Precision Endless Wire Saw with Digital Micrometer and Two Angle Adjustable Sample Stage

SMART CUT
6012

Operation Manual

Table of Contents

Introduction

SMART CUT™ 6012 Miniature/Lab Precision wire saw is designed to provide a very smooth cutting for almost all kinds of materials, especially for very fragile crystals and substrates such as SrTiO3, YVO4, and GaAs etc. ***SMART CUT™ 6012*** by using either a diamond impregnated or a plain wire blade with abrasive slurry. It is an ideal saw for your needs of cutting valuable delicate and fragile crystals. It is a very helpful for your R&D and laboratory applications.

SMART CUT™ 6012 has sample holder to hold samples of any shape. The sample stage can rotate at 360 degree horizontally and at 30 degree vertically. wire blade tension is adjustable to provide most accurate cutting capability. **Diamond Wire Saw offers the most gentle mechanical method for cutting virtually any material**. It is most useful for cutting fragile crystals, substrates with delicate layers or any material that would be damaged when using a diamond cut off saw or any other cutting method.

A sample is mounted to a sample holder and attached to a work table on the base of the saw. An appropriate load is applied by adjusting the counterbalancing weight and the mechanical downstop is set. The sample is then positioned in any starting position relative to the wire blade and then a micrometer is used for precise sample positioning. With the wire rotating, the arm is gently lowered until the wire blade touches the sample.

Specifications

Stage travel distance	• Max. 50.8mm (2″) travel length • 360 degree horizontal rotating and 30 degree tilt stage
Traveling position accuracy	2″ Digital Micrometer Head with accuracy of +/-0.005mm (5 microns)
Size of sample stage	80 x 51mm
Wire traveling speed	0 ~ 3m/sec
Rotate speed	50 ~ 900rpm
Diamond wire	• One piece loop type diamond wire (840 mm long, 0.3mm dia. Diamond coated) is included for immediate use. • A Diamond Blade Dressing Stone is included for keeping the wire sharp. • Anti-corrosive coolant is required during cutting (please select in optional product below table). • The diamond wire is consumable.
Cutting thickness	Up to 50 mm
Power supply	AC 110~220 50/60Hz, 50W
Product dimension	With saw closed: 81Lx 43Wx 37H cm With saw fully open: 81Lx 43Wx 54H cm
Package dimension	40″ x 25″ x 30″

Shipping weight	150Lbs
Warranty	One year limited manufacturer warranty with lifetime support (cutting wire is not covered by the warranty)
Certification	CE certified
Application note	Diamond wire is very easy broken. Please carefully install the wire and balance gravity before cutting.
Warnings	• It is required to use proper cutting fluid with the saw to prevent wire cold and from corrosion of the machine. We strongly recommend you use oil based coolant or lube cool lubricant with the water pump. Do not use tap water directly, otherwise, the rusting components are not part of the warranty.

	• Never cut any materials without the use of proper cutting fluid. If you do so, serious damages can be caused to the spooler driving mechanism. • For cutting the sticky materials such as non-ferrous alloy, epoxy, and plastic, you must sharpen diamond wire frequently. We suggest that cutting sample along with the included dressing stone (Glue sample and the dressing stone side by side and cut them together, this process will help keep the wire sharp enough for efficient cutting. • Please clean the machine after the completion of each use.

Structure

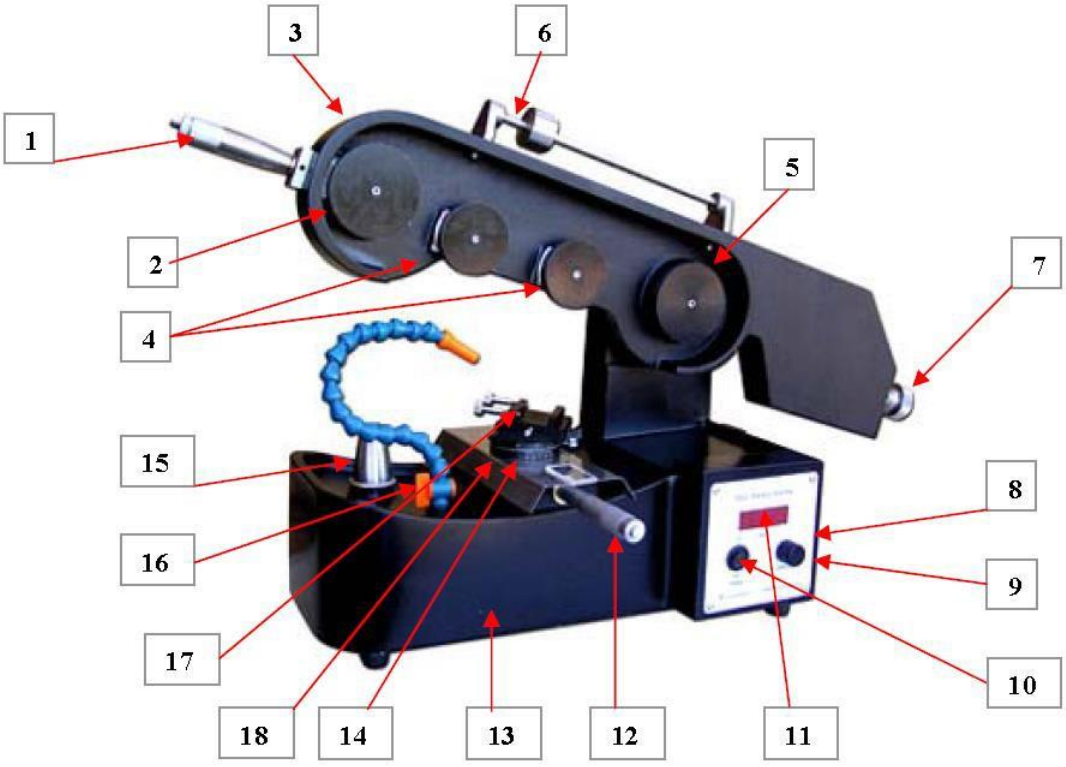


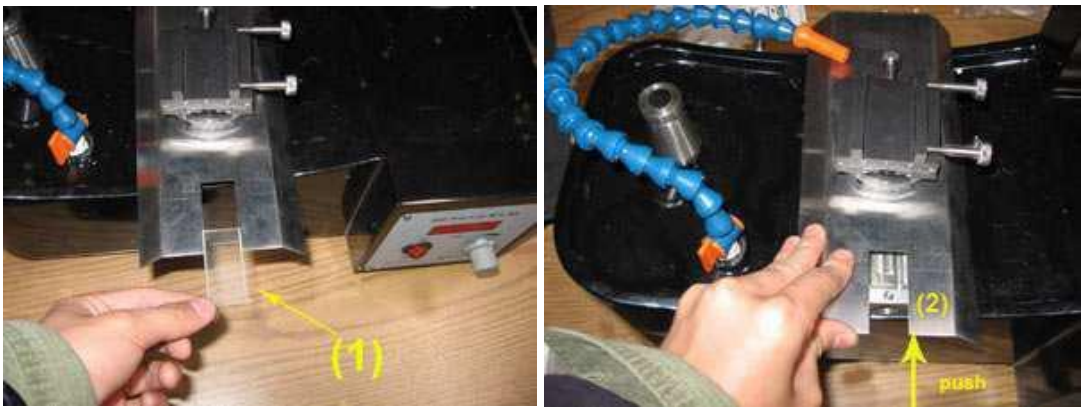
Fig 1

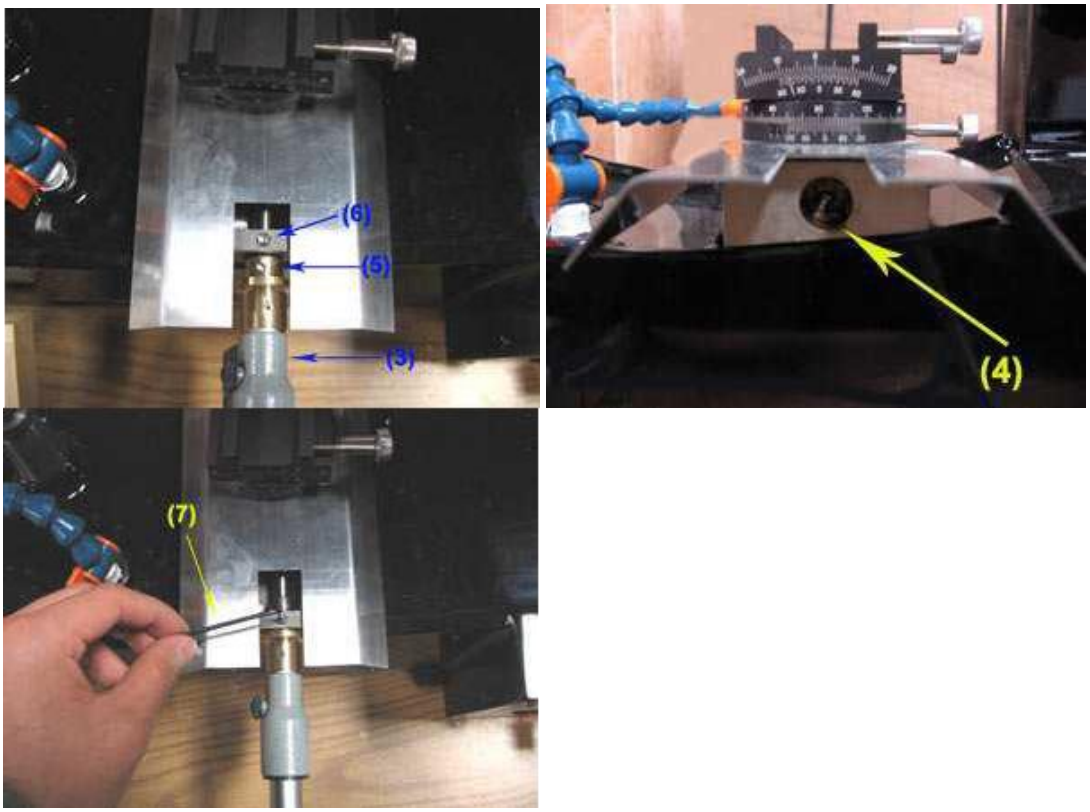
Part#	Description	Part#	Description
1	Tension adjustable handle	**10**	Power on/off
2	Passive wheel	**11**	Digital speed display
3	Swing arm for cutting	**12**	Micrometer with 2″ travel distance
4	Guiding wheel	**13**	Casting aluminum base
5	Driven wheels	**14**	Two axis goniometer screw
6	Top balance weight	**15**	Stop point for swing arm
7	Back balance weight adjustment nut	**16**	Coolant pipe with valve
8	Front control panel	**17**	Mini vise for holding sample
9	Speed control button	**18**	Working stage

Installation

a. Remove the glass block *(1)*.
b. Slightly push the base *(2)* but not to the end.
c. Assemble the micrometer *(3)* into the hole *(4)* until the screw *(5)* locates beneath the bolt *(6)*.
d. Use a hex screw driver *(7)* to tighten the bolt *(6)*.
e. Put the glass back.

NOTE: When uninstalling the micrometer, hold the base firmly to avoid injury.





Operation Procedures

Wire Blade Installation

1. Loosen the tension handler to create space for installing the wire blade, as Fig. 2. Let the wire blade loop the line in the groove of driven / passive and guiding wheels.
2. Adjust the two guiding wheels on the back of the saw to a distance where is enough to cut the sample (2″ Max.). (See Fig. 3)
3. Fasten the tension handle to tighten the wire blade. Please DO NOT over tighten to avoid blade breakdown.

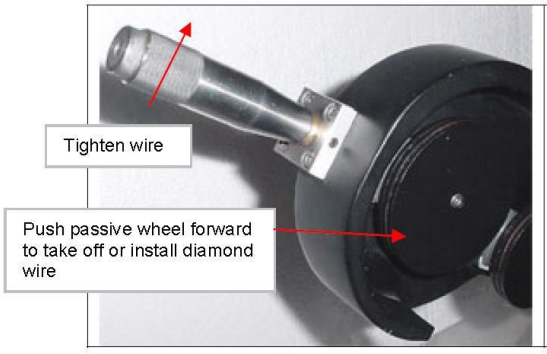


Figure 2

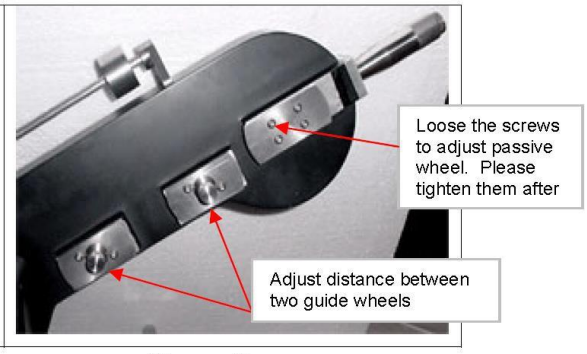


Figure 3

Sample Preparation

1. Place the sample on the graphite plate and aluminum plate, heat the sample to 80ºC by a hot plate (digital heating plate is available), then glue them together by waxing (Fig. 4). You may glue graphite and aluminum plate by high temperature epoxy glue (available from auto store) first, then wax sample to graphite later by wax.
2. Place the graphite and aluminum plate on the working stage and then screw the chuck, as Fig.5 shown.
3. You may mount the sample into a cross vise as Fig. 6, if you would like to dice a sample with accurate 90º. The cross vise is available.
4. Adjust the micrometer and move the sample to the initial cutting position.

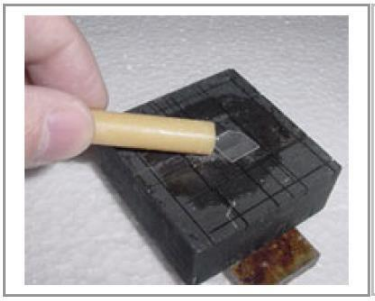


Figure 4

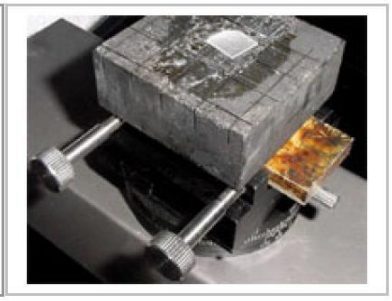


Figure 5

Figures 6

Precautions before Cutting

1. Place the machine on a stable platform.
2. Plug into AC 110V-230V power supply (Fig. 7).
3. Connect the drain pipe to drain outlet and water or coolant pipe to hose inlet (Fig. 8).

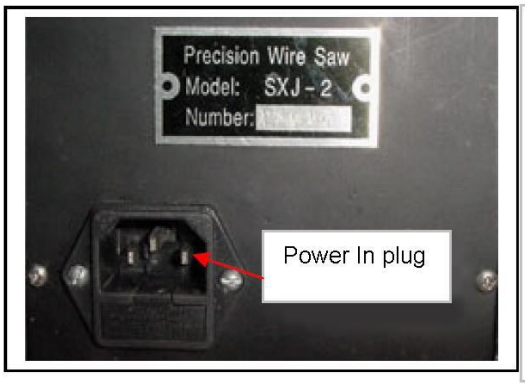


Figure 7

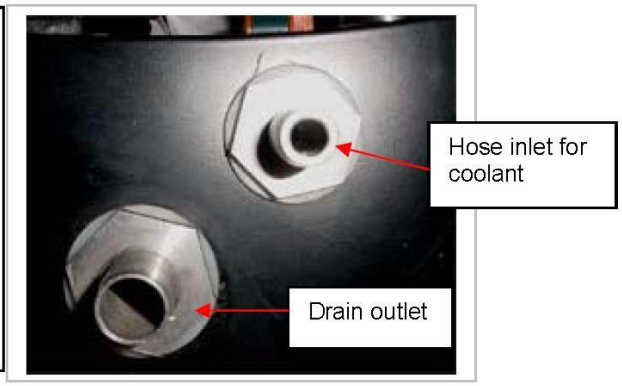


Figure 8

4. Connect tap water pipe or water pump for auto feeding of the water or coolant to cool down the temperature while cutting (water pump is optional).
5. Make sure water supply and drain pine are working properly without leakage.
6. Make sure the speed micrometer is in Zero position.
7. Turn on the machine and slowly increase the speed. Perform 1~2 minutes test run without cutting.
   NOTE: You may put a plastic disk under the saw to avoid water splashing out.

Gravity Adjustment

1. The wire saw cuts sample by using gravity. It is very important to adjust gravity to cut smoothly. The gravity can be adjusted in these two positions: right side handle for major weight adjustment (Fig. 9) and top weight slide for minor adjustment (Fig. 10).

Figure 9

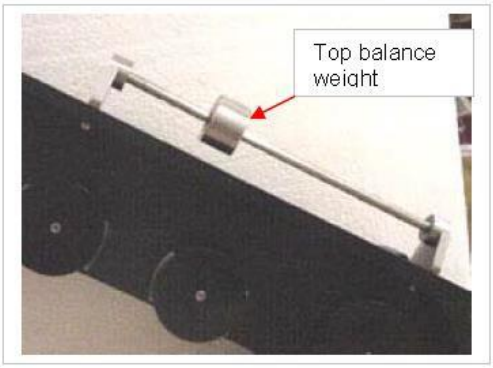


Figure 10

2. Turn the major weight handle clockwise to raise the swing arm and reduce gravity; turn it counterclockwise to decline the arm (see Fig. 9) and increase gravity.
3. For minor tension adjustment, slide the top balance weight forward or backward to meet the requirements. (Fig. 10)
4. Set the distance of the two guiding wheels by tightening or fastening the guiding wheel screws (on the back of machine for horizontal, Fig. 3) according to the size of your sample.

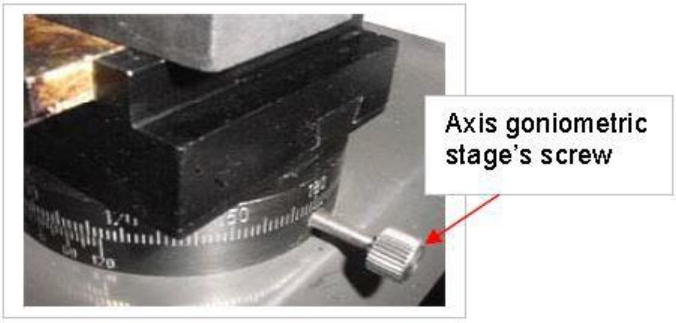


Figure 11

5. Weight your sample by moving the screw left or right.
6. Set the stop point screw to allow the machine to stop automatically.
7. Make sure axis goniometric stage's screw #14 (as Fig. 11) on the sample stage is tightened after adjustments.

WARNING

- It is required to use proper cutting fluid with the saw to prevent corrosion of the machine components. We strongly suggest using oil based coolant or lube cool

lubricant with the water. Do not use tap water directly, rusted component are not part of the warranty.

- Never cut any materials without the use of proper cutting fluid. If you do so, serious damages can be caused to the spooler driving mechanism.
- For cutting sticky materials such as non-ferrous alloy, epoxy and plastic, we suggest cutting them along with a dressing stone (place your material and the dressing stone side by side and cut them together, this process helps keep the wire sharp enough during the entire cutting process and thus increase the cutting efficiency.
- Please clean the machine after the completion of each use.

Notice

- This machine cuts the sample by gravity. It is very important to adjust the weight according to requirements. Large gravity may beak the diamond wire.
- Adjust the tension of the wire blade and make sure the blade is in line with guiding wheels to cut smoothly.
- Please use corrosion resistant coolant during cutting to protect machine and enhance cutting performance. (Fig. 12). A small immersion water pump may need to circulate the coolant during cutting. (Fig. 13). The coolant and pump are available.

Figure 12

Figure 13

Maintenance

- Keep the machine clean and dry after using it.
- After power off, the working arm must be lift up.
- Lubricate the machine once or twice a month if frequent usage.

Safety

- Always make sure the machine has good connection to the grounding.
- Do not touch the moving parts and the wire blade while cutting.
- Do not adjust the micrometer indicator and the weights after power on.
- Raises the working arm and set the speed nut to the position of “O” after using the machine.