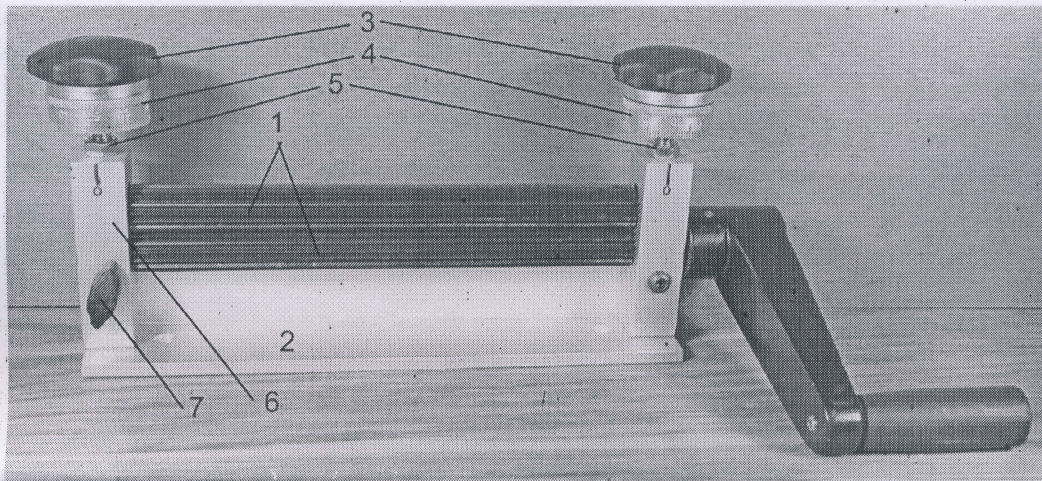


## USING THE MICROFOLD BRAKE

(Jack Berry)

The microfold brake is a type of rolling corrugator that can be used with sheet metal and wire. The rollers are made of 24 pitch steel pinion wire that are hardened and anodized to prevent roller damage and rusting. With thin sheet metals such as 36 gauge (0.005") to 30 gauge (0.010") rolled to maximum fold depth you can expect about 8 microfolds per inch on the exiting metal and a shrinkage of the flat sheet to about 60% of the starting length. These values will change with the thickness of the sheet metal because thicker metals will not be corrugated to the same extent giving fewer folds per inch and less shrinkage.



The parts of the microfold brake:

1. The two rollers which are 8" lengths of 24 pitch pinion wire. The rollers are treated to make them hard so they are not easily damaged and they resist "bowing" during corrugation which would lead to uneven corrugation. They are also anodized to prevent rusting. The lower roller is stationary and the upper roller height can be adjusted to accommodate differing metals thicknesses.
2. The base or foot of the brake can be screwed to a bench top (note screw holes) or C-clamps can be used to mount it to the edge of a bench.
3. Knobs attached to the vertical set-screws are used to adjust the pressure on the upper roller and this adjusts the gap between the rollers when corrugating.
4. Calibration discs are attached to the top of the set screws just below the knobs and the roller gap is measured with this numerical system (100 units or percent per rotation). The outer sleeve of the calibration disk can rotate independently from the set screw with a friction fit so the device can be "zero'ed" at any time. See "Using the Calibration Discs" below.
5. Below the calibration disc is a locking nut which prevents the set screw from rotating so a particular setting can be maintained. These should be gently locked down against the top of the end blocks while corrugation is in progress. 1/2" wrench is needed for this. Keep one handy by the brake at all times.
6. The left end block can easily be removed so a band or cylinder of metal can slide between the rollers for corrugation.
7. A convenient thumb-screw is used to remove the end block from the rollers.



### Metals for Corrugation

Corrugation works best with the softer metals and their alloys such as fine silver, Sterling silver, copper, red brass (15% or less Zinc content), gold and its alloys. Ferrous and other hard metals such as yellow brass (high Zinc content), nickel silver, titanium, etc should be avoided. Wires of the same soft metal content as those listed above can also be corrugated. This is best done near the ends of the rollers (to avoid accidental roller damage in the middle) while sheet metals should always be placed in the center of the rollers for even corrugation across the width of the sheet.

The thickness of the metals that can be corrugated depends of the width of the sheet used. The thinner metals corrugate easiest and best and it is not recommended to use metals thicker than 24 gauge except when using very narrow strips. Thicker metals will usually require annealing and corrugating a second time (at a tighter roller setting) to get a satisfactory fold depth. Even at 24 gauge it is best to stay within widths of about 2" or less. Very narrow strips of thicker metals (22 to 20 gauge) can also be corrugated with repeated annealing and corrugation. Fold depths with thicker metals will never be as deep as thin metals because the greater thickness of the metal itself prevents the tighter meshing of the teeth of the two rollers. The rollers can never get closer to each other than the thickness of the metals.

### Using the Calibration Discs

First, make sure the brake and your sheet metal are clean and free from loose debris (see "Maintenance of the Brake" below). Unscrew the locking nuts so they are away from the top of the end blocks. Turn the set-screw knobs on both end blocks clockwise until they are just snug and the rollers have no gap between them. You should not be able to turn the roller handle now. While holding the set screw knob with one hand so it cannot turn, rotate the outer sleeve on the calibration disc (it will have some friction resistance) until it reads zero ("0"). Do this for both calibration discs. Now rotate the set-screw knobs counter clockwise to the desired setting such as 25 units (%) for 1/4 of a rotation from the closed position, etc. Use the 1/2" wrench to gently tighten the lock nuts on each set screw being careful not to rotate the set-screw. The locking step is necessary because often the rotating hub of the roller which contacts the bottom of the set-screw will cause the loose set screw to rotate too which changes the roller setting as you corrugate.

### Testing for Even Corrugation

After locking your desired roller gap setting into position it is a good idea to test to make sure the corrugation is even across the sheet. You can do this with some thick paper such as card stock or pieces of manila folder so you don't waste metal. Feed a rectangular strip (square corners easily cut with a paper cutter) about 2" wide and at least 3" long into the center of the rollers making sure the entering edge is touching the roller across its entire width. This makes sure you are not entering the metal at an angle. Roll the paper completely through. If the corrugation is even the exiting paper will be shorter (shrinkage) but it still should be a rectangle. If the rollers were tighter on one side compared to the other the tighter side will corrugate the paper more deeply and that corrugated edge of the paper on the tighter side will be shorter (more shrinkage) giving a trapezoid rather than a rectangle. If this happens unlock the set-screw on the tighter side and loosen it slightly and re-lock it. Now you should also re-set the "zero" on the calibration disc to the new "zero" position. Test for even corrugation again.

### Roller Gap Settings

Typically a roller gap of 1/4 rotation of the set-screw from the closed position (25 units on the calibration disc) will work well for sheet metals up to about 28 gauge (0.010") with widths of 3" or less. Greater widths may require a larger roller gap, annealing, pickling, drying and a second corrugation at a smaller roller gap. Thicker metals such



as 24 gauge (0.020") and widths of 2" or less will need an opening of about 1/2 rotation (50 units on the calibration disc) to start. After annealing, etc a second corrugation at 40 units will increase the fold depth but the folds will never be as deep as those achieved with thinner metals. Even thicker metals (up to 20 gauge) can be corrugated but narrow strips are needed (1/2" or less) and multiple annealings and re-corrugations.

When multiple corrugations are done on the same sheet metal (annealing between steps) the first corrugation essentially creates a metal that behaves as a much thicker metal for the second corrugation (usually placed at a different angle from the first corrugation). A second corrugation on annealed, corrugated thin sheet (36 to 30 gauge) will usually require a setting of 1/2 to 3/4 revolution from the closed position (50 to 75 units on the calibration disc). Again, several corrugations over the same track on annealed sheet with decreasing of the roller gap may be needed. Always take notes on the roller setting used so experimentation can be eliminated next time.

#### Maintenance & Care of the Microfold Brake

The rollers as well as the sheet metals should be clean before corrugating to avoid leaving unwanted marks on the sheet metals. Never use any wet (or even damp) metals in the brake. If you use pickled metals you must be sure no pickle residue remains on the sheet before corrugation. If multiple corrugations have been used on the same sheet the many folds and pleats can hide pickle residue so a thorough neutralizing in sodium bicarbonate solution with thorough soaking, rinsing and drying is needed. Some users choose to save time and decide not to pickle the annealed metal between multiple corrugations on the same sheet. This can lead to a build-up of metal oxides between the roller grooves and will require a thorough cleaning eventually. This can be done by placing the brake positioned on its back on top of a layer of newspapers with the handle hanging over the edge of the bench. Spray an aerosol of a commercial rust preventing solution on the rollers while rotating the handle so all surfaces of the roller are exposed to the spray. Let the solution soak for a few minutes and roll several layers of paper towels through the rollers to remove the residue and solution. If needed the process can be repeated with a light brushing of the solution soaked rollers with a coarse (loose bristle) brass brush (or old tooth brush) before using paper towels. Since the anodized surface will eventually wear in the center area where most corrugation is done it is a good idea to brush on a coating of an all purpose light oil occasionally and remove the excess oil by corrugating paper toweling.

If you happen to corrugate sheet metal at a roller gap that is very tight the rollers can leave very fine marks in the grooves of the sheet metal folds. If this happens and you want to eliminate this you can sandwich the sheet metal between two layers of ordinary thin (about 20 lb) copy paper and this will cushion the metal. You will also need to use a slightly larger roller gap to accommodate for the paper layers. This technique can also be used to avoid marks on metal if you damage you rollers accidently such as using hard metals, wires, or dropping sharp objects on the rollers. Deeper nicks or unwanted grooves on you rollers can be partially removed by polishing with a small 3M Unitized wheel impregnated with a fine silicon carbide grit (Tools catalog # 330-562).



## Microfold Brake - Notes By Cynthia Eid

### MOUNTING TO THE BENCH-3 possible ways:

1. Screw to the corner of your bench, using the screws provided.
2. Clamp to the bench using 'C' clamps.
3. Grip the mounting foot in a vise.

### REMOVABLE END BLOCK.

You can make a complete cylinder, remove the end block, slide the cylinder between the rollers, re-install the end block, and corrugate the entire diameter of the piece.

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The microfold brake corrugates sheet metal and wire. Corrugation is also called microfolding, because so many fold forming techniques can be used with corrugated metal. The word "brake" refers to the type of machinery that this tool is (commonly used in the engineering world, but less commonly heard in the jewelry world).

The Microfold Brake is both like and unlike a rolling mill. Like a rolling mill, it has two rollers that the metal is fed through by turning a crank with a handle; unlike a rolling mill, the rollers are not held in fixed position. The lower roller stays in one place as it rotates. Oval holes allow the upper roller to be adjusted closer or further from the lower roller, for tighter or looser microfolding.

The knobs are attached to the tops of bolts, which can be adjusted so that the bottom of the bolt (inside the side blocks) affects the distance between the two rollers. Turning both knobs clockwise until they can turn no further keeps the two rollers close together for tight microfolding and/or thin metal. Turning the knobs counter-clockwise loosens the bolts, and allows a larger gap between the rollers for thicker metal and/or more moderately wavy metal.

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### Basic Instructions

- Before beginning, use an old toothbrush to clean any grit out of the rollers.
- Secure the unit to the bench using your preferred method.
- Turn both knobs to their tightest positions by turning each clockwise until it stops. Rotate the brass dial on each knob so that 0 on the knob lines up with 0 on the aluminum frame.
- Loosen each knob by turning counter-clockwise the same amount, before feeding a piece of metal between the rollers. For very thin metals, such as 32 gauge, a quarter turn is usually enough. The thicker the metal, and the wider it is, the more you will need to loosen the knobs, which widens the space between the rollers. For thicker metals, or wide pieces, you may need to loosen the knobs a full 360 degree turn.
- It is better to feed the metal through loosely, and then tighten the knobs and re-corrugate it, than to damage the tool by trying to make it do too much. If you find yourself working very hard, then the setting is too tight.
- It is usually easy to re-microfold more tightly without losing the alignment. Simply "hook" the first fold over a ridge of a roller, and then turn the handle.
- It is generally advisable to anneal, pickle, and dry the metal before cross-corrugating.
- It can be helpful to turn handle in reverse, and run the metal through back and forth if it is very wide, in order to get the middle to be corrugated.
- Wide metal, or thick metal may need to be annealed and run through the rollers more than one time to get the effect desired.
- If you are planning to cross-corrugate a long narrow strip, it works best to corrugate the widest direction first, (then anneal, pickle, and dry) and then microfold across the narrower direction.



### Metal recommendations

Sterling silver, fine silver, copper, bronze, nugold, and red brass, gold alloys, are the types of metal that work best with the microfold brake. Be careful with stiff alloys such as yellow brass and nickel silver.

It is generally advisable to anneal and clean the metal before using the microfold brake ---soft metal corrugates easily without damaging the brake. Metal oxides may get the rollers dirty and be transferred to a different piece of metal in subsequent use.

Corrugated metal is structurally stronger than flat metal. This allows us to use thinner metals, which can save money, resources, and weight. 34 to 24 gauge metal are most recommended for use with the microfold brake.

In general, 24 gauge is the maximum thickness recommended for use with the microfold brake. However, if the metal is annealed, then usually:

22 gauge sheet metal can be microfolded if it is 1" wide or less than 1" wide.

20 gauge sheet metal can be microfolded if it is 1/2" wide or narrower than 1/2" wide.

18 gauge sheet metal can be microfolded if it is 1/4" wide or less than 1/4" wide.

Wire: always corrugate wire on the side, so as not to mar the rollers in the middle.

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### Common problems and solutions:

Problem: The metal is corrugated more tightly on one side than the other.

Possible solutions:

- 1 - flip the metal over, and run it through again to even it out.
- 2 - Tighten the knob on the side that is corrugating loosely, or loosen the knob on the side that is corrugating tightly.

Problem: The metal is crooked at the end, despite starting evenly.

Possible solutions:

- 1 - Be sure that the leading edge is trimmed squarely.
- 2 - While turning the crank, guide the metal into the rollers with the other hand, so that it runs straight and true.
- 3 - Some people find that it helps to keep a bit of tension on the metal, "pulling" slightly as it is fed into the rollers.

Problem: The metal is not corrugating in the middle of a wide sheet.

Possible solutions:

- 1 - roll the metal back and forth before removing it.
- 2 - anneal the metal and re-corrugate.
- 3 - If possible, use a thinner or narrower piece of metal.

Problem: there is a little mark on the edge of the roller that is marring the metal.

Probable cause: someone rolled iron, yellow brass, or steel wire, or metal that was too thick, or tool was not stored or handled carefully.

Possible solution: smooth the edge of the roller where the nick is. My favorite tool for this is a gray 3M unitized wheel, or a scotch-brite wheel.

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For further instruction and ideas for use of your microfold brake, please refer to the books by Patricia McAleer, Metal Corrugation: Surface Embellishment and Element Formation for the Metalsmith and Jack Berry, Repetitive Micro-Fold Forms.

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**Disclaimer:** It is the metalsmith's responsibility to **use common sense, and appropriate safety precautions**. The author and manufacturer specifically disclaim any responsibility or liability for damages or injury as a result of any activity undertaken in conjunction with the information presented in these notes.  
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