

# Crystalmark Training SOP

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## Training Checklist:

- Components Overview: CrystalMark DV-1, FlashCut CNC, camera, etching nozzle, part mount
- Safety: hot printheads & bed, moving components
- Job Setup
  - At FlashCut CNC and CrystalMark: Open air pressure valve → turn on FlashCut CNC → turn on CrystalMark DV-1 → plug camera into computer → fixture piece onto part mount
  - At the computer: export .dxf → Zeroing
  - After cut: inspect and remove piece → vacuum area
- Part Removal Cleaning
  - Vacuum
  - Sharps
- Rates

## Safety Concerns

- Inhaling large aluminum oxide abrasive is hazardous. Wear a mask and safety glasses during use.
- Silicon and glass pieces may have sharp edges. Handle with caution.
- Keep hands clear of etching during operation. Press any key on the keyboard in FlashCut CNC to stop operation.

## Common Mistakes

- DV1 not applying abrasive
  - Check to see if valve on air pressure tube is open (handle is parallel to tube)
  - Check to see if DV1 is switched on
- FlashCut CNC 4 app is not connected
  - Ensure FlashCut CNC is on and reconnect with FlashCut CNC 4 by going to the "Controller" tab and selecting "Connect..."

## Safe Operating Procedures Review

1. Open air pressure valve (to the left of FlashCut CNC)
2. Turn on FlashCut CNC
3. Turn on CrystalMark DV-1 (under table)
4. Plug in camera to computer (USB connection)
5. Fixture piece onto part mount

There are two ways to use the CNC: Etching with a .dxf file or manually etching: using .dxf file or

manually

If .dxf:

1. At computer: Load .dxf into the “DXF to G-Code Converter” application:



2. For each shape in the display window, right click and select “Cutter Compensation” → select either “Right Compensation” or “Left Compensation” depending on whether you want the positive or negative compensation (the blue outline is the new cut path)
3. Select “Export” → “Optimize and Export Shapes” → save as .ngc
  1. There may be an error message displayed: “Z infeed null” This may be ignored.
4. open .ngc in “FlashCut CNC 4”:



5. open “DinoCapture 2.0” (Used to monitor operation):



6. Place the acrylic plate on the crystalmark mount
7. Jog the nozzle into the hole
8. “Set” → “Zero X and Zero Y”
9. Jog the CNC down to the surface of your piece
10. “Set” → “Zero Z”, be careful not to crash etching nozzle
11. After zero-ing the Z axis, move up in Z until Z is at 1.1 mm. This will be your cutting height.
12. Select “Jog” and jog CNC to where the .dxf origin should be on your piece

- 13. "Set" → "Zero X", "Set" → "Zero Y"
- 14. Note that origin is displayed in "DXF to G-Code Converter" (You can modify the origin in the software your .dxf was created):



- 15. Use tape and/or turn on vaccum to fixture part (optional)
- 16. Begin etching : "G-Code" → "Start"
- 17. Monitor operation
- 18. Select any key while in "FlashCut CNC 4" to stop operation

If manual:

- 1. open "FlashCut CNC 4":



- 2. open "DinoCapture 2.0" (Used to monitor operation):



- 3. Place the acrylic plate on the crystalmark mount
- 4. Jog the nozzle into the hole
- 5. "Set" → "Zero X and Zero Y"
- 6. Jog the CNC down to the surface of your piece
- 7. "Set" → "Zero Z", be careful not to crash etching nozzle
- 8. After zero-ing the Z axis, move up in Z until Z is at 1.1 mm. This will be your cutting height.
- 9. Use tape and/or turn on vaccum to fixture part (optional)
- 10. Select "CrystalMark" switch and set to "on"
- 11. Let the Etcher create a through hole
- 12. Select "CrystalMark" switch and set to "off"
- 13. In "DinoCapture 2.0", center the red lines about the hole
- 14. Jog X and Y to desired location, A hole will be made where the red lines intersect

15. Select “CrystalMark” switch and set to “on”
16. Monitor operation
17. Select “CrystalMark” switch and set to “off”

## Part Removal and Cleaning

- Jog CNC up in Z axis
- Remove piece from mount
- Blow aluminum oxide off part
- Use ShopVac to vacuum excess aluminum oxide
- Dispose of excess sharps in sharps container
- Unplug camera, close air valve, turn off FlashCut CNC, turn off CrystalMark DV1

## Maintenance

- Vacuum area before leaving.

## Additional Information

You can record your cuts in DinoCapture

## Troubleshooting

If the Crystalmark is not cutting, the abrasive canister may be empty. Please contact workshop staff to refill tool, email [flynnirvine@ucsb.edu](mailto:flynnirvine@ucsb.edu) with the subject “Crystalmark Refill”

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Last update: **2024/07/10 17:41**

