# CUTTING SAMPLES WITH THE BUEHLER PETROTHIN: USER GUIDE

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## INTRODUCTION

This user guide will help thin section technicians cut off the main bulk of the sample on the Buehler PetroThin. This will prepare the sample for lapping on the Logitech LP50 to precision thickness. For more information on the Buehler PetroThin refer to The Operation and Maintenance Instructions PetroThin, Thin Section System manual, located in the black binder in the Thin Section Laboratory cabinet labeled "Equipment Manuals and Thin Section Prep."

Additional user guides related to preparing thin sections include the following:

- Cutting Samples with the Buehler PetroThin
- Logitech LP50 setup
- Lapping Samples on the LP50
- Flattening thin section billets
- Frosting slides
- Bonding billets to frosted slides

## PROCEDURE

### PREPARING SAMPLES

1. Use a flat razor blade to clean the extra resin off the slide around the sample (Fig. 1).
   - If there is too much excess resin on the slide it will cause the slide to bow under vacuum on the PetroThin chuck face (Fig. 3). This will cause a bad seal or will crack the slide.
2. Use the diamond tipped pen to etch the sample number and orientation arrow if applies, onto the bottom right corner of the slide (Fig. 2).

3. Flip the slide over and clean off any excess resin the back side of the slide with the flat razor. Then, wipe the slide and PetroThin chuck face clean with a Kimwipe and isopropyl alcohol.

SECURING SLIDES TO THE CHUCK FACE

1. Connect the vacuum hose on the PetroThin to the vacuum pump hose if not already done (Fig. 3).
2. Turn on vacuum by turning on the power strip connected to the wall just left of the PetroThin (Do not turn on the vacuum button on the PetroThin).
   - Check the oil in the vacuum pump every few days.

3. Hold the back side of the slide onto the chuck face over the vacuum grooves and in the plastic pegs. Close the valve on the upper right side of the Logitech VS2 (Fig. 4).
   - Watch the gauge on the left side; it should be in the green around 25 in/Hg.

4. The slide should be secured to the chuck face now and unable to move.
USING THE CUTTING WHEEL

1. Set the cutting wheel micrometer to three increments and to 25 (Fig. 3 and Fig. 5).

2. Turn on the PetroThin wheels by pushing the Motor button on the front (Fig. 3).

3. Turn on the water by turning the Water dial counterclockwise (Fig. 3). Don’t need too much water, just enough to keep the sample wet.
   - If the sample is water soluble do not turn on the water. While cutting, spray isopropyl alcohol on the wheel.

4. Put on hearing and eye protection.

5. If the PetroThin has not been used for a while it is a good idea to sharpen the blades.
   - There are sharpening blocks in the drawer under the PetroThin.
   - Hold the block firmly and slowly run it against the cutting wheel and cup wheel.

6. Push the chuck face all the way to the left and lower it down slowly (Fig. 6).
- Once the cut begins do not apply pressure down. Its own weight should be enough.
- When it gets close to cutting at the end, the sound will change to a higher pitch. At this time slow down the cutting and take some weight off the sample.

7. Once the sample is cut all the way, bring it back up slowly. Let the chuck face move back to the right side but do not let it slam back into place. Apply pressure to it because it is spring loaded.

**USING THE CUP WHEEL**

1. Keep the water, motor, and safety equipment on.
2. Set the cup wheel digital micrometer to –0.600 mm. (Fig. 3 and Fig. 7).

3. Lower the chuck face down slowly so the whole sample has passed the cup wheel and bring back up slowly. Repeat a couple of times.
4. Set the digital micrometer by turning knob toward yourself to –0.500 mm and repeat step 3.
5. Repeat step 4 using settings of –0.400 mm, –0.350 mm, –0.300 mm, –0.275 mm, –0.250 mm, –0.240 mm, –0.230 mm, –0.225 mm, –0.220 mm, –0.215 mm, –0.210 mm, –0.205 mm, –0.202 mm, and –0.200 mm.
   - When cutting off less of the sample it is ok to speed up.
   - If the sample is too soft to lap down on the LP 50 it can be cut down on the cup wheel too. Take the sample down in increments to –0.069 slowly. After that it can go straight to the Logitech PM5 polisher.
6. Always set the digital micrometer back to –0.600, as a safety measure.
7. Open the Logitech VS2 vacuum valve (Fig. 5) and remove the slide from the chuck face.
8. Turn off the water, motor, and vacuum.
9. Clean the, sample, slide, and chuck face with a Kimwipe and isopropyl alcohol.
10. Open the door on the right side of the PetroThin and remove the cut off billet (Fig. 3).
11. Place the billet back into the sample bag.
LOGITECH LP50 SETUP: USER GUIDE

INTRODUCTION

This user guide will help thin section technicians start up and check the flatness of the Logitech LP50. For more information refer to the Logitech Thin Rock Section Production manual, available in the Thin Section Laboratory both on a Logitech thumb drive in the bookcase and computer under the “Manual” folder on the desktop. Or, refer to Operation and Maintenance of the LP50 Lapping and Polishing Machine manual, located in the black binder in the Thin Section Laboratory bookcase labeled “LP50, PM5 and Associated Equipment.”

Additional user guides related to preparing thin sections include the following:
- Cutting samples with the Buehler PetroThin
- Logitech LP50 setup
- Lapping samples on the LP50
- Flattening thin section billets
- Frosting slides
- Bonding billets to frosted slides

PROCEDURE

LOGITECH LP50 START UP

1. Press the Main button (Fig. 1) under the joystick (make sure the Vacuum button stays off).

![Figure 1](image)
2. Press the middle of the joystick for OK (Fig. 2).

3. On the Checking System Resources (Fig. 3) screen, make sure there are no jigs on the lapping plate; press OK to continue.

4. The Process Screen/Machine Setup (Fig. 4) screen will appear.
MACHINE SETUP SCREEN

1. Clean the monitor’s bottom surface and diamond edges with water and a soft brush. Make sure no water gets inside the top half. Blow it dry with the air gun.

2. Clean the master flat (Fig. 5) by wiping it down with a Kimwipe and isopropyl alcohol.

3. Place monitor on the master flat then set the weight on top of it (Fig. 5).

4. Plug in long cord to the top of the monitor and LP50 just under the slurry container (Fig. 5).

5. Move the monitor around on the Master flat to let it ‘bed down’ to the surface.

6. On the Process Screen/Machine Setup (Fig. 4) screen move the joystick down and select Machine Setup. Press OK.

7. On the Machine Setup (Fig. 6) screen move the joystick down and select Monitor Set-Up. Press OK.

8. The Monitor Set-Up (Fig. 7) screen displays a Raw Plate Shape scale and an Actual Plate Shape scale.
   - Raw Plate Shape scale should stay in the range of ±10 µm. If it is within range right away, wait a minute and it should adjust by itself.
- Actual Plate Shape scale will say “Averaging...”. Wait until a number appears.

9. Once the number appears move the joystick to the left and select Auto Zero. Press OK.
- “Zeroing Monitor” will appear on the screen. When complete, the Actual Plate Shape should be 0.0 µm.

10. Move the joystick to the right and select Exit. Press OK.

11. Upon return to the Machine Setup (Fig. 6) screen, move the joystick down and select Exit. Press OK to return to the Process Screen/Machine Setup (Fig. 4) screen.

**PROCESS SCREEN**

1. On Process Screen/Machine Setup (Fig. 4) screen, move the joystick up, select Process Screen, and press OK.

2. On the Confirm Action screen (Fig. 8), move the joystick down, select, and press OK.

3. When the Please Set Jig Positions screen (Fig. 9) appears, the monitor and jig arms need to be positioned. Do not press OK yet.
SET JIG POSITIONS WITH SETTING TOOL

1. Set the center cross in the middle of the lapping plate (Fig. 10).

2. Place the small arm (Fig. 10) with rollers facing up on the post that is back and to the right of the lapping plate.
   a. Place the monitor and weight in the arm so that it is touching the rollers on the arm.
   b. Disconnect the long cord that is attached to the monitor and the LP50 and reconnect the short cord (Fig. 10).
   c. Adjust the arm so the edge of the monitor is touching one of the sides of the center cross (Fig. 10).
   d. Tighten the arm down. None of the set screws should be touching the lapping plate. If any are, adjust the arm up.

3. Place the large arm with rollers facing up on the post that is forward and on the right side of the lapping plate.
   a. Clean the test block with a Kimwipe and isopropyl alcohol.
   b. Place the test block with the weight on top in the arm so that it is flat on the lapping plate and is touching the rollers on the arm (Fig. 11).
   c. Adjust the arm so the edge of the test block is touching one of the sides of the center cross (Fig. 11).
4. Tighten the arm down. None of the set screws should be touching the lapping plate if there are; adjust the arm up.

5. Remove the center cross.

6. On the Please Set Jig Positions screen (Fig. 9), select and press OK to open the Operating screen.

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**Figure 11**

**OPERATING SCREEN**

The Operating screen is shown in Figure 12.

- Note, if any screen selected from the Operating screen is left untouched for 4 seconds it will revert back to the Operating screen. Just reselect and press OK.

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**Figure 12**

**ABRASIVE SCREEN**

1. On the Operating screen (Fig. 12), move the joystick up and to the right. Select Abrasive and press OK.

2. On the Abrasive screen (Fig. 13), select Abrasive Drum and rotate the joystick clockwise to change it from OFF to ON.
3. On the **Abrasive** screen (Fig. 13) move the joystick **down** and select **Override.** Press **OK** to change from an **X** to a **checkmark.**
   a. If the LP50 has been sitting for a couple of days it may need some help to start spinning. Take the drum off and swirl it around to mix the slurry. (The abrasive drum contains a slurry mix of 500–600 mL of 600 grit aluminum oxide powder and a half full drum of deionized water.)
   b. The abrasive drum on the top of the LP50 will begin to spin.
   c. The drip wires should not touch the lapping plate, monitor, or test block (Fig. 11).
   d. The drips should follow underside of the wire all the way down; if they do not, follow the wire with your finger to get the drips started.
   e. Turn on the drip monitor by pressing the **green** button (Fig. 16) just behind the drip tray.

4. Once the lap wheel is started, the drip rate will be displayed on the **Operating** screen (Fig. 12) to the right of the Plate speed.

5. The drip rate should be about 1 per second. To adjust the drip rate, rotate the drip valve (Fig. 16).

6. When the drips exit the drum they should be split in half by the drip tray (Fig. 16). If they are not split evenly, move the tray so they are doing so.

7. Let the lapping plate get wet.

8. Move the joystick **down** and select and press **OK** to return to the **Operating** screen.

**TIMER SCREEN**

1. On the **Operating** screen (Fig. 12) move the joystick **up** and select **Set Time.** Press **OK.**

2. On the **Timer** screen (Fig. 14), move the joystick **up** and select **Timer.**

3. Rotate the joystick **clockwise** to change “**Disable**” to “**Enable.**”

4. Move the joystick **down** to select **Rest Timer** and press **OK.**

5. Move the joystick **down** to select **Set Time.**

6. Rotate the joystick **clockwise** to increase time or **counterclockwise** to decrease time.

7. **Set Time** to 15 minutes, then move the joystick **down** to select and press **OK.**
PLATE SCREEN

1. On the Operating screen (Fig. 12) move the joystick down and left and select Plate. Press OK.
2. On the Plate screen (Fig. 13) select Target Plate Speed.

3. Rotate the joystick clockwise to increase speed or counterclockwise to decrease speed.
4. Set the Target Plate Speed to 5 rpm then move the joystick down; select and press OK.
5. On the Operating screen (Fig. 12) move the joystick down and to the left to select Start. Press OK to start rotation of the lapping plate.
6. On the Operating screen (Fig. 12) move the joystick up and select Plate. Press OK.
7. Increase Target Plate Speed (Fig. 15) in increments of no more than 10 rpm up to 70 rpm, then move the joystick down and select OK.
   - The test block and monitor should rotate counterclockwise. If it does not rotate right away, it may take a couple of minutes to adjust to the plate flatness. Then they will begin to rotate.
8. On the Operation screen (Fig. 12), the Actual Flatness should stay within ±5 µm and the Target Flatness should stay at 0 µm.
9. When 15 minutes has passed, select Stop on the Operating screen (Fig. 12) and press OK to stop the rotation of the abrasive drum and lapping plate.
10. Make sure the abrasive stops dripping by rotating it so the scoop inside the drum is vertical (Fig. 16).
11. Wipe down the drip tray and turn off the drip monitor.

![Figure 16](image)

**MEASURING THE TEST BLOCK**

Measure the test block daily using the scale to check the **Actual Flatness**.

1. Take the weight off the test block and set it down, then set the test block upside down on top of the weight (Fig. 19).
2. Clean the test block with isopropyl alcohol and a Kimwipe.
   - If it is not cleaned right away it will begin to rust.
   - Keep cleaning until NO more abrasive comes off the surface of the face of the block. When all the abrasive is removed, the Kimwipe will be clean after wiping it.
3. Gently clean the master flat and Logitech micrometer scale support rim and spindle tips (Fig. 17) using a Kimwipe and isopropyl alcohol.

![Figure 17](image)

4. Carefully set the scale on the master flat and wiggle the scale back and forth to let it ‘bed down’ to the surface (Fig. 18).
- Any time the scale is picked up, slowly bring the spindle tips up above zero. To do this, use the levers on top of the scale (Fig. 18). When the scale is set on an object the spindle tips should never slam down.
- Also, any time the scale is picked off an object apply pressure to the levers and slowly move the spindle tips back to their resting place.

5. If the scale does not read 0 µm, adjust the gauge so it does.
6. Move scale over to the test block by keeping constant pressure on the spindle tip levers (Fig. 19).

7. Set scale down gently and wiggle.
8. The scale should read the same as the Actual Flatness on the Operating screen (Fig. 12). If the scale reads the same, the Actual Flatness is set properly.
   - Each small notch on the scale is 2 µm and the numbers are 10 µm each.
   - If it is not the same, repeat the process.
   - If it is still off after that, you will need to maintain flatness of the plate manually.
LAPPING SAMPLES ON THE LOGITECH LP50: USER GUIDE

INTRODUCTION

This user guide will help thin section technicians bring their sample to 40 µm thick. This will prepare the sample for the final stage of polishing on the Logitech WG2. For more information refer to the Logitech Thin Rock Section Production manual, available in the Thin Section Laboratory both on a Logitech thumb drive in the bookcase and computer under the “Manual” folder on the desktop. Or, refer to Operation and Maintenance of the LP50 Lapping and Polishing Machine manual, located in the black binder in the Thin Section Laboratory cabinet labeled “LP50, PMS and Associated Equipment.”

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- Lapping samples on the LP50
- Flattening thin section billets
- Frosting slides
- Bonding billets to frosted slides

PROCEDURE

SETTING THE JIG

1. Use the jig labeled “Lap.”
2. Clean the jig and Logitech scale by wiping them with a Kimwipe and isopropyl alcohol (refer to the Logitech LP50 Setup user guide for more information on scale use).
3. Gently set the scale on the jig (Fig. 1) and wiggle the scale.
4. The jig should be set to 1201. (Use the middle gauge on the scale.)
   - The small dial (Fig. 1) on the bottom left side should read 12.
   - The large face (Fig. 1) should read 01.
5. If the jig is not set to 1201, change it by inserting the Tommy bar into the holes on the main post in the middle of the jig (Fig. 1).

6. Rotate the Tommy bar clockwise to lower the chuck face, causing the numbers on the scale to increase, or counterclockwise to raise the chuck face, causing the numbers on the scale to decrease.

7. Remove the scale after the jig has been set.

LAPPING SAMPLES

1. Clean samples and the chuck face with Kimwipe and isopropyl alcohol.

2. Set six clean samples (unfrosted side down) on the chuck face over the vacuum grooves. There should be no space between any of the slides.
   - If there are 1 or 2 samples, place them in the middle of the chuck face and place frosted slides on the outer sides. The same frosted slides can used be as “filler slides” throughout the expedition.
   - If there are 3 or 4 samples, place them on the outer sides of the chuck face and place the filler slides in the middle (Fig. 2).
3. Connect vacuum hose, if not already connected.
4. Check oil level in the vacuum pump under the counter.
5. Turn on vacuum pump with the button labeled Vacuum under the joystick on the LP50.
6. Close valve on the LP50 to the left of the vacuum gauge (Fig. 3).
7. The vacuum gauge should read less than 150 mbar (Fig. 3) and should be in the green portion of the gauge.
   - If there is not a proper vacuum seal right away, try pressing lightly on the slides to help them seal and make sure the exhaust flap (Fig. 3) is clean.
   - If that does not work, take off the slides and clean them and chuck face again.
8. Gently set the jig upright on the lapping plate in the forward arm.
9. The plate monitor can stay in place on the back arm.
10. Turn on the abrasive drum by overriding and make sure it is dripping properly.
   - For samples that cut quickly on the PetroThin, lap for about 10–12 minutes for the first time.
   - For samples that cut slowly on the PetroThin, lap for about 15–20 minutes for the first time.
11. Set the plate speed to 5 rpm.
12. When the plate is wet, press Start.
13. Increase the plate speed in small increments to 58 rpm.
14. The jig should start to spin after a couple minutes when all the samples begin to even out to the same thickness.
   - Bungee cords can be added to the vacuum hose to assist the jig spin.
   - Do not walk out of the lab when the LP 50 is running.
   - If the samples are left on too long, the abrasive will “pluck” minerals out of the sample, leaving a hole.
15. When time is up, press Stop.
It is best to bring the speed back down to 5 rpm after the lapping plate is stopped to help prevent starting it back up at a high speed.

17. Take the jig off the plate carefully.
18. Open vacuum valve and turn it off.
19. Place jig chuck face up in the sink.
20. Scrub the jig and slides gently with a soft brush to break the vacuum seal.
21. Clean the jig by scrubbing it down with warm water and a soft brush. Then, blow air through the jig and on the chuck face with the air gun.
22. Rinse the samples with warm water, and then wipe them with a Kimwipe and isopropyl alcohol. Blow them dry with the air gun.

### MEASURING SAMPLES

1. Hold the micrometer with your pinkie and ring finger through the “C” part of the micrometer. Your index finger and thumb will move the dial.
2. Clean the micrometer before use by placing a piece of paper in between the two bars and closing it gently (do not apply force). Pull the paper out and repeat.
3. Gently close the micrometer all the way. It should read zero.
4. To measure the sample, place it in between the two bars and close them gently onto the slide where the sample sits.
5. Take a measurement at the middle and sides to make sure that the sample is even all the way across.
6. On the micrometer, each tick mark is 10 µm. The difference between the thickness you measure and the thickness of the slide is the thickness of the sample. For an example, if you measure 19 on the micrometer and the slide is 15, that means the sample is 40 µm.
   - Soft samples should be about 45–50 µm.
   - Medium or hard samples should be about 40 µm. This is the majority of samples.
   - Very hard samples should be about 35 µm.
   - If the sample is too thin, it will either not get a good polish before reaching a target thickness of 30 µm, or it will become too thin.
   - If the sample is too thick, it will take a very long time to polish down to the target thickness.
7. Write the thickness next to each sample on the sample tray.
8. If the samples are too thick, put them back on the lapping wheel for a couple more minutes.
**INTRODUCTION**

This user guide will help thin section technicians prepare billets for bonding to microscope sides. For more information refer to the Logitech Thin Rock Section Production manual, available in the Thin Section Laboratory both on a Logitech thumb drive in the bookcase and computer under the “Manual” folder on the desktop.

Additional user guides related to preparing thin sections include the following:
- Cutting samples with the Buehler PetroThin
- Logitech LP50 setup
- Lapping samples on the LP50
- Flattening thin section billets
- Frosting slides
- Bonding billets to frosted slides

**PROCEDURE**

**SAMPLE PREPARATION**

1. Log all the thin section billets into the thin section log and assign them a number.
   - Label the billets with their corresponding number and orientation, if applicable, with a wax pencil. It is very important that these do not get mixed up. Also, write the assigned number on the sample bag and request form.

2. Make a sample tray by cutting a wypall (heavy duty paper towel) in half. Place it on a metal tray and draw a grid on it. Write the numbers assigned to the billets on the grid (Fig. 1).
   - It is helpful to draw a small picture of the billet and orientation arrow next to the number for later reference.
   - The tray will help you to carry samples around the lab safely.
LAPPING BILLETS ON THE LP50

1. Use the LP50 for flattening hard rock billets. For soft, water soluble, or vesicular billets see “Flattening Billets by Hand” on page 4.

2. Place metal ring in the forward arm (Fig. 2 and Fig. 3).

3. Place the billets around the outer edge of the ring (Fig. 2) with their number facing up. If there is a small billet it should be placed in the middle.
   - The billets should be all the same thickness. If not, add a filler rock on top to make it level with the others.

4. Fill in the empty space with filler rocks (Fig. 2).

5. All the rocks should fit loosely. Do not wedge them in.
6. Assemble the LP50 as shown in Figs. 3 and 4:
   a. Put the rubber pad on top of the rocks.
   b. Place the sponge pad next on top of the rubber pad.
   c. Then place the metal stopper on the sponge pad.
   d. Finally, place the weight on top of the stopper.

7. Turn on the abrasive drum by overriding it and make sure it is dripping properly.
8. Reset the timer 15 to 25 minutes, depending on how hard the samples are.
- It is better to leave the sample on longer if it is hard material. You can never make it “too” flat.

9. Check the plate speed; it should be set to 5 rpm.
10. When the plate is wet press Start.
11. Increase the plate speed in increments to 58 rpm.
12. After the time has elapsed, remove the weight, stopper, pads, ring, filler rocks, and samples.
13. Clean the ring by wiping it down with a Kimwipe and isopropyl alcohol.
14. Rinse and scrub the billets and filler rocks with a soft brush and warm water.
15. Place the billets lapped side up on a 70°C/160°F hot plate to dry. Spray the billet with isopropyl alcohol to speed up the drying.
16. When finished, the flat side of the sample should reflect light and feel smooth to the touch (Fig. 5). If any parts look dull or feel rough it may need more time on the lap wheel.

**Figure 5**
(Logitech Thin Rock Section Production Manual)

**FLATTENING BILLETS BY HAND (FOR BILLETS TOO SOFT, WATER SOLUBLE, OR VESICULAR)**

1. Use the metal flat plate and aluminum oxide wet dry sandpaper (Fig. 6).
2. Start with lowest grit and move to highest:
   a. 240 grit will flatten the sample, but will leave it scratched.
   b. 400 grit will help remove scratches left by the 240 grit.
   c. 600 grit is the finest and will make the billet smooth for bonding.
3. Hold the billet flat by applying equal pressure across the sample and move in a “figure eight” motion on the paper (Fig. 6), moving slowly across the whole surface.
4. Rotate the billet from time to time.
5. When finished, the flat side of the billet should reflect light and feel smooth to the touch (Fig. 5). If any parts look dull or feel rough, it may need more time sanding.

6. Some very soft materials will remain dull.

7. If the billet has been impregnated it will reflect light.

8. Wipe the billet clean with a Kimwipe and isopropyl alcohol.
INTRODUCTION

This user guide will help thin section technicians prepare slide for bonding to billets. For more information refer to the Logitech Thin Rock Section Production manual, available both on a Logitech thumb drive in the Thin Section Lab cabinet and Thin Section Lab computer under the “Manual” folder on the desktop. Or, refer to Operation and Maintenance of the LP50 Lapping and Polishing Machine manual, located in the black binder in the Thin Section Lab cabinet labeled “LP50, PMS and Associated Equipment”.

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PROCEDURE

SETTING THE JIG

1. Use the jig labeled “Frost.”
2. Clean the jig and Logitech scale by wiping them with a Kimwipe and isopropyl alcohol. (Refer to the Logitech LP50 Setup user guide for more information on scale use.)
3. Set the scale on the jig gently (Fig. 1) and wiggle the scale.
4. The jig should be set to 1217 (use the middle gauge on the scale).
   - The small dial (Fig. 1) on the bottom left side should read 12.
   - The large face (Fig. 1) should read 17.
5. If the jig is not set, put the Tommy bar into the holes on the main post in the middle of the jig to adjust (Fig. 1).
6. Rotate the Tommy bar clockwise to lower the chuck face, causing the numbers on the scale to increase, or counterclockwise to raise the chuck face, causing the numbers on the scale to decrease.

LAPPING UNFROSTED SLIDES

1. Clean six unfrosted slides by washing them with hot water and wiping them off with a Kimwipe and isopropyl alcohol. Then blow dry with the air gun.
   - If slides are stuck together, let them soak in hot water. They should separate easily after a day.
2. Set the clean slides on the jig’s chuck face over the vacuum grooves. There should be no spaces between any of the sides (Fig. 2). If there are spaces the vacuum will not seal properly.
3. Connect vacuum hose to the right forward vacuum plugin (Fig. 3).

4. Check oil level in the vacuum pump under the counter.
5. Turn on vacuum pump with the button labeled Vacuum under the joystick on the LP50.
6. Close valve to the left of the vacuum gauge (Fig. 4).
7. Check that the vacuum is less than 150 mbar (Fig. 4). It should be in the green portion of the gauge.
   - If there is not a proper vacuum seal right away try pressing lightly on the slides to help them seal and make sure the exhaust flap (Fig. 4) is clean.
   - If that does not work, take off the slides and clean them and chuck face again.

8. Gently set the jig upright on the lapping plate, in the forward arm (Fig. 5).
9. The plate monitor can stay in place on the back arm (Fig. 5).
10. Turn on the abrasive drum by overriding and make sure it is dripping properly.

11. Reset the timer and set it to 25 minutes.

12. Set the plate speed to 5 rpm.

13. When the plate is wet press **Start**.

14. Increase the plate speed in increments to 58 rpm.

15. The jig should start to spin after a couple of minutes when all the slides even out to the same thickness.
   - Bungee cords can be added to the vacuum hose to assist in helping the jig spin (Fig. 5).
   - Do not walk out of the lab as the LP 50 is running.

16. When time is up, press **Stop**.
   - It is best to bring the speed back down to 5 rpm after the lapping plate is stopped, to help prevent starting it back up at a high speed.

17. Take the jig off of the plate carefully.

18. Open vacuum valve and turn it off.

19. Place jig chuck face up in the sink (Fig. 6).
20. Scrub the jig and slides gently with a soft brush to break the vacuum seal.

21. Wash the frosted slides with warm water and blow dry with the air gun. Then, clean them with a Kimwipe and isopropyl alcohol.

22. Clean the jig by scrubbing it down with warm water and a soft brush. Then blow through the jig and on the chuck face with the air gun.

MEASURING FROSTED SLIDES

1. Hold the micrometer with your pinkie and ring finger through the “C” part of the micrometer. Your index finger and thumb will move the dial (Fig. 7).

2. Clean the micrometer before use by placing a piece of paper in between the two bars and closing it gently (do not apply force). Pull the paper out and repeat.

3. Gently close the micrometer all the way gently. It should read zero.

4. Place the slide in between the two bars and close them gently onto the slide (Fig. 8).
5. Take a measurement at the middle and sides to make sure that the frosted slide is even all the way across.
   - Uneven slides will cause your sample to be uneven. If this happens put the slide back onto the jig and lap it down longer until it is even.

6. Organize the frosted slides into groups based on slide thickness (Fig. 9).
INTRODUCTION

This user guide will help thin section technicians bond the flattened billets to frosted slides. For more information refer to the Logitech Thin Rock Section Production manual, available in the Thin Section Lab both on a Logitech thumb drive in the bookcase and computer under the “Manual” folder on the desktop.

PROCEDURE

PREPARING FOR RESIN

1. Set the billets flattened side up on heat pad and spray them with isopropyl alcohol to help them dry.
2. Clean frosted slides with isopropyl alcohol, blow them dry, and measure them again.
   - It is best to have all the slides the same thickness for the billet group being bonded.
   - Take note of how thick the slides are and write it on the sample tray. The samples will need to be 30 µm on top of the slide thickness.
3. Place the slides on the heat pad as well.

MIXING RESIN

1. Mix one full pump of EpoTek 301 part A and part B into a weighing dish.
   - The ratio is 3 to 1. The pumps are preset to this ratio.
   - Make sure pump is primed first or the ratio will be incorrect.
2. Stir the resin slowly with a wooden stick until there are no trails of the two mixing (Fig. 1).
- Gus says 200 circles, and best if you count.
- Make sure no wooden splinters fall into the resin; pick them out if they do.
- The resin should stay good for about 45 minutes. If it starts to get gooey, place on the hot plate for a few seconds and it will become runny again for a very short time.

**PUTTING RESIN ON THE BILLET**

1. Once the samples are **completely dry**, clean the surface off with a Kimwipe and isopropyl alcohol.
2. Place the billet on a Teflon puck.
3. With the wooden stick, slowly draw an X with the resin on the sample (Fig. 2).

- If the first stroke is discolored it means the resin is soaking in the vesicles. This is one way to tell if surface impregnation is needed.
4. Spread the resin around so it covers the whole sample, and then let it sit for 1–2 minutes and watch for formation of bubbles.
   - If bubbles form, disrupt them with the metal point tool (Fig. 3).
SURFACE IMPREGNATION

1. If the billet is soaking up resin, it is a good idea to surface impregnate it.
2. Hook up the vacuum hose to the impregnation stand (Fig. 4).
3. Place the billet under the bell jar (Fig. 4).
4. Check the vacuum oil level. Refill if it starts to run low.
5. Turn on vacuum pump by turning on the power strip connected to the wall (Fig. 4).

5. Close the valve on the upper right side of the Logitech VS2 (Fig. 5) and make sure the valve on the impregnation stand is open (parallel with the vacuum hose) (Fig. 4).
Bonding Billets to Frosted Slides

- Watch the vacuum gauge on the left side; it should be in the green around 25 in/Hg.
- Press on the bell jar to get a good seal.

6. Let the vacuum run for about 1 minute. Watch the billet while it is running. If the resin on the billet is bubbling, it means it is soaking in.

7. Open the vacuum valve slowly. The bubbles should dissipate.
   - Add more resin on the billet if there are bare spots.

8. Repeat steps 5, 6, and 7.
   - There should be fewer bubbles.

9. To force the resin into the billet, repeat step 5 and only let it run for about 30 seconds, and then shut the valve on the impregnation stand (perpendicular with the vacuum hose). Then open the vacuum valve. After the vacuum is fully released, open the valve on the impregnation stand quickly.

10. Repeat step 9 until there are only a few bubbles left.

11. Remove billet from the impregnation stand and turn off the vacuum pump.

12. After the billet is surface impregnated it can be immediately bonded to a frosted slide.

**BONDING FROSTED SLIDES TO THE BILLETS**

1. Make sure the frosted slides are clean.

2. Hold the frosted side up to the sample to measure how large it is. Draw two horizontal lines with resin to outline the size of the sample (Fig. 6).
3. Fill in the space between the two lines with resin, placing more resin on the right side.

4. Place the slide with resin side down onto the sample from left to right (Fig. 7).
   - Lay down very slowly to prevent making bubbles.

5. Press on the middle of the slide, moving any bubbles out to the sides (Fig. 8).
6. If there are lots of bubbles, take off the slide, wipe off the resin and clean the sample off with isopropyl alcohol, and then start over again.

7. Put the sample on the hot plate under the jig with the slide up and place a Teflon puck on top.

8. Lower the rod very gently down (Fig. 9). (Squeeze the spring and remove the Teflon puck to begin lowering).

8. Let the resin cure for about 1 hour.

- Poke the resin with the metal point tool to make sure it is no longer sticky.
9. Write down the thickness of the frosted slide on the sample tray.
10. When cured, remove sample and replace Teflon pucks.

GRAIN MOUNTS

1. Dry the grains on the hot plate for an hour or more in a weighing dish.
2. Mix up EpoTek resin.
3. Place dry grains into a clean plastic mold and cover them with resin.
   - It is best to use a small mold and fill it at least halfway.
4. Label the mold with the sample number.
5. Place the mold on the hot plate on top of a Teflon puck.
6. Let it cure until it is hard all the way through—it may take the whole day.
7. Peel away the mold and make sure to label the sample.
8. Once the resin is dry, the grain mount can be treated as a hard rock billet.
9. When flattening the grain mount it is best to do it by hand. Make sure enough material is taken off so the grains are cut in half.
10. When bonding the grain mount to a slide, treat it as a hard rock.

IMPREGNATING A BILLE T

1. Samples that are soft, water soluble, or vesicular billets should be impregnated (e.g., pumice, sandstone, mudstone, and claystone). Note: These samples should be dried first (reference the Freeze Drier user guide).
2. Once the samples are dry, mix up 3 pumps of both part A and B of EpoTek resin.
3. Place the billet into a clean plastic mold that is best fit it.
4. Label the mold with the sample number.
5. Cover the billet with resin (Fig. 10).
6. Hook up the vacuum hose to the impregnation stand (Fig. 4).

7. Place the mold with the billet under the bell jar (Fig. 11).

8. Check the vacuum oil level. Refill if it starts to run low.

9. Turn on vacuum pump by turning on the power strip connected to the wall (Fig. 4).

10. Close the valve on the upper right side of the Logitech VS2 (Fig. 5) and make sure the valve on the impregnation stand is open (parallel with the vacuum hose) (Fig. 11).
    - Watch the gauge on the left side; it should be in the green around 25 in/Hg.
    - Press on the bell jar to get a good seal.

11. Let the vacuum run for about 1 minute. Watch the billet while it is running.
    - If the resin on the billet is bubbling it means it is soaking in.

12. Open the vacuum valve slowly. The bubbles should dissipate.
    - Add more resin on the billet if there are bare spots.

13. Repeat steps 10, 11, and 12. There should be fewer bubbles.

14. To force the resin into the billet, repeat step 10 and only let it run for about 30 seconds. Then shut the valve on the impregnation stand (perpendicular with the vacuum hose) and open the vacuum valve. After the vacuum is fully released, open the valve on the impregnation stand quickly.

15. Repeat step 14 until there are only a few bubbles left.

16. Remove the mold from the impregnation stand and turn off the vacuum pump.

17. Place the mold on the hot plate on top of a Teflon puck.

18. Let it cure until it is hard all the way through—it may take the whole day.

19. Peel away the mold and make sure to label the sample.

20. Remove any excess resin with the rock saw or the band sander.
21. When flattening the impregnated billet it is best to do it by hand. Make sure that all the resin is removed from the bottom so the billet is showing.

22. Treat the impregnated billet as a hard rock when bonding it to a slide.