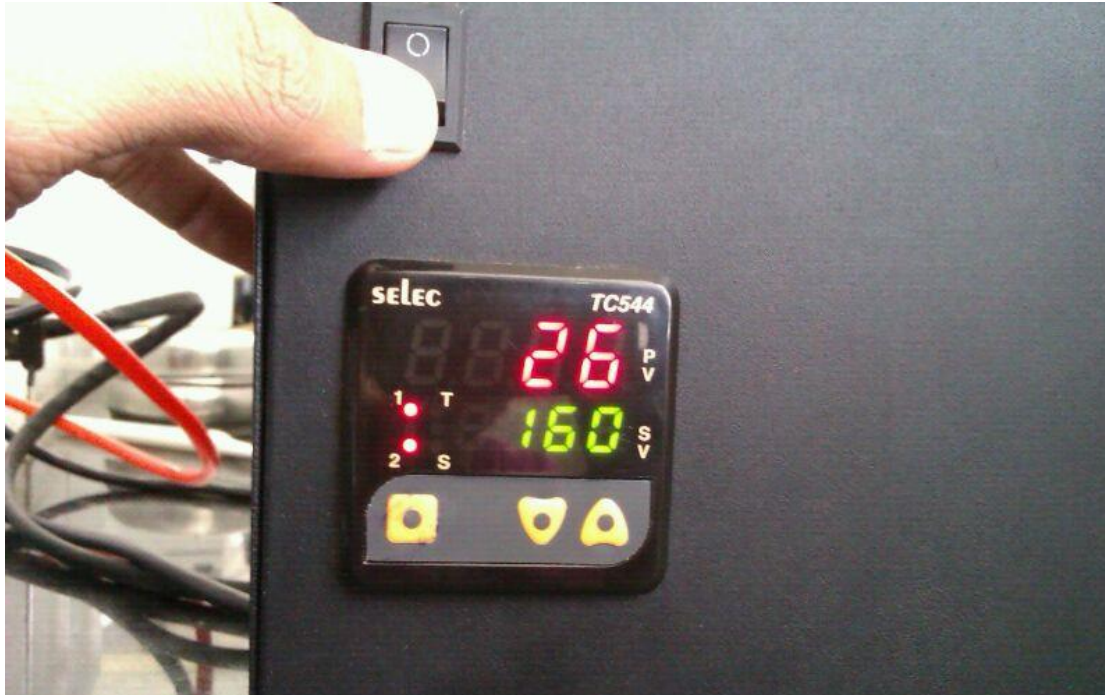
31. Place stand into the IG heater (Furnace -1).



32. Open argon gas cylinder valve, Set 2 bar pressure on meter and adjust flow rate at 5 units on scale.



33. In the IG heater, bring argon gas pipe over the mold for 30 second so that oxygen gas is removed by argon gas. Switch on the IG heater, set argon flow rate at 4 units on the scale.



34. The immersion of the installation should be performed according to the following regime :

- ✓ On the Furnace -1, set the temperature 160⁰C and keep until all immersion glass has flowed into the mold (section A-B-C). Section BC corresponds to glass melting and flowing.
- ✓ After that, keep the installation at temperature 160⁰C for 10 minutes (section CD).
- ✓ Replace the installation into the vacuum drying oven, preliminary heated to temperature 70⁰C. At this point, the temperature falls unevenly (section DE).
- ✓ Keep it for 2 hours at temperature 70⁰ into the vacuum drying oven (Furnace -2) (section EF).
- ✓ Set the vacuum drying oven temperature 38 °C. Independently the oven will cool down to this temperature within approximately 6-7 hours according to the exponential law (section FG).

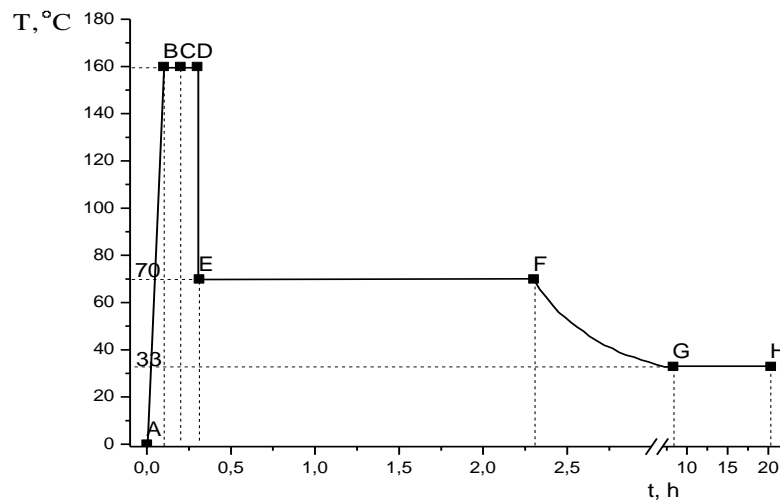
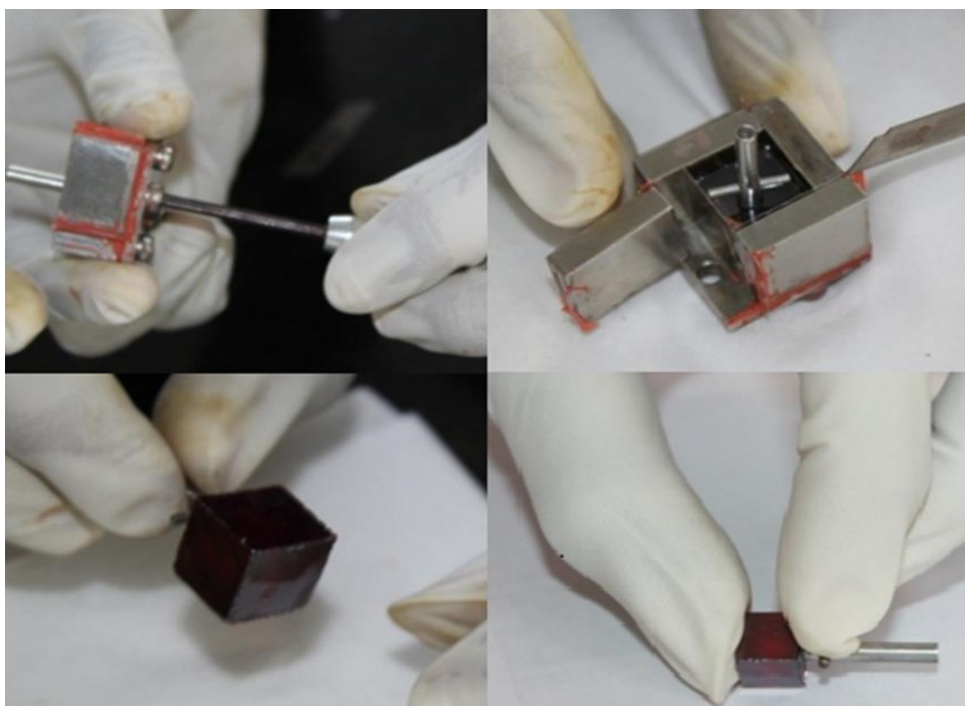


Figure 11 Immersion glass process

35. The Mold must be taken apart right after its removal from vacuum drying oven, because the cooled metal may press hard the glass with the diamond and lead to cracking. Right after taking apart the mold, the glass-diamond must be placed into the thermo box.

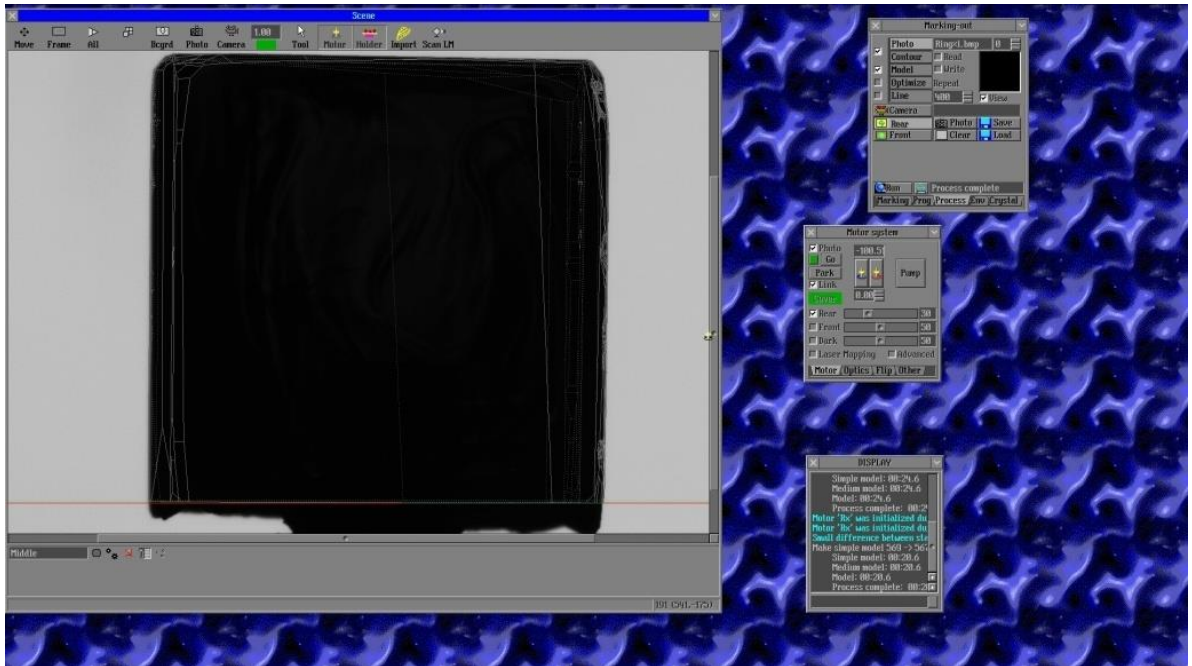
BEFORE TAKING THE INSTALLATION APART,

- ✓ Switch off the Air-conditioner.
- ✓ Close the windows.
- ✓ Close the doors.

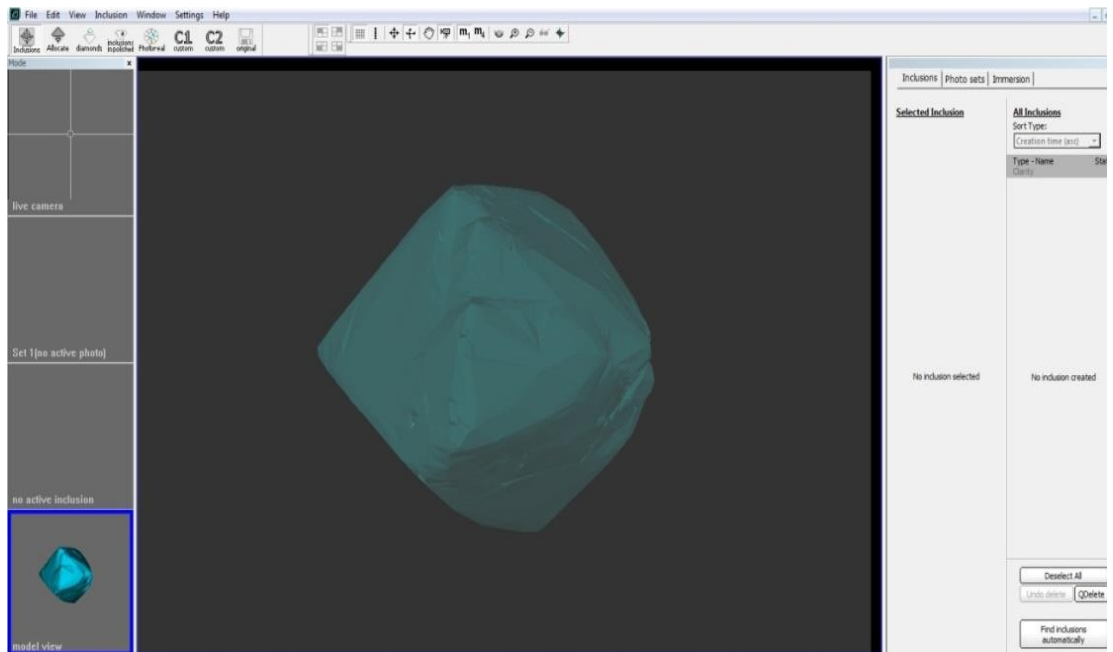




- 36. Make cube model on helium rough, to make a cube model first you open recognize model to check model match (if doesn't rotate 180 °) and start scanning shadow model of cube on helium rough.

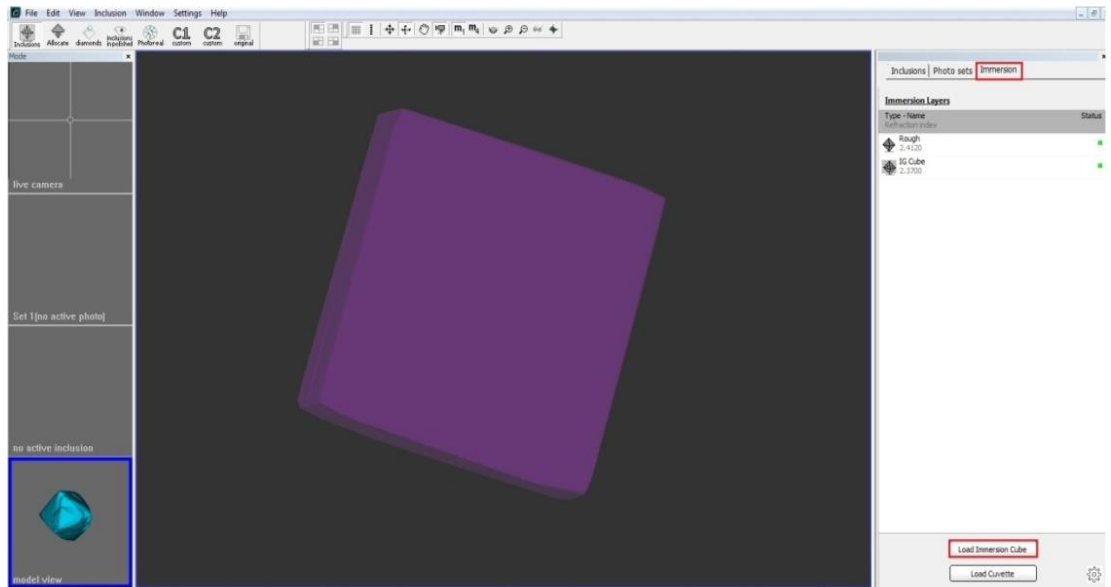


- 37. Cube photo on HIG Scanner,
 - a. Open recognize model. File -> open -> recognize model.

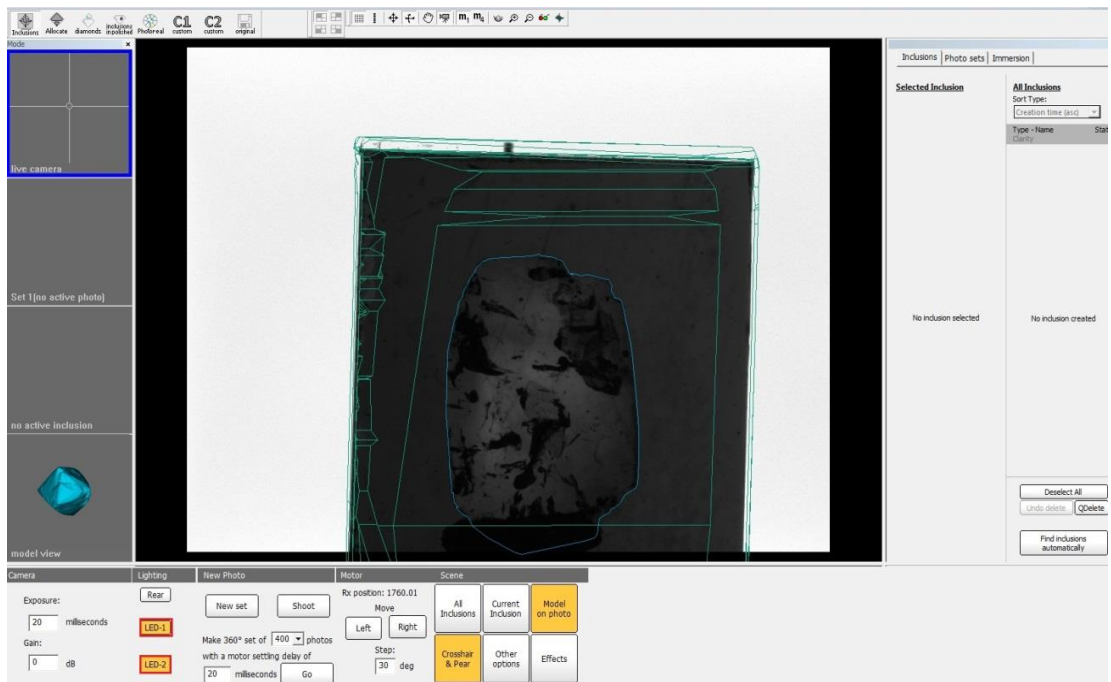




b. Load immersion cube model. Immersion -> Load Immersion Cube.

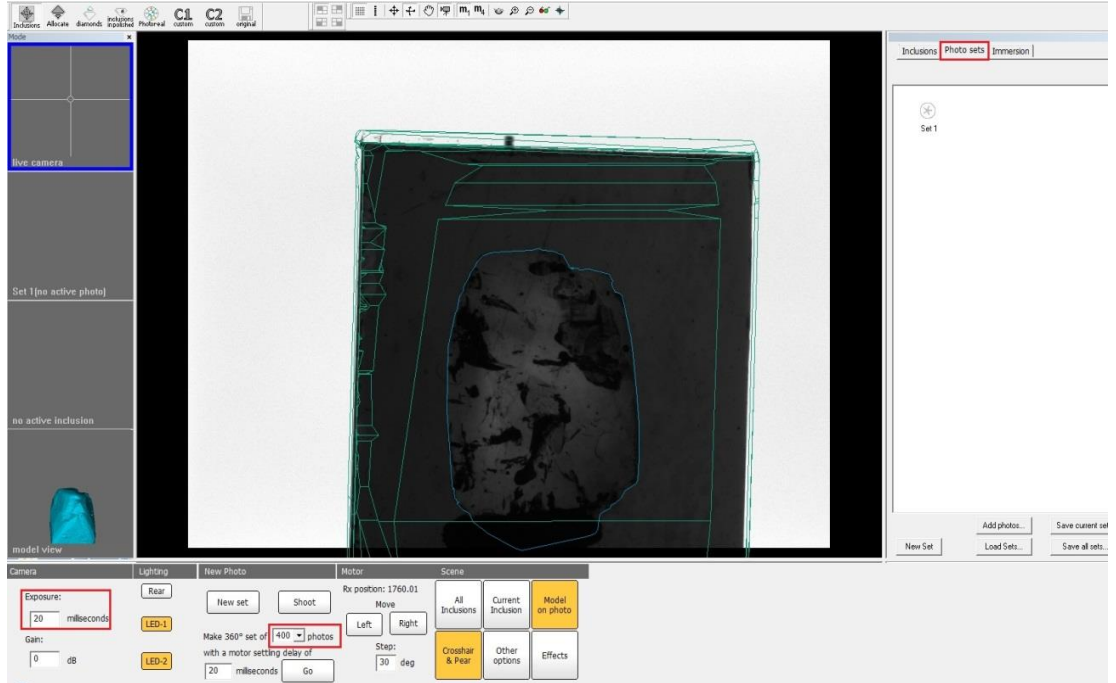


c. Start live camera mode, turn on Led-1, Led-2 and check model match.

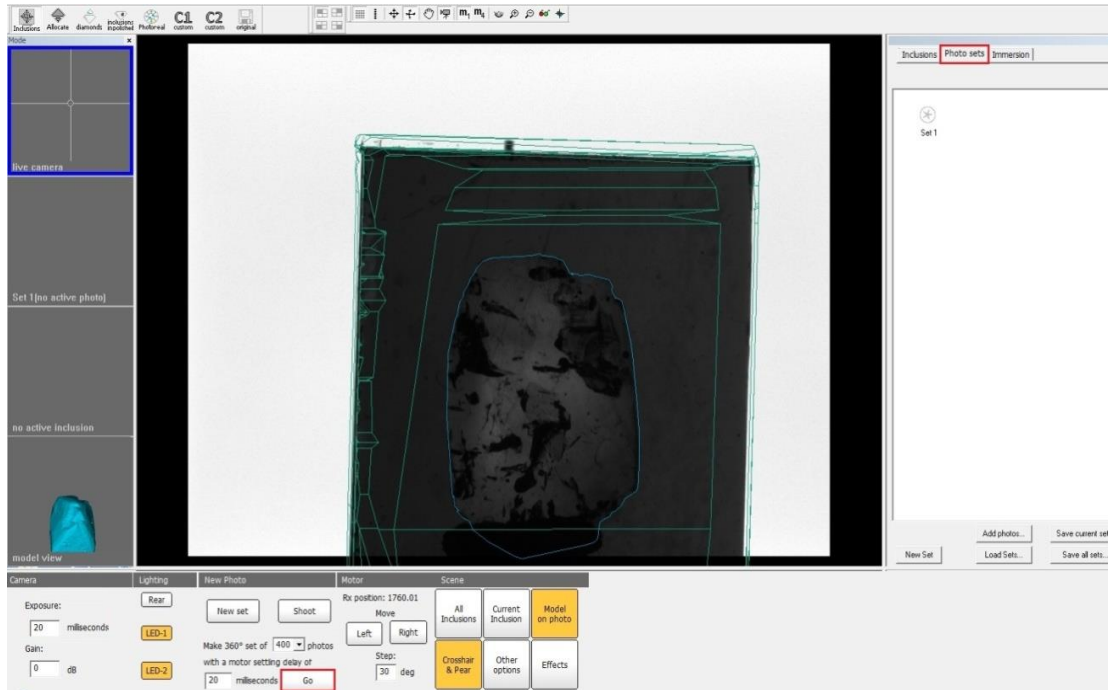




d. Select exposure and set of photos.

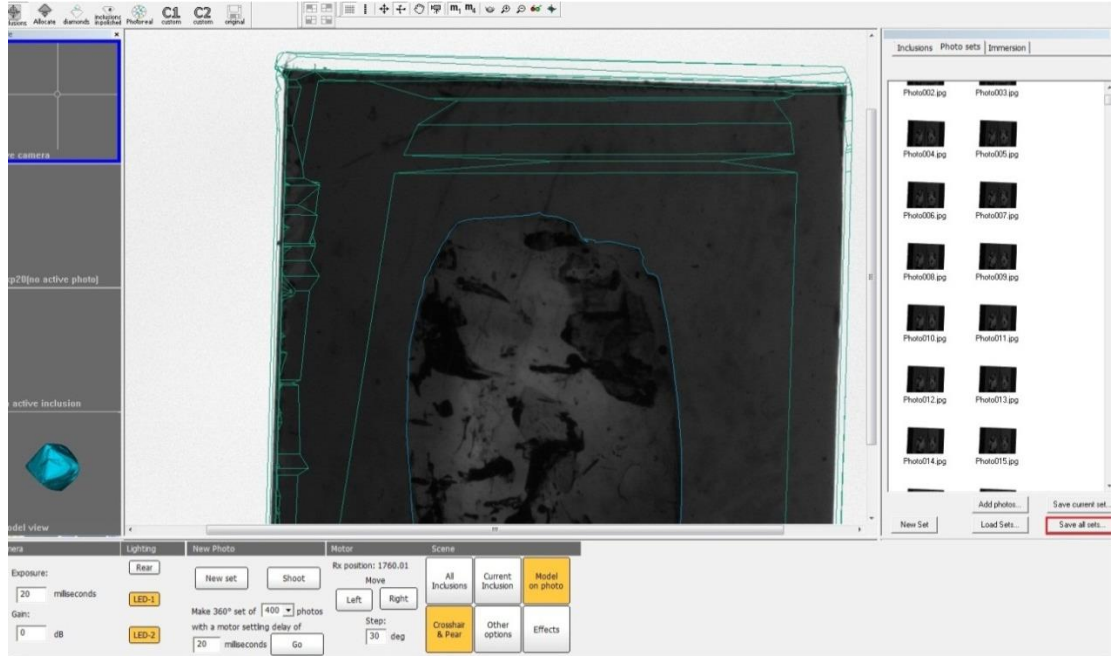


e. Start scanning photo with click on GO.



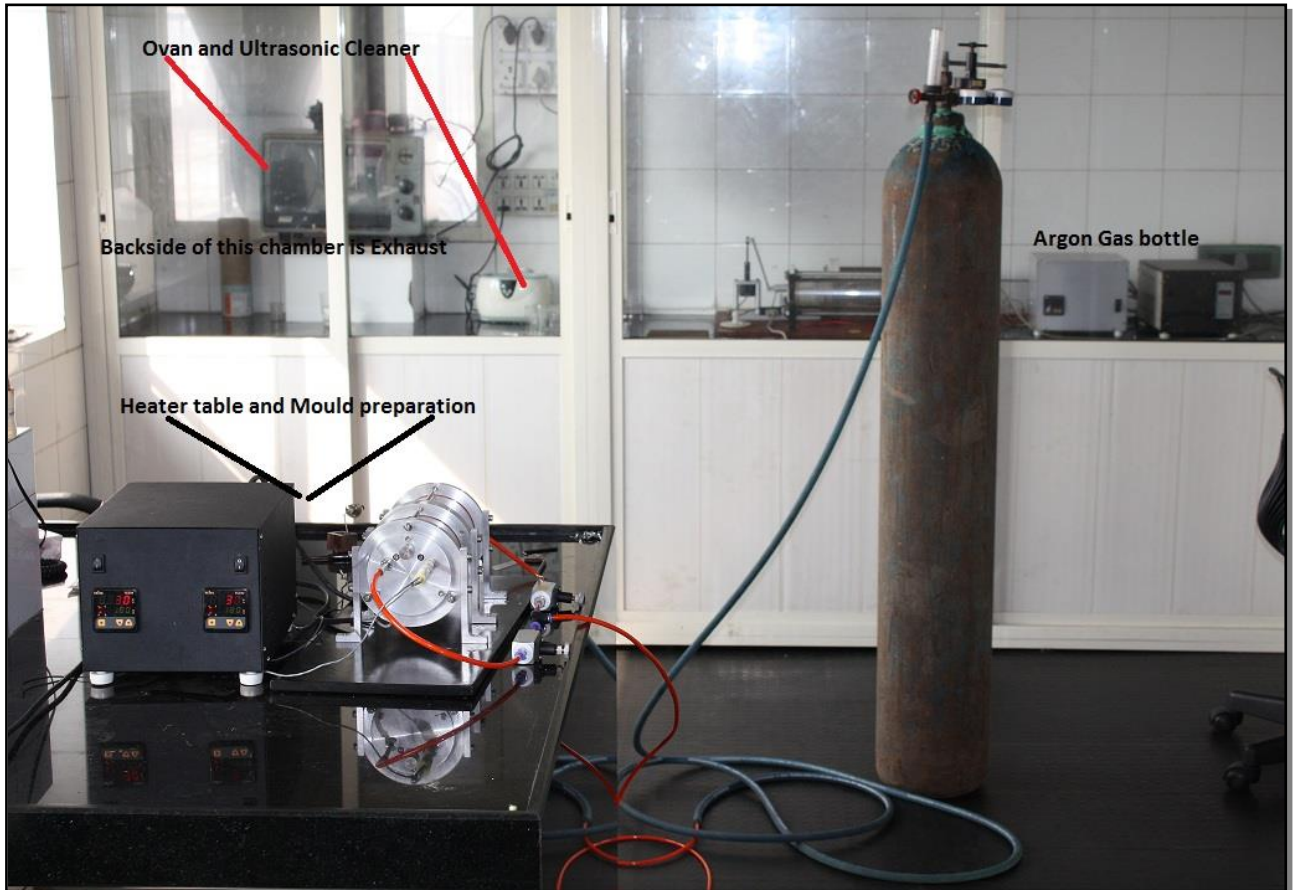


f. To save all set of photo click on save all set.





Our LAB





Our LAB's Photos



Oven and Ultrasonic cleaner is backside of this.