TECHNICAL ARTICLE

Susan Zeiss contacted me about publishing an article on mitsuro-hikime after her very successful workshop prior to the SNAG 2011 Seattle conference. This article joins other articles that have adapted and built upon a range of techniques and approaches from a variety of traditions and even other professional industries. Since SNAG News *has gone digital, we have been able to occasionally publish more detailed articles without incurring additional publishing or mailing costs. I hope you consider experimenting with this approach and sharing your experiences with Susan and myself. – James Thurman*

Mitsuro-hikime: A Casting Wax
By Susan Zeiss

Mitsu(honey) ro(wax)-hiki(drawing) me(texture)

Several years ago I became interested in jewelry pieces with a distinctive grooved design. At first glance they appear to be engraved or constructed of multiple wires, but on closer examination, they are cast. The grooves are actually achieved in the wax, *not* the metal. I set out to research waxes and develop a formula.

If you have a light touch, some patience, and are willing to dedicate some time to practicing, this wax will allow you to design in a completely creative and enjoyable fashion.

Mitsuro-hikime is a pliable wax, which behaves like taffy and during processing develops a unique linear pattern. Most effective in simple designs, Mitsuro-hikime will fold, curl, intertwine and give surface detail. Along with these interesting properties come some technical challenges. When warm enough to work, the wax attracts dirt, lint and fingerprints. When cool enough to hold shape, it is very brittle and will crack with the slightest shock. Dropping a Mitsuro-hikime piece even a short distance to a work surface will result in a shattered piece. With these considerations, the finished model will be fragile and should be cast on site.

In this article I will provide the wax formula and the process for designing Mitsuro-hikime, how to prepare the wax from its ingredients, and give the names of suppliers for purchasing the ingredients.

When working Mitsuro-hikime set up a CLEAN workspace with the following materials close at hand: wax paper, a container of cool water, a lamp to provide heat, a towel, a roll of paper towels, an X-acto knife, manicure type scissors, a cutting surface, and any forming mandrels along with tools needed for designing. A hot wax tool

should be nearby in a safe, dry place, well away from the drips and puddles that will result from the wax forming process.

Figure 1

To form the wax, warm a small piece with your hands or on a piece of wax paper under a lamp. Warm it until the temperature is consistent throughout. Dampen your fingers with water to prevent sticking and shape the wax into a starting bar [Figure 1].

Figure 2

In pulling lengthwise the bar will begin to flatten. Fold it in half, offsetting the edges, thus, creating a parallel ridge and a slightly wider strip [Figure 2].

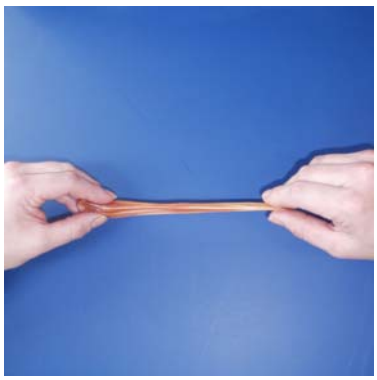

Figure 3

Take the strip ends and pull until the strip has doubled or tripled in length [Figure 3].

Figure 4

Continue to pull and fold the wax a total of four or five times and with each fold offsetting the long side edge. You will note by the third fold, the wax will begin to develop many more ridges, giving the wax a striated pattern [Figure 4].


Figure 5

To take advantage of this look, be careful not to over-handle the strip. Also watch that the edges do not become too thin, as this will affect the appearance and wearability of the finished piece. You can thicken these by running the strip along the work surface or between your fingers [Figure 5].

Beware of fingerprints. These cannot be polished off without destroying the fine textures that make Mitsuro-hikime so lovely. Practicing this pull and fold technique with several bars will quickly show you how this wax can be tapered, twisted, and shaped into rings, pendants and bracelets.

Support your piece during the design process to keep it from slumping. Mandrels, dowels, rods and tubes are helpful. Metal supports will cool the wax. Wood and tagboard are options. Cover mandrels with wax paper to prevent the wax from sticking. Keep the work surface CLEAN. Have dipping water at hand and a hot wax tool ready [Figure 6].


Figure 6

Models that have snapped are hard to repair. Super glue can be run into a crack using a jeweler's saw blade. The small teeth will hold just enough glue to do the job. "Just a touch" is the rule. Too much glue will dissolve the wax. White glue can be used to seal or thicken a section. Allow it to dry. Glued repairs will dry clear, then turn whitish upon washing and investing, but will be fine. If using glues for repair, do not use room temperature mold material. The contact point will turn gooey. Blue inlay or Perfect Purple repair waxes will flow well, but retain heat and distort the Mitsuro-hikime.

Preparing a piece for casting can be tricky. Lay the piece flat or in a supported position on a suspended mandrel, dowel or piece of foam covered with wax paper so both of your hands are free. Prepare all of the sprues before attaching to the Mitsuro-hikime wax model. Altering sprue wires after welding will cause tension, resulting in a snapped piece. Plan for findings at this point.

Pink wax sprue wires bend easily and hold up to some handling. They are low temperature and good for joining and flow. Choose a joining wax that has a low congeal (set-up) temperature, as higher temperatures will melt or warp the surrounding Mitsuro-hikime. Sticky wax, first melted in a ball at the end of a sprue wire, then remelted onto the model when in position, is a simple technique. ***Drop the joining wax into the void between the piece and the sprue instead of touching the hot tool to the piece itself.*** Don't overwork! Run fillets with wax or white glue. Be sure to allow the sprue wire to set up completely before removing the support.

Use a diameter wire larger than the thickness of the model where it will be joined (the "gate") and where possible, connect to a ridge of the Mitsuro-hikime that will feed the metal into the design, serving as a duct. This is especially helpful in pieces that are longer and a distance from the sprue base.

Surface textures are beautiful in this work and need to be preserved. Attach sprues to the backside and to edges whenever possible. Placing rings on a tilt will facilitate metal flow and reduce the chance of trapping air beneath

the shank. Position the crown side up, so the metal reaches it first, although often theory says to place the crown down and shank up for shrinkage reasons. Plan for enough metal to bulky sections. It is important to design for controlled shrinkage - supplying the model with liquid metal while cooling.

Use as low a temperature on your hot tool as possible. A temperature adjustable wax tool is ideal, as it maintains a constant temperature. An alcohol lamp will suffice, used with a needle or fine wax tool. Perfect for Mitsuro-hikime work is a battery pen, and it is a small cost compared to electric varieties. It is ideal for spot welding and reaching into tight areas. Fine wire tips of all types can leave tiny air bubbles behind when inserted into the wax. Check for this as you learn to insert the needle into the join [Figure 7].

Figure 7

The Mitsuro wax will fuse to itself easily, but at overlaps be sure to check for trapped air bubbles and sharp corners that may require a fillet. Trapped air could blow out in the vacuuming process leaving a pit in the finished casting. Small pieces of the Mitsuro-hikime can flake off. If pits appear on curves, the wax was too cool, did not stretch in bending and cracked. Portions break free in vacuuming and fill with investment, causing voids in the metal.

Pits occurring at joins are where the hot needle left an air bubble, or wax did not flow into the space completely. A fine wire tip that will hold a drop of wax is helpful. A “dry” needle will often pick up wax rather than deposit it. These flaws usually don’t show on the model, but may blow out in vacuuming, fill with investment and consequently, restrict metal flow through this duct and gate location.

Angular voids on the surface of the model opposite a duct gate are usually from small pieces of investment breaking off and floating on the molten metal into the surface. (The metal is CLEAN, right?) Vacuum casting is preferred.

It is best to work the wax bar, form the design, sprue and invest all at the same location. Pieces can be transported floating in cool water, on a piece of wax paper in a standard wax model box (placing it in the foam packing will mar the wax), or already on a sprue base. The container should be kept upright, well cushioned and not subjected to heat or cold. Prolonged storage in water will create a white film on the piece, which may affect the cast surface.

Even with a clean work area, Mitsuro-hikime will pick up dust during designing. Before investing, wash the sprued model with a soft brush using equal amounts of a mild soap and hydrogen peroxide. Rinse in COOL water and allow to dry completely. A lot of effort has gone into your piece at this point. Handle with care!

When choosing a flask it is important to remember that investment insulates. When baked, it will maintain the casting temperature of your piece, now a cavity in the center. Leave a main sprue duct (or ducts) of ½-3/4”between the sprue base (button) and the model; 1/2’ between the model and sides of the flask; or rods, if used; and ½-1” covering the model. When in doubt, select a larger flask. Use a regular ratio of investment to water, and ALWAYS do a 4-5 minute mix (stir).

In general, both gold and silver casting is successful. Thin, long sections in silver fill using higher flask temperatures and additional sprues. Polishing is best achieved with tumbling. I use a magnetic tumbler with fine pins that reach into the surface detail and corners of the piece. When casting with new gold alloy it is possible to burnish or hard felt buff the highlights and leave remaining areas untouched.

For further information:

Practical Wax Modeling
Advance Techniques for Wax Modelers
Hiroshi Tsuyuki and Yoko Ohba
ASQ Corporation
17356 West 12 Mile Road
Southfield, MI 48076
ISBN: 0-9637463-0-8

Mitsuro-hikime Wax Formula
Susan Zeiss

Weight in grams:

245	2U28 J.F.McCaughin wax -or- Kerr Sticky Wax
215	284120003 Daniel Smith lump pine resin
50-75	2-U7 J.F. McCaughin red, soft industrial wax

454 grams per pound

Suppliers:

Ball Consulting Ltd. West - supplier for McCaughin waxes in small amounts
4665 S. Ash Ave. G-15
Tempe AZ 85282-6766
480-967-7727

J.F. McCaughin Co. (now M.Argueso & Co. Inc.)
2628 River Ave.
Rosemead CA 91770-3302
626-573-3000

KerrLab/Jewelry (Kerr Corporation)
714-516-7650

Sticky Wax	03416	bulk/slab
	00623	12 sticks
	00625	120 sticks

Daniel Smith
4150 First Avenue South
P.O. Box 84268
Seattle WA 98124-5568
800-426-6740
pine resin is used in printmaking listed with “grounds”, varnishes also at your local gymnastics center in powder form

Melt the waxes in a wax pot, starting with the higher temperature pine resin, stirring in the sticky wax. Turn off the heat, then add the 2-U7. Smooth aluminum foil into a shallow pan and stretch a nylon stocking over an embroidery hoop. Strain the wax through the nylon into the pan. Cool, score and break the wax into pieces and store them wrapped in wax paper. The finished Mitsuro-hikime has a shelf life of several months.

Adjustments can be made to the formula to suit your room temperature. To soften, add red #2-U7; to harden, add sticky wax. Pine resin adds sheen, but also brittleness and seems to vary most from batch to batch.

Sticky wax 2U28 is made to go to high temperatures. Patch wax 2-U7 is soft and volatile. In storing, it is the 2-U7 that tends to evaporate and the formula becomes brittle. Melt and add fresh 2-U7 to revive. Scraps of Mitsuro-hikime may be re-melted as long as they are clean. Treat re-melts separately from a new batch of wax.

Credit to Fred Palmer, colleagues, and J.F. McCaughin Co. for specifications on waxes and recommendations in experimenting with this formula.

Susan Zeiss *began her interest in jewelry during high school, and went on to earn her Master's Degree in metal arts and art education from the University of Wisconsin. She has always been involved in art education and teaching, including her development and technique of Mitsuro-Hikime wax. Susan's design experience includes positions such as elementary art curriculum coordinator, community playgrounds chair, college faculty, and product development consultant. Susan currently works out of her studio in the Pacific Northwest. Her work is shown in juried exhibitions and selected galleries.*