

FlexPrep

Laboratory cutting machine used for sawing asphaltic materials into lab specimens for evaluating flexible pavement overlays in the Overlay Tester

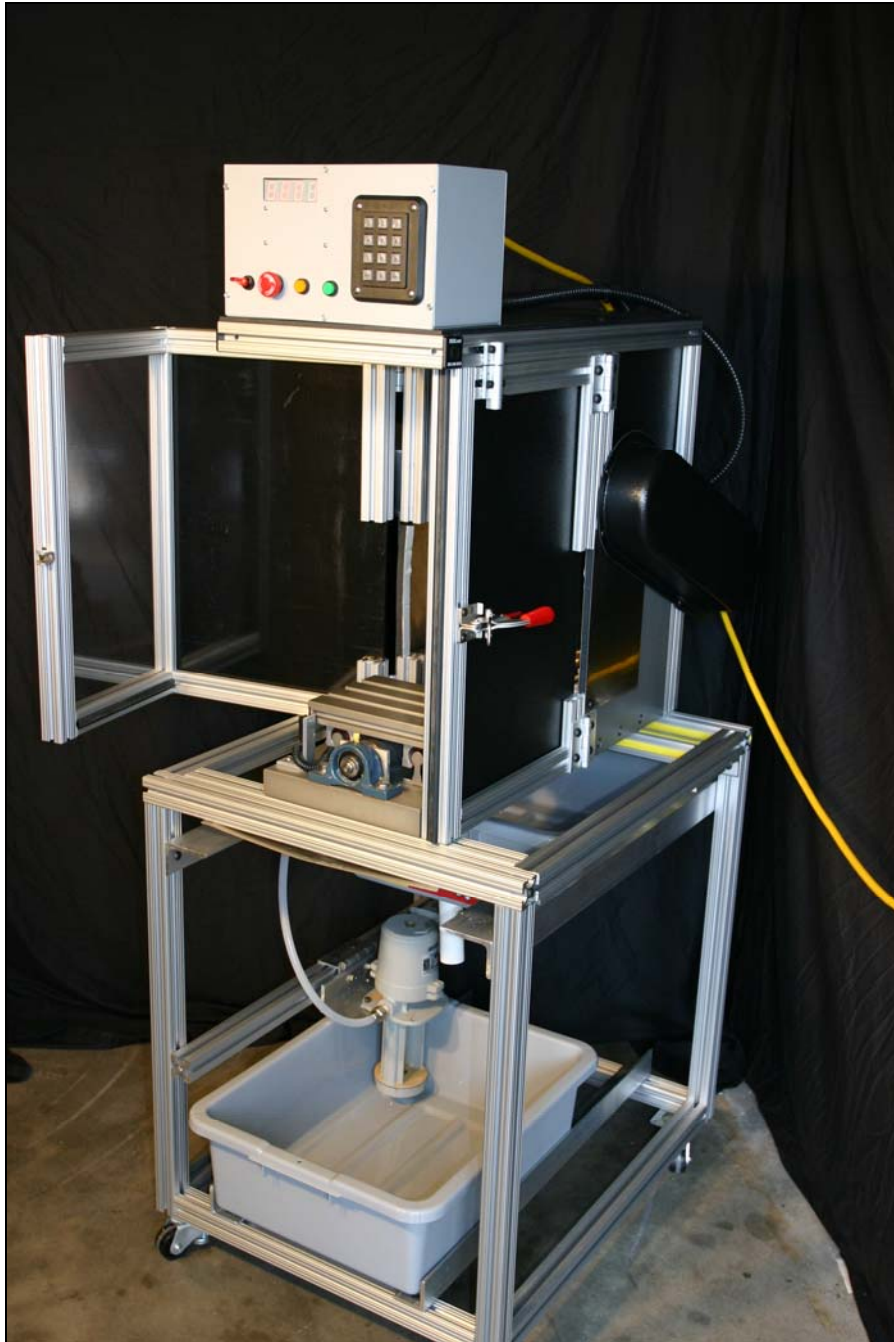


Figure 1. FlexPrep FP311 Hardware Version 2.

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Caution: This machine is for industrial use only and shall only be used by trained personnel. An enclosure is provided, but the doors may be opened while the machine is running to handle oversized material. Protective safety equipment such as eye and ear protection should be worn by operators even when the doors are closed.

Unpacking and Setup

The machine is packed on a shipping skid or pallet that can be dismantled relatively easily. An experienced forklift operator is required for unloading and maneuvering the unit prior to unpacking. Strapping the unit to the backstop as a backup method of preventing forward tipping is recommended, especially if the travel surface is uneven or the forklift operator is inexperienced.

Once the machine is in the general area desired for placement, the skid can be dismantled. The unit is mounted on wheels and may be rolled into final position after the skid is removed. However, the wheels are not designed for rough surfaces such as gravel. The skid may be dismantled with at least two people as follows:

1. There are metal strap(s) going all the way around the machine vertically. Cut these straps with tin snips. Use caution and appropriate eye and other safety protection to avoid injury when cutting the straps since they are under tension.
2. Remove the shrink-wrap.
3. At each corner of the machine, there is a piece of steel angle bolted to the legs of the machine and to the pallet. Remove these bolts and the steel angles. The steel angles may be retained for future shipping use or returned to the manufacturer for reuse.
4. The machine should be ready to move at this point and can be rolled off the skid by at least two people to keep it from dropping off the edge of the skid. Minimize the amount of side load on the wheels.

Check the electrical supply circuit output before the machine is plugged in for the first time. The standard machine requires 120VAC single-phase supply, minimum 20A dedicated circuit (a 208/230VAC version is also available). A GFCI circuit is recommended, especially for operations in damp/wet locations.

Normal Operations

Operation of the machine is straightforward. The saw blades have various settings that can be obtained through sequences pre-programmed into the keypad unit. These sequences are discussed in the *Basic Keypad Operation* section. Clean the machine at least daily during use to ensure smooth operation of the saw blade. When in the normal closed position, the two blades on the machine are about 1½ inches apart. They can be moved to a maximum of 7 inches apart as necessary. Debris may clog the drip rails in the unit causing overflow of water. This can be relieved by scooping out dust and larger matter and re-exposing the drain plugs. The cutting area is fully enclosed but is not perfectly leak proof. A shallow drip pan can be installed under the machine if small amounts of water on the floor are unacceptable.

The primary purpose for this machine is to precisely cut a 6-inch core into specified specimen sizes for laboratory testing. The primary testing application is Overlay Testing (beam shape) — see [Figure 2](#) below. The objectives are to remove portions of the original compacted cylinder that do not have homogenous air voids and to provide parallel charts.

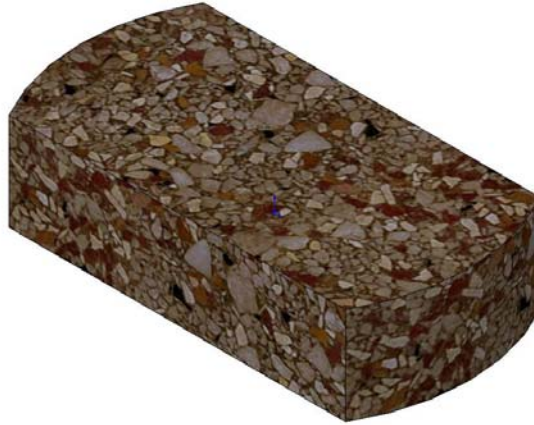


Figure 2. Final Overlay Test Specimen.

Specimen Preparation and Installation

Standard Hot Mix Overlay Specimen

Generally, a specimen is fabricated from a field core or a lab compacted specimen. The round core is used and is usually cut from a 6-inch core to be 1 ½ inches tall and 3 inches wide by 6 inches long with the core radius on each end. Other beam lengths and configurations may be used depending on the mounting plates used.

Simple Performance (Hot Mix Asphalt Tester) Specimen

The machine can be used to cut the original core or gyratory compacted specimen to the correct length for the simple performance (e.g., hot mix asphalt test, dynamic modulus, flow number, etc.) test. The resulting cylinder must then be cored down to 4-inch diameter for which an optional precision core rig is available.

Specimen Clamping

For the Overlay Test, a core may be inserted in order to cut it down to a 1½-inch thick disc. After this is completed, the 6-inch diameter by 1 ½-inch disc may be inserted in order to be cut into a 3-inch wide specimen to be used in certain testers, such as the Overlay Tester (OT-11).

Installation

The core and disc are installed in the same basic manner. The orientation of the core or disc is the main variable that is changed. Once the specimen is installed in the desired position, the machine is set for the thickness/width necessary to make the specimen.

Cutting Disc to Desired Thickness

1. Insert core so the end faces of the cylinder are parallel with the saw blades. This will ensure that the disc will then be cut to the desired thickness.
2. Screw knob onto all-thread until specimen is adequately secured underneath clamp arm (see [Figure 3](#) below).
3. Continue to *Normal Run Checklist*.

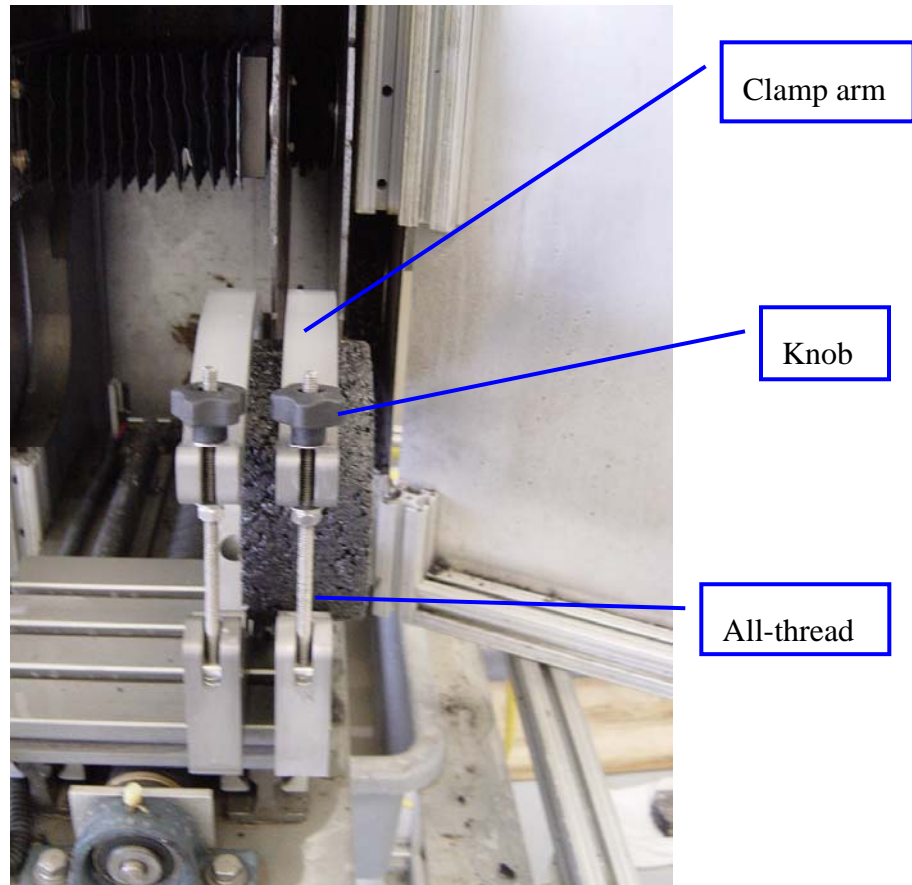


Figure 3. Specimen core after installation in clamp prior to cutting to desired thickness. Note: if specimen is too short to span both clamps, the unused upper clamp arm MUST be tightened down against the nut and washer provided on the all thread in order to prevent damage to the machine and/or operator.

Cutting Disc to Desired Width

1. Insert disc with desired thickness (generally 1½ inches) so the diameter (6 inches) is perpendicular to the saw blades. This will ensure that the disc will be cut to the desired width.
2. Place the spacer on top of the disc. Screw knobs onto all-thread until specimen is adequately secured underneath spacer and clamp arm (see [Figure 4](#)).
3. Continue to *Normal Run Checklist*.

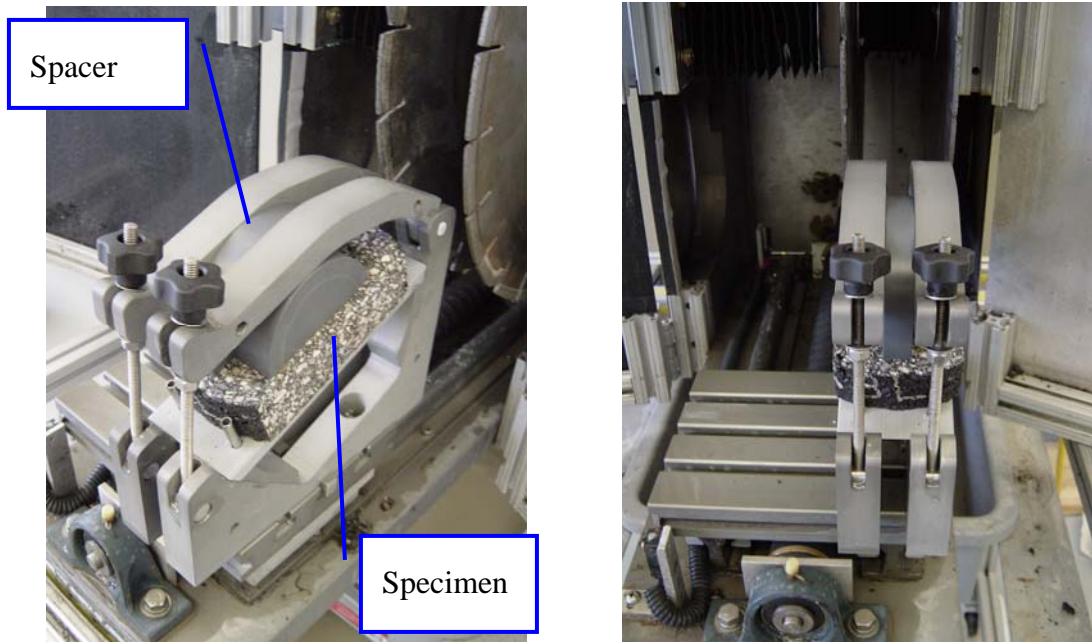


Figure 4. Specimen disc after installation and cutting. Notice saw blades have been moved into the correct position (3") prior to making this cut.

Normal Run Checklist

Startup and Test Specimen Installation

1. Before the main switch is turned on, clear all debris from the cutting area and drip rails. Make sure the clamp arms are secured in the clamped position (down). Also, make sure both doors are closed and secured.
2. The Emergency Stop switch must be in the released position (partially rotating the switch allows it to pop out to the released position if it has been previously pushed in).
3. Turn the Main Power Switch on (up). The machine will start moving the left blade toward the right to the reference (“Home”) position and back left to the standard overlay height cutting position of 1.5 inches.
4. Open door(s), Loosen clamp knob and put sample in the clamp. Tighten clamp arm back down on specimen. Enter desired width of sample through keypad if it is not already at the desired spacing, and proceed to *Basic Keypad Operation* (see [Figure 5](#)).

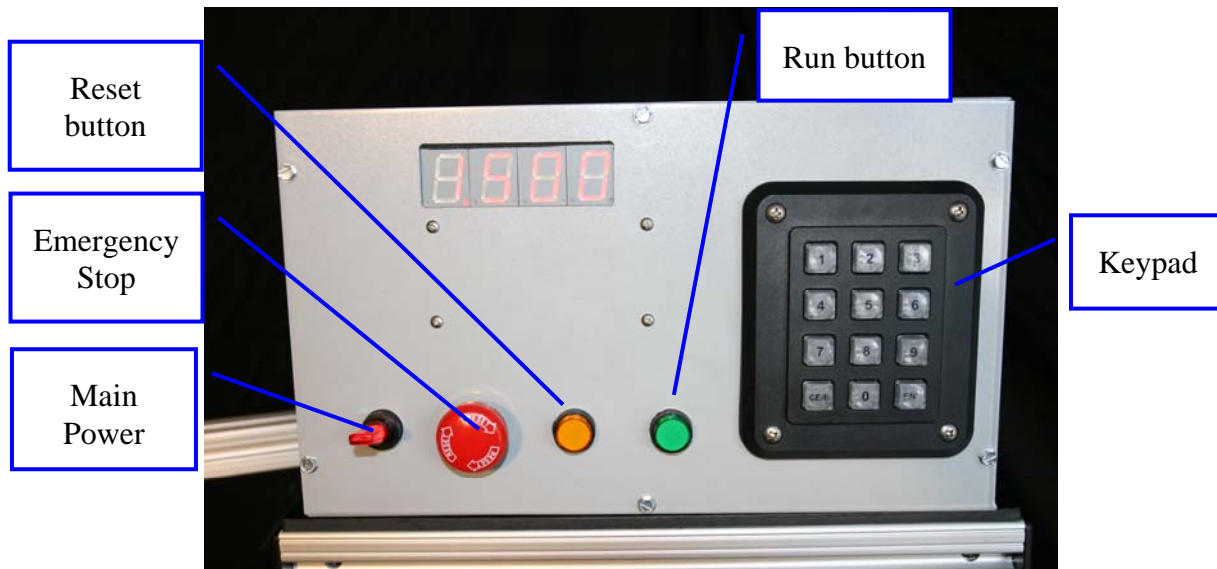


Figure 5. Keypad.

Basic Keypad Operation

1. The unit should already be on. Enter the desired specimen width as follows:
 - a. Enter desired width on keypad, with three decimal places. NOTE: The decimal is not entered by the user, it is always assumed to be entered in thousandths of an inch. To cut at 3-inch spacing, type 3000 and press ENT on the keypad. The display will show 3.000 and the blade will move to 3-inch spacing.
 - b. If the user enters a wrong value, press CE/E (“clear entry”) in order to correct it.
 - c. Wait for the saw to position itself.
 - d. Close door(s). Note that for secure reason, the door(s) must be closed in order to start the cutting process.
 - e. Press the green button in order to start the cutting process. If the machine needs to be stopped for any reason, the Emergency Stop button may be pressed. To resume operation, press the yellow recover/reset button.

NOTE: The decimal is stationary in the display. Accuracy can be determined to three decimal places. If a value is entered that exceeds the allowable value of the machine, the machine will automatically choose the closest maximum or minimum value to that which was entered. For example, if a user entered 9 inches, the machine would go to a value of 7 inches since that is the default maximum value, and if 1 inch is entered, the machine would go to a value of 1.5 inches. Operation outside these limits is possible with non-standard options on the saw specified at time of order.

2. Once the machine has cut the specimen to the desired value, remove the specimen by doing the reverse of the installation. Loosen the knobs on the all-thread, and raise the clamp arms to remove the specimen and spacer, if applicable.

NOTE: Knobs do not need to be completely removed, it is only necessary to loosen enough to clear over the arm.

3. Remove the excess material from machine bed.
4. Clean interior of machine and all drip rails if necessary.

Emergency Operations

In the event of emergency, the primary method of terminating machine operation is pressing the red Emergency Stop mushroom button located on the control panel (see [Figure 5](#)). Pushing the switch disconnects power to the motor from the supply line (however, power is still present inside the machine). If the machine is used in a damp/wet location, a GFCI is recommended.

If the power upstream of the entry box needs to be disconnected, unplug the machine or disconnect the circuit at the building's service panel (e.g. building's circuit breaker or fuse panel).

Maintenance, Adjustments, and Calibration

Most of the machine parts are low maintenance, and linear bearings are not subject to rusting. However, rotating bearings are not corrosion proof. Inspect these items as indicated in maintenance section.

Maintenance

- Check the grease on the main bearing system daily. Apply new grease if necessary. There are three grease fittings on the machine—one on each end of the main table drive and one on the top left vertical arm.
- Keep a light coat of grease on items that are not corrosion proof such as exposed screw heads, the main drive shaft coupler, and exposed bearing components. Almost everything that is magnetic, painted, and/or black oxide finished is not corrosion proof.

Recommended lubrication products are available from the manufacturer or locally through auto parts stores, retail stores, and industrial supply houses.

- For general oiling, use LPS-2 or 3-in-1 oil.
- For cleaning metal parts, use WD-40 if long-term lubrication is not necessary. However, if WD-40 is used to clean the moving parts, make sure you then clean the WD-40 off the parts before applying additional lubricants.
- Do not use WD-40 on the linear bearings and shafts. Use 3-in-1 oil or similar.
- Use rubbing alcohol or something similar to clean parts that need to be cleaned but are not oily.

- For greasing the main bearings and rails, use CRC Lithium General Purpose NLGI #2 (P/N SL 3310) or comparable grease. It is also recommended that components prone to rust be coated in either LPS-3 or grease (e.g. ball bearing system, pillow blocks, and shaft coupler). Even though most of these components have some sort of protective coating on them, they will rust if they are not given additional protection.
- For cleaning the clear polycarbonate window, use Meguiar’s Mirror Glaze plastic cleaner and plastic polish. Do not use any other type of cleaning products on the polycarbonate (i.e., do not use ammonia type cleaners like Windex). There are some other plastic finishing/polishing compounds available at hobby shops. For major scratches on polycarbonate, you can actually use sandpaper of various grits to get the scratches out and then proceed to finer and finer grits, usually getting down to 800–1200 grit (available at auto parts stores) or emery cloth before polishing with Mirror Glaze. A pencil eraser may also be used during this process if desired. By the time you have reached the 800 grit, the plastic should be getting clear again and will be transparent by the time you are done with the Mirror Glaze. **Warning:** this takes a huge amount of elbow grease, and once you start, you are committed to the project if you ever want to see through the plastic again.
- For general cleaning of the aluminum and opaque plastic paneling, you can use a number of cleaning products such as Windex. Black plastic panels are ABS or acrylic. ABS will withstand more aggressive cleaners such as “Goo Gone” and “Goof Off” if necessary, however Goof Off is very aggressive and must be used with care and wiped off very quickly (test a hidden area before using to make sure it will not damage the plastic). The aluminum framing system can also be cleaned and minor scratches removed with products such as Scotchbrite.

When saw blades need replacing, use the type is shown in the *Specifications* section. In order to replace these blades, perform the following steps:

1. Remove left side protective cover.
2. Loosen clamp collar on left end of saw shaft.
3. Remove belt guard.
4. Remove screw in right hand end of saw shaft.
5. Remove three screws on each blade near hub.
6. Pull out saw shaft from left side while holding blade to prevent it from dropping.
7. Replace blades pushing shaft back in to right when blades are in place. Make sure the keyway in the shaft lines up with the keys in the housings. There is a key in the left blade arm assembly and a key in the right blade mount assembly.
8. Tighten screws previously removed during blade removal procedure.

Adjustments

All fasteners on the machine are US customary hardware. The leveling feet can be used to level and stabilize the machine after it is moved into place in the laboratory. The leveling feet are integral with the casters and have some vibration isolation capability (see [Figure 6](#)).

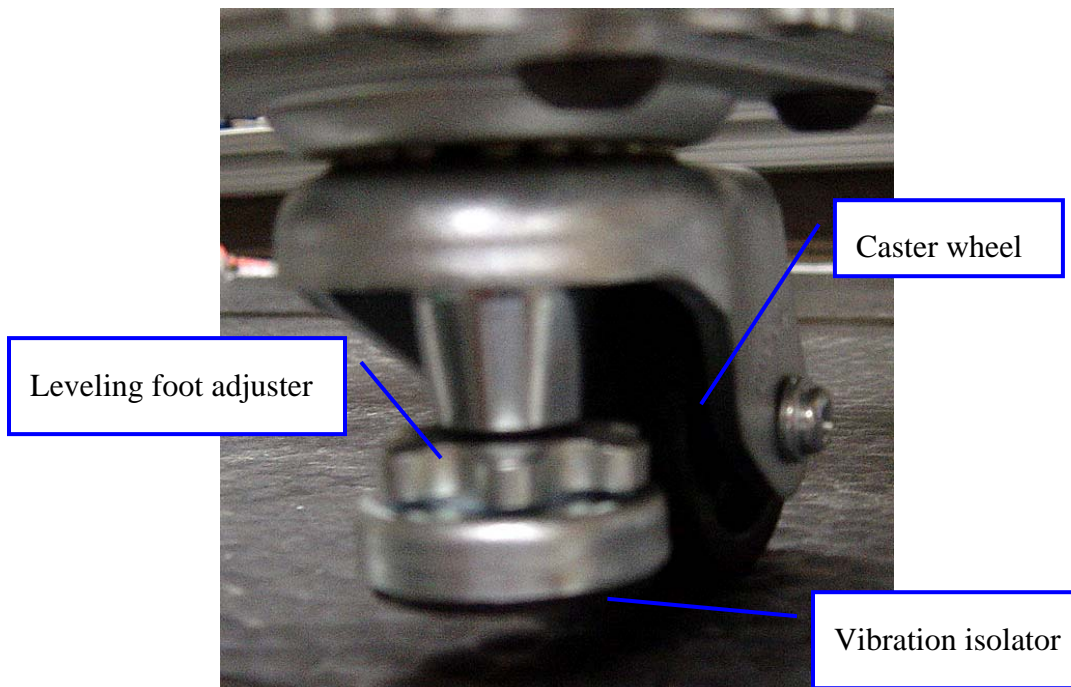


Figure 6. Integrated caster, leveling foot, and vibration isolator.

Calibration

The machine is calibrated prior to shipment. The user cannot recalibrate the unit as it requires a chip programmer.

Trouble-Shooting

- **Not enough coolant pressure**

Check to see if pump has been clogged with silt buildup from the samples that have been cut. If the pump is clear, then make sure that enough water is flowing to the bottom tub. The sieve here may also be clogged with sediment or large debris. Clean out the tubs and use fresh water as needed as to avoid a build-up issue. If there is not enough water coming into the blade area, the bar at the top inside of the machine may be clogged. Unscrew the right and left fittings in the bar and clean with compressed air.

- **Display shows “Estp”**

This shows when the Emergency Stop is engaged (in). Pull and release the button. The display should read “0.000” after doing so.

- **No display on system**

Make sure the main power and breaker switches are in the on (up) position, the Emergency Stop button is in the released (out) position, and the yellow reset/recover button is pressed. If the main power switch is not lit, check to make sure there is power to the unit. Double-check the breaker box to make sure that the breaker is not tripped for the unit. If it is, unplug the unit and reset the breaker. Turn off the main power switch and plug the unit back in. Once the unit is plugged in, turn on the main power switch. The

main power switch should light up as should the display. There is also a breaker on the back side of the keypad box which should be checked to make sure it has not tripped.

- **Motor hesitates on startup**

V-Belt is loose or circuit amp rating is insufficient. In general, if the circuit is adequate, other causes of the motor hesitation are not critical problems.

- **Specimen dimensions are not correct**

Stepper motor is missing steps. Turn the machine off and back on. If this does not work, then clean machine. If steps are still being missed, then contact manufacturer.

Specifications

Approximate shipping weight.....	300 lb
Approximate dimensions	31"W x 39"D x 63"H
Components	All US customary except ball bearings
Electrical power required.....	120VAC, 20A single-phase, dedicated circuit*
Saw blade diameter	18"
Saw blade integrity/material	Segmented Diamond with kicker segments
Saw blade mounting bolt hole pattern	1.125 @ 120°
Blade spacing indicator resolution.....	0.001"
Standard Max/Min blade spacing	1.5" – 7.0"**
Standard Max travel.....	12.5"**
Approximate Max cutting length.....	8"**

* Machine can be wired 208/230VAC single phase at no charge if requested at time of order. Retrofitting a 120VAC unit for 208/230 requires a service call and parts for internal modifications at extra cost. GFCI protection on the circuit is recommended, especially for operation in damp/wet locations.

** Custom ranges are available at extra cost.

Machine color depends on version and is at the discretion of the manufacturer. However, models generally have a black cabinet. Contact the manufacturer at time of request for quote if you desire a specific color combination.

Hardware Revision History

The first production prototype utilized a 10-inch wide base plate.

Later units utilize a 12-inch wide base plate in order to more easily accommodate a protective bellows for the blade moving mechanism on the left hand side.

Warranty

Except for expendable components such as diamond blades and for corrosion, normal wear and tear, and unauthorized Purchaser modification, all parts and labor are warranted to be free from defects for a period of 12 months from the date of sale. Liability is limited to refund, repair, or replacement at the Manufacturer's option.

For repair service and technical support:

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Specific Machine Data

Machine Serial Number: _____

Original Electric Motor Output (hp): _____

Keypad Module Re-Flash Maintenance Log

Table 1. Maintenance Log. Enter dates keypad module has been re-programmed.

NOTE TO TECHNICIAN: Make sure re-flash code has been stored in machine's folder on server so that it may be readily retrieved.

<i>Date</i>	<i>Brief Description of Change</i>	<i>Technician</i>
	INITIAL PROGRAMMING	