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Proper Use of Wire Blades for the Model 850

The Model 850 Wire Saw is a tremendous tool for making precise, nearly damage free cuts in even the most brittle of materials. To maximize the benefit of the saw, it is important that it be properly maintained and operated. The lifetime of a wire blade will vary depending on the sample size, sample material, applied load, operating parameters, and other factors. An estimated life for the various wire blade types is given below.

Wire Diameter	Cutting Life (hours)
0.015" (0.381 mm)	1 to 4
0.010" (0.254 mm)	0.75 to 3
0.005" (0.127 mm)	0.5 to 2

If premature failure of the wire blades is happening, there are a few things that should be checked.

Wheel Alignment

Be certain that the Drive Wheel (large wheel coupled to motor), the Idler Wheel (large wheel at left side of arm) and the 2 Guide Wheels (2 small wheels near the sample) are all in line with one another. The Drive and Idler wheels are factory aligned and will be in line if the saw is properly assembled. Be sure that the arm is securely fastened to the base casting using the two recessed screws in the riser of the base casting. If these are not secured, then the arm will wobble. Also, be sure that the Idler Wheel has been tightened again after mounting the wire to the saw. The 2 Guide Wheels are items that need to be adjusted to be sure that the wire tracks properly.

Wheel Wear

Please note that there are several sets of grooves on each of the wheels. As one groove wears out (when the wire runs too deeply into the groove), you need to re-position the wire into another groove and realign the guide wheels to be sure that they are tracking properly. If your wire blade is running in a groove that is too deep, it can get pinched which will cause the blade to snap.

Lubrication

It is very important to be certain that the contact point between the wire and the sample is constantly flushed with water (in the case of diamond wire) or abrasive slurry (in the case of plain wire). The water will serve to flush debris from the cutting area which could cause the wire to bind in the sample. The abrasive slurry serves a similar purpose. In addition, the plain wire will cut wherever there is abrasive. If the abrasive does not flow to the bottom most point of contact between the wire and the sample, the wire could tend to wander producing an unevenly cut surface.

Wire Tension

Wire tension can have a drastic impact on how straight the cut is through the specimen, especially when looking at the cross sectional profile. Wire tension needs to be as tight as possible without placing too much strain on the wire. The proper tension is required for maintaining proper wire life and to keep the cutting profile straight. Too much wire tension will cause premature wire failure, and too little wire tension will cause the edge of the cut profile to be curved (wire wandering). The wire should be adjusted such that there is approximately 1mm or less of deflection between the guide wheels. The guide wheels should be adjusted as close to the edges of the specimen as possible to provide the maximum amount of support on the wire blade during the cutting process. This helps maintain a straight cut all the way across the specimen area and through the entire cross section.

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Readjusting of the tension will be necessary after a certain number of cuts due to the slight amount of stretching the blade will do during the course of the cut.

Adjusting the wire tension is done as described below (see Figure 1 for illustration):

1. Loosen the tension device set screws (#1) by turning counter-clockwise.
2. Turn the tensioning screw (#2) counter-clockwise to allow the idler wheel to slide backward. The entire idler wheel assembly (#3) should slide back against the tensioning screw and allow for the wire to be mounted.
3. Place the wire into the wire saw by pulling the wire around the drive wheel, holding the wire in place, and stretching the wire to the idler wheel. Pull the wire down on the top of the idler wheel, and then slide the idler wheel assembly forward to place tension on the wire.
4. Hold the idler wheel assembly in place while the tensioning screw (#2) is tightened until pressure is felt against the idler wheel assembly (#3). Turn the tensioning screw about ¼ turn to add tension.
5. Adjust the guide wheels to accommodate the specimen being cut. Loosen the guide wheel set screws (#8) and adjust the spacing and height by sliding the guide wheel mounting brackets (#7) vertically and horizontally. Be sure the guide wheels (#5) are not going to hit the specimen or the work table before the cut is terminated.
6. Tighten the guide wheel set screws (#8) to lock into position.
7. Check the wire tension between the guide wheels (#5) by gently pressing with your finger or gently lowering the arm down onto the specimen. The wire should deflect less than 1mm from the horizontal.
8. If the tension is too loose, turn the tensioning screw (#2) clockwise until the proper tension is obtained. If the tension is too tight, turn the tensioning screw counter-clockwise until the proper tension is obtained.

CAUTION: Do NOT overtighten the wire using the wire tensioning screw. If the wire is too tight, wire failure will immediately occur.

9. Tighten the tension device set screws (#1) by turning clockwise until the idler wheel is locked in place.

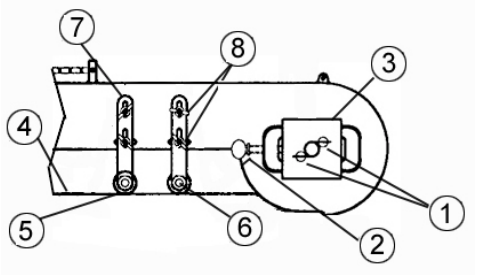

Figure 1: Schematic illustration of the arm and tensioning mechanism.
1- Tension device set screws, 2- Tensioning screw, 3- Idler wheel and tension assembly, 4- Wire, 5- Guide wheel, 6- Lateral guide wheel alignment screw, 7- Guide wheel mounting brackets, 8- Guide wheel set screws.

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Tension Procedure (Models prior to 1998)

Adjusting the wire tension is done as described below (see Figure 2 for illustration):

1. Remove a wire blade from it's package, taking care not to kink the wire.
2. Loosen the two thumbscrews from the back of the idler wheel. Idler wheel should be able to move back and forth with light pressure.
3. Carefully place the wire blade around the drive wheel (#2) ensuring the wire is seated in a groove on the drive wheel.
4. Hold the wire tightly in place with the left hand by pulling it taught so the wire does not slip off the drive wheel.
5. Push the idler wheel towards the drive wheel using the idler wheel adjustment (#1) and place the wire around the idler wheel in the same grooves as the drive wheel.
6. Allow the idler wheel to gently slide back to make the wire tight, keeping the left hand on the idler wheel to prevent it from sliding back up. **Caution: If the idler wheel is allowed to slide back too quickly, it will place too much tension on the wire and break the wire. Hold the idler wheel in place to the desired amount of tension.**
7. Tighten the thumbscrews at the back of the idler wheel adjustment (#1) to lock the wheel in place at the proper tension.
8. Check that the wire is in the grooves of the guide wheels (#4) and that the grooves of the guide wheels, idler wheel, and drive wheel are all aligned to make the wire parallel.
9. Adjust tension if necessary using the idler wheel adjustment (#1).
10. Adjust the guide wheels using the guide wheel arm adjustment (#4) to position the guide wheels. For very large samples it may be necessary to remove the guide wheels completely.
11. Place cover over the arm assembly.

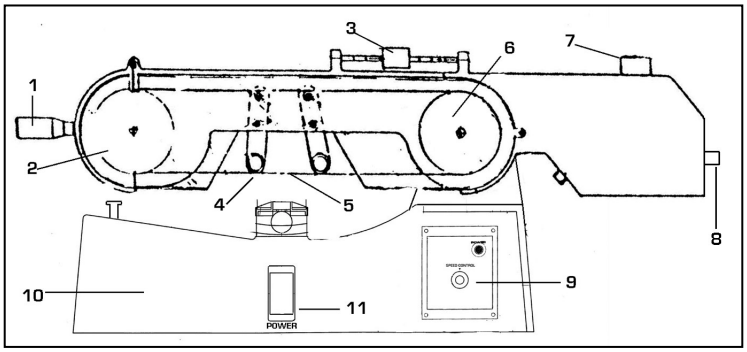

Figure 2: Front view of the Model 850 Wire Saw.
1- Wire tensioning screw; 2- Idler wheel; 3- Small weight; 4- Guide wheel assembly; 5- Wire blade; 6- Drive wheel; 7- Weight; 8- Counter weight adjustment; 9- Dial speed adjust; 10- Casting; 11- Down stop screw