Shippō Yaki: Enameling in Japan

by Coral Shaffer

Shippō Yaki: Enameling in Japan

TABLE OF CONTENTS

CHAPTER	PAGE
Foreword	1
Chapter 1 - General Procedures	4
Chapter 2 - Yūsen-jippō (Cloisonné)	9
Chapter 3 - Ginbari (Embossed Silver Foil)	13
Chapter 4 - Shōtai-jippō (Plique-à-jour)	17
Chapter 5 - Musen-jippō (Wireless Cloisonné)	22
Chapter 6 - Shizumi-moyō (Overcoated Design)	25
Afterword	27
Bibliography	28
Glossary of Japanese terms	29
Index	30

FOREW0RD

My fascination with Japan began in early childhood. As an adult I yearned to go there and, if possible, have some connection with the people. Because I had been practicing cloisonné and champlevé enameling techniques for several years, I thought enameling could be that connection. I wrote to every Japanese enamel manufacturer, enameling teacher, cloisonné producer, and retailer I could find, hoping to get a foothold. After several years of letter writing I had a positive response from the Enameling Council of Japan, a group of businesses and artists concerned with the promotion of the enameling arts in Japan. Over the next year Mr. Katsumi Inaba, president of the Council and president of the Inaba Cloisonné Company, worked out the details with me. I left for my Japan adventure in April of 1985. I lived in Kyoto and studied at the Inaba Cloisonné Company 5 days a week.

Inaba Cloisonné was founded in 1887 by Shichiho Inaba Sr. who assembled enamel and metal craftsmen from the Kyoto area under one roof. Almost one hundred years later Inaba-san's grandson was my host. I was given free reign and could study whatever I wished. I had at my disposal a teacher, the workspace, the materials and the equipment - all for free. Even though I was definitely an intrusion, taking up valuable workspace and interrupting the busy work schedule, everyone there was gracious and helpful to me. At the Inaba site the artisans made high quality cloisonné vases, plates, teapots, miniature chests, folding screens and the like. But they also brought in enamel pieces from all over Japan to display and sell in their showroom. I sometimes spent hours looking at the variety of techniques displayed there, trying not to be a bull in a china shop!

Inaba Cloisonné Co. Storefront

Mr. Inaba

A sampling of Inaba Cloisonné pieces

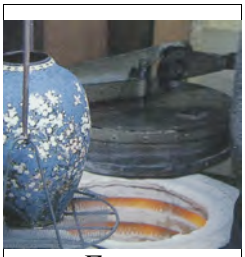
Showroom

Here, as in most large scale enameling companies in Japan, the enameling process was divided into individual tasks. A single piece was worked on by many different hands: the designer's, the metal worker's, the wire bender's, the kiln person's, the grinder's, the finisher's and finally the salesperson's. And they were experts, some having been there over 40 years. With the exception of the making of the metal forms which were made for us by the metalworker, my teacher and I were the only ones who took a piece through the entire process.

Forming the base

Bending the wires

Wet packing



Firing

Adding the trim

The Japanese "shippō" (7 treasures) crest

Shippō yaki is the term used for fired enamel pieces. Shippō translates as "seven treasures": gold, silver, lapis lazuli, crystal, ruby, emerald and coral. Yaki translates as "baked". Some historians have conjectured that early cloisonné-type pieces were made with inlaid stones, later replaced by different colors of enamel.

Although Japanese enameling procedures are very similar to ours in the US, there are some differences in materials and techniques that I will cover here. My first experiences were with yūsen-jippō (cloisonné) on flat and 3-D pieces. After I got my feet wet, I asked to learn about the more specifically Japanese techniques of shōtai-jippō (plique-à-jour), musen-jippō (wireless cloisonné), ginbari (embossed silver foil), and shizumi-moyō (overcoated design).

My teacher, Okomoto-sensei, is a kind man and a talented artist who generously shared his knowledge with me. He was very patient with my "baby-talk-Japanese" attempts at the language and he even learned some English for my benefit. Often times we just understood each other through observation and pantomime. He taught me all that I will be explaining to you. We still exchange Christmas/New Year's cards. He is now 95 years old.

Okamoto-sensei working on some shōtai goblets

The Inaba Cloisonné Company had around 50 employees of which 16 or so were the artisans. The company's philosophy was to keep their people employed, to make a good product and to come up with new designs to keep the public interested. I remain very grateful to everyone at the Inaba Cloisonné Company for allowing me to have this fantastic experience. I am sad to report that after four generations of Inaba leadership, their cloisonné company is no longer in operation and the their building has been torn down.

The majority of this book is written in the first person, past tense, since it is basically a history of my experience of enameling in Kyoto. Following the "history" part there is a "notes" section with further explanations and later discoveries, written in the present tense. I hope this information in Shippō Yaki: Enameling in Japan proves to be of interest to you.

The illustrations in this book were drawn by Barbara Becker Hammer.

CHAPTER 1 GENERAL PROCEDURES

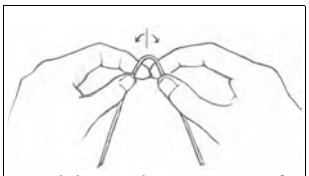
This first chapter gives an overview of the materials and methods I observed at the Inaba Cloisonné Company.

An Inaba Cloisonné vase

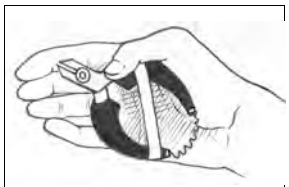
Metal Foundations: There was a man at Inaba's that made these full time. Ninety nine percent of the pieces were made out of copper. Many were silver plated after enameling. All the seams were brazed with an oxy-acetylene torch. Often extra rims or tabs were added so that the pieces could be manipulated while being wet packed, these would be removed after the final firing. When pieces were to be enameled with opaques, as most were, wires were glued directly onto the copper shape (no undercoat) and sifted with a light dusting of unwashed enamel flux that was then fired to hold them in place. If a certain cell or cells called for transparent enamels, these were later undercoated with a thin layer of a color-appropriate opaque. When much of the piece would be coated with transparent enamels, a base layer of enamel flux was fired before the wires were glued in place.

Enamel Preparation: Many of the enamel powders were purchased from Japanese manufacturers. However when something special was required, they would make their own. This was called honjippo (our enamel). I made enamel from scratch a few times and it was very time consuming. First the coloring agent was mixed with a flux enamel base (for transparents) or white enamel base (for opaques) and the mixture was spread over a bed of silica on an earthenware plate. This was heated in the furnace for about 20 minutes at 1500°F. until it melted into a pancake. The pancake was then quenched in a bucket of water, which broke it into smaller panes of glass, which were pounded into even smaller pieces by hand. These were dried on an earthenware plate over a burner. A large motor driven mortar & pestle ground these pieces into powder. Every so often we would sift the grains and remove the finer ones, then continue grinding until the majority of grains were 80 mesh or smaller. This process of firing and grinding was repeated two more times to insure that the ingredients were thoroughly mixed. If the color wasn't what we were after, we had to start the whole process over again, adding or subtracting coloring agents until it was right. To “wash” (remove the fines) from a large batch of enamel, we mixed it in big plastic dishpans with lots of water, stirred it with a rice paddle, and vibrated the slurry with a paint vibrator to settle the grains. The water and fines were poured off into a big barrel and after the enamel fines had settled, the water was syphoned off and poured down a drain.

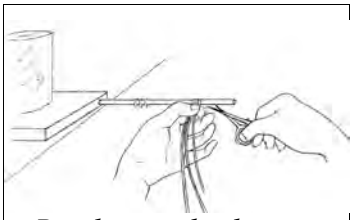
Wire Bending: Very thin, silver wire was generally used. Brass wire was used for the "antique" designs. All the wire was rolled out on a motor driven rolling mill. Copper wire was rejected because of the firescale. After milling, the wire was coiled, sprinkled with silica, and annealed in a kiln. The silica protected the wires from melting together where they touched. Each coil of wire was cut into 2 foot lengths and straightened by holding one end in our teeth and pulling on the opposite end with a pair of pliers until it was taut and straight. The wires were shaped with hands and fine point tweezers. To make multiples of a shape, for instance for a diaper (overall) pattern, we had special pliers. Both prongs of the nose had the same circumference from top to bottom. Three or so lengths of wire were lined up edge to edge and shaped at the same time. The master wire bender was so skillful that he could look at a drawing and duplicate a shape in wire without touching the wire to the drawing. Wires for curved 3-D pieces were first molded to fit the contour of the piece by pinching them between the thumb and index finger of each hand, and gradually pulling and pivoting the hands away from each other. After that the design shapes would be bent.



Molding the wire to fit a 3-D form



Wire cutting scissors strapped to hand



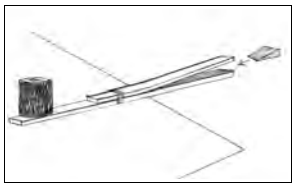
Bending multiple wire circles

To cut the wire, small scissors with a loosened screw were kept handy by tying them to our hands with a thin strip of cotton. Multiple circle shapes were made by wrapping 3-4 strands of wire side by side around a weighted metal rod, molding them around the rod, and then cutting the wires off where they met. After repeating this step many times the rod holding the cut circles was rolled back and forth between two thin boards until the ends of each circle joined. Thin wire and/or big circles demanded a more delicate touch, I rolled these circles closed on the rod with just my fingers (like making a clay snake), on a soft platform such as a magazine.

Enameling Adhesive: "Funori" glue was made from a special type of seaweed mixed with water. These were boiled together for an hour (approximately a 6" X 6" piece of the seaweed, crumbled in 2 quarts of water) and then strained and squeezed through cotton cloth. This removed the little sea shells and such. We used different consistencies depending on the application: full strength for gluing wires and diluted 1:5 with water for spraying/sifting and wet packing. Because it was organic, we kept it in the refrigerator to keep it from spoiling.

Funori seaweed

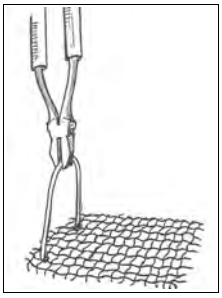
Wet Packing: Flat bamboo sticks, with rounded ends of different sizes, were used for wet packing. These held more enamel than metal tools. A pin inserted into a bamboo handle was used to fill in small spaces. The wet enamel was held in sake cups that rested in "doughnuts" of twisted cloth. These held the cups steady and at an angle so the excess water would drain to one side. Often the piece was held in one hand, while wet packing with the other, rather than laying the piece flat on a table. This allowed us to gently vibrate the piece to keep the water distributed and to spread out the enamel more evenly. 3-D pieces with a neck (vases, canisters) were braced on a device made of two sticks wired together at one end. The closed end of the device was weighted or clamped onto the table and the open end, wedged with a piece of wood, was slipped into the neck of the piece to keep it stable as we worked on it. On 3-D pieces, the piece was rotated to keep the area being wet packed parallel to the floor. Often a thin piece of metal about 8" long and 1" wide, that looked like a cake frosting knife, was used to tap the enamel after it was blotted, to even it out and compress it to eliminate air pockets. These implements were thin enough that they could be bent to conform to the curve of 3-D pieces. Okamoto-sensei believed that wet enamel abutting dry enamel would cause cloudiness. Therefore, before firing we sprayed each piece with water until the enamel was evenly saturated, being careful not to spray too much and cause the enamel to slump off. After spraying, we kept the pieces moving in a figure 8 pattern for about two minutes to keep the enamel from settling in one area. Then the pieces would be swaddled in clean, pure cotton cloths and gently pressed to absorb the water. I washed these out at night and hung them up to dry. It looked like we were raising a large number of babies!



Note: the back side of a spoon would also work to even out and compress the enamel.

Dry Sifting: Following a spray of diluted funori, blown through a mouth atomizer, dry enamel powder was applied through a sifter, made from an open section of a bamboo stem that was fitted with wire mesh on one end. The spraying took a lot of wind power and I was glad that I no longer smoked! I avoided aiming directly at the piece at the beginning and end of the spray because at those times the atomizer tended to deposit blobs of funori rather than a fine spray. We would spray and sift two or three coats before each firing. Okamoto-sensei would often use the same metal tool as the one used for wet packing, to settle the grains and even them out. I was surprised that it didn't disturb the enamel.

Firing: Pieces were allowed to air dry over night. Forced drying was frowned upon. I expect it was because they feared forced drying would dry out the top layer of enamel, but leave the lower grains damp, leading to "popping" when the enamel was fired. There were five kilns in the kiln room. I used a top loading one with a foot pedal that mechanically lifted the heavy, 6" thick lid. There were heating elements on both the lid and the bottom of the kiln that provided even heat. The interior chamber measured about 1 foot across and 1.5 feet from top to bottom. Temperature was adjusted by turning the kiln on and off. I usually fired between 700°- 850° C. (≈ 1325° - 1565° F.). The stainless steel firing racks had a loop of steel rod attached to one end. We grabbed onto this loop with a pair of pliers, which had elongated handles made of copper pipe, to lower our pieces down to the bottom of the kiln. Vases were set on a similar rack with two handles and lowered into the kiln with two long hooks (see the "firing" picture on page 2). The company made their own trivets which were very similar to the ones we have in the U.S. The cooling platforms were slabs of 1/2" thick polished steel. We wiped these clean before each firing so that pieces could be flattened on them if necessary. Flat pieces were flattened with knives or trowels and 3-D pieces with specially made weights that fit inside.



Grinding and Polishing: Depending on the piece, two to eight grades of stones were used to grind it, followed by one to three types of polishing powders. The coarsest stone was about 120 grit, I'm guessing, and the finest about 6000 grit. The grinding vat was comprised of a system of adjustable wooden crossbars over a vat of water, which was heated in the winter time. The slats could be moved to accommodate all sizes and shapes of 3-D pieces. Other than this time-honored way of grinding, there were two, more modern methods used. Cylindrical pieces were attached to a lathe. One arm of the lathe held a rubber covered cone and the other a metal spindle. The cone was pushed inside the opening of the cylinder and the spindle was inserted into a hole in a block of wood that was pressed tightly against the bottom of the cylinder. Wet grinding stones, fashioned with an appropriate curve, were held against the enamel as the canisters rotated. Saucers were ground on an adapted potter's wheel with suction supplied from below to hold the saucer in place. As the piece spun, water dripped on it from above while it was ground with a stone. These labor saving devices were only used for the initial grinding, the remainder was done by hand as usual. (Later, on a field trip to another enameling company, I was shown a grinding apparatus hooked up to a computer. They were testing

the idea that a vase with an uneven contour could be measured, the measurements fed into a computer, and the robotic grinding arm would be able to grind the piece. But I did not learn if it ever worked.) After the final grinding, the piece was taken to the bōshūko room for final polishing. Bōshūko is a natural compound much like cerium oxide. We would slather the enamel piece with a slurry made of bōshūko and water and then polish the slurry off with a stitched buffing wheel on a motorized arbor.

There was an exhaust fan above the bin and a towel hanging down to protect our faces. Bōshūko polished both the enamel and the metal and left a lovely soft, but shiny, finish. This step takes quite a bit of pressure and a long time. It made for a Zen-like moment. With a polished-finish such as this, pin holes were often inevitable. I was shown how to clean out the grit that had lodged in them with soap or baking soda, hot water, and a bristle brush to gently tap any sludge out of the pinholes.

Finding and Finishing: All the finishing touches: plating, jewelry findings, rims on bowls and boxes, and frames on screens and panels, were added by another craftsman. Many of the pieces were gold electro-plated in a cyanide bath. This was only possible when there was no enamel between the cloisonné wire and the foundation. Pin holes in the enamels were filled in with oil pastels of a close color. Sometimes two or more colors would be melted together to achieve the right color. I loved to look through the drawers at all the tiny screws, bolts, lids, frames, and such. Bowls and other 3-D items that needed metal rims were finished with "nie", rims stamped out of chrome, which were made elsewhere by special order. The nie had a cross section that looked like ⊓ and the outside leg was pressed inward with a large burnishing tool so that the rim would fit more tightly to the piece. If necessary, the enamel on the lip of the bowl etc. would be ground down a little to accommodate the nie. When it was fitted, the nie was glued on with epoxy.

After all this work had been done, the piece went to the showroom to be on display.

Inaba pieces in the showroom

CHAPTER 2 YŪSEN-JIPPŌ

Yusen means "has wires", we call it cloisonné. Soon after meeting Okamoto-sensei he said, "make something". So I bent a simple yūsen flower design using silver wire on an 8" diameter copper plate. I wanted to polish-finish this piece, as previously I had only fire-finished. I took the plate through all the grades of stones and the bōshūko and got my first taste of the Japanese grinding method. The 1st stone, the heaviest grit, was used to expose the wires and remove the deep indentations. The 2nd stone attacked the trouble spots (low spots), that were first identified and circled with ink, to make them easier to spot when the plate was wet. After that the piece was stoned in alternating, crosswise directions to remove the scratches from the previous stone. To judge my progress, I dried off the piece and checked it every few minutes with a magnifying glass.

Antique yusen vase, unsigned

At the bōshūko wheel I worked on a small section of the plate at a time, replenishing that area often with wet bōshūko. This kept the piece from getting too hot. At the end of the polishing cycle I used only a thinner consistency of this "goop". Bōshūko took out light scratches and also shined up any enamel dulled by pickle. This entire process took a long time. I spent 1½ hours just at the bōshūko wheel! There were pinholes in the enamel which I cleaned out with a brush and baking soda and filled the biggest ones with oil pastels.

Notes: I loved the way this polish-finish looked but it was much more time consuming than a fired-finish. I made two more flat (2-D) cloisonné pieces: a 2-part inset for a shoji screen and a four panel folding screen. These were made with silver wires on flux-covered copper bases just as I had made the plate. My wires, except for the first piece, were shaped on my drawings, not in the air! (The design on the plate was simple enough I did not need a drawing.) Having the prepared frames at my disposal inspired me to come up with designs to fit them. (The frame for the shoji screen piece was meant to hold a clock and an enamel instead of two enamels.)

Next I began working on 3-dimensional pieces. I started with two copper tea canisters. Each canister had interlocking metal rims, one soldered onto the bottom of the lid and the other soldered onto the top of the base. One slipped inside the other to hold the two parts together. I enameled the insides of both parts with liquid porcelain enamel that I poured in and swirled around to completely coat the metal. When the enamel was dry, I cleaned off any that had run onto the outside of the canister, and sifted a flux undercoat onto the outside over a coat of funori. I carefully cleaned off the stray enamel on the rims with my fingers and a wet brush. When the sifted enamel was dry, I fired the piece. The second inside coat (the counter-enamel) was applied in a very clever way. I was shown how to heat enamel on a terra cotta plate, like the saucer of a plant pot, on an electric hotplate. When I poured diluted funori inside the canister, swished it around, poured off the excess, and then scooped in some hot enamel and jiggled it into place, the enamel stuck to where it landed.

Notes: The enamel heated on the hotplate never gets hot enough to melt. The hot enamel dries the wet "glue" immediately allowing the enamel to stay put. You can jiggle the enamel around just like you would jiggle flour around to cover a greased cake pan.

Now it was time to bend the wires. To keep the solder on the rims from contaminating the enamel, I glued a solid line of cloisonné wire semi-circles where the rims met the enamel. Okamoto-sensei showed me how to transfer a design drawn on paper to a cylindrical shape. I drew the design on tracing paper, then turned the paper upside down and punched small holes along the design lines. Then I taped the paper (right side up) on to the cylinder and pounced it with white powder tied up in a small bag. I drew over the powder with an oil based ink. This helped with the placement of the wires. I used a photo copy of the design to guide the bending of the wires, wires that had already been formed to fit the curve of the canister, as explained in Chapter #1.

Notes: When transferring a design to a 3-D piece you can also use an oil based marker to tap through the holes, skipping the powder step. Make a photocopy or two of your design before piercing it with holes because the holes and the inking will obscure your design and make it unusable for future reference. To make a paper pattern fit a bowl shaped object, it helps to cut pie shaped wedges out along the perimeter first, and then to form the paper to your bowl, taping the pieces together (see Chapter 4).

Wet packing proved to be quite a challenge. The enamel was mixed with diluted funori which constantly obeyed the laws of gravity and oozed to whichever side of the piece was lowest. I had to keep blotting it in order to keep the enamel from landing in my lap. It helped to leave empty spaces between the areas of wet enamel - this kept the funori in

one area from mixing with that from the adjoining area. At the end of the wet packing, all the enamel "islands" were connected. To keep the depth of all the enamel areas relatively even, I alternated my filling-in approach. The first time around, I wet packed the small areas first and then the background. The second time, I enameled the background first and then the small areas, and so on. After filling in and blotting, I tapped against the enamel with the flat tool to flatten and compress the enamel. Then I sprayed the entire piece with water, keeping the piece moving so that enamel would not slump and fall off. I dried the sprayed piece by cradling it in cloths and pressing it softly between my hands. After this I could refill small cells that were hard to fill high enough when the whole piece was wet. The main canister parts were inverted with each consecutive firing so that the enamel would not pool at one end but the lids could only be fired rim down.

It was time to grind when the enamel was up to the level of the wires. I was able to use the lathe set-up for grinding the canisters with the first stone, and then went to hand grinding, and finally polishing with bōshūko.

Tulip tea canister

Plum tree tea canister

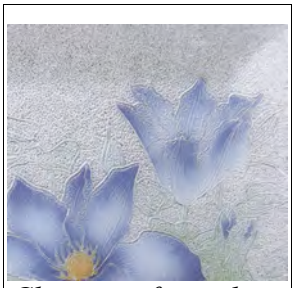
I next tried my hand enameling a small vase with "pigeon blood," red transparent enamel. Pigeon blood enamel is fired over a coat of high-firing flux. Traditionally, the metal form would be given a texture by filling it with pitch and hammering it from the outside. But I opted to cover the vase with a lacquer resist, scribe through this, and etch the texture into the copper with acid. I fired the special pigeon blood undercoat flux very hot at 900°C ≈ 1650°F, which made it very clear. The pigeon blood enamel was fired at a lower temperature, 750°C ≈ 1400°F. I used the "hot dry enamel" technique for the inside counter-enamel, and repeated it after firing for a 2nd coat, because the front coat was so thick. The flux undercoat and the pigeon blood overcoat were sifted and fired BEFORE the wires were added. Then the wires were bent, glued in place and fired. The next enamel coat was wet packed, both the pigeon blood red and the white inside the design. Because of the amount of enamel, the hardness of the enamel, and because of the shape of the vase, it was necessary to compress the dried enamel with fingers and tools as much as possible before firing. After enameling and firing multiple times, reversing the direction of the vase in the kiln each time, I ground and final fired the vase using the

"hanyaku" technique. That literally translates as half-baked and entails removing the piece from the kiln half way through the firing, turning it over, and returning it to the kiln to finish the firing. Lastly I adjusted the "nie" rim and glued it on.

My next 3-D experience was with a yūsen teapot. The metal worker, who made all the copper foundations, made the teapot body. The teapot was formed in four parts: the top half of the body, the lower half of the body, the spout and the handle. The first three parts were brazed together, the handle was attached with screws after the firing. The handle and spout had such steep arches that it was necessary to completely cover them with wires and to solder the wires down, instead of sinking them into an undercoat. These wires were glued in place and dried, and then more funori was sprayed on to hold powdered soldering flux and borax, that were sifted over the wires and soldered in the kiln. All the soldered areas were covered with opaque enamel and therefore the solder would not be seen. For the design I made four cloisonné "frames", each to hold a type of flora typical of a season of the year, one for each side of the square teapot. I counter-enameled the spout by pouring in porcelain enamel but used the "hot dry enamel" technique to counter-enamel the interior of the base. The outside of the base was then undercoated with a sifted high firing flux and fired. When the wires had been bent and "sunk", I wet-packed the piece with jewelry enamel. The background color was black and the design colors were light. Because of this I was concerned that the light colors might "jump" and contaminate the background. So, I intentionally added bits of the design color enamels to the black background enamel. I didn't record the time that it took to bend the wires or to enamel the teapot but it took me 29 hours to grind it and 4 more hours at the bōshūko wheel.

Notes: While I was there, Okomoto-sensei worked on a very large yūsen mural pieced together from 32 copper tiles, each 7.5" X 8". After each firing he gave the tiles a slight dome over a convex piece of copper while they were still hot.

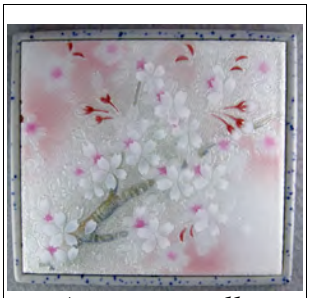
CHAPTER 3 GINBARI



Close up of a ginbari piece

As far as I know, the ginbari technique is only practiced on a professional level in Japan. This technique enables the enamelist to make multiples of the same design without repeating every step. The literal translation of ginbari is "attached silver" or "stretched silver" and that is what it is. Heavy silver foil is embossed and adhered to a piece of enamel-coated copper. Etched zinc plates, which can be re-used indefinitely, are the masters used commercially for the embossing forms. The word ginbari refers to two types of processes: one in which a shallow embossing, in a uniform overall pattern, serves as a background for a cloisonné design, and one in which the foil is more deeply embossed, and the embossing itself provides the design. In the latter, the type that I practiced, the enamel melts and is "sucked up" under the raised portions of the foil by capillary action. From examining the ginbari pieces in the Inaba showroom, I concluded that this technique was best suited for free flowing subjects such as florals, clouds and seascapes and that intricate designs were better attempted in other techniques that allowed for more precision.

The cloisonné type of ginbari



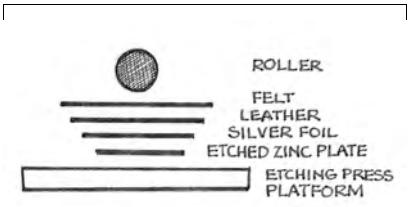
A commercially embossed foil type of ginbari

The commercial ginbari technique uses two etched plates. One plate has an overall dot pattern that makes small pinholes in the foil when it is run through a printing press. The holes allow gasses to escape when the ginbari piece is fired. The second plate holds the design. Before the design plate is etched, the design is drawn on a piece of "screen tone" paper. Screen tone papers are covered with an array of black dots. When the dot pattern is etched into the zinc plate it gives the foil background a dimpled look to reflect more light. Black ink is used to draw the design lines, which are .01 - .02 mm thick, and each line is outlined on both sides with white ink or paint. Where the black lines meet, the white lines skip over the black. The paper design is sent out to a printing company

where the zinc plates will be etched. When translated to the etched plate the black lines will be raised and the white will be recessed. The foil is first placed on the hole-piercing plate and run through a printing press. The foil is then removed and centered on the design plate and run through the press again. Ginbari companies use a series of stencils and dry sift the enamel colors in place.

The drawing

Close up of etched zinc plate



The printing press set-up

The finished plate

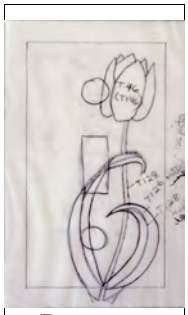
In Japan I had the use of a printing company to etch the plates and the Inaba printing press to emboss the foil. But I wanted an alternative method for times when I would not have such access. So I used round copper wire glued onto a flat piece of metal for the master and embossed the foil over it by hand. First I prepared the copper piece by dipping the metal into a vat of white porcelain enamel to cover both sides. I used a tong-like tool that had three notched prongs to grip the piece. I dipped and then spun the wet enamel, to even it out and whisk off the excess. The enamel was then dried, supported on trivets or on inverted thumbtacks, so air could reach both sides, and fired. After this firing, firescale only formed on the edges and that I ground off with sand paper. I recoated the piece with another layer of white porcelain enamel. When it was dry and the piece could be handled safely, I sifted a black jewelry enamel over the back. In this way both sides could be fired simultaneously.

After the undercoat enameling I pierced and annealed a piece of 4.5 micron thick silver foil. From the pierced sheet I cut out a piece of foil slightly larger than my copper piece, because embossing over the wire would "use up" some of it. Then to make the master, I formed my design with pliers using 28 gauge, round copper wire. And with a Super Glue type adhesive I adhered the wires to a flat piece of copper. After the glue was dry, I dusted the master with baby powder to cover up any stickiness from the glue that would tear the foil, and dumped off the excess powder.

The next steps were to center the foil on the master, cover the foil with a piece of felt and

roll over the felt with a brayer. I painted the fired undercoat enamel with funori to hold the foil in place, and then gingerly moved the foil into position and lightly tapped the foil down with a soft sponge where there were no raised lines. If there were any tears I covered them with snippets of the foil glued down with more funori.

When the funori had dried, the piece was fired until the enamel had melted and was molten enough to rise. After this firing, the enameling proceeded as usual. I chose to wet pack, rather than dry sift, the colored enamels into place. However, I did sift the final coat, a flux for silver, over the entire piece to keep the exposed silver foil from tarnishing.



Drawing

Wired master

Undercoated switchplate

Fired foil

Finished switchplate

Ginbari wave pin. Foil embossed over wires

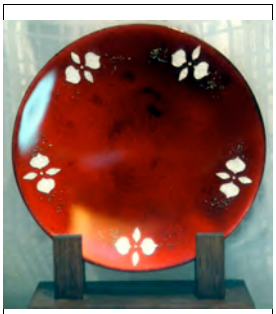
Ginbari moon fan. Foil embossed over an etched plate

Notes: Use a white jewelry enamel or white porcelain enamel under the foil in case the foil should tear. This way the color difference between the silver foil and the copper base will be less noticeable than if you used flux, i.e. white vs. pink, contrasting with the silver. Use a low to medium firing white so that it will melt and rise up under the raised lines when fired at ≈ 1500°F. The easiest way to pierce the foil is to fold a piece of 180-100 grit sandpaper in half, sandwich the foil in between, and run over the backside of the sandpaper with a brayer or rolling pin. You should be able to see the holes when you hold the foil up to the light. Use 28 or 24 gauge round wires, anything larger will tear the foil. Use any flat, sturdy, non-absorbent substrate to glue the wires down onto. Make

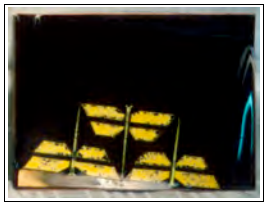
sure you hold the foil and the felt down with one hand as you use the brayer with the other while embossing. The embossed foil is very delicate, treat it gently. Charbonnel brand Gold Leaf Size is a good way to attach the foil. Paint it over the enamel and wait until it is tacky to attach the foil. Put a spot of it on the back side of the piece and use it to test for tackiness. It should feel like the business side of Scotch Tape. You may need to use a heat source to speed up the drying-to-tacky process. I now use a rubber tipped gum stimulator or a pencil eraser, instead of a sponge, to tap down the low areas to make sure that they are touching the enamel, being careful not to touch the raised lines. The enamel will not rise unless the foil around the raised areas is tightly adhered to the undercoat. If the foil does happen to puff up with air when fired, you can tamp it down with a natural bristle brush and return the piece to the kiln for a bit. The tamping results in some "fireworks" but hopefully it will push the foil back down onto the enamel. If fired correctly, you will see a furrow on each side of the raised lines that shows that the enamel was pulled from there to fill up the raised areas. You can test it further by pushing down on an inconspicuous place on one of the raised lines, after giving the enamel a few seconds to solidify. If the line wasn't flattened, the firing has worked. If not you can fire again. The ginbari technique only allows for a thin layer of colored enamel so think of it more like a water color than an oil painting. You can enamel over the raised lines if you wish but I prefer to leave them bare of color. I like to hold the final flux coat of enamel in place with enameling oil. I paint the oil on and wipe it off - it doesn't all wipe off - and dust over it with flux. When you turn the piece upside down, all but a thin coat of enamel will fall off. If silver sensitive colors are to be used, fire the flux layer first, and then fill in with the colored enamels. Designs should be simple and organic for the best effect. No grinding or polishing is required. I use the left over pieces of foil for other projects. By putting the scraps between sheets of paper I can cut out shapes with cuticle scissors.

Cloisonné and cut-out-ginbari foil plate

Cut-out-ginbari foil incense holders



Cut-out-ginbari foil plate



Cut-out-ginbari foil sweets plates

CHAPTER 4 SHŌTAI-JIPPŌ

Shōtai goblet from the Inaba showroom

Shōtai-jippō means “omitted-base enamel”, we know it as plique-à-jour. Shōtai is basically cloisonné except that the metal foundation is etched away after the enameling.

I had made a few flat plique-à-jour pieces before my stay in Japan, but I was not familiar with the Japanese technique. I thought I would start simply with some flat pieces before getting into 3-D. As it turned out, flat pieces were more difficult. All the pieces were cracking. I tried making them over a copper base but the enamel cracked before I even etched away the copper. So then I tried enameling the back side of the copper too (which later would have to be removed as well as the metal) but that didn't work either. So I resorted to the method that I knew, firing on mica instead of on metal. That worked OK but left something to be desired. The mica rippled when fired which made the enamel wavy on the back side. Plus, the mica stuck to the back and I didn't like the way it looked. The best results were obtained when I used a Japanese ceramic plate as the temporary backing. I was fixated on making kanzashi, Japanese hair ornaments, and I made quite a few (around 20 I think) in plique-à-jour. The wires were not soldered together so the pieces were not strong but I didn't expect that hair ornaments would be handled much. In addition to the cloisonné kanzashi, I made a few on pierced, stamped copper and silver.

Plique-à-jour kanzashi done on a ceramic plate

Note: I think the ceramic plates are made out of ceramic knife material. And because of this they are only supplied in small sizes, no wider than the biggest knife blade.

When I had had my fill of kanzashi, I moved on to shōtai 3-D forms. My first efforts were on 18 gauge, 3” diameter, covered copper containers we called powder boxes, and then on 4” diameter bowls. My first powder boxes all had cracks, the bottom even fell out of one. There was a lot to learn. In the Japanese technique the cloisonné wires are not soldered together, the only thing holding the piece together is thick glass (≈ 2 mm thick) and many wires (≈ 1.4 mm high). Therefore, three flux undercoats are usually applied and fired before the wires are added and the colors filled in. When the pieces were fired, the

thickness of the enamel led to pooling on the lower edge, the rim. There was no way to flip these pieces so the rim side was always facing down. That meant that some of this pooled enamel needed to be removed each time. Sometimes it cracked and fell off, other times I ground it off.

A piece of broken antique shōtai showing the thickness of the enamel compared to a penny

Example of a wired bowl for shōtai

My designs included a nearly solid coverage of wires to ward off cracking. Where there were no design wires, I filled up the spaces with circles and curlycues. The top half of the piece held my design and the lower half of the powder box was basically a diaper pattern (repeated wire motif). The hardest areas to keep from cracking were the steep curves on the cover; the abrupt angles where the base met the sides on the bottom half; and the rims where each half ended. I learned that the more wires in these areas, the better. The piece that lost the bottom had wires in the center of the base but no wires near the angle up from the bottom. The wires that spread over the curve of the cover, had to be molded to fit the curve, before I bent the design.

Some diaper patterns

Dragonfly powder box

Citrus powder box

Fall leaves powder box

Note: These were my first powder boxes and they had some cracks.

Chrysanthemum powder box

Spider mum powder box

Dogwood powder box

Note: These 3 were made later and were more successful.

The bowls were potentially less of a problem than the powder boxes because they formed a continuous curve and had no acute angles. However the top edges of the bowls (the rims) still needed to be filled with a multitude of wires, just as the powder boxes did.

The first bowl that I made was a pink flower, similar to the picture on the next page. Unfortunately I lost my grip when I was doing a bōshūko polish and it crashed against the wall!!! This accident gave me time to think about how this bowl should be designed. The flower should make sense on the side from which it would be seen. For instance, if seen from below, the bowl should show a stem area, if seen from above, it should show the center of the flower.

I used the same basic technique for both the powder boxes and the bowls. The first step was to apply three layers of flux (colorless transparent enamel) and to remove the excess that had pooled after each firing. I then transferred the design to the piece, either by drawing directly on the piece with waterproof ink, or using the paper pattern method.

Fluxed bowl showing slumped enamel chipping off the rim

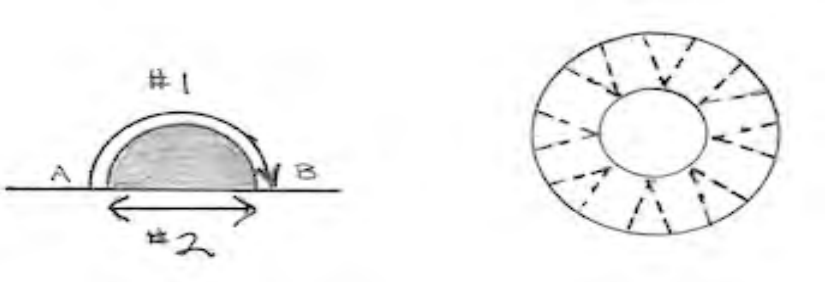
To make the design I shaped tall wires (1.4mm) to fit both the curve of the piece and the design lines. These were glued on with funori and fired in place. The trick was to fire hot and long enough to attach the wires but cool and short enough to keep the wires from sinking into the thick undercoats.

All the chosen enamels were mixed with funori and wet packed and fired as many times as it took to get the enamel up to the level of the wires. At that point I ground the piece using only a 120 or 220 stone because I was told finer grit stones would leave debris in the pits and show up with a fired-finish. Even though I used the coarser grit stones, I still cleaned each piece as well as I could with soap, hot water, and a bristle brush.

After I had final fired and let the piece cool slowly, I coated the fired enamel with several coats of lacquer to act as an acid resist, and put each piece into a vat of new acid (≈ 7-7 ½ cups nitric + ½ - 1 cup hydrochloric + splash water). The pieces had to be fully submerged in the acid and watched closely. It took as little as 15 minutes in new acid to remove most of the copper substrate. When I removed a piece from the acid I checked to see if any bits of the copper bowl remained, and if they did, I ground them off with a diamond bit. The lacquer resist could be scratched off with warm water and finger nails or with lacquer thinner on a cloth if it was resistant. The pieces were polished with bōshūko to restore the shine to any of the enamel or wires that had been dulled by the acid.

After the bōshūko polishing I washed the piece well, dried it, and it was ready for me to adjust the nie. Fitting the nie to the shōtai pieces was a delicate process and had to be done off the piece. I used a bezel tool and a block of wood wrapped in a towel to force the outer leg inward while the nie was placed upside down on the desk. Then when back on the piece, I marked it with ink where it needed further work and marked both the piece and the nie where they fit together for correct re-positioning. This back and forth process continued until the nie fit tightly to the rim, at which time I glued the nie in place with a metal/glass adhesive.

Notes: Since there is no counter-enamel, firescale will form on the exposed metal on the insides of these pieces every time they are fired. Make sure to clean the loose stuff off with sand paper after each firing or coat the metal with Scalex or its equivalent. As much as possible, use enamels that melt at the same temperature, the Ninomiya transparents are very good in this regard. I later heard from Okomoto-sensei that honjippō, higher firing, harder enamels, are less likely to crack. The draw back is that there are only a limited number of colors. When the undercoat slumps, diamond abrasives are a good way to remove the excess. If you decide to draw or transfer your design onto your piece, do not ink where the enamel had chipped off or been ground off, because the marks will not fire out. To make a pattern for design transfer onto a bowl you can use the following as a guide.



Measure #1 from A to B and use that as the diameter of your paper pattern circle. Measure #2 and use that to draw a circle in the middle of the larger one. Cut out some triangular pieces so that the pattern will fit the bowl better when you tape it in place.

Draw your design on the remaining tracing paper, puncture it with holes from the back side and tape it to the bowl. Now you can ink through the holes to transfer the design. When you are ready to etch away the copper substrate, make sure there is no stray enamel there. It would act as a resist and the copper would not etch away in those spots. I have tried using asphaltum as a resist and etching the copper away with ferric chloride but found that both discolored the enamel and in general did not work as well as the lacquer and the nitric solution. Sometimes the enamel at the rim of the bowl needs to be ground down so that the nie (metal rim) will fit.

How exciting it was to finally see the "light of day" come through my shōtai pieces!

Pink flower shōtai bowl

Money plant seeds shōtai bowl

Wave shōtai bowl

Note: Many of the shōtai pieces made by companies in Japan nowadays are very similar in color and design to the ones made 100+ years ago. I think the lesson is, find enamels that are not likely to crack and design wires that do not add stress to the piece and keep using them!

Antique shōtai bowl from Nihon no Shippo *by Norio Suzuki, 1979*

Contemporary shōtai bowl from the Inaba showroom

CHAPTER 5 MUSEN-JIPPŌ

Musen tray by Namikawa Sōsuke from Nihon no Shippō *by Norio Suzuki, 1979*

The translation of the Japanese word musen is "no wires" or "wireless". Unfortunately it is also the word for any wireless device, making searching for information more difficult. I spent a week at the Library of Congress with the Asian Art librarian and found only the most general information on musen-jippō. And when I asked my Japanese acquaintances how musen was made, they answered only, "very carefully." There are various conjectures on how the artists of the late 18 hundreds produced musen but no actual written documentation has come to light. One idea is that the wires were left in until the end of the enameling process and then acid-etched away; another is that the wires were fired in place but were very short and were subsequently covered over with layers of enamel; and yet another (my favorite) is that the wires were in place during wet packing but removed, except around very small cells, before firing.

With this technique one can achieve the preciseness of cloisonné without the metal outlines, resulting in a more realistic and more painterly rendition of a subject. The musen artists often copied important paintings of their time for their musen pieces. Antique musen pieces made in the late 1800's and early 1900's, notably those made in the workshop of Namikawa Sōsuke, are truly amazing. I have heard that his work is sometimes referred to as "nyushin no gi", divine art. Amongst other masterpieces he was responsible for 32 kachogaku plaques (bird and flower studies) for the Crown Prince's Palace in Tokyo. Okamoto-sensei copied five of these. Below is Okamoto-sensei with two of these and a close-up of one of them next to a picture of the original from the Palace.

Okomoto-sensei with two of his musen pieces

Closeup of Okomoto-sensei's musen

Original by Namikawa Sōsuke

The first part of the musen process was to fire two coats of a white jewelry enamel undercoat on the front side, and one coat of counter-enamel onto the back side, of a piece of copper. Then I shaped the design from tall (≈1.2 mm high), thin (≈ .15mm) wires and glued them down with funori. When the funori had dried I carefully wet packed, keeping the enamel as dry as possible so that the wires would not float around. Okamoto-sensei held his pieces in his left hand and periodically slapped his left forearm with his right hand to vibrate the piece and even out the enamel as he wet packed.

After finishing the first wet packing, I sprayed the piece with water and blotted it until it was still damp - not wet or dry. At this point I grabbed the tops of the wires with a pair of tweezers to pull them out, floated the wires in a cup of water to remove the glue and bits of enamel, and blotted them dry so they would be ready for future use.

Even though the wire was thin, removing it left small open troughs in the enamel. So I pushed the enamel together, half way from each side, with a wet brush. The piece was then dried completely and fired. For the second wet packing there was a choice of using the same wires again if the enamel was flat enough, or filling in without the wires. When the enamel was filled to an acceptable level, I ground the piece, over-coated it with a thin layer of flux and final fired.

Notes: The undercoat does not have to be white opaque, however this cancels out the pinkness of the copper in case transparents or opalescents will be used over it. Use jewelry enamel as the undercoat since porcelain enamel will crack with the thick build up of enamel on top of it. The undercoat and the overcoat help the other enamels flow together. Small enclosed cells will not work, the enamel inside will be removed with the wires. Make sure the wires are touching the undercoat so the enamel grains won't ooze under them when you are wet packing. If they aren't fitting tightly to the undercoat, hold them down while you dry the adhesive, e.g. Klyr-fire, with a hair dryer. Remember how the wires fit together so you will know where to grab them. The wires can be used again since they are not fired into the enamel. Fine grains of lower firing enamels will spread the best. Wet packing with a brush is more gentle than using a pick. Spraying with water evens out the wetness before blotting.

Olympic Mountains musen

Notes: When I came back home I experimented further with musen and made a series of what I called my "matte minis". They were small, 1" X 1.5" pictures of places where I have been. These were polish-finished rather than fire-finished. Because they were to be finished this way, I had to make sure that there were no "divots" in the enamel, so I ground once, filled in the low spaces and then did the final grinding, followed by polishing with bōshūko. I made quite a few and here is a sampling:

North Cascades Lake, WA

Similkameen River, WA

Grayland Beach, WA

San Juan Islands, WA

Inside Passage, AK

Kona Coast sunset, HI

North Shore Lake Tahoe, NV

North Cascades wildflowers, WA

Olympic Rainforest rhododendrons, WA

CHAPTER 6 SHIZUMI-MOYŌ

Shizumi vase

Shizumi-moyō, literally "sunken design", is an enameling technique that was added to the Japanese repertoire in the 1950's, later than the other techniques described here. It is a wireless technique featuring a white design, that is undercoated and overcoated with the same translucent (half transparent) enamel. Green and white enameled shizumi were the ones displayed in the Inaba showroom but other colors are sometimes used.

Toward the end of my stay, Mr. Inaba kindly took me to a place where these pieces were made and I was allowed to watch and photograph the procedure. I have not yet tried this technique but I thought it would be of interest to include it in this book. Because the shizumi effect is so subtle it is difficult to capture in a photograph.

This was the technique that I observed: First the vases were coated and fired twice with white opaque jewelry enamel. Then one coat of jade colored translucent enamel was sifted over the entire piece and fired. For each coat the vases were cleverly turned on a lazy-Susan for the funori spraying and then removed and hand held for the sifting.

Sifting

On the lazy-Susan

Ready to fire

When the initial white and green undercoats had been fired, the design was drawn on with black ink, and wet packed quite thickly using finely ground white opaque enamel mixed with funori. After the white design was fired, two more coatings of the jade translucent enamel followed. And finally the vases were polish-finished giving the enamel a satin, ethereal look.

Drawing the design

Wet packing the design

Wet packed design ready to fire. Over-coated, fired vases in foreground

A finished piece of shizumi

AFTERWORD

In retrospect, if I had known how much this "gaijin" (foreigner) would interfere with the workings of the Inaba Cloisonné Company, I would have been too embarrassed to ask to go. Luckily for me, my naiveté allowed me to have an experience of a lifetime. Mr. Inaba not only allowed me to come but thereafter he made sure that I was getting along OK. I was invited on vacations with the company - the entire company goes on vacation together - and to all the company dinners. I called him "mister" instead of "san" because he spoke English and because that was how I was introduced to him. He told me I could stay and study for as long as I liked. This was a one-way arrangement though, I could have whatever I needed and was never asked for anything in return. I started feeling pretty guilty about this and I knew at some point I would have to start making a living again, so after a year and half I decided I had better return to the US. Before I left he took me on a field trip to visit other enamel makers in the surrounding areas to further my education. At the end of my stay I was encouraged to show my work ("my fruits") in the show room - and so I did.

Advertisement for my "show"

Display of some of my pieces

Okamoto-sensei & me on a company vacation

BIBLIOGRAPHY

Coben, Lawrence A. and Ferster, Dorothy C. *Japanese Cloisonné, History, Technique and Appreciation*. New York and Tokyo: John Weatherhill, Inc., 1982.

Impey, Oliver, Fairley, Malcolm and Earle, Joe. *Treasures of Imperial Japan 3: Enamel.* London: The Kibo Foundation, 1994.

Kuwayama, George. *Shippō: the Art of Enameling in Japan: February 5 - April 26, 1987.* Catalog. Los Angeles: The Far Eastern Art Council of the Los Angeles County Museum of Art, 1987.

Mintz, Robert. *Japanese Cloisonné Enamels, The Stephen W. Fisher Collection.* Catalog. Baltimore: The Walters Art Museum, 1994.

Nguyet, Tuyet and Leary, R.H. "Inaba Cloisonné." *Arts of Asia* Magazine, September-October 1973, pp. 63-67.

Schneider, Frederic, *The Art of Japanese Cloisonné Enameling: History, Technique and Artists, 1600 to the Present*. Jefferson, NC, and London, McFarland & Co, 2010

Suzuki, Norio and Sakakibaru Satoru. *Nihon no Shippō* (Japanese Enamels). Kyoto: Maria Shobō, 1979 (in Japanese)

GLOSSARY

Bōshūko: A natural material similar to cerium oxide used as the final polish.

Funori: A type of enameling adhesive made from boiled seaweed and water.

Ginbari-jippō: Embossed silver foil attached to a copper base. The embossing may be an over-all pattern in low relief used under a cloisonné design or in higher relief where the embossing forms the main design.

Hanyaku: A firing technique of removing a piece half way through the firing, reversing its position, and returning it to the kiln to finish the firing.

Honjippō: Enamel manufactured by enameling companies exclusively for their own use. It customarily fires at a higher temperature than "metaru" enamel, the type made for sale by enamel manufacturers.

Kanzashi: Japanese hair ornaments.

Musen-shippō: A work created with cloisonné wire which is removed before firing.

Nie: A metal rim stamped out of chrome and attached with glue to an enameled bowl or vase etc.

Pigeon blood enamel: An intense transparent red enamel.

Shippō yaki: The Japanese word for a fired enamel piece.

Shizumi-moyō: A technique of applying white opaque enamel in the form of a design over a translucent enamel, which is then over-coated with the same translucent enamel. The white design has no metal partitions and the result is very subtle.

Shotai-jippō: A form of plique-à-jour created on a metal base which is etched away at the end of the process.

Yūmusen: An enamel technique incorporating both visible wires and removed wires, a combination of yūsen and musen.

Yūsen-shippō: Cloisonné enamel

INDEX

Images, drawings and photographs, are listed in *italics*

Bōshūko, 8, *8,* 9, 19, 20, *29*

ceramic plate, 17

cloisonné, *1,* 9, *9, 10,* 13, 16, 21

counter-enamel, 10, 12, *20*

design transfer, 10, 19

diaper pattern, 5, 18, *18*

enamel, hot dry, 10, 11

enamel, making, 4

enamel, sifting, 6

enamel, washing, 4

finishing, *2,* 8

fire-finish, 2, 3, 9

firescale, 5, 14, 20

firing, *2,* 6

firing rack, 7, *7*

flux, 4, 9 10, 11, 12, 15, 16, 17, 19, 22

funori, 5, *5,* 10, 11, 15, 19, 22, *29*

grinding, 7, *7, 9,* 11

ginbari, 13-16, *13, 14, 15, 16,* 29

hanyaku, 11, *29*

Inaba Cloisonné Co., 1, *1,* 3, 4, *8,* 13, *17, 20,* 24, 26

metal work, *2,* 4, 12

mortar & pestle, 4, *4*

musen-jippō, *21-23, 21, 22, 23,* 29

nie, 8, 12, 19, *29*

Okamoto-sensei, 3, *3,* 9, 10, 12, *12,* 20, 21, *21,* 22, *26*

pigeon blood enamel, 11, *11*

polish-finish, 9, 23

polishing, 7, *8*

shizumi-moyō, 24-25, *24, 25,* 29

shōtai-jippō, 17-20, *17, 18, 19, 20,* 29

wet packing, *2,* 6, *6,* 10-11, 15, 25

wire, cloisonné, 17,18, 19

bending, *2,* 5, *5,* 10, 12, 22

molding, 5, *5, 10*

wire, round copper, 14, *15*

yūsen-jippō, 9-12, *9, 11, 12,* 29

zinc plates, 13, 14, *14*