Polisher Training Notebook

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February 1, 2023 (rev. 1.1)
Before you begin...

- Complete the required safety training modules on UC Learning
  - Laboratory Safety Fundamentals
  - Hazardous Waste Management
  - Compressed Gas Safety

- Submit a copy of your Training Transcript to Lab Manager

- Review the MSE Policies and Regulations

- Fill out the MSE 150, 250, 309 FAU Authorization Form with PI signature

- Provide your ENGR username to Lab Manager to set up Faces account

- Arrange a time for training with Lab Manager

- Schedule your reservation on Faces for your training
Allied MetPrep 3 Polisher Operation

I. Polisher Layout
II. Control Panel
III. Grinding
IV. Polishing
V. Cleaning Samples
VI. Powerhead Positioning
VII. Manual Polishing
VIII. Semiautomatic Polishing
IX. Adjustable Parameters
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I. Polisher Layout – 1/3

Perpendicular = Off
Parallel = On

Power Head

Handle

Water Nozzle

Platen

Emergency Stop

Release Latch

Positioning Lever

Sample Holder

Control Panel
I. Polisher Layout – 2/3

Water Dispensing requires pump to be turned on first!

Turn Knob to “Pump On” if water is needed

Remember to Turn Knob to “Pump Off” when finished!
I. Polisher Layout – 3/3

Sample Holder for Central Force (CF) - *Grinding*

Sample Holder for Individual Force (IF) - *Polishing*

Set-screws for Sample

1.25” (25 mm) Sample Size

Drive Pin

Sample Loading/Unloading Fixture
II. Control Panel – 1/2

**Jog:** Activates and deactivates *Platen* rotation
- used to clean platen or to apply diamond suspension
- also used to rotate *Platen* for manual grinding/polishing

**Water:** Activates and deactivates water
- will override any setting for water in automatic operation

**Stop:** Deactivates every function during operation

**Start:** Activates the step toward which the arrow is pointing on display

**Emergency Stop:** Shuts off all power and stops operation of machine
- use only during EMERGENCY to prevent injury to operator or damage to instrument
- turn clockwise on red knob to restore power
II. Control Panel – 2/2

**Step:**
- Accesses the **Step Menu**
- steps will be displayed
- selection arrow designates desired **Step**

**Program:** Used to program individual parameters within each **Step**

**Select:**
- Used to toggle selection arrow in display windows
- navigate to different screens
- select **Step** for programming

**Arrows:**
- **(Jog Mode)** will increase and decrease **Platen Speed**
- **(Step Parameters)** will scroll up and down and change parameters to desired value
III. Grinding – 1/1

1. Perform **Grinding** FIRST to:
   - Remove any deformation left over from the sectioning
   - Expose specific regions in the sample from the bottom of the **Sample Mount**

2. Use the **Central Force** functionality for **Grinding** purposes

3. Speed (most commonly used settings):
   - **Platen Speed** = 200 – 300 RPM
   - **Sample Speed** = 150 RPM

4. Force (most commonly used settings):
   - For 1.25” (32 mm) Sample Mount: 4 – 6 LbF (per sample)
   - E.g. 3 Samples -> 12 – 18 LbF **Total Force**
   - E.g. 6 samples -> 24 – 36 LbF **Total Force**

5. Abrasive:
   - 8” Silicon Carbide Paper are provided in 180, 320, 600, and 1200 Grit
IV. Polishing – 1/1

1. Perform **Polishing** **AFTER** **Grinding** to:
   - Remove scratches from grinding and any metallurgical deformation

2. Use the **Individual Force** functionality for **Polishing** purposes

3. Speed (most commonly used settings):
   - **Platen Speed** = **Sample Speed** = 150 RPM

4. Force (most commonly used settings):
   - For 1.25” (32 mm) Sample Mount: 4 – 6 LbF (per sample)

5. Polishing Cloth + Abrasives:
   - **Polishing Cloths** for specific **Abrasives** are provided
   - **Polycrystalline Diamond Suspensions**:
     3 μm, 1 μm, 0.5 μm, and 0.05 μm are provided

Note: Only use the designated Suspensions with the designated Polishing Cloth!
V. Cleaning Samples – 1/1

1. Samples **MUST** be cleaned after every *Grinding* and *Polishing* step

2. Failure to properly clean each *Sample* before next step will transfer *Abrasive Particles* onto subsequent *Grinding Paper* and *Polishing Cloth*

   Note: If Polishing Cloths are CONTAMINATED, they must be replaced $$$

3. Remove the *Sample Holder* to clean **BEFORE** switching *Grinding Paper* or *Polishing Cloths* to avoid contamination
VI. Powerhead Positioning – 1/1

1. Loosen the *Positioning Lever* to adjust and swivel the position of the *Powerhead*

2. Push the *Release Latch* to lift up the *Powerhead*

3. Use the *Powerhead Handle* to raise and lower the *Powerhead* and adjust position
VII. Manual Polishing – 1/1

1. Press the **Jog** button ![Jog button](image) to initiate *Manual Grinding* using the **Platen** only.

2. During this operation, the **Platen** always rotates *clockwise*.

3. Press the **Up** and **Down** arrows ![Arrow buttons](image) to change the **Platen RPM**.

4. Press the **Water** button ![Water button](image) to stream water onto the **Platen**.
VIII. Semiautomatic Polishing – 1/1

1. Press the **Steps** button ![Steps](image1.png) to program **Semiautomatic Polishing** parameters

2. Press the **Up** and **Down** arrows ![Up Down](image2.png) to scroll to desired **Program Step**

3. Press **Select** button ![Select](image3.png) to enter settings menu

4. To change the value of any setting, scroll to that parameter and press the **Program** button ![Program](image4.png)

5. A “?” will appear next to parameter and can be changed using **Up Down** arrow buttons

6. Press **Program** button ![Program](image4.png) to set into memory
IX. Adjustable Parameters – 1/2

• Sample RPM:  
  displays rotation speed of *Sample Holder*  
  - variable between 0 and 150 RPM {with 10 RPM increments}

• Force:  
  allows toggling between *Central Force* and *Individual Force* modes

• Force (LbF):  
  *(Central Force)* will display *Total Force* acting on sample holder  
  *(Individual Force)* will display the *Individual Force* acting on each sample

• Platen RPM:  
  displays rotation speed of *Platen*  
  - variable between 40 and 600 RPM

• Mode:  
  *Comp* = indicates *Platen* and *Sample Holder* rotates in same *complimentary* clockwise direction  
  - used for most applications  
  
  *Contra* = indicates *Platen* and *Sample Holder* rotates in *opposite* direction  
  - used for aggressive material removal during *Grinding*
IX. Adjustable Parameters – 2/2

• **Time:** displays the total time that step will run before automatically stopping
  - adjustable between 0 and 120 minutes {in 15 second increments}

• **Fluid**
  - **(Off)** no water is activated when step is started
  - **(Water)** – water will be dispensed from nozzle
    - generally used for grinding applications and to flush/rinse the *Platen*

• **Rinse**
  - allows a rinse cycle to be activated in the last **XX** seconds of step
    - commonly used to rinse cloth and samples with water

• **Frc Reduce**
  - **(On)** will reduce the force applied at the beginning AND end of step
    - gradual application of force produces more shallow scratch and protect delicate samples from cracking

• **Reduce Time**
  - defines duration of force reduction in **XX** seconds
    - only applicable if **Frc Reduce** is set to “**On**”

• **Reduce %**
  - defines percentage that force that will be decreased during **Frc Reduce**

• **Frc Start**
  - **(On)** will reduce force by **70%** in first **10** seconds as “soft start”
    - helps protect samples from damage to sudden application of full force
X. Central Force Setup – 1/5

• Central Force (CF) holder requires a **MINIMUM** of 3 sample mounts
• Not recommended for precision/site specific applications
• Samples need to be equally positioned around center of sample holder to polish evenly and remain balanced

Note: Failure to balance will damage instrument, sample holder, or even operator!

1. Position the **Powerhead** in the **Lifted Up** position

2. Check if **Diverter Valve** is already dis-engaged (flush with surface)
   • **If already dis-engaged, continue to Step 6**

3. If not, locate the “V” stamped into the cylinder
X. Central Force Setup – 2/5

4. Take the \( \frac{1}{4} \)" **Allen Wrench** and insert into hole

5. **Rotate counter-clockwise** until **Diverter Valve** is disengaged and slides down cylinder

   **Note:** Failure to unlock it will damage cylinder!

6. Position the CF fixture so the **Drive Pin** is aligned

7. Take a **5/32 Allen Wrench** and securely tighten the set-screw
X. Central Force Setup – 3/5

8. Loosen the **Positioning Lever** and swivel the **Powerhead** and lower the **Mount Holder** so it is located between the **Edge** and **Center** of the **Platen**

9. Confirm that “**Force**” setting is set to “**Central**”

10. Use the provided **Sample Loading Fixture** to set the proper depth of mounts when secured into the **CF Sample Holder**
X. Central Force Setup – 4/5

11. The **Sample Mounts** MUST be correctly balanced on the **Sample Holder**
   - 3 Sample Mounts (shown) or
   - 6 Sample Mounts

12. If necessary, provide “**Blanks**” to occupy empty spaces so **Sample Holder** is properly balanced
   - 4 Sample Mounts + 2 Blanks (shown)

13. Secure the **Sample Mounts** by applying pressure to the backside of the **Sample Mount** and tightening the set-screw using provided **1/8” Allen Wrench**
X. Central Force Setup – 5/5

14. To unload *Sample Mounts*, flip the *Sample Loading Fixture* to *Unloading* position

15. Insert the *Sample Holder* onto the *Sample Unloading Fixture* with the *Sample Mounts* facing upward

16. Inspect the *Samples* first before unloading *Samples*

17. Remove the *Samples* from the *Sample Holder* by loosening the set-screw with provided *1/8” Allen Wrench*
XI. Individual Force Setup – 1/3

• Individual Force (IF) holder allows up to 3 mounts to be prepared simultaneously

• Each mount floats independently and force is applied individually to each location

• IF functionality is more suitable for precision/site-specific applications

1. Position the **Powerhead** in the **Lifted Up** position

2. Check if **Diverter Valve** is already engaged (sunken in)
   - If already engaged, continue to **Step 6**

3. If not, locate the “V” stamped into the cylinder
XI. Individual Force Setup – 2/3

4. Take the ¼” Allen Wrench and insert into hole and press upward

5. Rotate clockwise until Diverter Valve locks into place for IF

Note: Failure to lock it into place will damage IF holder!

6. Position the IF fixture so the Drive Pin is aligned

7. Take a 5/32 Allen Wrench and securely tighten the set-screw
XI. Individual Force Setup – 3/3

8. Loosen the **Positioning Lever** and swivel the **Powerhead** and lower the **Mount Holder** so it is located between the **Edge** and **Center** of the **Platen**

9. Confirm that “**Force**” setting is set to “**Single**”

10. During operation individual **Pistons** will extend from cylinder body to apply pressure to back of mounts

11. The **Pistons** above empty locations will stop above **Platen** surface automatically
XII. Cleanup – 1/1

1. Remove and clean *Sample Holders*

2. Return back to appropriate drawer

3. Rinse the *Polishing Cloths* and return to appropriate drawer

4. Rinse the *Platen* and *Chamber* thoroughly

5. Keep the *Powerhead* in the *Lifted Up* position

6. Swivel the *Powerhead* away from the *Platen*

7. Record your usage on the *Sign-in Sheet* indicating all consumables used