SECTION 7: THE WORK OF THE DECORATIVE METAL FITTINGS ARTISAN (*kazari kanagu shi*)

CONTENTS:

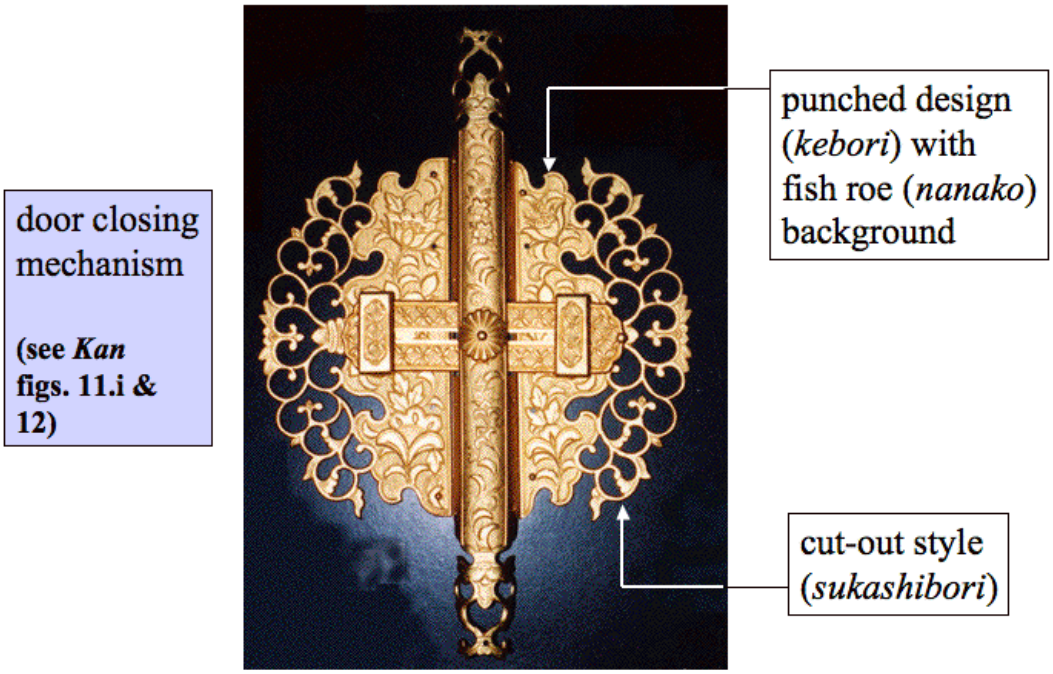
INTRODUCTION:

General:

As you know, throughout this website we have been using the production of a *butsudan* to outline, as far as possible, traditional Japanese craft techniques. Although, in today's efforts to cut down on costs many of these skills are disappearing, we have tried to document as much as possible. Having discussed woodworking, lacquer skills and gilding, this 7th section, which details the work of the decorative metal fittings artisan (*kazari kanagu shi*), will complete the website, except for a brief account of assembly (*kumitate*). We hope this part will be useful for anyone who is interested in either traditional metalworking or the making of a *butsudan*.

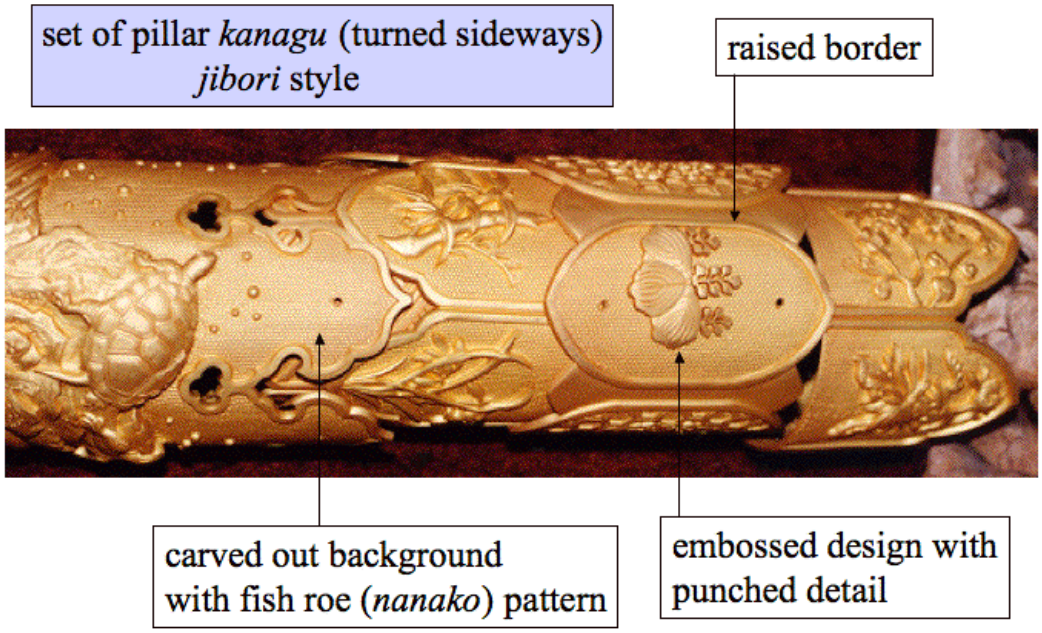
For an overview of the whole website and its focus of traditional craftsmanship please look at the general introduction at the beginning. A further glance at the introduction to each of the six subsections will help with understanding exactly what a *butsudan* is (see *Kin* photos 01 & 02) and where metal fittings (*kanagu*) are applied.

Kanagu-making can be classified into two basic styles: those that use heat and those that don't. These are quite different techniques and are thus done by differently trained artisans. The *kebori* artisan works without heat and produces elaborately engraved designs simply by punching with burins (*tagane*). Variations on this can be done with slight embossing (*ukibori*) or by cutting right through the metal to give an open design (*sukashibori*).



Kan photo 01.a: typical work made without heat

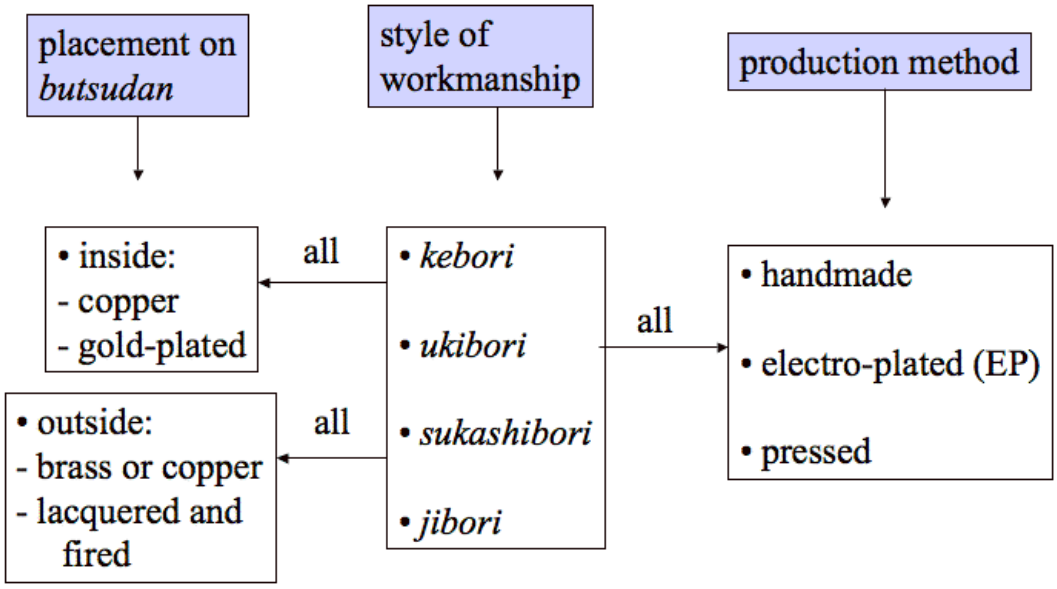
On the other hand, the *jibori* artisan uses heat to soften the metal so it may be pounded (embossed) and sculpted to produce a high relief design.



Kan photo 01.b: typical work made with heat (*jibori* style)

Both of these styles, when placed in suitable positions on the *butsudan*, are beautiful in their own right. They will be discussed in greater detail in the next section.

To understand the classification of metal fittings clearly, please consider the table:

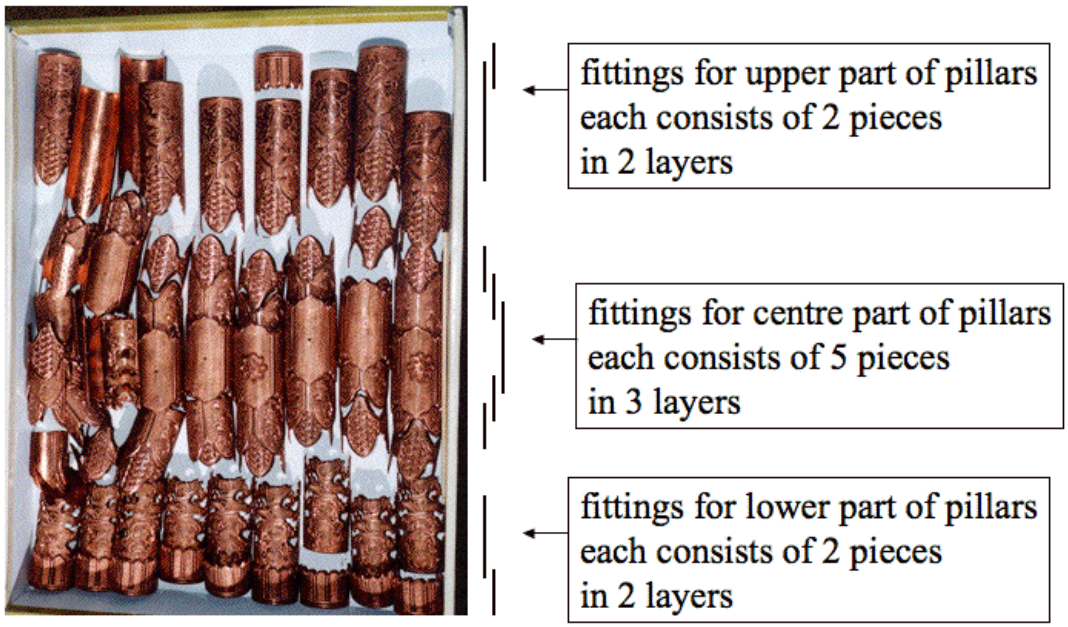


Kan figure 01: simplified overview of metal fittings' production

A. The types of metal used and its placement on the *butsudan*,
B. The treatment given to the pieces after completion,
C. Production method.

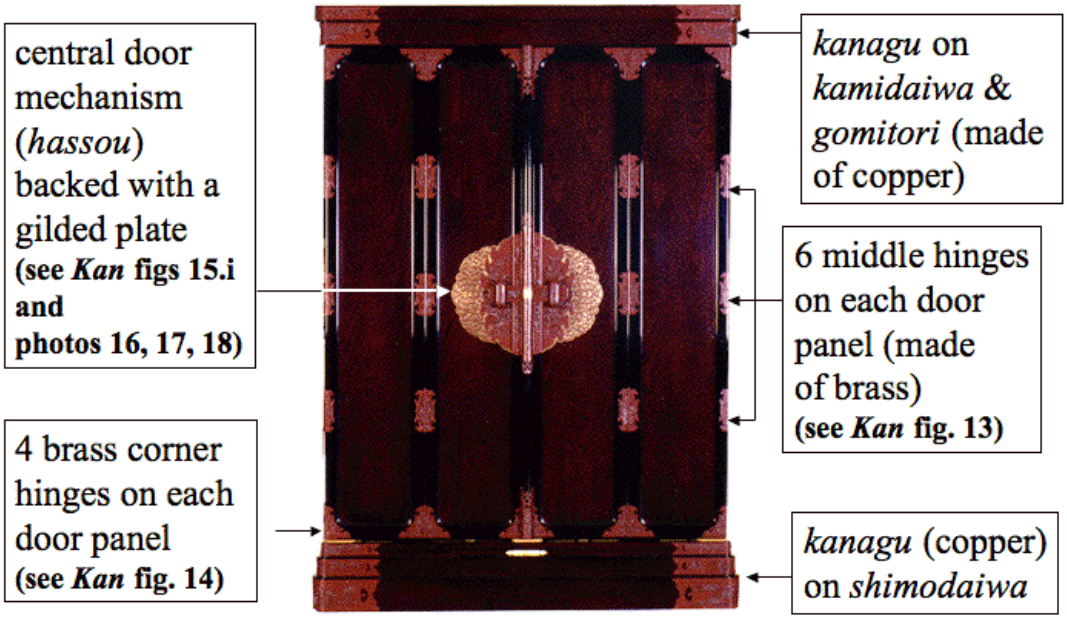
A. Types of metal and placement on the *butsudan*:

The pieces for the inside of the *butsudan* are made of copper, as are the decorative non-load bearing pieces on the outside.



Kan photo 02: set of copper fittings for small pillars (*kobashira*)

This includes those on the top (*kamidaiwa*, *gomitori*) and the base (*shimodaiwa*) (see *Kin* photos 01 & 02) and the door mechanisms of both *amado* and *shouji*. The hinges, which have to bear the weight of the fairly heavy door panels, are made of brass.

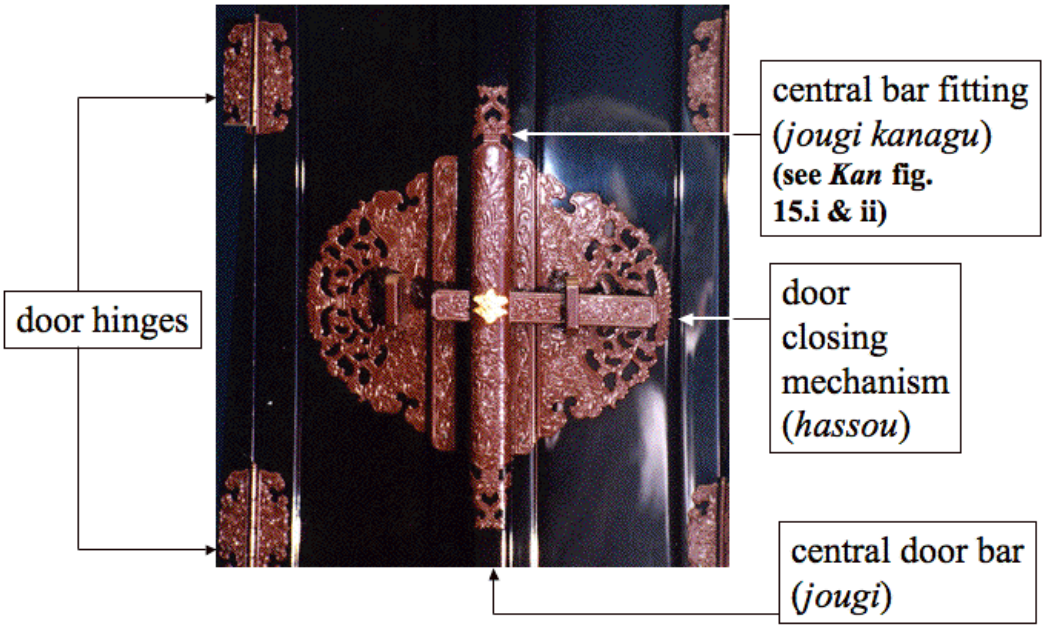


Kan photo 03: showing lacquered *kanagu* on outside of *butsudan* (see *Kan* photo 16 and fig. 13)
(courtesy Hikone *butsudan kumiai*)

B. **Treatment after completion**:

After completion the copper and brass fittings are treated in the following ways to prevent tarnishing and to make them more beautiful.

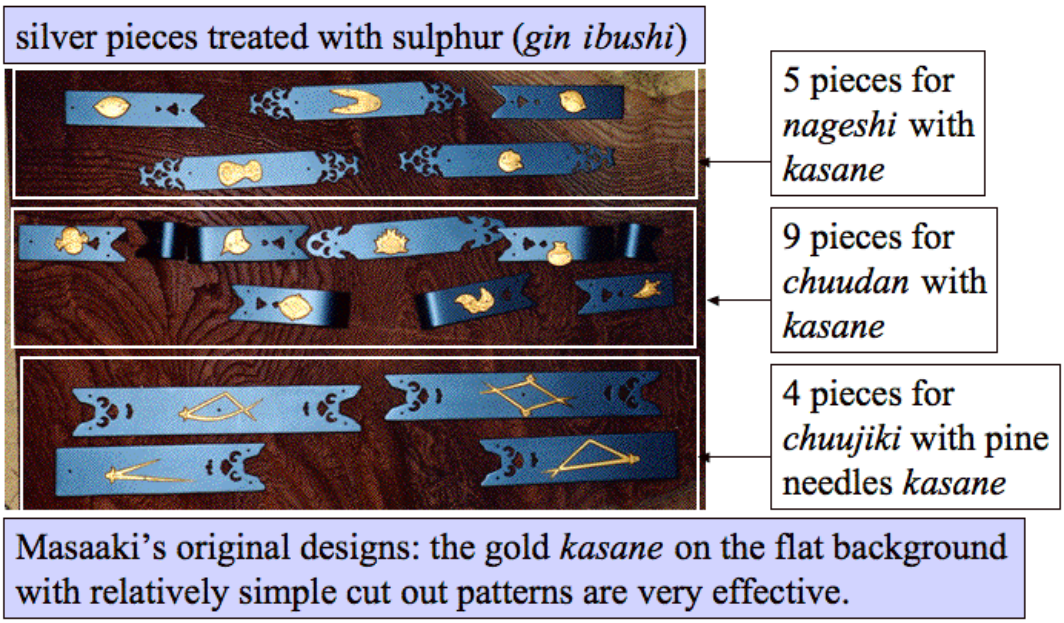
1. Fittings for the outside are coloured with lacquer and then fired to harden them and increase their durability. This stops tarnishing and protects them from the atmosphere. It is called *urushi yakitsuke* and results in a shiny 'painted' look, which can be any colour but is most popularly reddish brown (see *Kan* photo 03).



Kan photo 04: lacquered fittings for outside of *butsudan*

With this treatment, *kebori* artisan Sawatari Masaaki worries a little because details of the engraving could disappear due to the rather thick lacquer applied before the firing process. “I only worry about the depth of the punching for door fittings, not for the pieces to be gilded. So I will do a little deeper punching for those.”

2. The parts destined for the inside of the *butsudan* are usually gold plated. However they can be silver-plated and treated with sulphur to give them a dull finish, then used in addition to or instead of the gold ones.



Kan photo 05: dull silver pieces laid out with gilded attachments (*kasane*) ready to install [see assembly (*kumitate*) section]

In this website, we are most interested in gold plating and Masaaki explains that there are three ways to do it. "Adding to the thickness with these processes is not a problem because the plating is only a few microns thick," he says.

Three ways of plating:

The cheapest way is used for mass-produced *kanagu* and for this website is therefore a matter of only passing interest. "First," says Masaaki, "the original copper piece is chrome-plated, then gold plate is put on top of that. Chrome plating is not very good because gold doesn't stick onto it as well as it does onto a coppered base. And the colour isn't very nice, because you can see the silvery colour of the chrome through the very thin layer of gold. And because it doesn't stick well, the gold plating is uneven."

The standard method of plating is to copper plate the punched *kanagu* initially and then gold plate it. "After copper plating gold will stick better onto the surface," continues Masaaki. "Before gold plating, if the copper sheet is covered with copper plating any unevenness will be filled so the gold plating will be more even. Copper conducts electricity very well so it makes a good electrode. This is especially important when the copper piece has some spots of solder (for example when *kasane* pieces, as in *Kan* figs. 21 & 23, have been attached with solder) because the gold can't stick. But copper does stick so it is copper plated first."

For very high quality items there is a third way of plating. "On top of the finished copper *kanagu* it is copper plated again, then silver plated and finally gold plated. "In this case the colour of the gold plating is very good. It has 'deep taste'," he says

meaning very elegant. “I guess silver conducts more easily than copper. The gold plate over silver plate sticks better than the gold directly onto copper plating.” (FN.1)

C. Production method:

Along with the other *butsudan* crafts, modern cost-cutting methods are used to make *kanagu*. Craftsmen like *kebori* artisan, Sawatari Masaaki and *jibori* artisan, Okamura Masao still proudly resist this and do all their work by hand. However ‘pressing’ and ‘electro-plating’ are becoming viable alternatives. Throughout this website we have been discussing high quality traditional (*dentouteki kougei hin* – DKH) *butsudan* where cost cutting is not practised. Interestingly, in this one case (*kanagu*), mass-produced works are acceptable in some places on the *butsudan* and this will be discussed later.

Handmade metal fittings are quickly becoming a thing of the past. They are being superseded by both electroplated and pressed fittings. Although there is no absolute rule, electroplated (EP) fittings are most appropriate for the thicker more deeply carved and embossed *jibori*-type pieces while pressed fittings are more suitable for the engraved *kebori* style. Fortunately, however there are a few artisans who are carrying on the tradition of handmade pieces (*tebori*).

1. Handmade fittings:

Kebori artisan, Masaaki says, “The difference between the hand-made fittings and ‘pressed’ goods is that the machine punches the whole pattern: flower, stems and leaves, background texture (*nanako*), all at one time. The same pattern over and over, many mass-produced products, with no variation.” They make a template for this so it is not economical unless they can reproduce it many times. “In the case of handmade fittings,” continues Masaaki, “I can make an assortment of patterns, for example mixing open and half open flowers, buds, (see *Kan* fig. 07), even the backs of flowers. In the case of ‘pressed’ fittings, exactly the same pattern will be pressed onto all the fittings of a set. For example a set for *nageshi* (see *Kan* figs. 08 & 09.a & b and *Kan* photos 05 and 11) will have the same patterns. And in the case of hand made fittings, for example among a 5-piece set, I can change the design, size and proportion of the pieces. Sometimes I change them intentionally so people can see it is done by hand. With pressed pieces they all have the same length and same design. With handmade I can make the central piece a little bigger than the others. Or I can make some part of it a cut out design (*sukashibori*). Or make the flowers face in different directions such as the side two flowers facing the middle one.” However, sadly the following mass-produced items are becoming more and more popular:

2. Electroplated (EP) fittings:

The manufacture of EP items of *jibori kanagu* started 20 or 30 years ago. According to one source, a high quality *jibori* work produced by hand, is used as a prototype to make a template. Vinyl chloride resin is heated to between 200 and 300°C and run onto the template. When cooled and solidified the moulded item is separated from themetal. Then a solution of silver is sprayed onto the resin surface to act as a negative electrode. Ionic copper (purity 99.8%) is melted and used as the positive electrode. The resin mould is dipped into a solution of copper sulphate. After 3 days

of electroplating, the copper is thick enough and can be removed from the resin mould. The rough edges of the metal fitting are filed away.

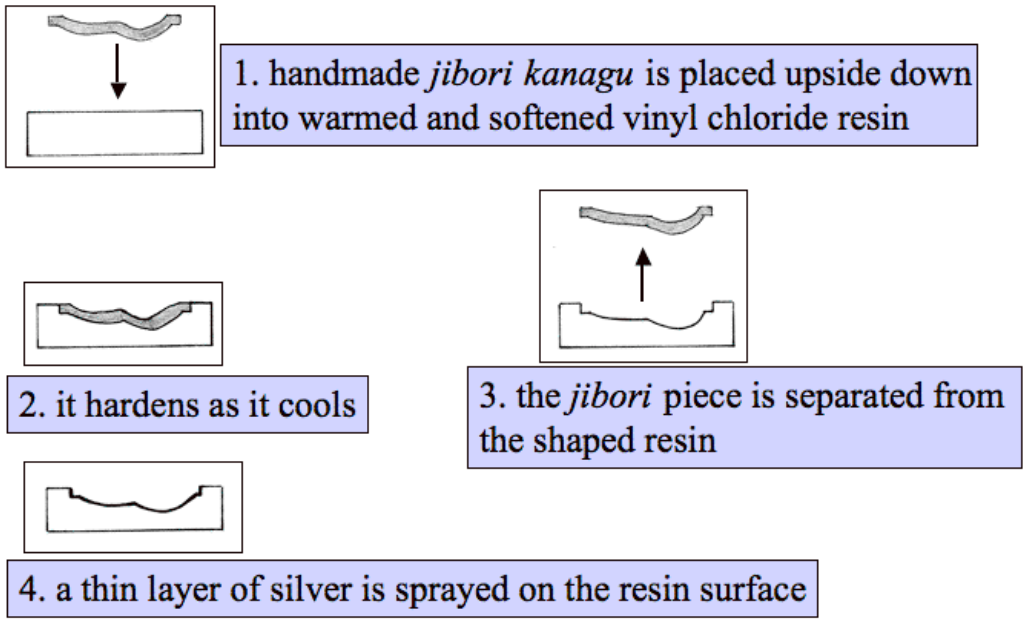
The advantages of EP products are:

- A product exactly the same as the mould can be obtained.
- The material and colouring are exactly the same as hand-made *jibori kanagu*.
- They are cheap.
- The supply is stable (you don't have to wait for an overworked artisan).
- Uniformity of products can be achieved. You always know what you are getting.

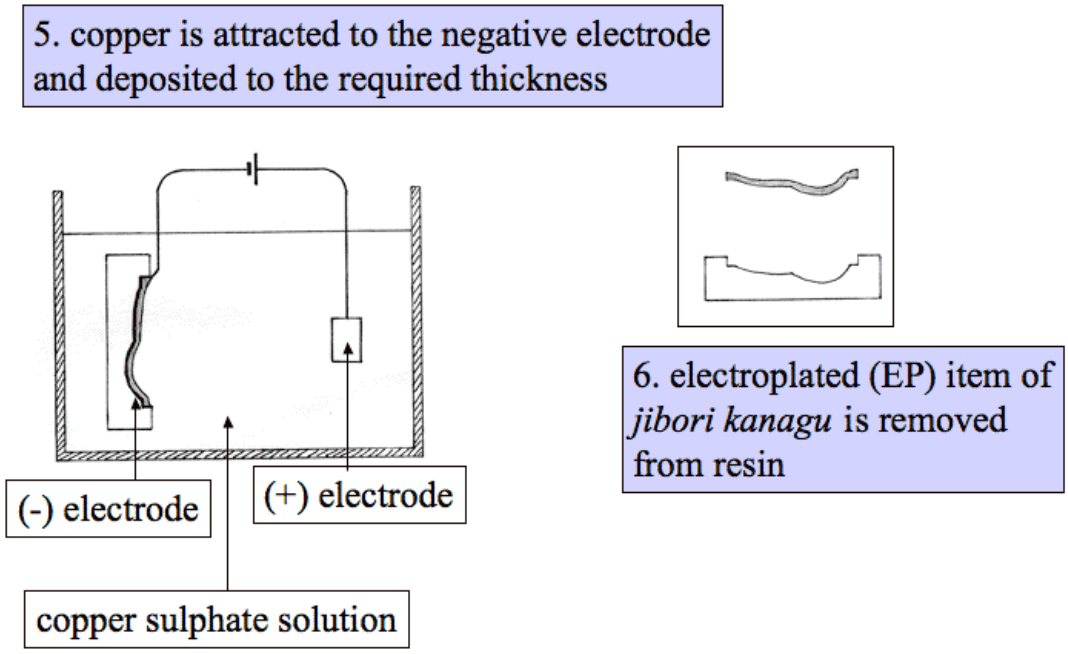
The disadvantages of EP products are:

- They lack individuality.
- Because they are a cast item, they are thinner and lack density. Therefore they are not used in places where a heavy load or frequent use is expected. They are used only on pillars, *chuujiki*, *chuudan* and *nageshi*.

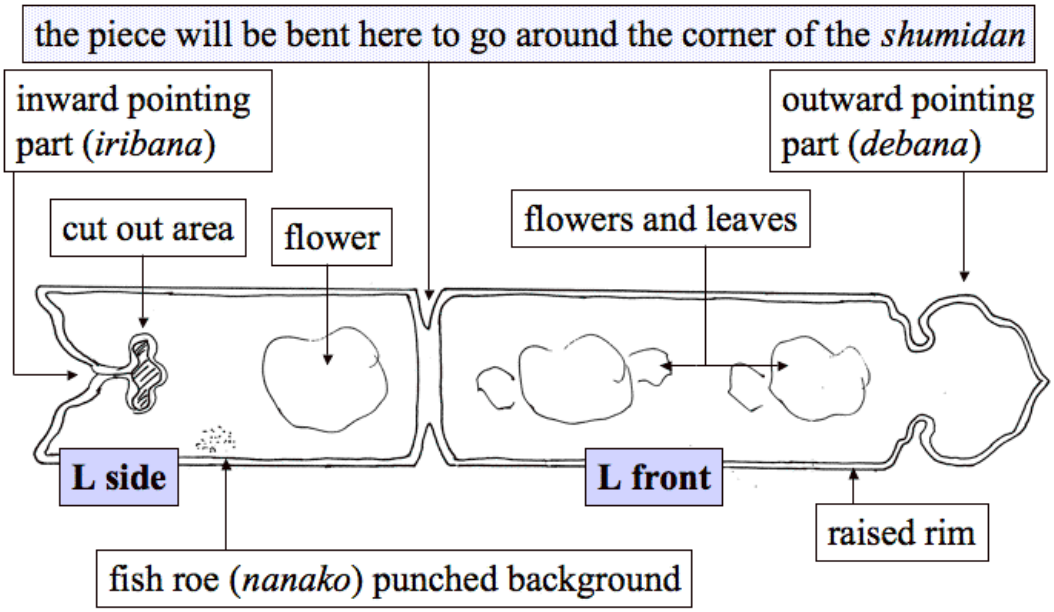
Masaaki showed us an example of an EP fitting and gave his own similar but less technical description, "They make a thick plate of resin and while it is hot and still soft they press the finished *jibori kanagu* down into it. And they get a reverse-shaped mould. They connect the electrodes and copper collects on the resin surface until it reaches the right thickness. So the material of the finished product is pure copper. It is more bendy and not strong."



Kan figure 02.i: stages of making a mould for EP (Masaaki's simplified explanation)



Kan figure 02.ii: electroplating continued



Kan figure 03: EP *kanagu* for temple *shumidan*
(actual size = 28.0cm x 4.8cm)

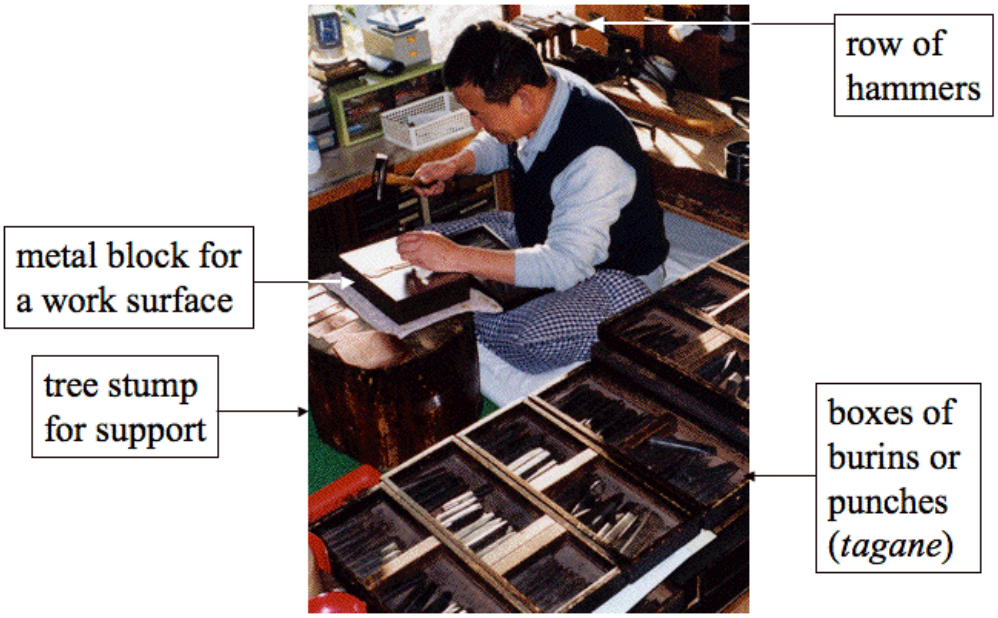
The piece shown above was from a temple *shumidan*, where the front and side sections were joined and could be bent around the platform. It measured 28cm long and 4.8cm wide. “These days,” he explained, “for almost all portable shrines (*mikoshi*), festival floats (*dashi*) or inside fittings for temples, EP fittings are used. There is almost no market for such handmade ones anymore.” Up to about 20 years ago Masaaki was sometimes asked to do work for *mikoshi*, temples, shrines etc, but now things like this are machine made. “So now we have no chance,” he says rather dolefully. “Like everything, the manufacturer takes the fittings to China to be copied and then sent back to Japan.”

3. Pressed fittings:

About 20 years ago pressed fittings became common. Masaaki explains, “They can do the rough carving (*arabori*) process with machines. You can draw the lines with a computer and then the computerised machine does the work. If you feed it all the information, it will arrange everything about the design - computers can do anything! Machines can apply more pressure to the metals, so a greater variety can be used and there can be more impurities, making the metal cheaper. Pure copper bends easily so the more impure the metal, the better. Machine-made items are called ‘pressed’ *kanagu*.” “However,” he says, “pressed designs are more general and non-specific; and the wrong patterns are sometimes used in the wrong places.”

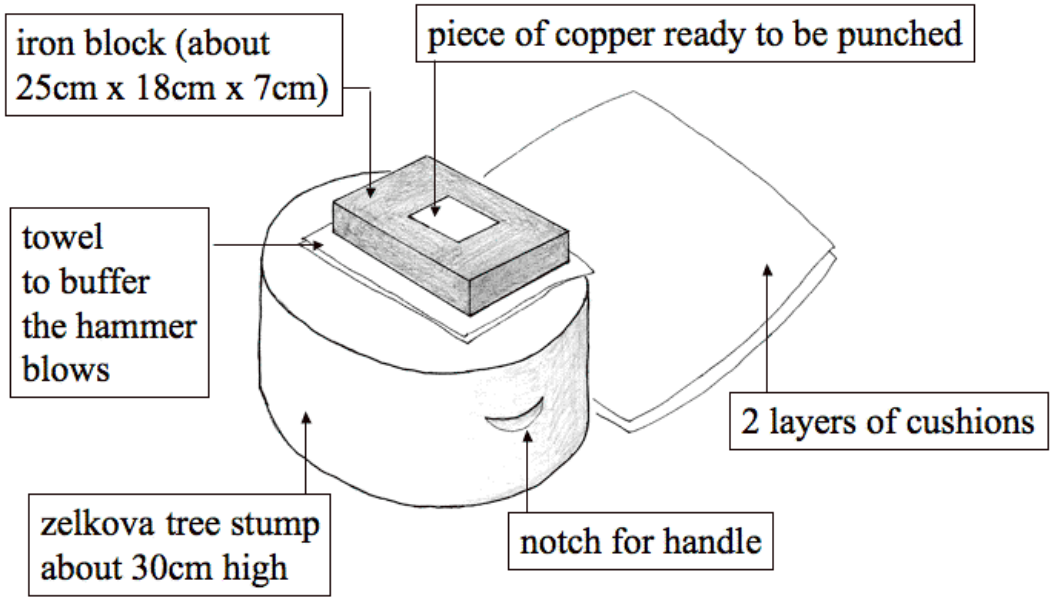
ABOUT THE ARTISANS:

As mentioned previously, our aim here is to describe the handwork of these traditional craftsmen. And thanks to the many hours given to us by *kebori* artisan, Sawatari Masaaki we were able to get a comprehensive understanding of his particular skills. His workshop, a well-lit room at the front of his home, is on a street (Nanamagari) where, in the past, many *butsudan* artisans lived and worked.



Kan photo 06: *kebori* artisan, Sawatari Masaaki in his workshop

Here, he sits on his cushion surrounded by tools, tapping busily on a piece of brass or copper, placed on a tree stump that was his father's and his grandfather's before that.



Kan figure 04: Masaaki's working equipment

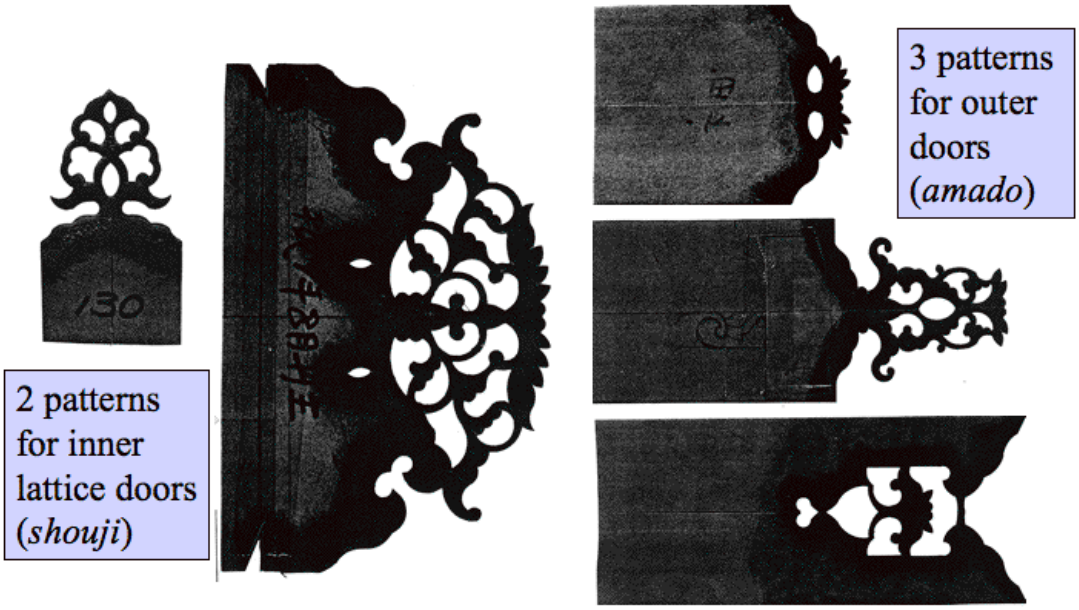
His wife, Chizuko has the responsibility of copying the pattern shapes onto the metal (see processes section, *Kan* photos 43, 44 & 45). She sits on the sidelines nodding,

occasionally commenting and finally bringing us tea and sesame scones with homemade blueberry jam, when she thinks her husband has had enough. Masaaki says, “Mori (*choukokushi* – see part 3) warned me that, ‘you’ll get very tired’.”

Chizuko is rubbing India ink over the paper pattern - to transfer the design to the metal (copper)

the pattern paper is like that used for kimono stencils: it is treated with persimmon juice to make it stiff and water proof

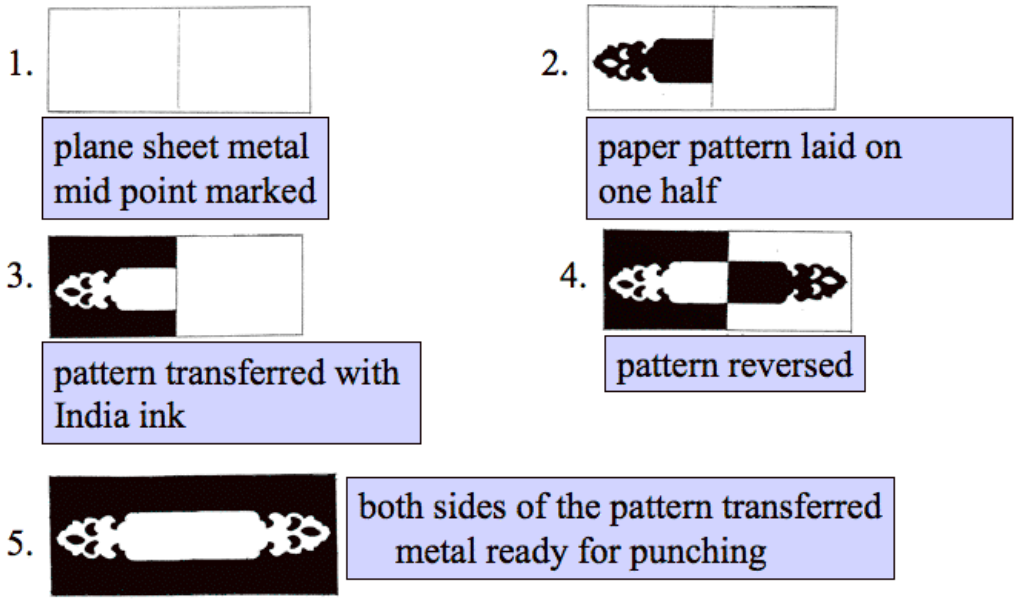
Kan photo 07: Masaaki’s wife, Chizuko transferring patterns



2 patterns for inner lattice doors (*shouji*)

3 patterns for outer doors (*amado*)

Kan figure 05: examples of paper patterns for transfer to metal with India ink (see *Kan* figs 15.i & ii)



Kan figure 06: explanation of how a paper pattern is copied (see *Kan* fig.10.ii & photo 45)

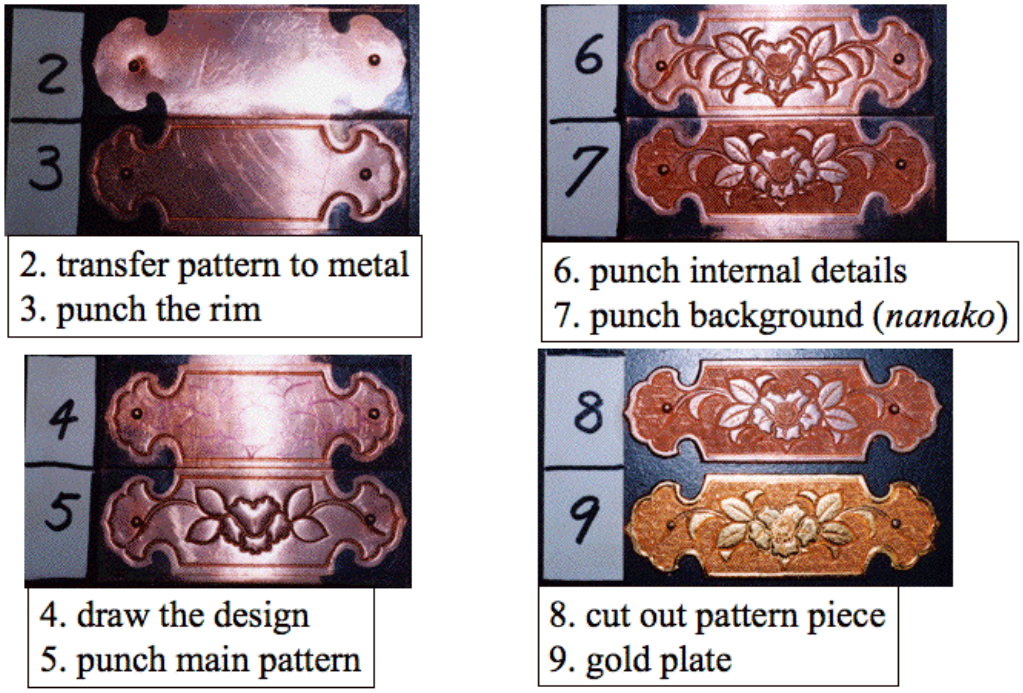
Masaaki is talented, innovative (see *kasane* in *Kan* photo 05 and exhibition *butsudan Kan* photos 23.a & b) and very independently minded. He says, "I'm doing my work in my way. My way might be different from *butsudan* shops and also different from other metal artisans." He says that devising new patterns that can't be copied or mass-produced is the key. And it is true that even though the economic climate is not good for artisans he still has work coming in.

The most stressful part is measuring for the pieces and preparing the patterns. He works in monthly cycles and tends to do this planning at the beginning of each month. In this case, to calculate sizes, work out designs and draw the patterns for the three *butsudan* he is working on concurrently is very demanding. Once all the planning is done, he just has to do the punching and that is not so 'mind-bending'. His wife seems more relaxed as well, joining into the talk and serving us ice cream, cake and coffee. When he works instinctively, he is as garrulous as the other craftsmen, reminiscing about the good old days when you could hear the 'chinking' of the metal workers far into the night. However, since the number of skilled artisans is decreasing with each generation, that is a thing of the past.

According to *kanagu* artisan, Tanaka Youichi, "It takes about five years to become 'useful' to your master, in other words when your skill is 'not bad'. To become an independent artisan it takes seven or eight years and after 10 years training you can be called 'full fledged'." Thus you think twice before embarking on such a career.

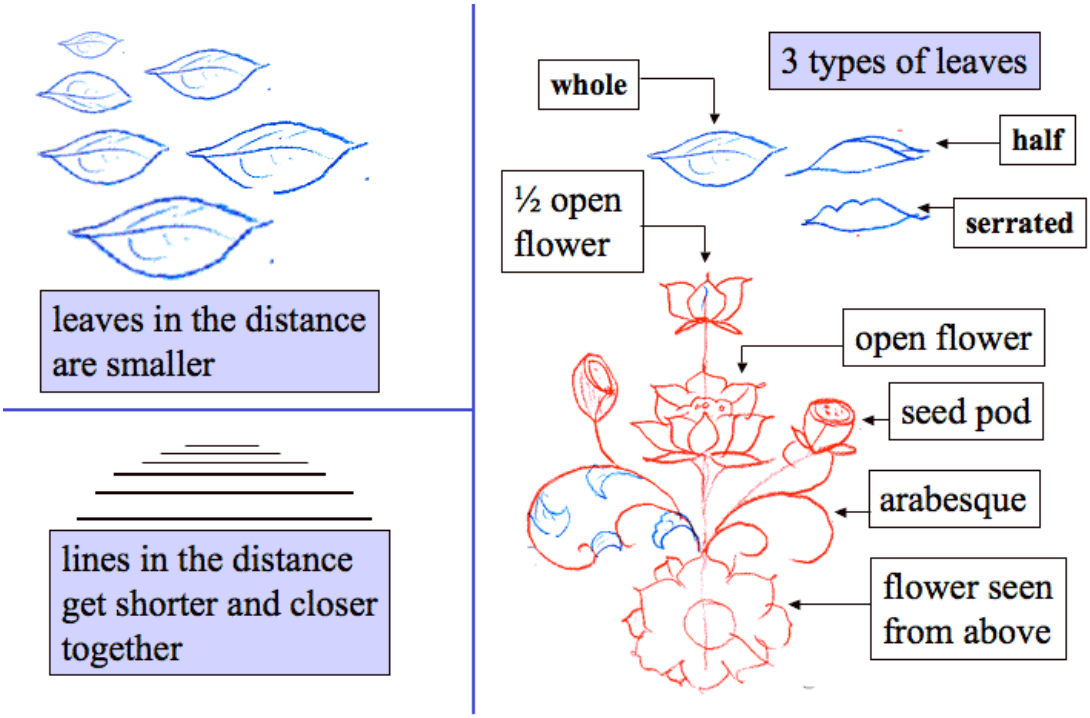
Typically, Masaaki feels concern at the drift of the modern generations away from the traditional values. Therefore he does his best to make sure that even if there are no budding artisans amongst today's school children, at least they will have some

understanding of what is involved in the making of their family *butsudan*. “I go to an elementary school once a year to talk about *kanagu* artisans’ work,” he explains. “I take a process board and give out an explanation sheet and explain everything. The 5th grade children learn about the local history and industry of the Hikone area. I teach them the history and how to make the *kanagu*.



Kan photo 08: process board (see processes)

“Drawing is important for a fittings artisan,” says Masaaki while using his coloured pencil, blue and red at opposite ends, to help us understand. “The mental activity or feelings needed for carving or punching patterns on metal fittings is the same as that needed for drawing pictures. I heard that my grandfather used to take his apprentices out to sketch flowers and plants. Drawing and carving have something in common. I think I should learn to draw,” he says with a suggestion of a smile. He uses the line drawing technique of making lines closer together and shorter, to suggest distance and farther apart and longer, for close up. Also objects such as leaves in the distance appear smaller.



Kan figure 07: Masaaki's drawings skills

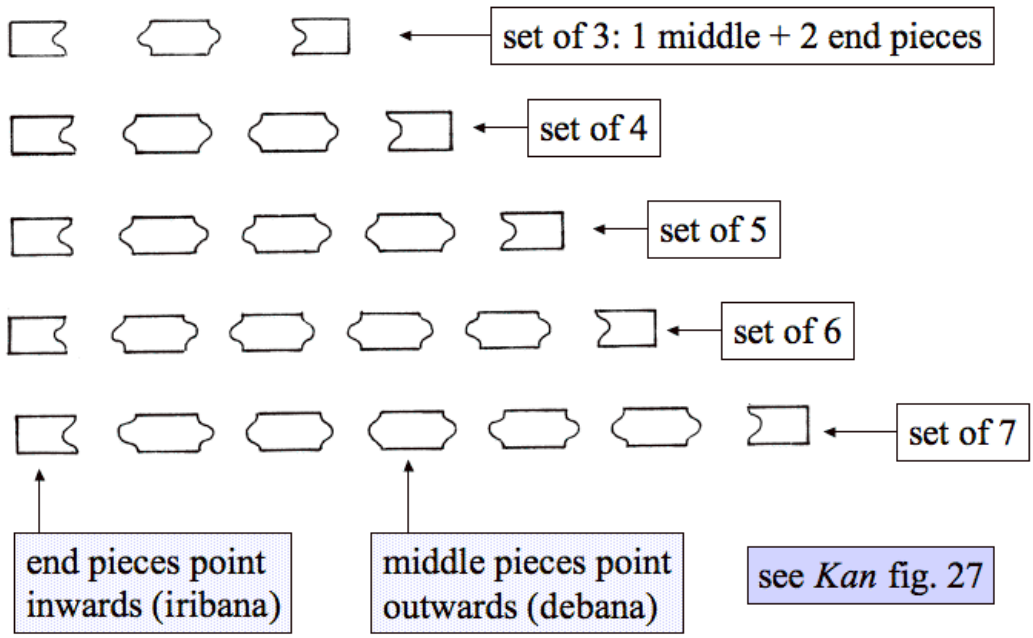
Following our discussions with Masaaki, in order to appreciate the differences between his punching (engraving) techniques and the sculpting and embossing techniques of a *jibori* artisan, we interviewed Okamura Masao. Masao's workshop is also a room connected to his house, which is slightly away from the centre of *butsudan* activities. He contributes a lot to local artisan activities such as the yearly *butsudan* exhibitions. He very kindly prepared a piece of metal ready to demonstrate all the processes. His wife was very helpful with the explanation. In fact, sometimes he asked her to, "let me do the talking..." She prepared tea for us several times and was helpful with bringing out samples of his work to show us.

Kan photo 09: *jibori* artisans working in resin

7.1 BUTSUDAN STRUCTURE and PLACEMENT OF FITTINGS:

How the fittings are ordered.

Metal fittings are divided into sets which fit for instance along the edge of a door (see *Kan* fig. 11.i). The 'set' includes the pieces at the corners (*sumi*) and the 'middle' (*naka*) ones that are placed in between. The advantage of handmade items is that the proportion of the sizes to the numbers of pieces in the set as well as pattern details can be changed.



Kan figure 08: concept of sets

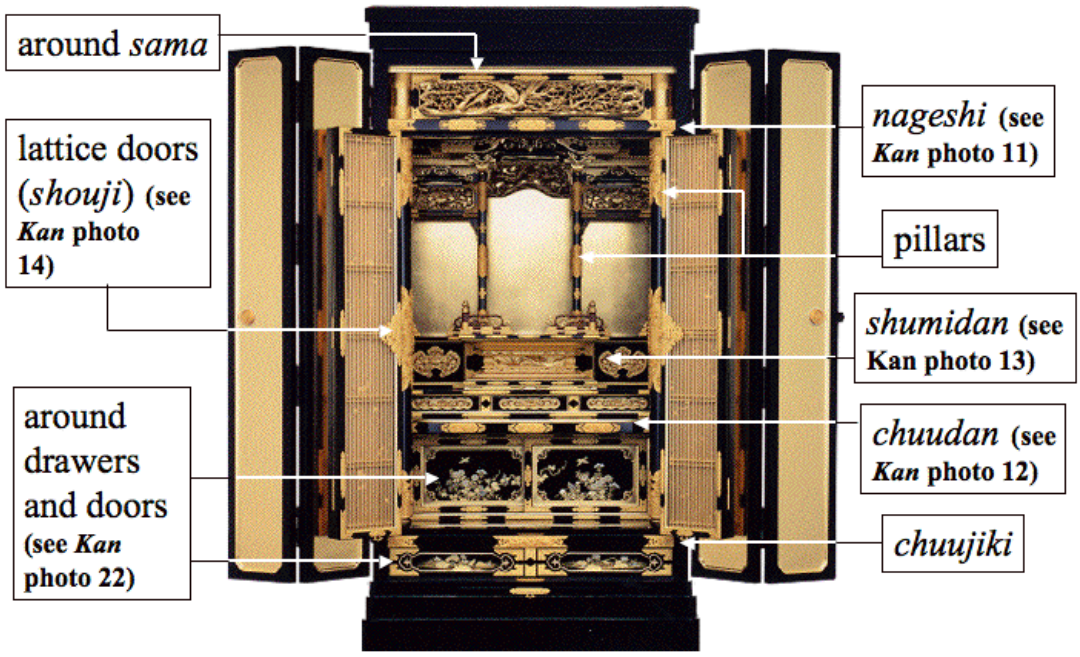
Butsudan shops ask the fittings artisans to make a certain numbered set for a certain place on the *butsudan*, for example a set of seven for a *shouji* frame, or a set of five for *nageshi* (see *Kan* photo 11). The kind of work to be done for each part, such as *kebori*, *ukibori*, *sukashibori* or *jibori* is negotiated. This is decided for each place, according to the price of the *butsudan* ordered, taking into consideration, the kind of metal (copper or brass) and its thickness. "So I use thicker metal for higher quality ones. I use the thickest plate, sometimes up to 3.5 mm, for the *sandan* fittings (the three internal shelves – *chuujiki*, *chuudan* and *nageshi*: see *Kan* photo 10 & figs. 09.a & b) of the *butsudan*. The more important or obvious pieces and the load bearing pieces are thicker," explains Masaaki, adding, "Although this may vary for different artisans."

The shops may order all the fittings to be made of *jibori* or sometimes only *sandan* fittings are *jibori*, depending on the customers taste, priority or budget. The style of work is up the customer. Some want a consistent style throughout, such as only *kebori*, while others might want different styles of *kanagu* on various parts of the same *butsudan*. Sometimes, if the buyer wants the metal very thick (4mm or more) Masaaki uses 2 layers of 2mm each (cf. *Kan* fig. 20). He puts extra design pieces of 2mm on top of the main piece of 2mm. On the other hand, some customers will choose cheaper fittings because they want to emphasize something else, like *makie* instead of *kanagu*.

Here, we will describe where the decorative metal fittings can be found on the *butsudan*. Their style and the placement is different depending on the *butsudan* Production Area and, according to Masaaki, it takes several years to learn the style of each area. (FN.2)

The number of metal fittings (*kanagu*) for a large Hikone DKH kin *butsudan* (see *Kin* photo 02) is about 350; and for a smaller one, (see *Kan* photo 10), is 250. A wider *butsudan* has more. (FN.3) The time necessary to make these fittings for a large Hikone DKH (see introduction) *butsudan* is about 1 and half months.

As mentioned before, the metalwork inside the *butsudan* is usually made of gilded copper. It is found on the pillars (large, medium and small), on the *sandan* (*chuujiki*, *chuudan* and *nageshi*), on the small doorframes and drawer fronts, and on the outside of the inner lattice door (*shouji*). When placed against shining black lacquer it sparkles and makes a pleasing contrast. Against a gilded surface it appears subtle and sophisticated (see *Kin* photo 02).



Kan photo 10: places where *kanagu* are found (inside) (also see *Kin* photo 02) **(courtesy Eirakuya Co Ltd)**

The hinges and fastenings on the outside of the *butsudan* door (*amado*) have to be stronger and more weight bearing than those on the inside and are thus made of brass. To make them resistant to the atmosphere they are lacquered and then heated, giving them a 'painted' look, most commonly a shiny brown colour. Sometimes there are also decorative fittings at the corners of the doorframe and if so, these will be matched by fittings at the corners of the *kamidaiwa* and *shimodaiwa* (see *Nuri* photo 01 & *Kan* photo 03). These will usually be made of copper and treated with lacquer to match the hinges and opening mechanism.

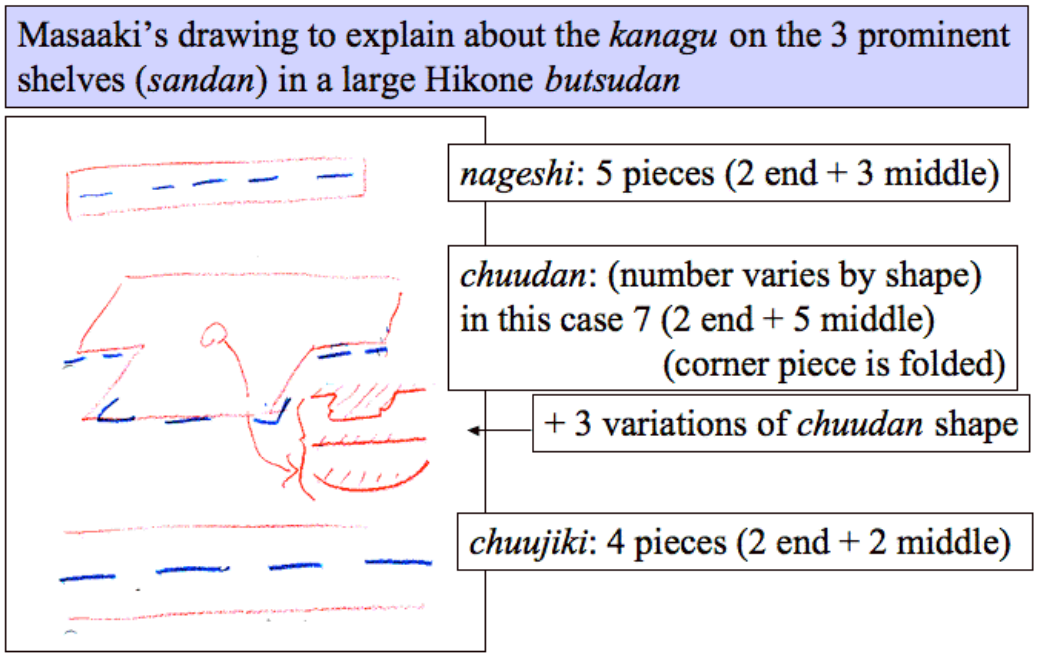
"In the past," says Masaaki, "the size of the rooms was always the same, that of the *butsudan* was the same and thus the number of *kanagu*. Now there is more variety in rooms and more variety in people's demands. There will be various kinds of *butsudan*, with various number of *kanagu* in the future."

Placement of *kanagu* on *butsudan*:

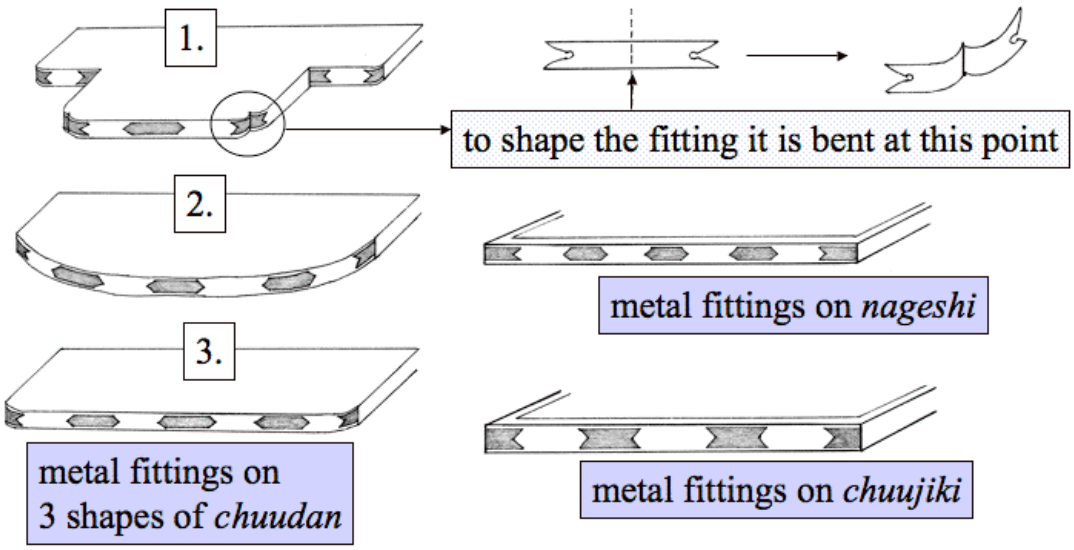
For handmade pieces to be used on a DKH *butsudan* there are certain stipulations. The metal fittings for *amado* must be at least 1.0mm thick. For *shouji* the thickness must be at least 0.8mm. For inside items there is no limit for thickness.

A. Fittings for the three shelves (*sandan*)**:**

As seen in previous photos, there are three prominent shelves inside the *butsudan* (see *Kan* photo 10). Collectively called *sandan*, they include the upper *nageshi*, the middle *chuudan* and the lower *chuujiki*. *Kanagu* sets for these areas can vary but generally Masaaki uses the following arrangement.

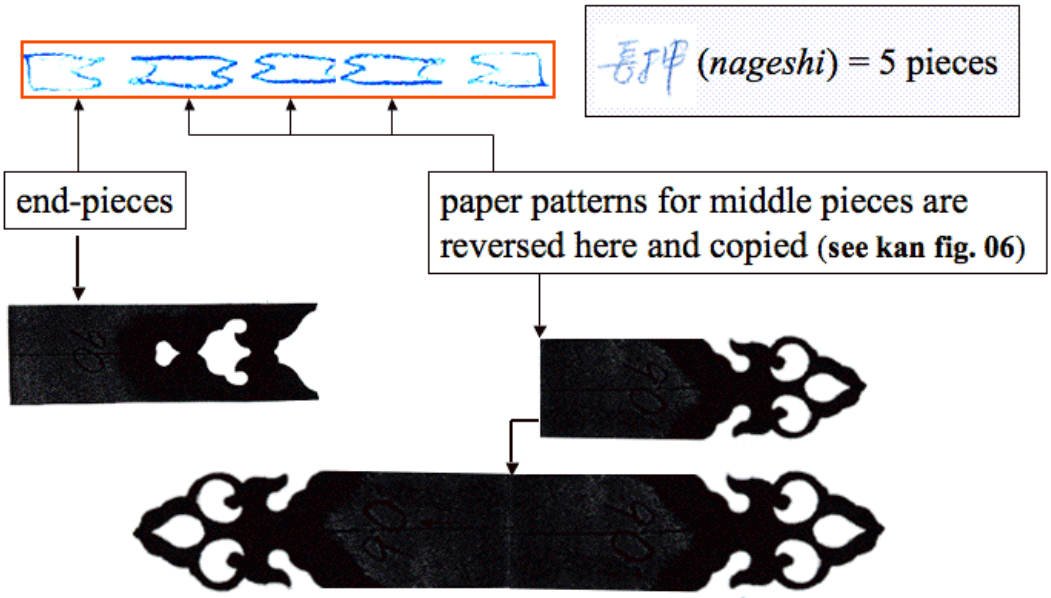


Kan figure 09.a: Masaaki's drawing - sets of *sandan kanagu* (see *Kan* photo 05)

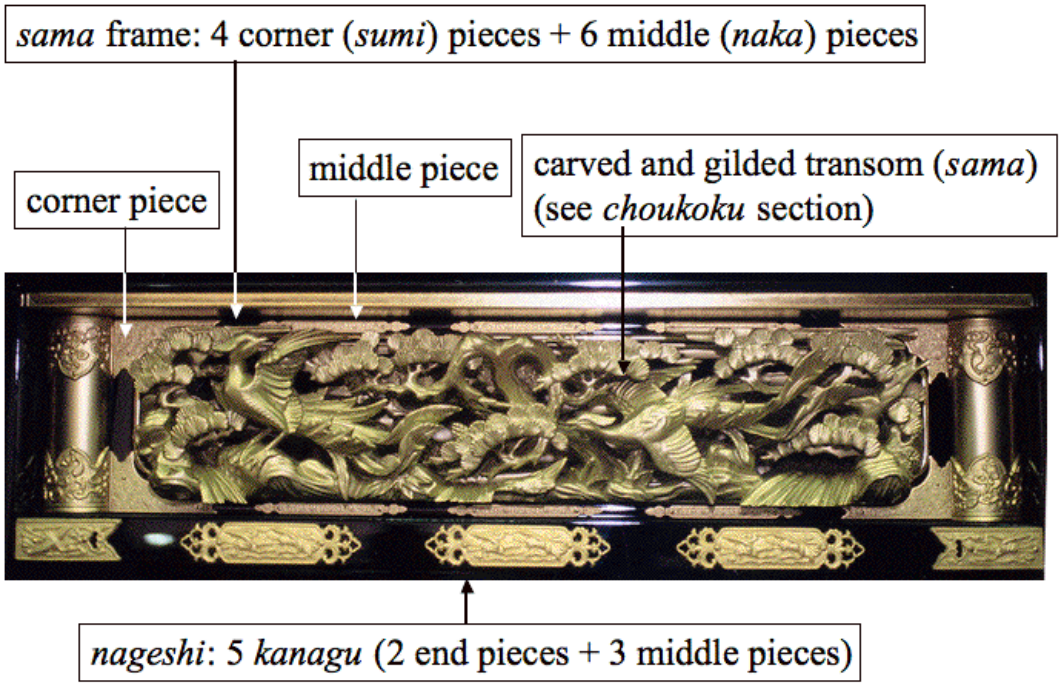


Kan figure 09.b: supplementary diagrams of *sandan kanagu* (showing shapes and number of pieces)

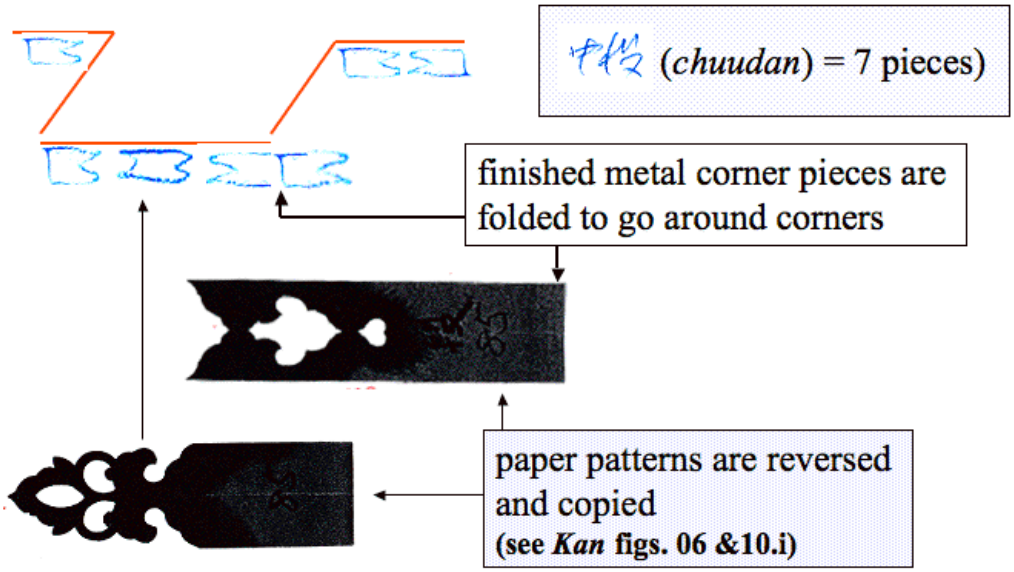
Nageshi and *chuudan* sets have two for the corners and an odd number (one, three or five) in between. "The number of the fittings for *chuudan* and *nageshi* is uneven," says Masaaki, "because Japanese like uneven numbers. I discuss with the shop, how many to do, three or five or seven.



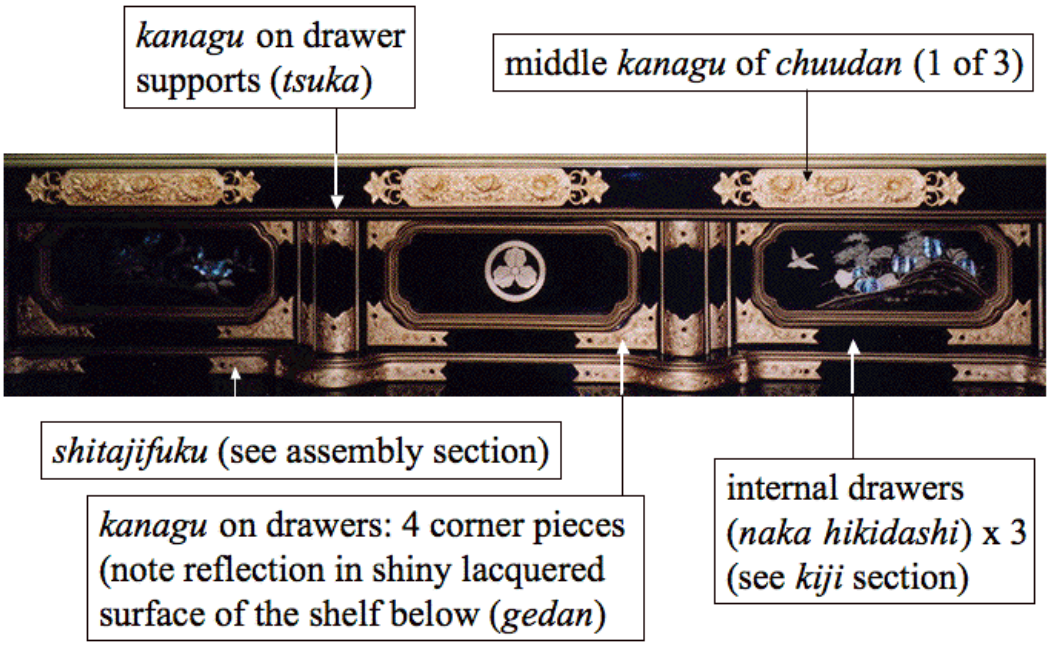
Kan figure 10.i: patterns for *sandan* (*nageshi*)



Kan photo 11: *kanagu* on *nageshi* and *sama* frame

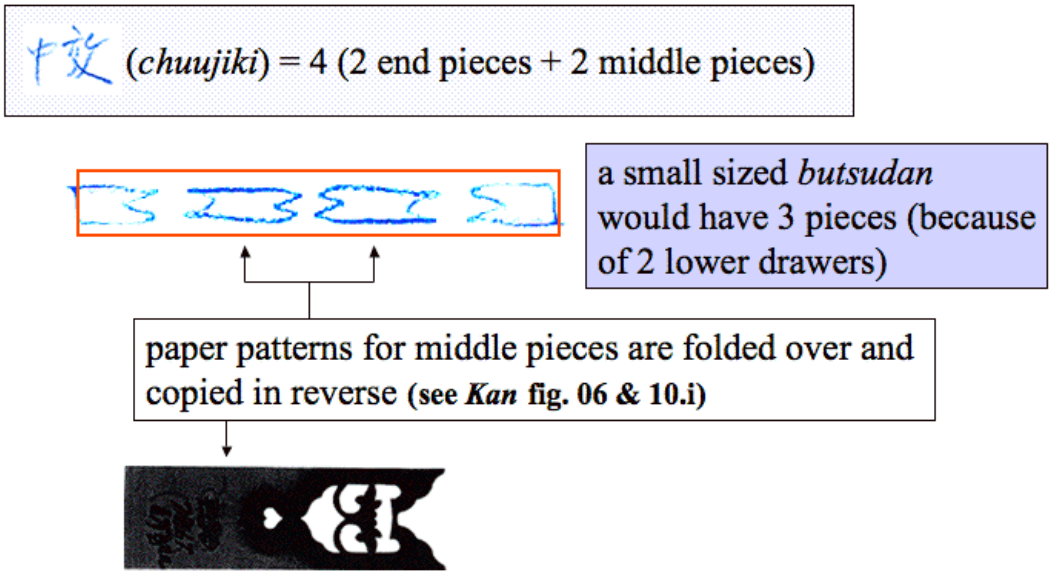


Kan figure 10.ii: patterns for *sandan* (*chuudan*)



Kan photo 12: *kanagu* on *chuudan* and internal drawers (*naka hikidashi*)

Generally, the number of fittings for *chuujiki* on a big *butsudan* is fixed at a set of four, because this balances well with the three *daiwa* drawers (just below the *chuujiki*), each of which also has metalwork (see *Kin* photo 02 & *Kan* photo 03). Note that on a smaller *butsudan* (see *Kan* photo 10) where there are two drawers, there is a set of three (two at the corners and one in the middle). End (*sumi*) fittings usually stop at the corner of the *chuujiki*, and then there is nothing on the side. For very expensive *butsudan* costing upwards of 20 million yen or more, they can be bent around the corner.



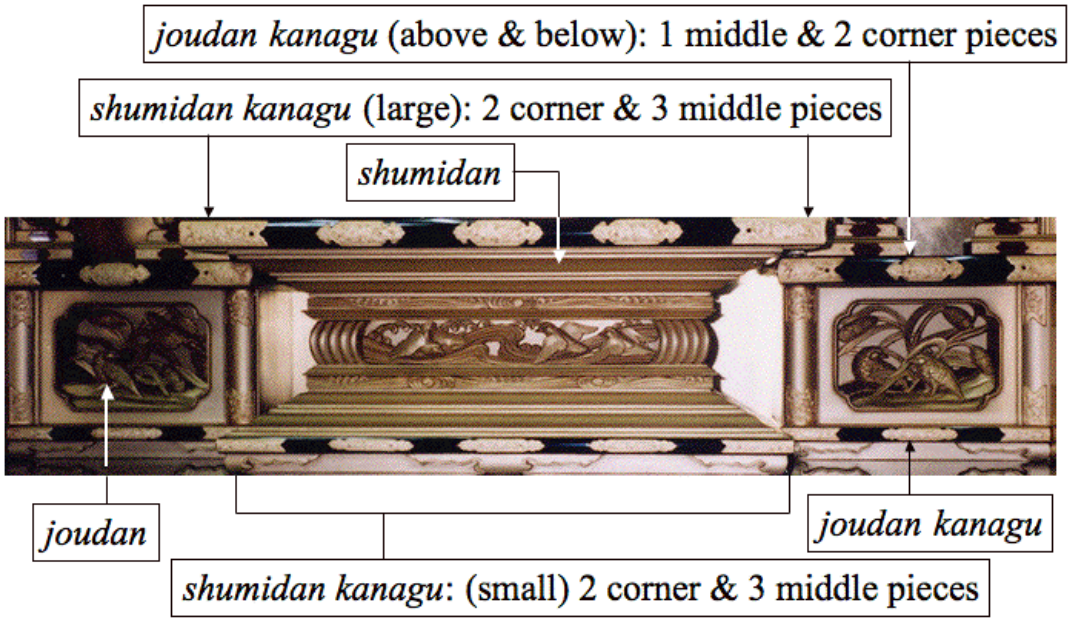
Kan photo 10.iii: patterns for *sandan* (*chuujiki*)

These pieces can be made in any of the four styles shown in *Kan* fig. 01: *kebori*, *ukibori*, *sukashibori* or *jibori*. Even though the *butsudan* may be of high quality and traditionally made (DKH), EP *kanagu* may be used. However 'pressed' or imported goods may not.

Nevertheless, there are variations, such as when the *chuudan* (see *Kan* figs. 09.a & b) is not straight across: here there may be 7 or more pieces to balance the 5 on the *nageshi* (see *Kan* photo 05).

B. Fittings for Buddha pedestal (*shumidan*):

Because of its Buddhist icon, the Buddha pedestal (*shumidan*) is the focal point of the *butsudan* and the fittings found here must always be handmade. Generally those at the top are wider than those at the bottom, and even for a smallish *butsudan* there is usually one at each corner and three in between. Sometimes, but not always, equivalent pieces can be found on the *joudan*, as in the photo below. The *kebori* technique is ideal for these fittings because they are small and must be delicately made. Unfortunately, sometimes it is only these that the artisan is asked to make, while many of the others are pressed or EP.

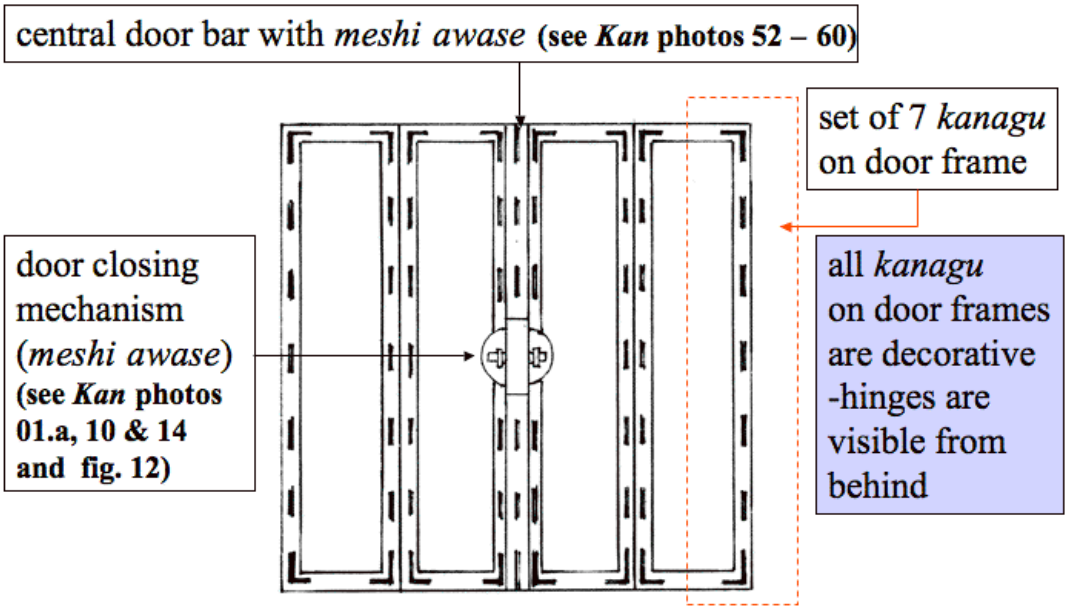


Kan photo 13: *kanagu* on *shumidan* and *joudan* (also see *choukoku* section)

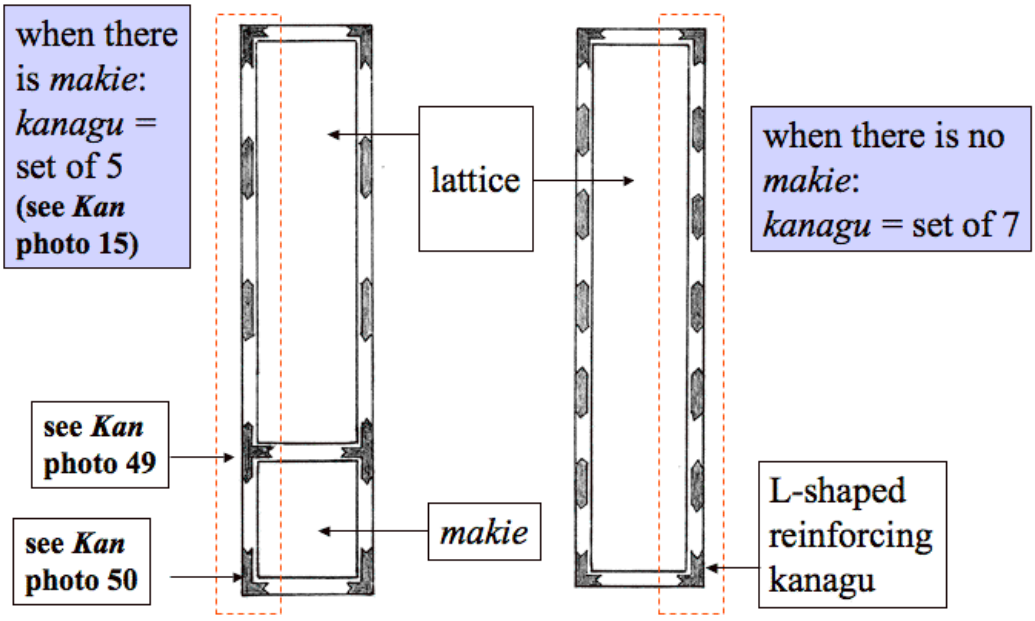
C. Fittings for doors:

There are two types of fittings for the doors: those that are truly decorative and those that are functional and weight bearing. For a traditionally made *butsudan* (DKH) they cannot be either pressed or EP, they must all be handmade.

For the inner lattice doors (*shouji*) the fittings are made of either copper or brass with a minimum thickness of 0.8mm. A set of three brass hinges, visible from the inside, joins the frames of the individual door panels and allows them to be easily folded out of the way when opening and flattened again for closing. The decorative pieces are made of copper and are on the outside of the *shouji* frames. A set of seven is the highest number used. Corner pieces (*sumi kanagu*) are L-shaped because their function is to reinforce the joins between the horizontal and vertical frame (*kamachi*) sections (see *Nuri* photo 16).

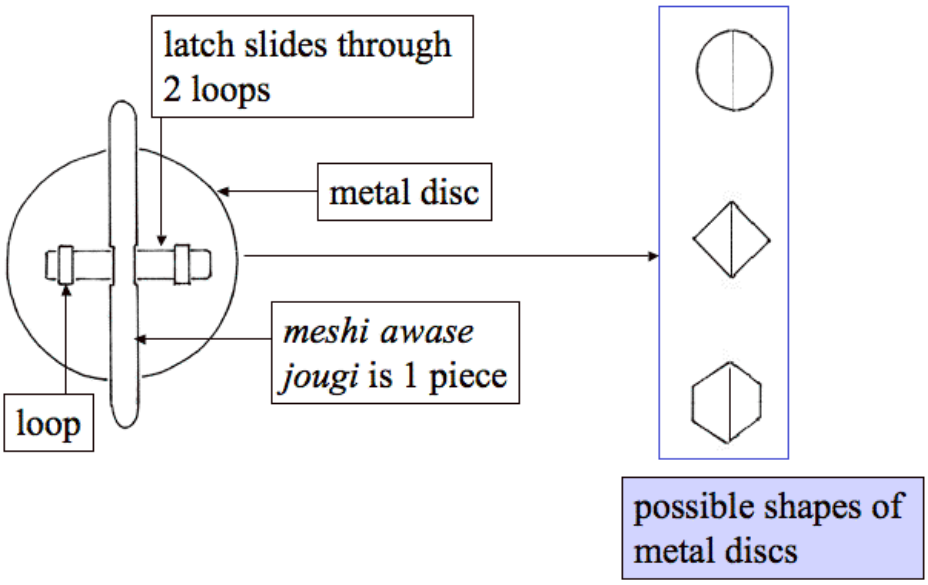


Kan figure 11.i: *kanagu* on inner lattice door (*shouji*)

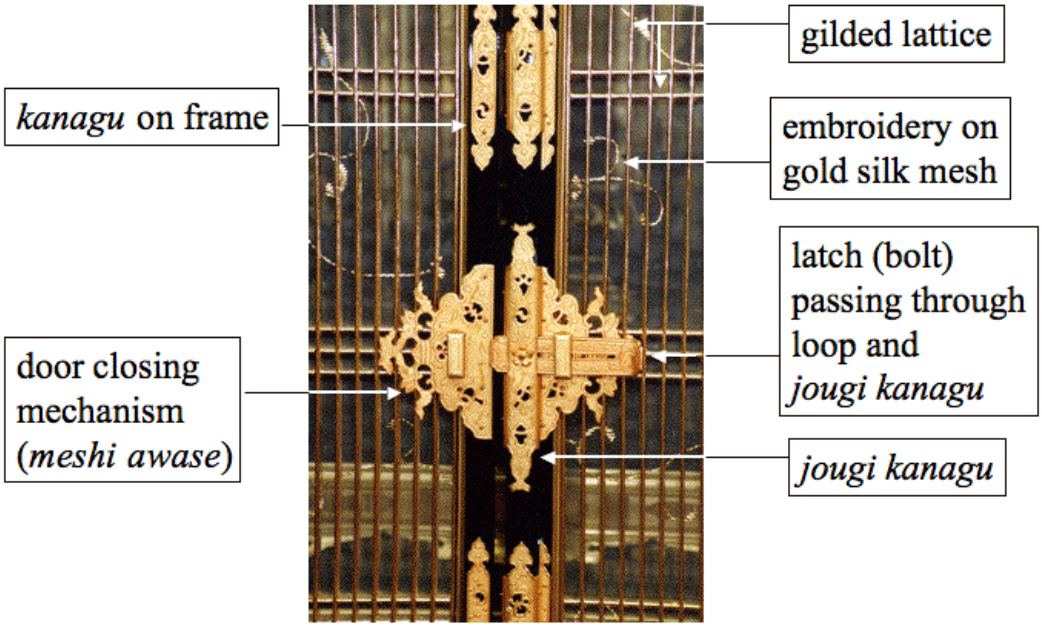


Kan figure 11.ii: examples *kanagu* distribution on two types of *shouji* frame (with and without *makie*)

One of the most beautiful pieces is the closing mechanism (*meshi awase*). It is divided in half, with a central vertical bar (*jougi kanagu*) attached to the right side. A latch or bolt passes through, to hold the door closed.

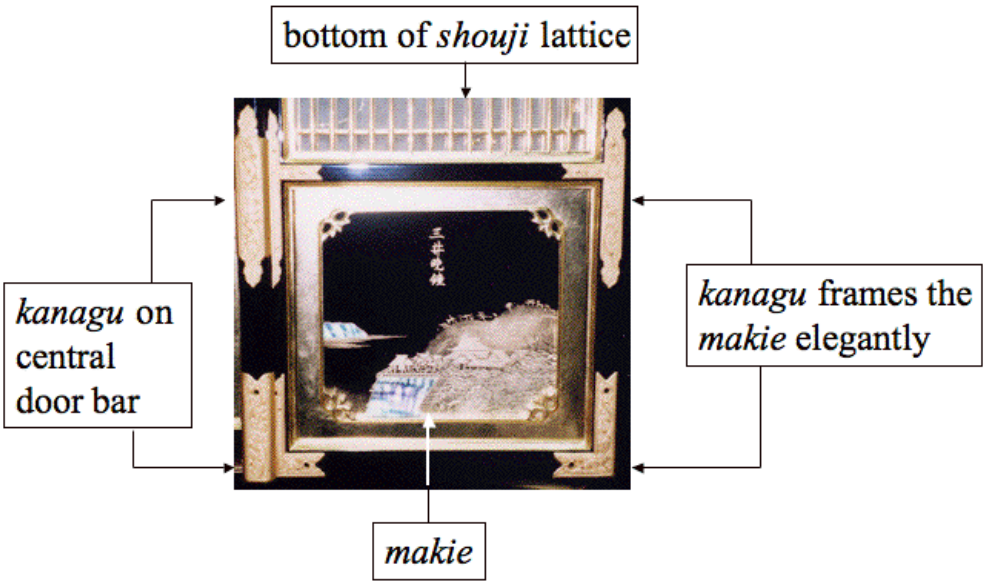


Kan figure 12: door closing mechanism for *shouji* (*meshi awase*) (same shapes are used for *amado* fittings (*hassou*)



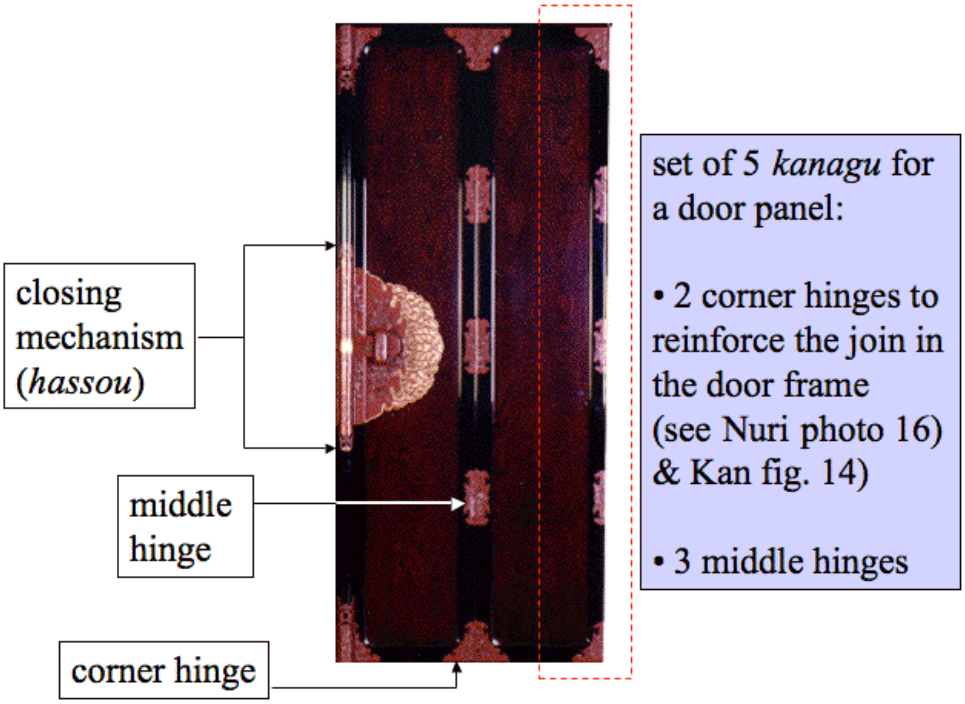
Kan photo 14: closing mechanism (*meshi awase*) for inner lattice door (*shouji*)

Sometimes there is a picture (*makie*) at the base of the *shouji*, in which case there will be metal fittings around the *makie* to set it off elegantly against the lattice door (see *Makie* photo 29).

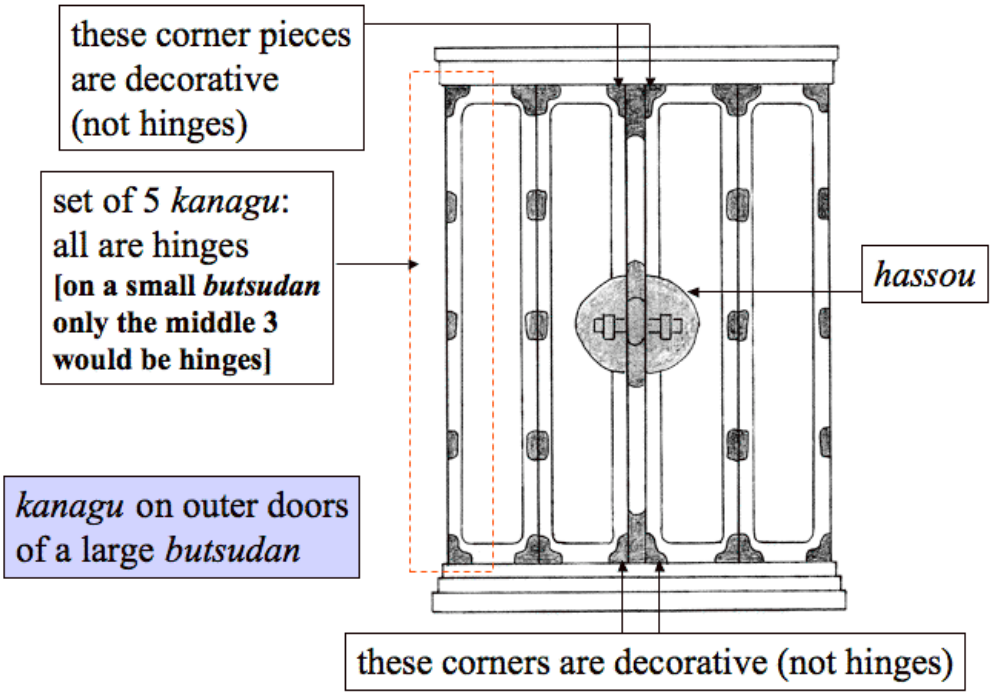


Kan photo 15: *kanagu* around *makie* on *shouji*
(see *Kan* fig.11.ii)

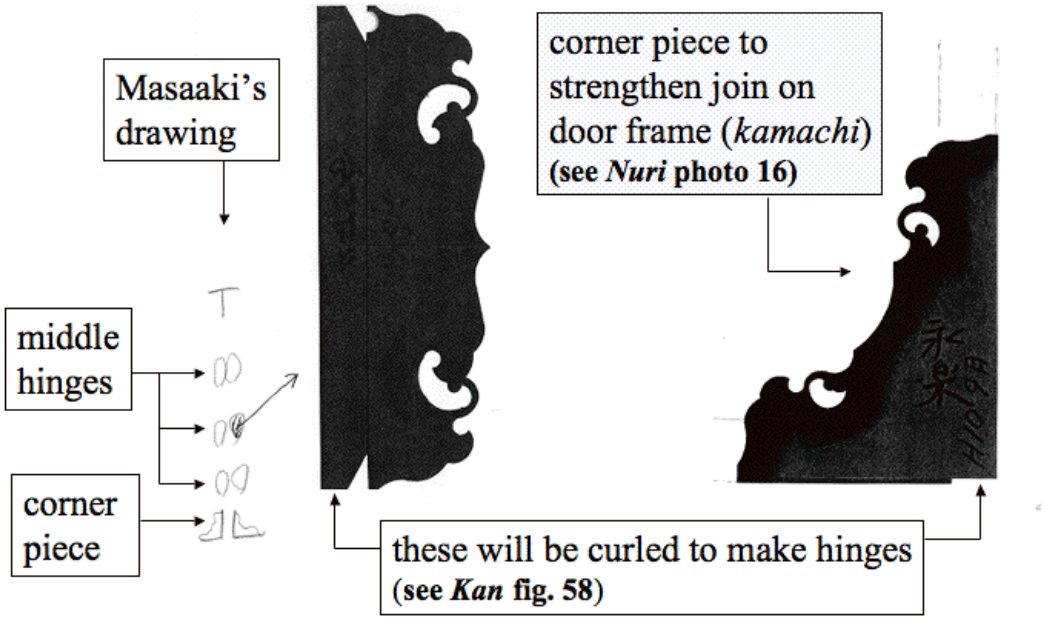
For the outer doors (*amado*), the metal must be at least 1.0mm thick and the hinges on the outsides are both functional and decorative. For a large sized *butsudan* usually there is a row of five brass hinges for joining two door panels: two at the corners and three in between. As with the *shouji*, the added function of the *amado* corner pieces is to strengthen the join in the corners of the kamachi (see *Nuri* photo 16). For a smaller *butsudan* the corner pieces simply strengthen the join and only the three middle pieces are hinges.



Kan photo 16: *kanagu* on 2 door panels

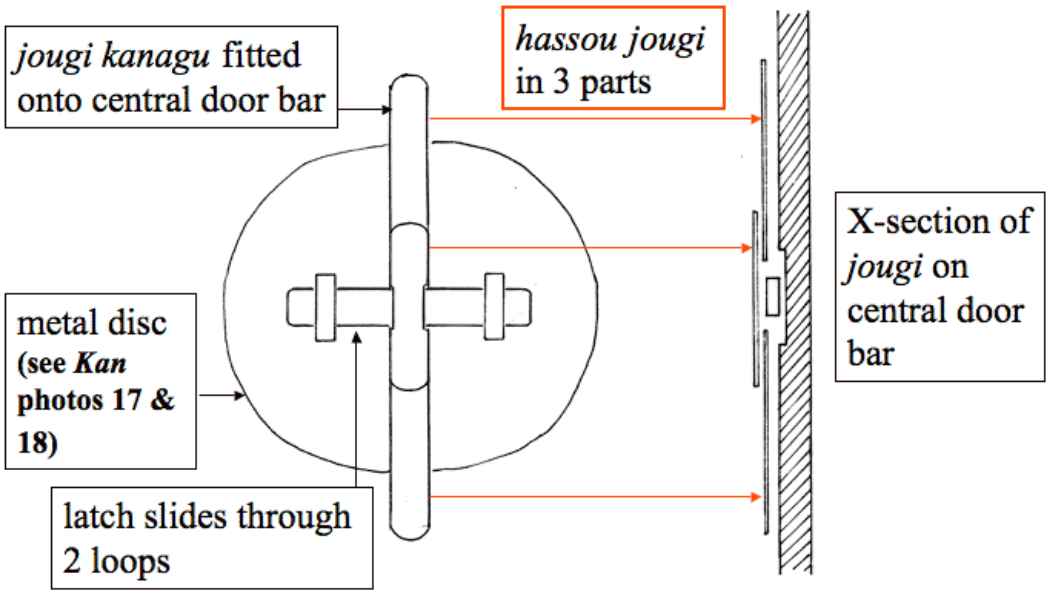


Kan figure 13: metal fittings on *amado*

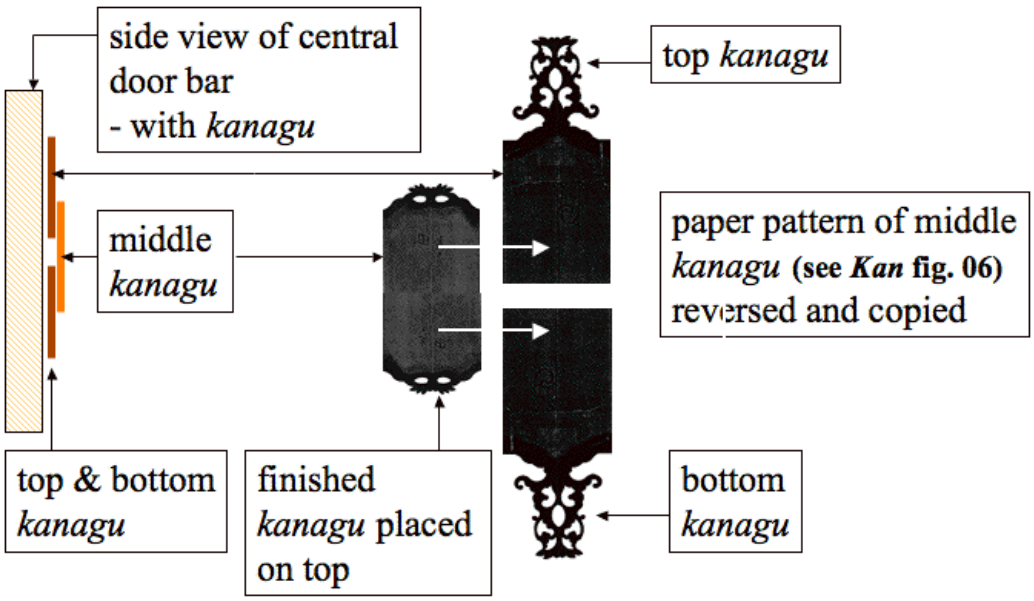


Kan figure 14: patterns for *amado kanagu* (hinges)

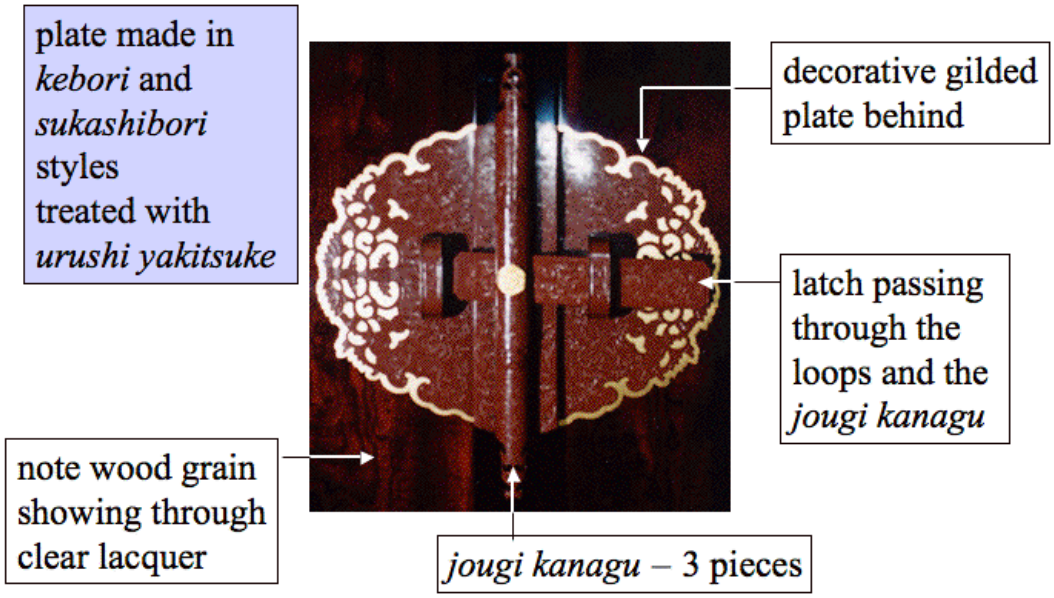
The door-closing mechanism (*hassou*) is made of copper sheet and will be treated with lacquer. The structure is virtually the same as *meshi awase* found on the *shouji*. It consists of a metal plate divided in half, with a loop on each side and a latch that passes through the loops. The vertical bar (*jougi kanagu*) is long and thus made of three pieces: top and bottom with a middle piece that overlaps both.



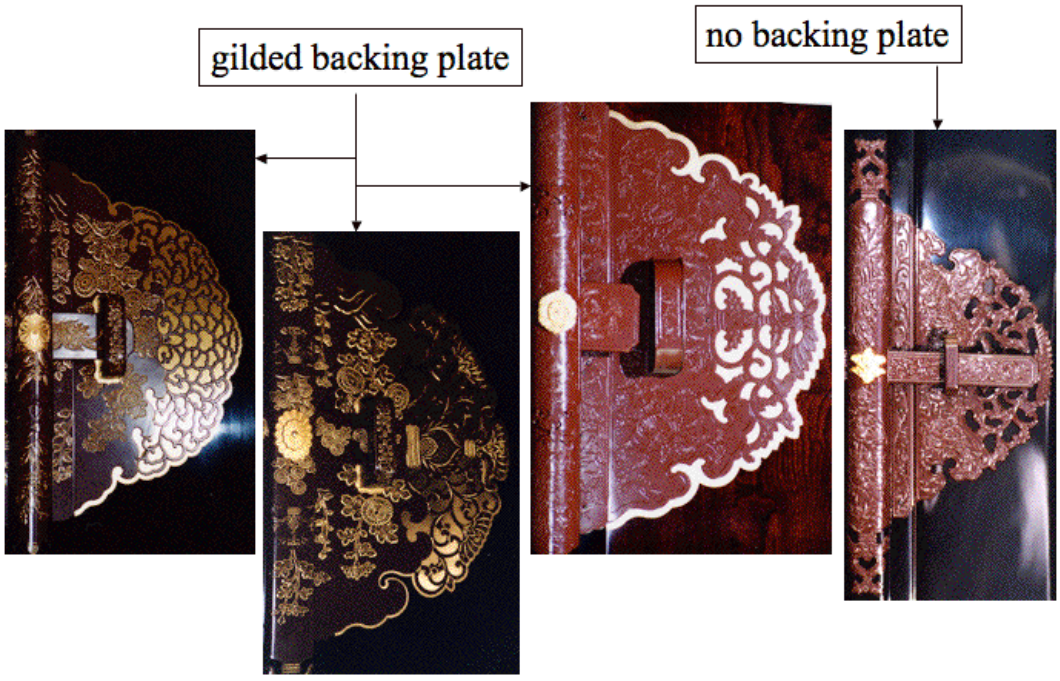
Kan figure 15.i: details of door closing mechanism for *amado* (*hassou*)



Kan figure 15.ii: patterns for kanagu on central door bar of *amado* (*jougi kanagu*) (see *Kan* fig.05)



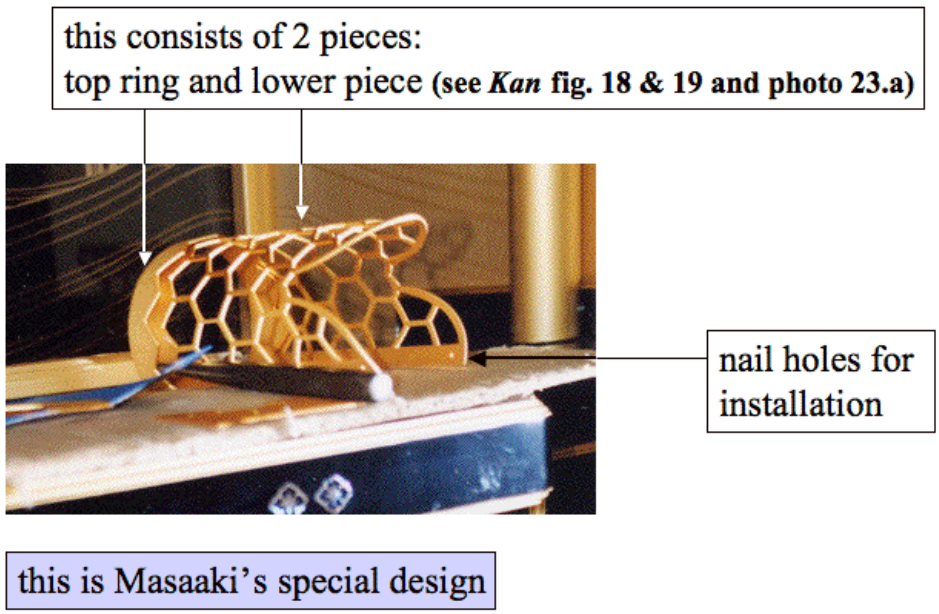
Kan photo 17: door closing mechanism (*hassou*) for *amado*



Kan photo 18: variations of *hassou*

D. Fittings for pillars:

For a DKH *butsudan*, the *kanagu* on the pillars can be electro-plated but cannot be either imported or pressed. The fitting does not go all the way around the pillar. It is open at the back and usually covers 50% of the circumference or up to 70%, for high quality *butsudan*. "It is harder to do with *kanagu* that has a lot of cut out areas (*sukashibori*)," says Masaaki. "When we make *sukashibori kanagu* round, it tends to gape and doesn't fit tightly onto *urushi* surface."



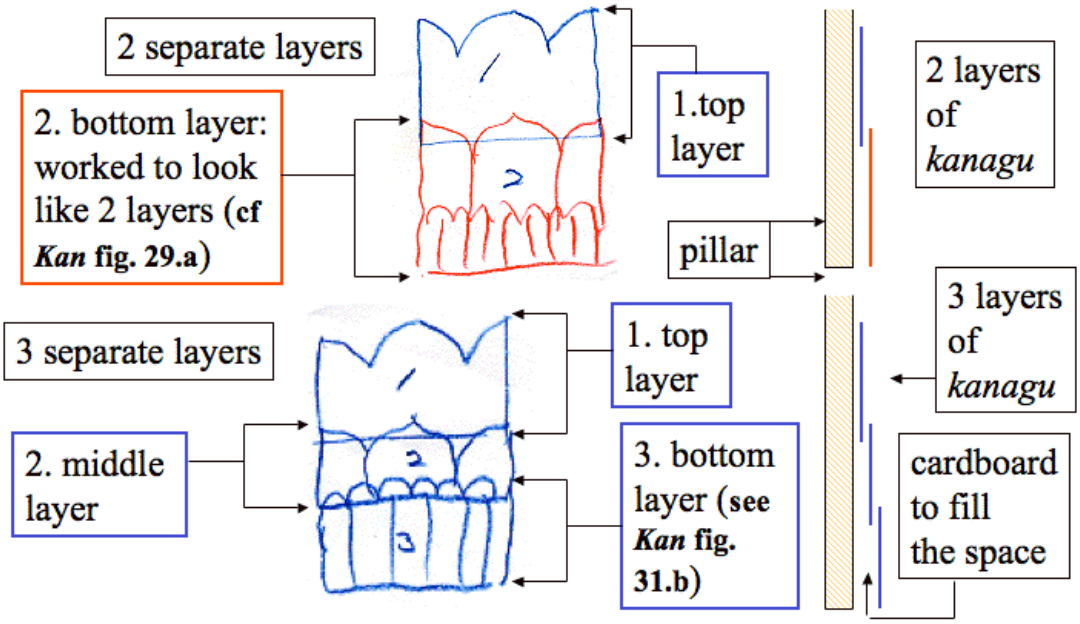
Kan photo 19: 70% round *kanagu* for upper part of pillar (before installation onto the *butsudan*) (see assembly)

Pipes of the same diameter as the pillar are used for rounding the *kanagu*. The diameter of the small canopy (*kuuden*) pillars (*kobashira*) can be from 2.4 to 3.9cm (8 *bu*, 1 *sun*, 1 *sun* 2 *bu*, or 1 *sun* 3 *bu*). That of the large front pillars (*oubashira*) is 7.6cm (about 2.5 *sun*), depending on the size of the *butsudan*. (FN.4)

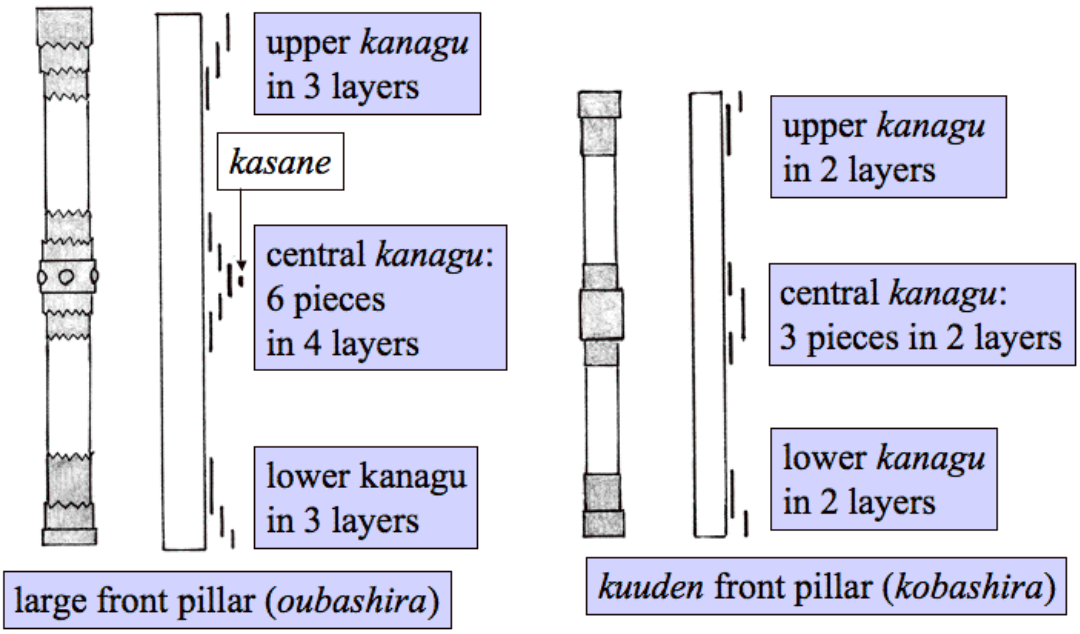
Metal fittings will be put on the upper, central and lower parts of each pillar. The style and number of fittings for small pillars is based on that of the large ones. For example, if there are three *kebori*-style *kanagu* on the big pillars there will also be three similar ones on the smaller pillars.

"When I make *kobashira* fittings with three pieces in each position (upper, central and lower), I make them in two overlapping layers for the central *kanagu* set, which is in the front and in a conspicuous position," explains Masaaki. "The upper and lower *kanagu*, for a *kobashira* of more than 3cm (1 *sun*) diameter, will be either two pieces

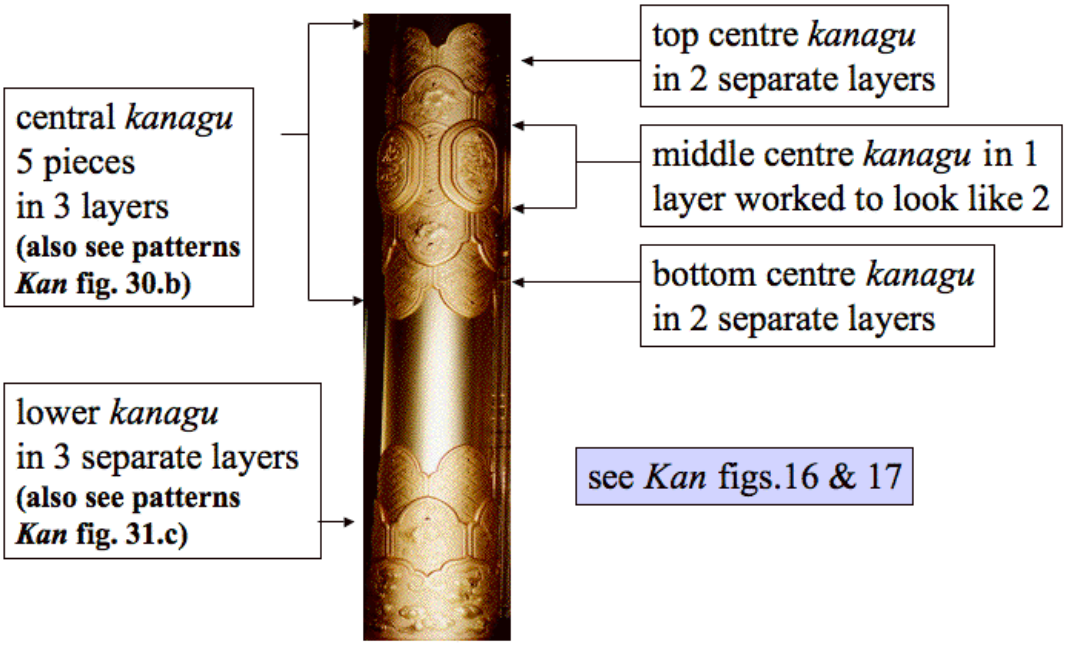
or three pieces, where three is highest quality. When I make a layered metal fitting, the thickness of each sheet is from 0.8 mm to 1.0 mm." Between the metal and the pillar, I put stiff paper such as a post card."



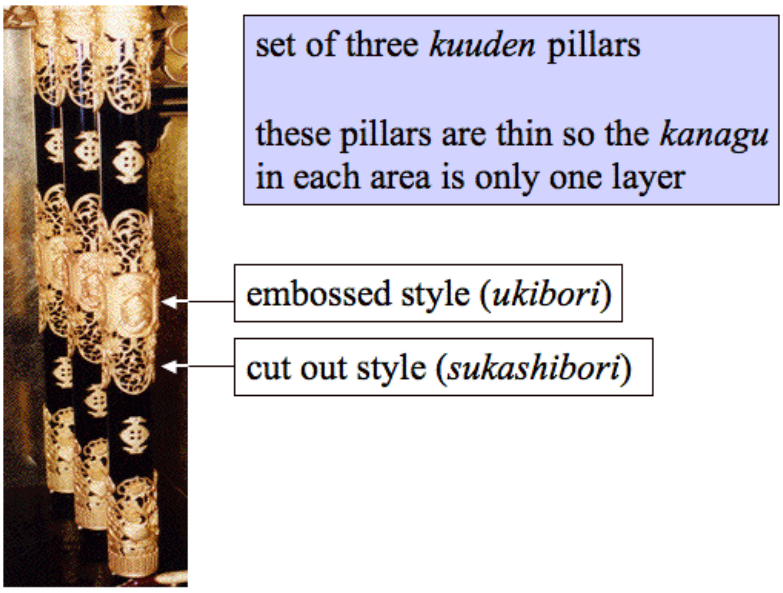
Kan figure 16: overlapping layers of lower pillar *kanagu* (reverse for upper *kanagu*)



Kan figure 17: types of pillar *kanagu* (see *Kan* photo 20 & figs. 29 to 31)



Kan photo 20: *ukibori kanagu* on large front pillar (*oubashira*) (showing central and lower area)

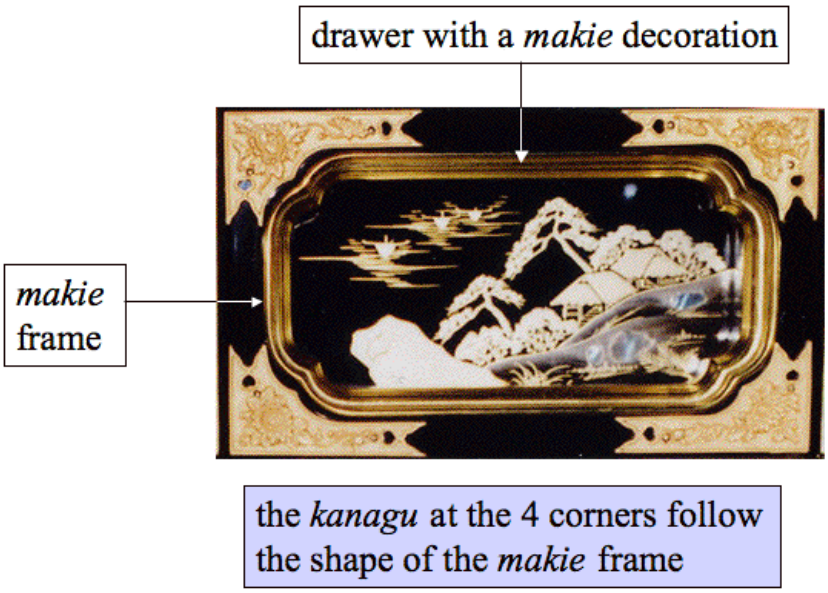


Kan photo 21: single layered *kanagu* on small palace or canopy (*kuuden*) pillars (*kobashira*)

If, for some reason, such as a low quality *butsudan* or very thin pillars of less than 1 *sun* in diameter, only one layer is put on. However, it may be designed to look like two or even three overlapping layers (see *Kan* fig. 29.a).

E. Around the drawers and small doors:

These pieces must also be handmade if the *butsudan* is to be certified as 'traditionally made' (DKH). The *kanagu* are shaped at the corners to match the shape of the decoration on the drawers (see *Kiji* photos 13, 14 & 15 for the shapes of drawer decoration)



Kan photo 22: *kanagu* around the small inner drawers

7.2 STYLE AND PATTERNS:

Masaaki's attitude to style and patterns:

As with the other artisans, Masaaki has quite strong opinions about the *butsudan* industry in general and metalworking in particular. During our time with him, he expressed these opinions more and more openly and profusely. "We artisans have only a few opportunities to see our finished products installed on a *butsudan*. Other than contributions for exhibitions (see examples in the main introduction and below (*Kan* photos 23.a & b), our work is delivered directly to the customer's house. But there are occasions when the shops take photos and give them to us," he adds displaying a photo of a finished *butsudan*.

"Moreover," he continues, "I want to show my personality in the punched pattern. For example though arabesque (*karakusa*) patterns are ordinary and used everywhere on *butsudan*, I want to make the patterns individual so people will say 'this can only be Sawatari's work'." He wants his engraving to be distinctive, so that everyone recognizes that it is his. His personal characteristics are expressed in his work.

"Most metal fittings will be gold or silver plated so I don't know exactly what they will look like while I'm making them," he continues. "I don't know until after they are actually nailed onto the *butsudan* and displayed in the shop. I am very happy when people see them on the *butsudan* and say, 'they are good'. And I'm happy when people say, 'you made unique fittings'. When they see my work people have said, 'these are done by Sawatari' or 'you made us fittings a little different from usual'. I think the manufacturers (*toiya*) expect me to make something a little unique when they order from me so I want to respond to their expectations. If someone says 'it must be made by Sawatari because 'it's unique' I am happy. I am making the works, thinking people are expecting something distinctive."

Masaaki feels it is very important to keep thinking up new designs. "It doesn't matter whether the work is *jibori*, *ukibori* or *kebori*," he says, "but if an artisan makes the same pattern and the same shaped *kanagu* again and again, people get tired of it and the price will tend to go down gradually. Which means the value of the *kanagu* goes down, so in the end, the *toiya* cannot ask the price they want from the customer. Then the artisans will be out of work. If we continue thinking of something new and make better items than the *butsudan* shop expects, this kind of thing won't happen. The artisan who can carry out the *toiya*'s request and then add just a little more can negotiate and get a good price. Carver, Mori Tesso (see *choukoku* section) makes that effort."

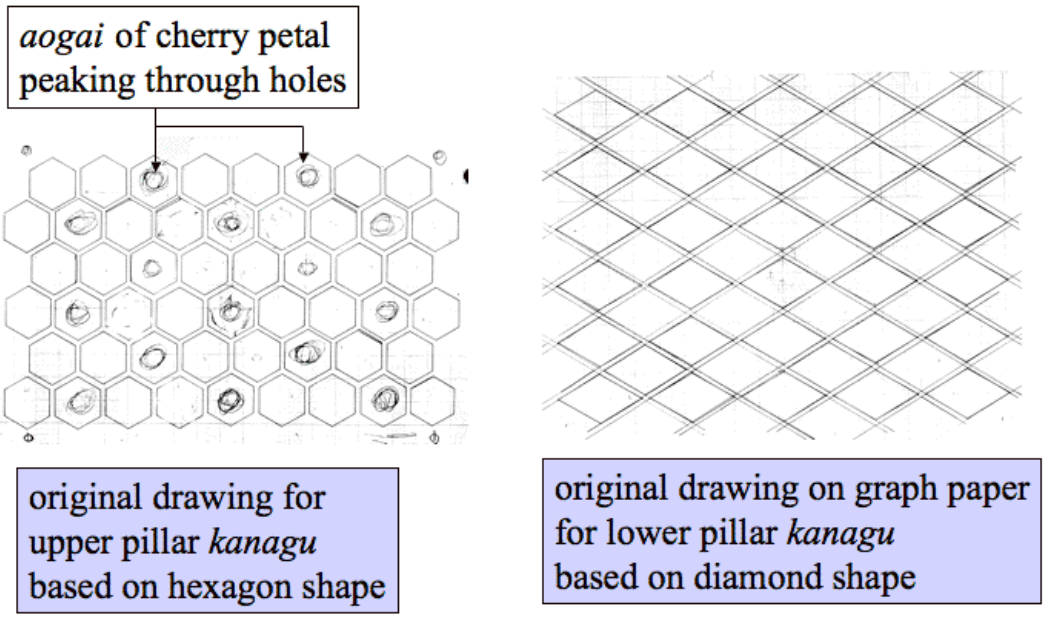
Although it is important to keep making new patterns, they must also be suitable. Masaaki says, "In such places as Nijoujou [the Kyoto residence of Shogun Tokugawa Ieyasu], the handles of the sliding doors (*fusuma*) are designed to fit the image of the whole building so even after so many years, since it was built, we still feel they are good." He showed us some door decorations he had made with a pine needle design (cf. *Kan* photo 05). Another of his ideas was to use a hanging pull instead of just a knob for a drawer or door. He keeps his imagination active by preparing both *butsudan* related and non-related works for local exhibitions. Every two years,

he enters works into an exhibition held by the local *butsudan* cooperative (*kumiai*) and usually wins a prize.

However, for the most part, he does his own work without reference to what the other artisans are doing. Unity of theme, as discussed in the *choukoku* section, is not such an important concern with Masaaki as it is with *choukokushi*, Mori Tesso. That being said, the case of a *butsudan* being prepared for a national exhibition, as described below, raised certain issues.

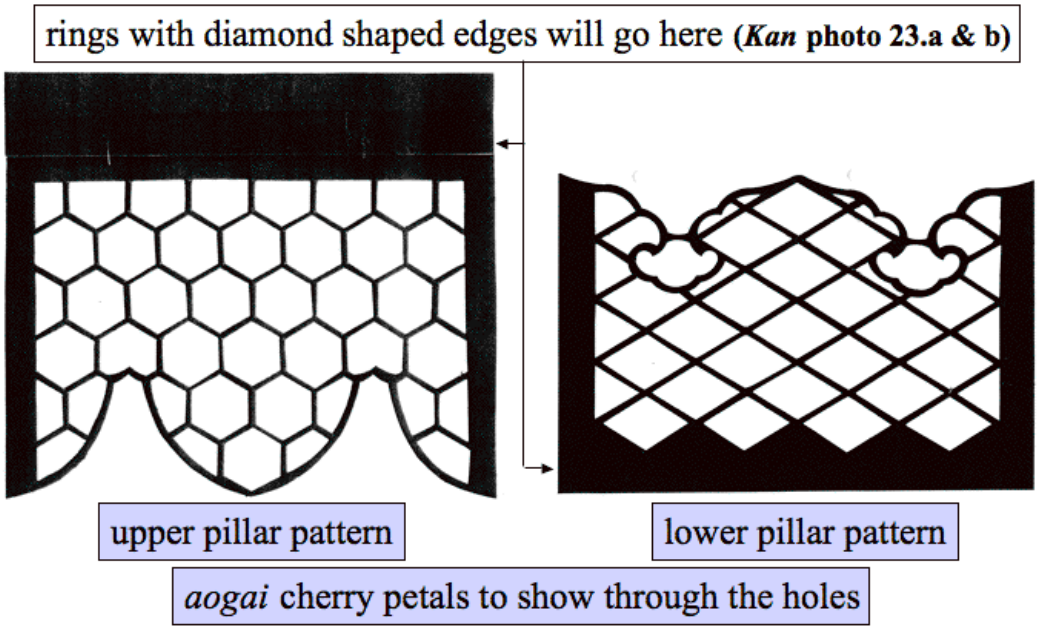
Naturally, there is not always agreement between *toiya* and artisan. Of course, the artisan keeps his feelings to himself, and he does not necessarily know the pressures the manufacturer is under, but is glad to have an outlet for his frustration once in a while. One day, when we arrived, Masaaki started talking about it almost before we got into the house.

"A *toiya* ordered a set of metal fittings for a *butsudan* from me," he explained. "But I couldn't accept the order because I was busy with others. And he asked me to make designs for the fittings for the pillars. And I made the patterns and gave them to him. Another artisan made the fittings and I did only the last punching process (see *Kan* photos 23.a & b). The large pillars of this *butsudan* are lacquered using the *raden* technique, where pieces of lustrous pearly shell (*aogai*) are embedded in the lacquer (see *makie* section), thus the metal fittings are the 'cut out' style (*sukashibori*) so that the *raden* (of cherry petals) will show through the holes in the *kanagu*. The designs are variations of diamond and hexagon shapes, like a turtle shell. The diamond design goes on the lower part of the pillars and the hexagon design goes on the upper part. These are also kimono patterns. The borders of these patterns are unique."



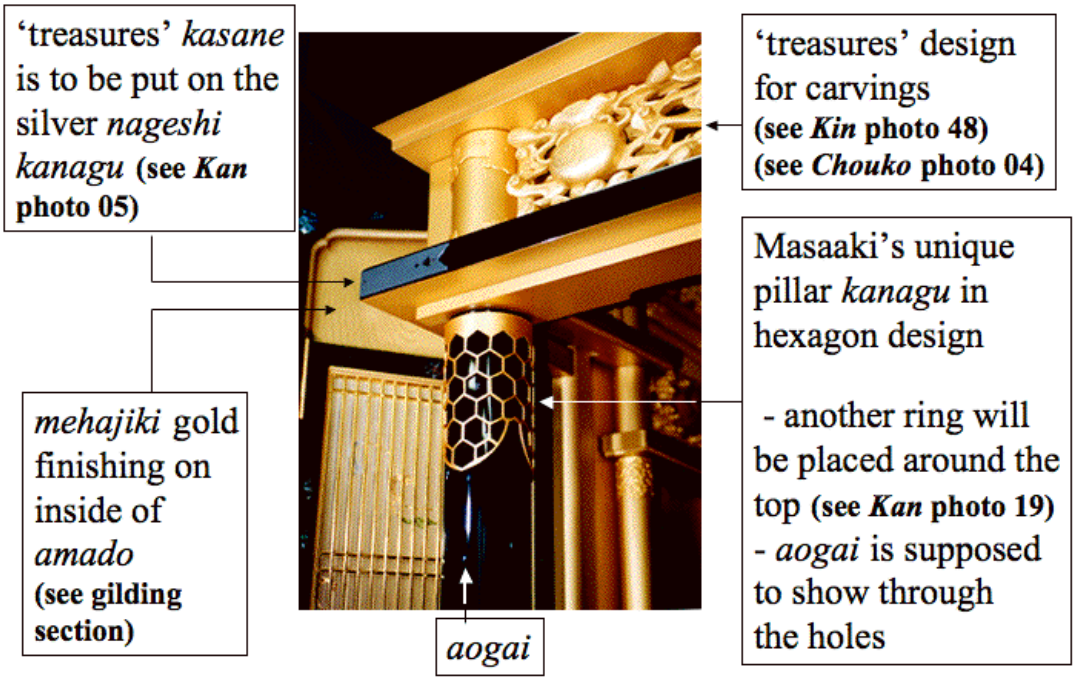
Kan figure 18: Masaaki's original conception for unique pillar *kanagu*

"When doing a single pattern such as petals or leaves, it is important to makes them different: double or overlapping or twisted or bent (see *Kan* fig.07). Otherwise, they are not natural. This wasn't done," he said with a sigh. "What's more, before making metal fittings I handed the drawings and patterns for the designs to *toiya* and recommended him to put them onto the pillars and to put *aogai* cherry petals in such a way that they could be seen through the *sukashibori* holes."

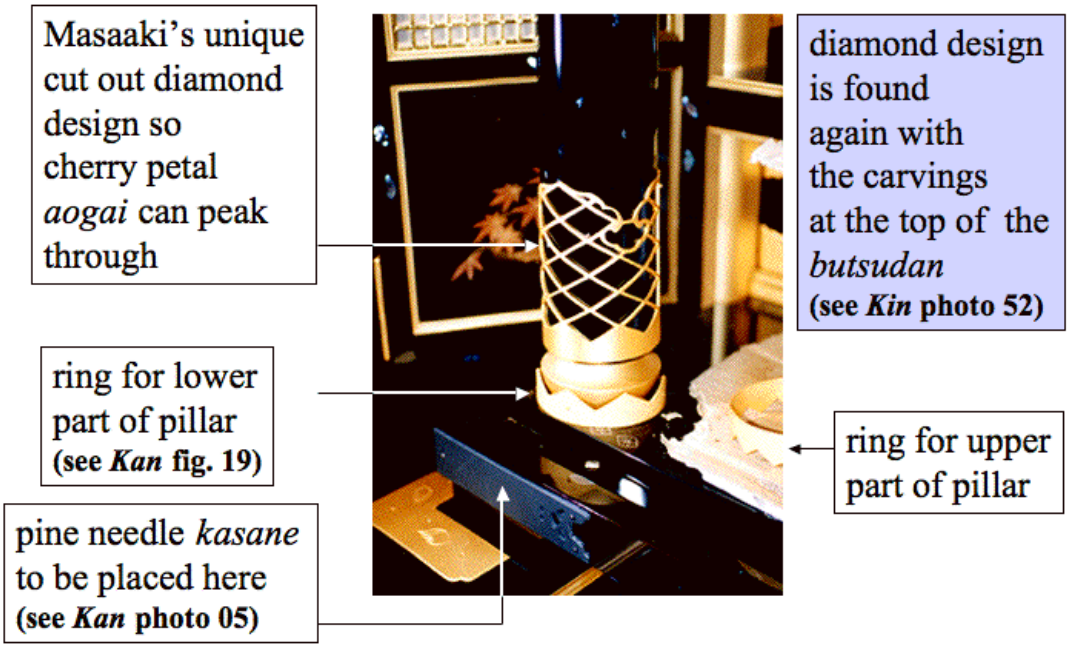


Kan figure 19: patterns for Masaaki's unique pillar *kanagu* in cut out style (see *Kan* photo 23.a & b)

"*Toiya* asked me to do the *kanagu*, before the lacquering and *aogai* were finished. So we were kind of working blind. We discussed it before but we hadn't seen each other's finished work. So I was disappointed with the end result and I couldn't see very many petals through the fittings. I'm not attacking *toiya*, but I'm entitled to my opinion aren't I?" asked Masaaki hardly hiding his regret that his beautiful designs weren't used to full advantage.



Kan photo 23.a: unique *kanagu* for upper pillar



Kan photo 23.b: unique cut out style (*sukashibori*) *kanagu* for lower pillar

This particular *butsudan* highlights another issue already touched on in the carving section, that of unity of theme throughout the *butsudan*. Masaaki wanted his gold plated *kasane* pieces to match the carvings done by the *choukokushi*. The 'treasures' (*takara zukushi*) pieces were placed on the *nageshi* and *chuudan* near the carvings with the same topic (see *Kan* photo 05) (also see *Chouko* photo 04 and *Kin* photo 48). This was done more or less as he wanted and he was happy. He wanted the pine needles to go on the *chuujiki* to match the plant themes in the lower parts of the *butsudan*. Again, with this, he was content.

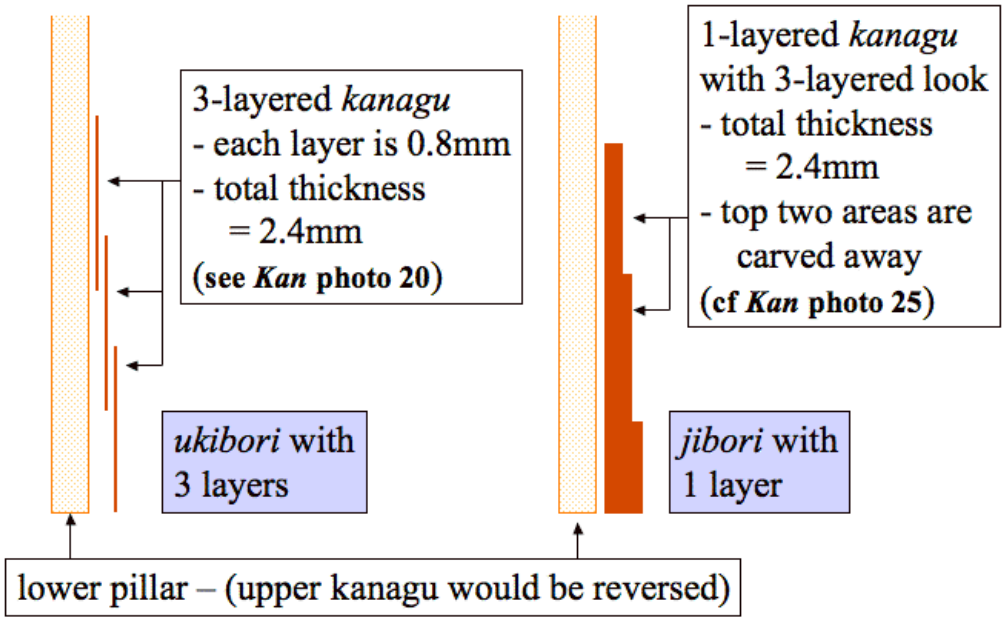
STYLES OF METALWORKING:

There are four commonly used styles or methods of metalworking. The main difference is that for three of them heat is not used. These are the line punching or engraving style (*kebori*), the embossing style (*ukibori*) and the cut out style (*sukashibori*). Training for these techniques is quite different from that for the final sculpting style (*jibori*), which requires heat to soften the metal so it can be carved and deeply embossed without difficulty. Thus there are two distinct types of artisans using four different methods. These methods are outlined below and more details are given in the section on processes.

Styles where heat is not used:

a) The **line punching style** (*kebori*): in this case the *kanagu* is flat. The rim, the ground and all the design parts are on the same level. Here, lines with different textures (ridged or smooth) and patterns (straight, curled or swirled) are punched to make the design. Sometimes another layer of *kanagu* can be fixed on top to give extra depth. Further, more removable pieces can be added, which are called *kasane* (see *Kan* figs. 23 and 30.a & b). If the *kasane* is a different colour than the lower piece, such as gold *kasane* on a silvered base (see *Kan* photo 05), or vice versa, it gives a very pleasing appearance.

b) The **embossing style** (*ukibori*): in this case the *kanagu* is embossed, but only slightly because the metal is not heated so it is not very malleable. The rim and the ground are on the same level, punched as in *kebori* style, while parts of the pattern are raised. *Ukibori* fittings can be used in place of *jibori* fittings (see *Kan* photo 01.b) because with a cursory glance they look the same. *Ukibori* style was devised in Hikone. Since it requires less skill than *jibori* and can be done more quickly and cheaply, it is popular with today's emphasis on cost cutting. This technique, used by *kebori* artisans, does not require the carving skills used by *jibori* artisans. As an example of the way these styles could be used for pillar *kanagu*, Masaaki says, "This is my honest opinion. An *ukibori* fitting with 3 layers of 0.8 mm can be made to look like a *jibori* fitting of 2.4 cm with three carved out steps (gradations).



Kan figure 20: difference between pillar *kanagu* of *ukibori* and *jibori* techniques

c) The **cut out style** (*sukashibori*): this is where some of the pattern details of the *kanagu* are cut out completely so the background, such as black lacquer or gilding, shows through (see *Kan* photo 21). Sometimes the cut out areas are larger so more background shows (see *Kan* photos 23.a & b) and sometimes yet another layer (*kasane*) is put on top to accentuate the pattern.

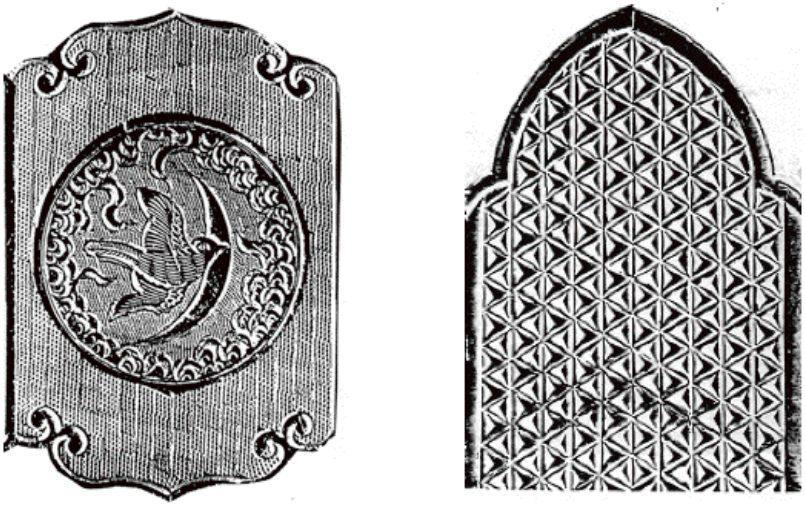
Style where heat is used:

d) The **sculpting style** (*jibori*): this *kanagu* is both embossed and carved. The rim is left untouched, the ground is dug out and the patterns are raised. Then internal design details, like leaf veins, are punched in using the *kebori* method. The metal is thicker and heat is required to soften it and increase malleability. The heated metal plate is fixed in a bed of resin (*yani*) for ease of working. This technique requires special skills taught by a *jibori* master and is not done by *kebori* artisans.

Although the characteristics of these four styles overlap somewhat, clearly the main differentiating feature is whether or not they use heat. Having considered the kinds of metalwork that can be done, and before discussing techniques, let us look in detail at some aspects of the patterns.

PATTERNS:

The concept of patterns can be divided into two categories: those that form the internal designs of the piece and those used for the background. There are a few standardized patterns used to fill the 'ground' space behind the motif and the skill comes in choosing the size and type of ground pattern to maximize the whole effect. It is said that the background decoration can make or break the basic design. Therefore, let us look at this 'ground' punching first before going on to the internal motifs.



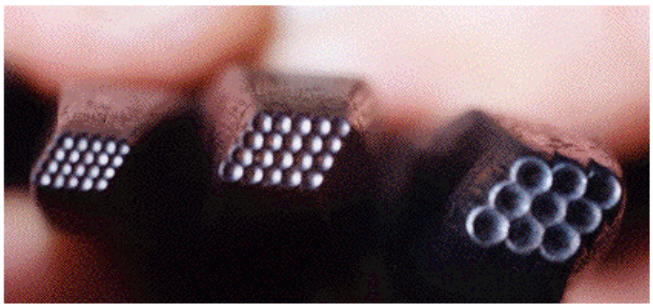
basic *nanako* ground (see *Kan* fig. 23)

triangle ground on pillar *kanagu*

Kan figure 21: Masaaki's background punch work (also see *Kan* figs. 29-31)

Ground punching:

1. **Fish roe punching**: After the designs are finished a simple, repeated pattern is punched into the background. Whatever the style, some artisans might consider this ground punching the most important part of their work. The standard way is to set off the pattern with a granular background, a little like fish roe (*nanako*). Traditionally it was done with a single-tipped burin (*tagane*) making a tiny depressed ring with a raised area (nib) in the middle. Recently though, multiple-tipped *tagane*, producing diagonal lines of nibs, make this job easier. The burins have a waffle-like appearance and, when punched, produce rows of tiny 'mountains' or 'nibs'.

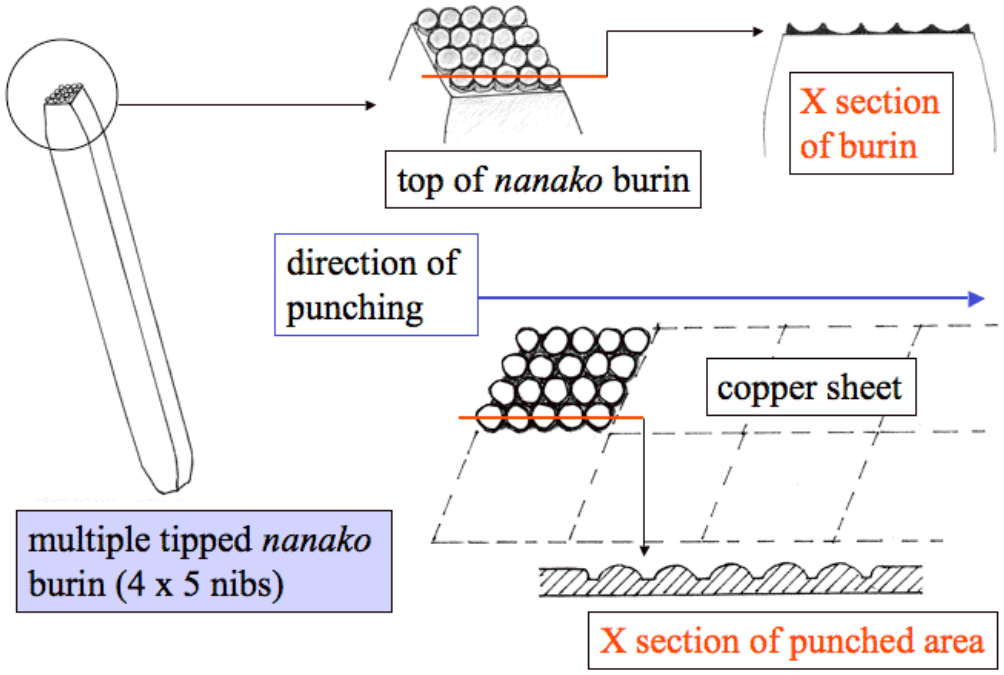


the punch has pits (like a waffle)

the result is little mountain-like 'nibs' surrounded by depressed circles running in diagonal lines
(see *Kan* photo 31 and figs. 22 & 36)

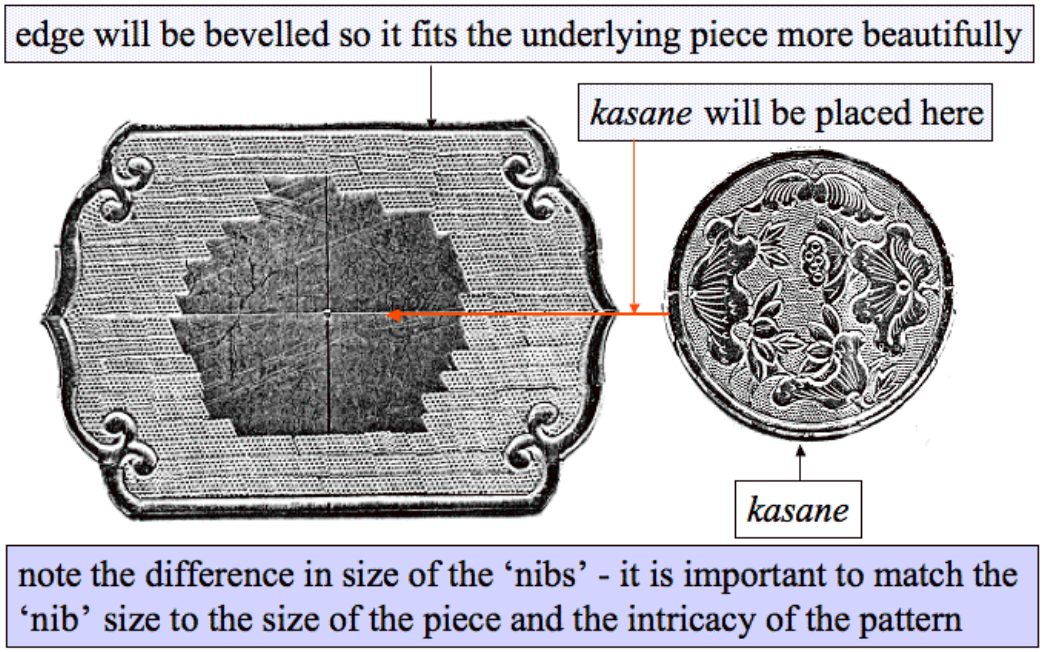
Kan photo 24: three sizes of *nanako* burins (*tagane*) (see tools for more details)

In any case, as *jibori* artisan, Okamura Masao says, "We have to punch *nanako* perfectly, clearly, beautifully even though our skill of pattern punching or carving is a little lower. *Nanako* is most important. If *nanako* is rough, the carved or punched patterns will die. It is important to punch with even strength to get even depth. I make the nibs in a line on the straight and the diagonal. And they should all be the same level." Punching each time at exactly the same pressure requires speed as well as confidence with placing the burin.



Kan figure 22: *nanako* punching

"This is just like the background scenery in a picture," comments Masaaki, "and it makes the clouds or other design features stand out. Depending on the kind of patterns or the size of the fitting I use various sizes of *nanako*."

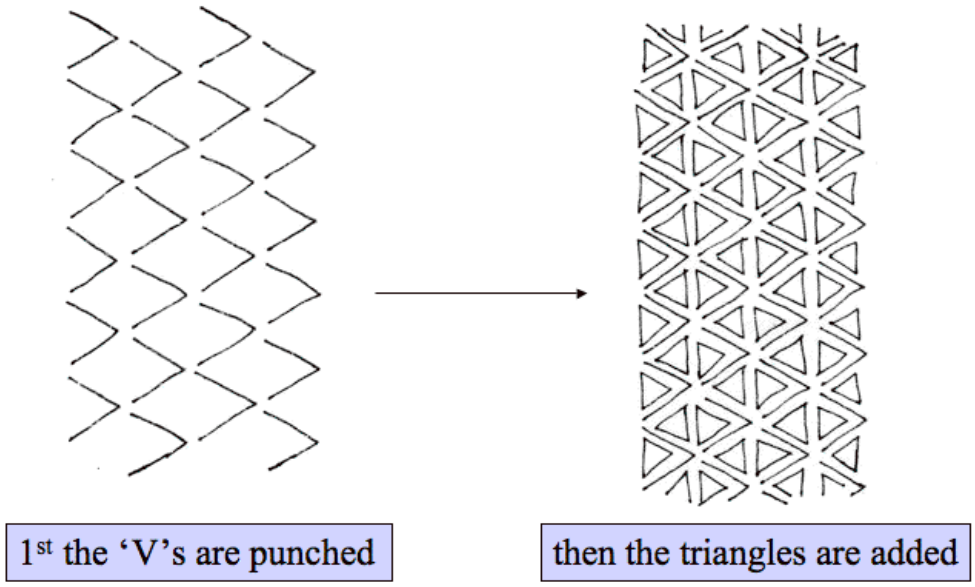


Kan figure 23: *kasane* showing *nanako* punching (see finished work *Kan* figs. 21 & 30.b)

"Usually," he continues, "I use a punch with 4 x 4 points (= 16), or perhaps 4 x 6 (= 24). The size of a point varies. I use a single point *nanako* burin only for high quality fittings. With this I can put *nanako* even into the tiny spaces between the intricate parts, such as leaves or petals, so the main patterns seem even more neat and clear. I never use the single point with the combined point burin. So if I use the single point for some parts, I have to use it all over. I put *nanako* on the fittings for the inside (*uchi mawari*) of the *butsudan*, but rarely on the fittings for the outside (*soto mawari*). The outside fittings, seen when the doors are closed (see *Kan* photo 03), do not have ground patterns."

All artisans do this *nanako* style of punching, but in addition Masaaki has some other background patterns of his own devising, especially triangles and variations of the *shippou* design.

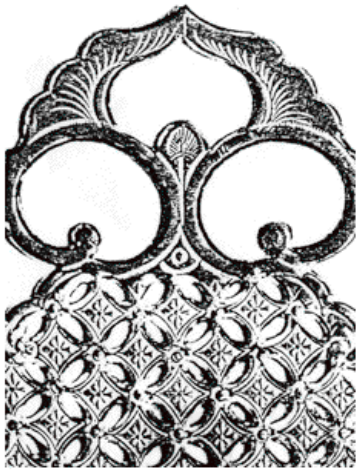
2. Triangle punching: He makes the triangle design with 2 *tagane*. First he punches a 'V' shape and then he punches a triangle inside it. This is his original idea.



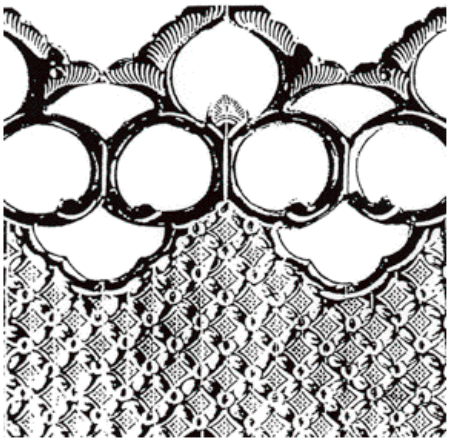
Kan figure 24: stages for making triangle ground punching

3. Seven treasures pattern (*shippou*) punching: "I learn about patterns by looking at kimono and ceramics," explains Masaaki. "The *shippou* pattern is used for kimono or Arita *yaki*."

shippou ground patterns on pillar *kanagu*
open cut out style (*sukashibori*) is typical of lower pillar *kanagu*



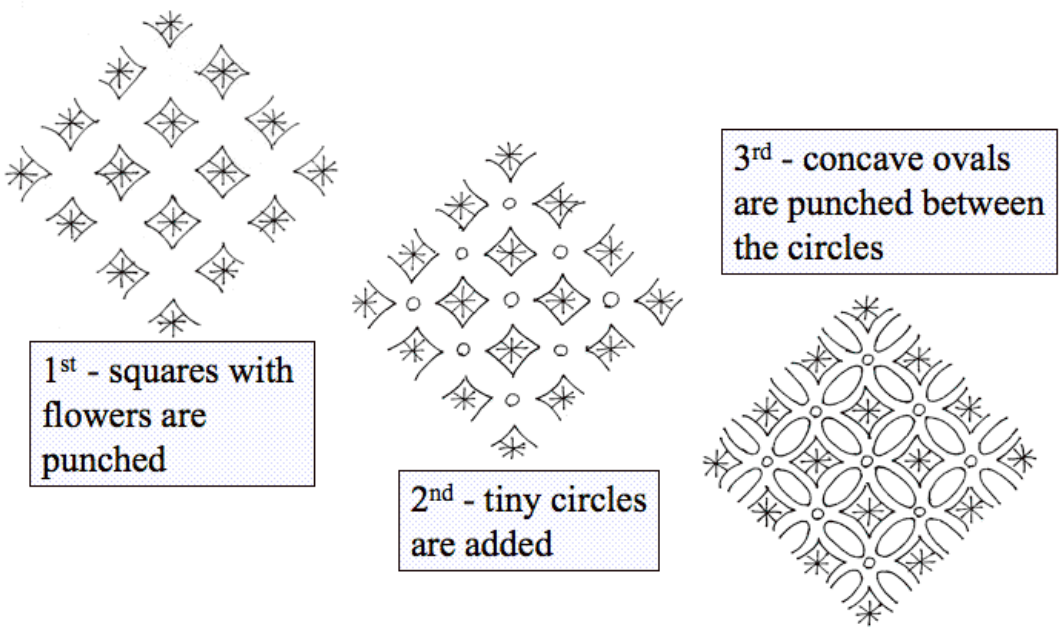
shippou with flower centres



square *shippou* with dotted centres

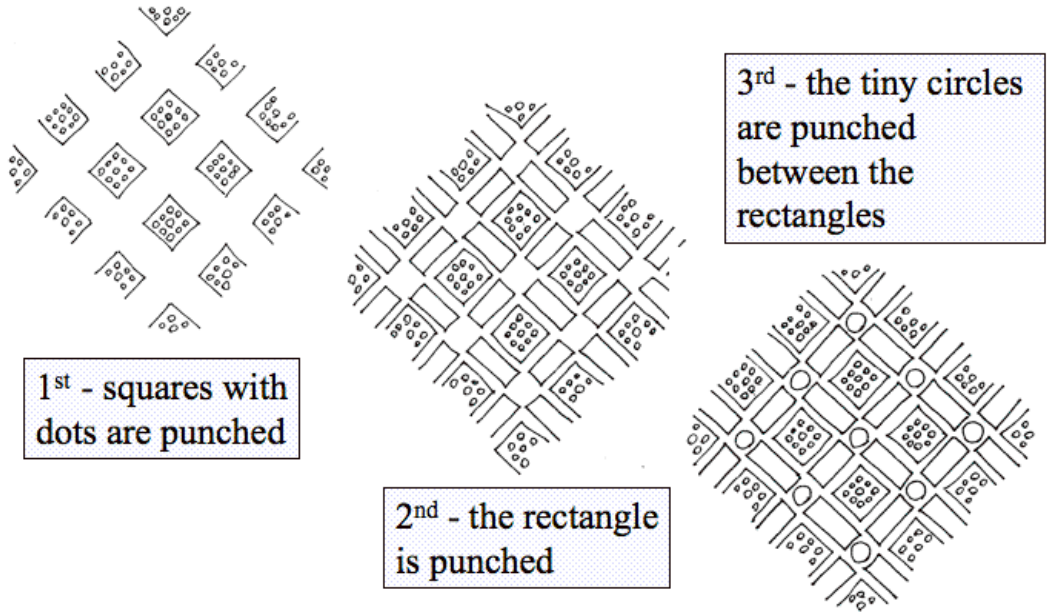
Kan figure 25.a: Masaaki's background *shippou* patterns in *situ* (also see *Kan* figs. 29-31)

The standard *shippou* design is made using 3 punches: a tiny circle using a punch like a single-nib *nanako tagane*, a flower and an oval plane punch. First he punches the flower, then the tiny circle. Most artisans then leave the area between the circles rounded up. However, he then does an additional punch, where he pushes that area down.



Kan figure 25.b: stages for making standard *shippou* patterns

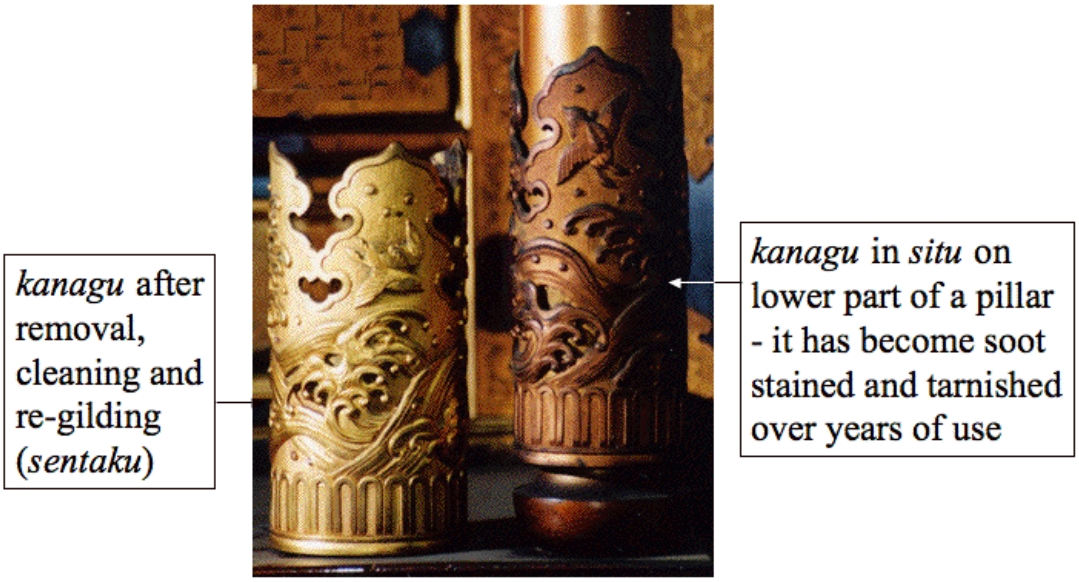
He also does square *shippou* where the patterns are squared rather than diamond shaped, and the lines between the circles are straight. [



Kan figure 25.c: stages for making square variation of *shippou* pattern

Shapes and internal motifs:

As mentioned before, even though artisans tend to specialize in certain types of design, Masaaki feels a real need to develop new designs. However, generally there are certain expectations about what kind of patterns are best suited to the upper, middle and lower parts of the *butsudan*. "For the fittings on the upper part of the *butsudan*, such as *nageshi*," says Masaaki "I will put suitable patterns, such as clouds. In principle things related to high places, such as the sky, go at the top. On the upper parts we find flowers of lotus, heavenly creatures, such as floating women, clouds, cranes, phoenix. In the middle position I put things concerned with the ground such as plants and flowers. On the lower positions you can find things connected with water, such as waves, lotus leaves, plovers, rabbits in the waves and mandarin ducks. Those patterns are decided for those places and they would not be put in another place."



Kan photo 25: Taisho (1912-25) *butsudan kanagu* with waves and plover design (a single layered piece of high quality *jibori kanagu*)

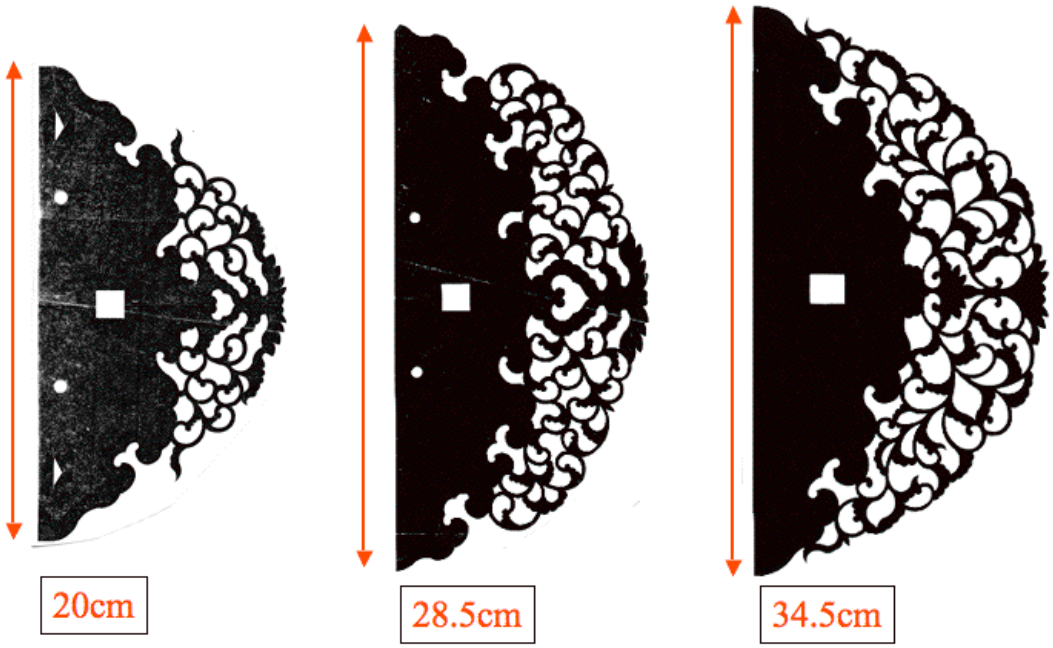
We will consider two aspects of the patterns: both the external shape of the metal piece and the internal design, which will be punched, carved or embossed onto the piece. When Masaaki plans the design he has an all-over picture in his mind and which style will suit best.

"The *butsudan* has Buddha inside," he explains, "so the *kanagu* should have a peaceful or spiritual focus. Traditional designs are good. The crane and phoenix are traditional designs. Certain patterns are clearly decided for certain areas of the

butsudan. Always flowers should point up. And of course birds must be up. But other than that, the position and patterns are relatively flexible. I often produce new patterns for the works, looking for new designs, such as what I see on kimono, pottery etc. Patterns are stylised to a certain extent (not realistic) but I can change them more freely than you might expect. I observe the basic rules, but vary them as I want. For example, swirling arabesque patterns (*karakusa*) come from the design for grape leaves. After the tendrils are drawn, leaves can be put on in interesting ways (see *Kan* fig. 07)."

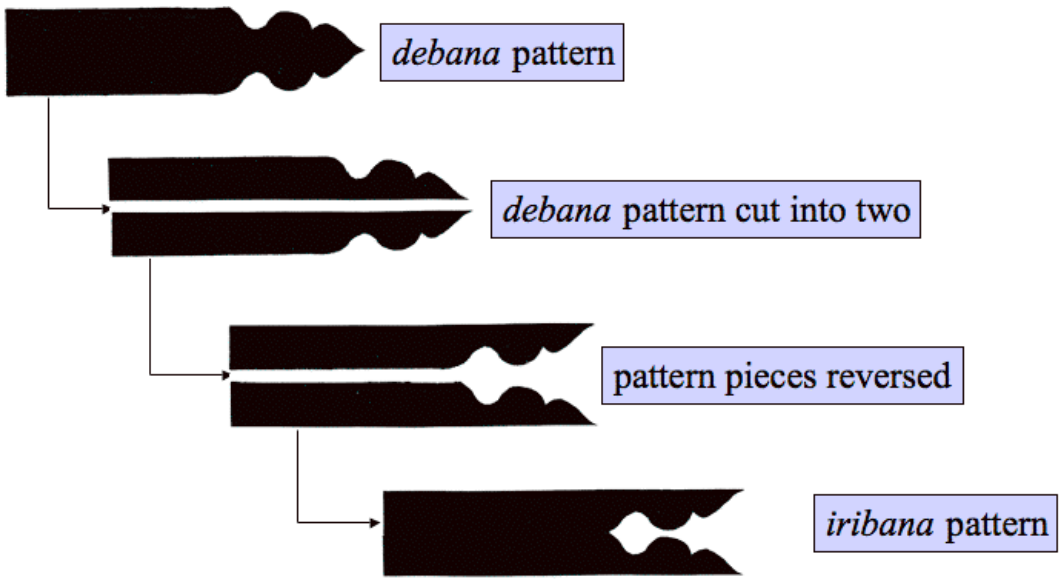
His favourite pattern is lotus, because it has so much variety and it stands out. Also it means enlightenment. "I like both flowers and leaves," he says. "Lotus petals like the silver and gold tinted paper ones the Buddhist monks scatter amongst the audience during ceremonies, pictures of them in their natural state in the water, full bloom lotus flowers, half open flowers, buds, all of these are nice."

Generally, if the external shape is intricate, Masaaki balances this with a simple, easily made internal design, and vice versa. As an example, the door opening mechanism (*hassou*) *kanagu* for *amado* may be circular, square or hexagonal (see *Kan* fig 12). For the *hassou* and meshiawase pieces for *shouji*, he makes a core pattern using arabesque swirls drawn freehand. He includes leaves, sometimes seen from the side view and perhaps with variegated edges. The more branches and leaves the arabesque has, and the more intricate the design becomes, the more cut-away parts there will be. The very complex shape balances his preference for a simple engraved inner design, without *nanako* (cf. *Kan* photos 04 & 18).



Kan figure 26: paper patterns for *hassou* *kanagu* (actual size in red)

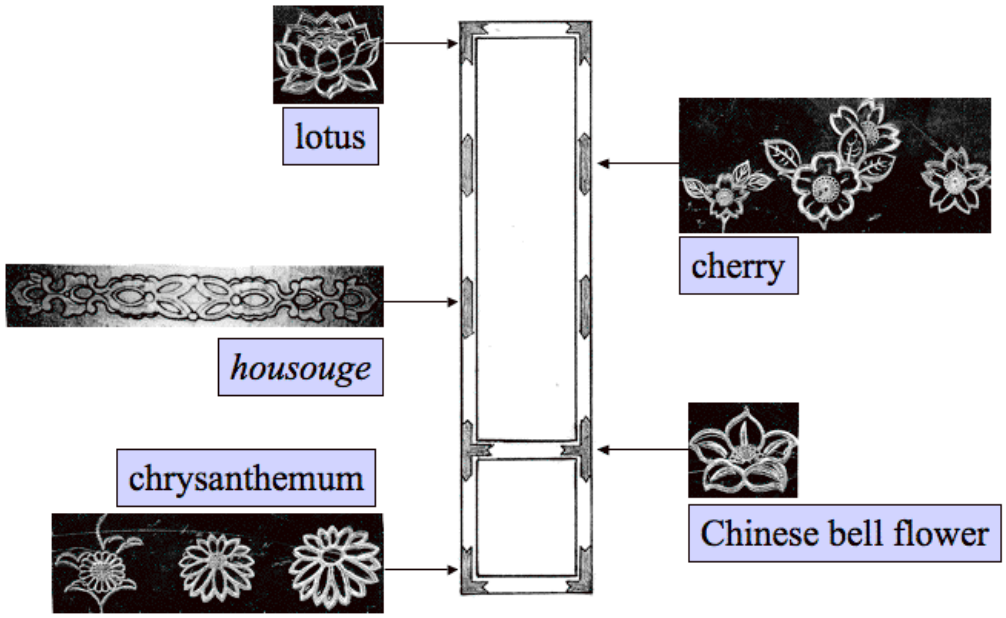
Pieces that are longer than they are wide, such as those on the shelves or the inner lattice doors (*shouji*), either point inwards (*iribana*) or outwards (*debana*) at the ends (see *Kan* fig.08). "*Debana*," explains Masaaki, "is the shape at the top of the newel post (*giboshi*) on the *shumidan* railings (*kouran*) surrounding the pillars (see *kuuden* figs. 09.b & c). *Iribana* is a mirror image of the *debana*, so these patterns repeat themselves throughout the *butsudan*. Usually the corner pieces point inwards while the middle pieces point outwards (see *Kan* photos 05 & 11). An exception to this might be *chuujiki* pieces that are generally all *iribana* shaped. To make the shape of *iribana*, the *debana* is cut in half and turned over to make the shape of the *iribana*.



Kan figure 27: making the *iribana* shape from the *debana*

After deciding on the shape of the piece and making the pattern with thick brown slightly waxed paper like that used for kimono stencilling, either he or his wife copies it onto the metal. Then he draws the pattern, freehand with a wax pencil, onto the copper or brass. "About 80% of all patterns are in my head," says Masaaki. His designs are so well fixed in his mind that he sometimes doesn't even need a rough sketch.

When he makes a 5 or 7-piece set of *shouji kanagu*, (see *Kan* fig.11.ii) he uses different flower patterns for each level. On a *sanpoubiraki butsudan* (see *kiji* section) with six door panels, the same pattern will follow horizontally, but vertically they will be different. For example, he could have lotus at the top (corner), then, moving downwards, cherry blossom, *housouge* (imaginary flowers on swirling arabesque patterns), followed by Chinese bell flowers and finally, at the bottom perhaps chrysanthemums. "In the ordinary way, many artisans would make one pattern for all the *shouji kanagu*," says Masaaki.

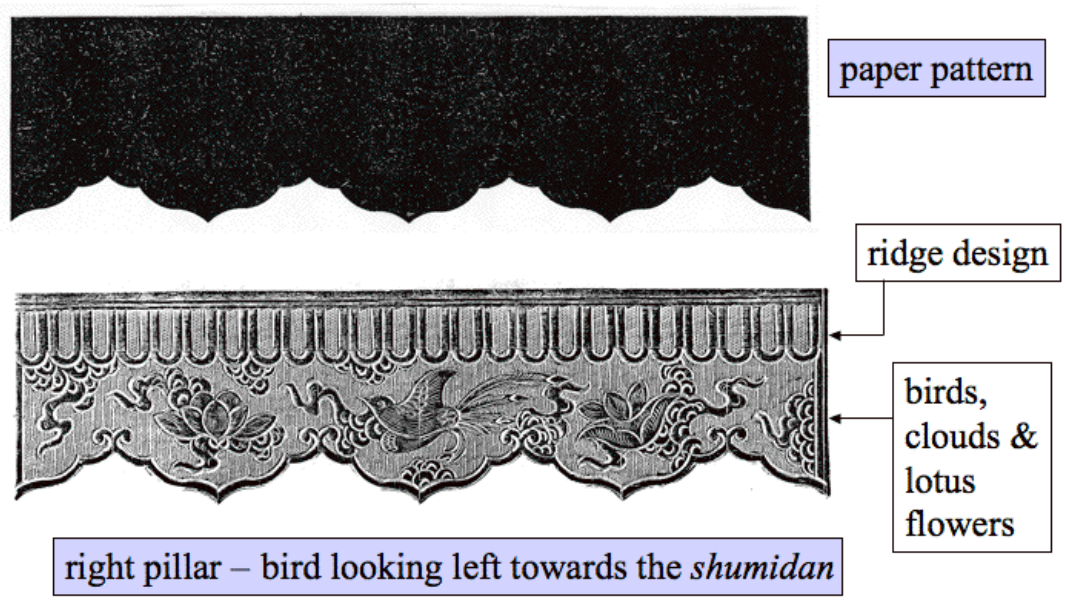


Kan figure 28: shapes and motifs of *kanagu* on *shouji* (showing patterns as punched in copper – see tools section)

To illustrate the concepts given above, let us consider the designs and shapes as found on *kanagu* for a set of large pillars (*oubashira*).

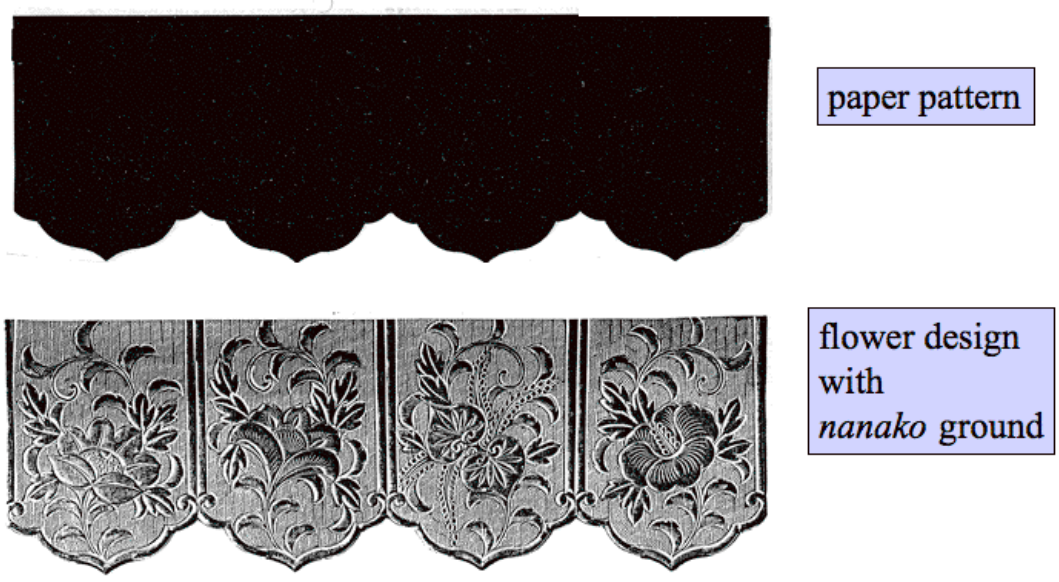
The **UPPER FITTINGS** are in 3 layers (see *Kan* fig.29.a, b, c & d):

a) The top layer has a ridged border above a section with birds and clouds.



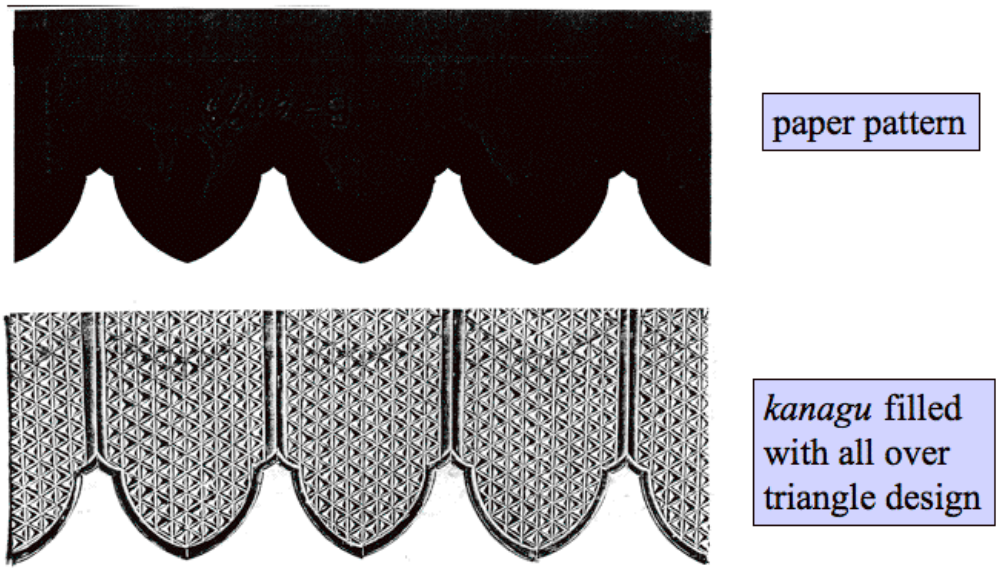
Kan figure 29.a: segment of upper pillar *kanagu* - top layer (worked to look like two layers)

b) The middle layer has flowers.



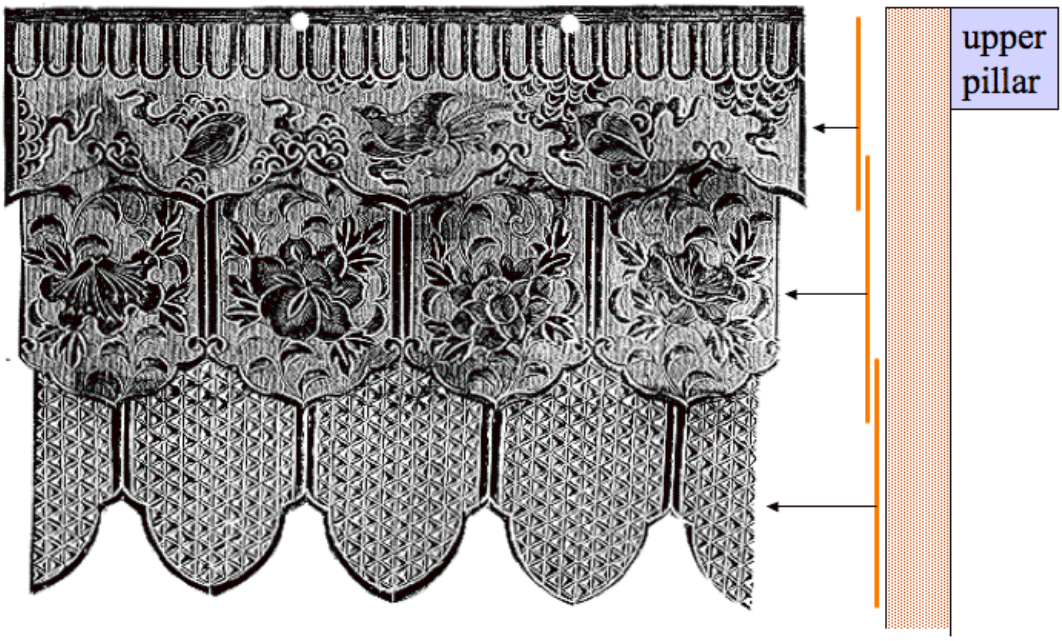
Kan figure 29.b: segment of upper pillar *kanagu* - middle layer

c) The bottom layer has a repeated background design of triangles.



Kan figure 29.c: segment of upper pillar *kanagu* - bottom layer

These are combined to look as follows.



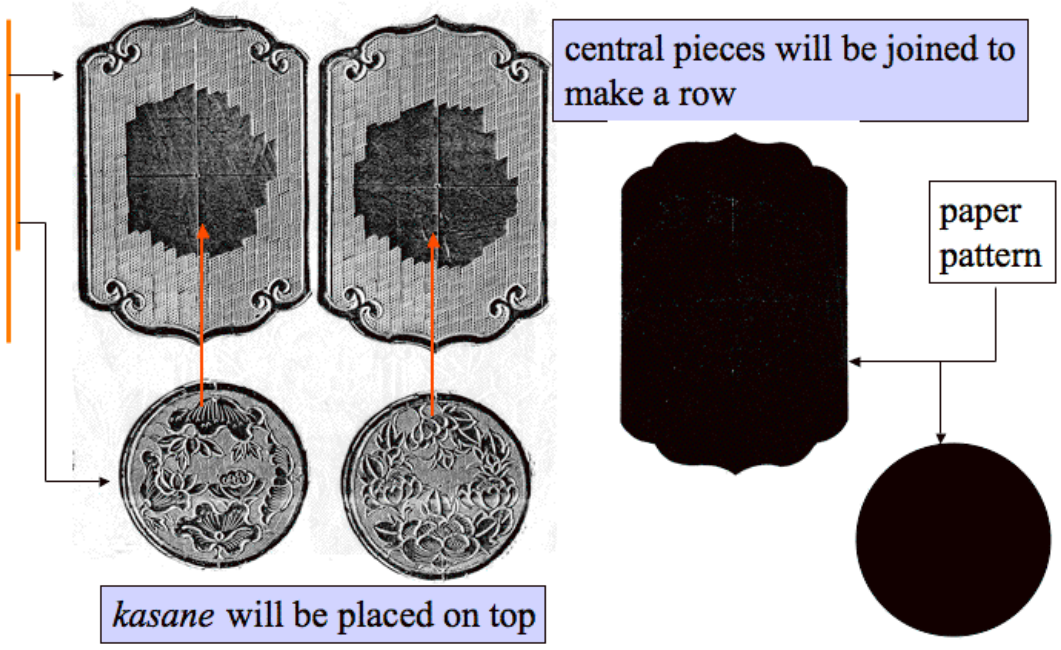
Kan figure 29.d: segment of upper pillar *kanagu* - three layers combined

The **CENTRAL FITTINGS** are in 4 separated layers (see *Kan* figs. 29. b & c and 30.a & b):

a) The top (t) layer repeats the triangle pattern (see *Kan* fig.29.c).

b) The middle top (mt) layer has a design of flowers (see *Kan* fig.29.b).

c) The middle (m) layer has *nanako* background topped by medallion (*kasane*) pieces with birds and flowers.

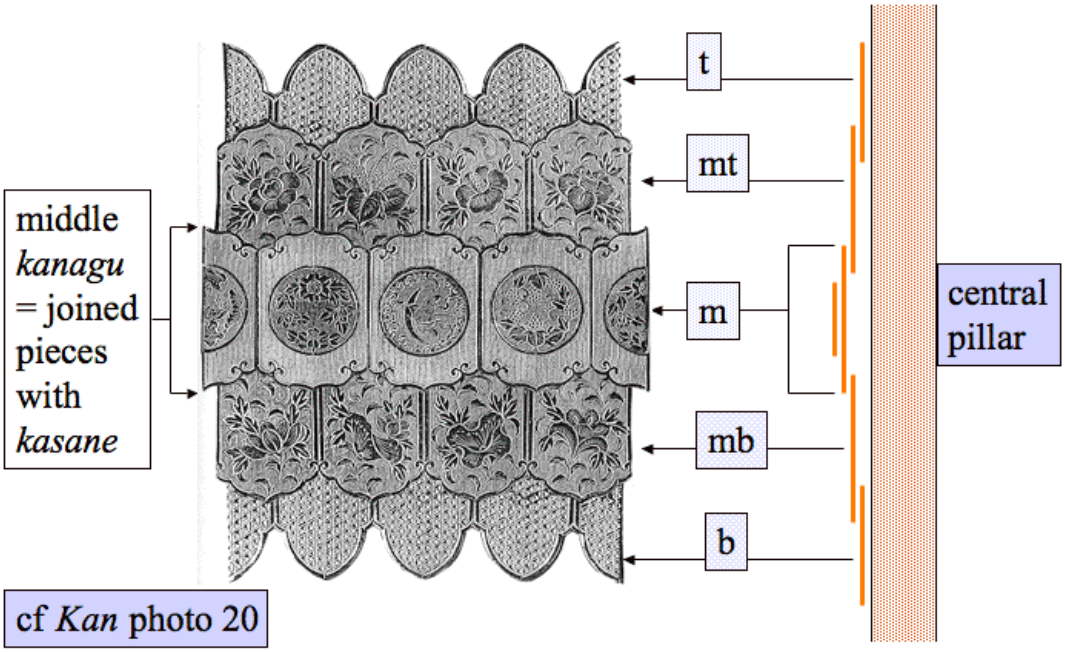


Kan figure 30.a: segment of central pillar *kanagu* - middle layer with *kasane*

d) The middle bottom (mb) layer has a design of flowers (see *Kan* fig.29.b).

e) The bottom (b) layer repeats the triangle patterns (see *Kan* fig.29.c).

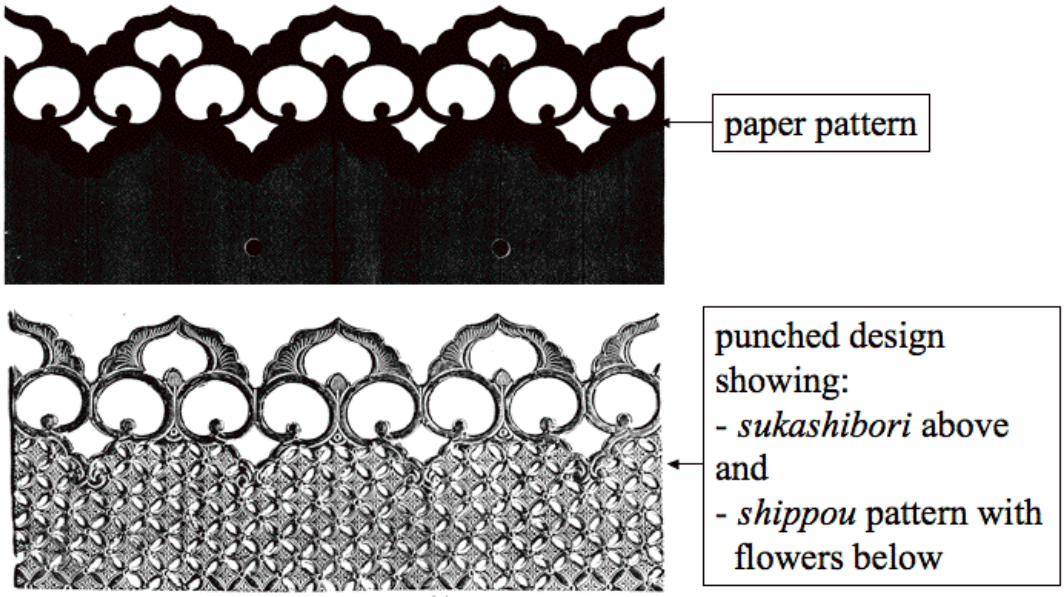
These layers are combined to look as follows.



Kan figure 30.b: segment of central pillar *kanagu*, six parts combined to make four layers

The **LOWER FITTINGS** are in 3 layers (see *Kan* figs. 31.a, b, c)

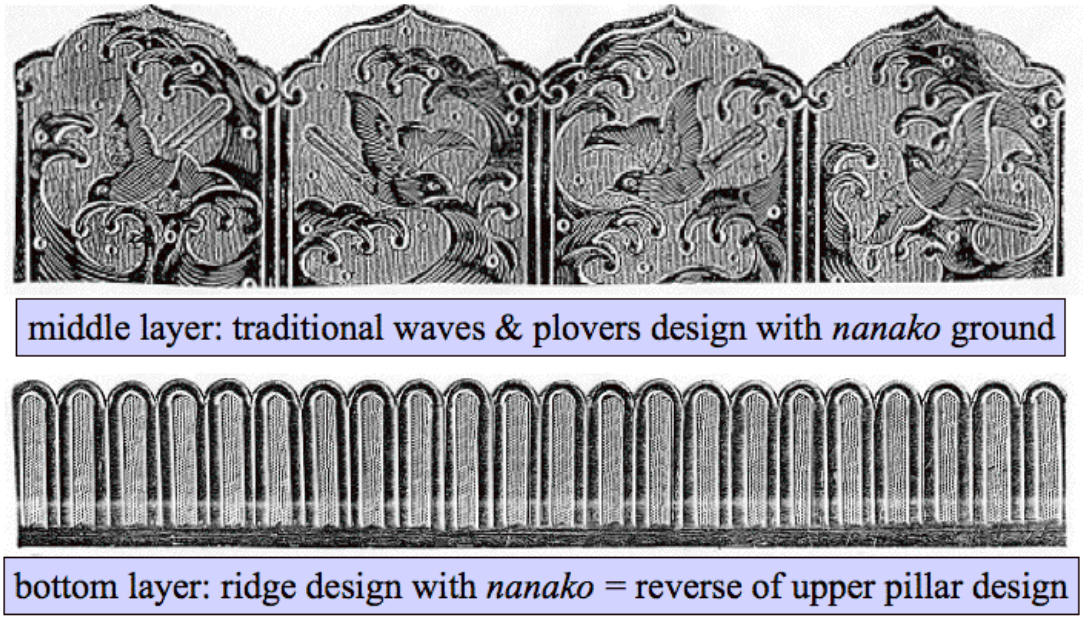
a) The top layer is the cut out style (*sukashibori*) with a 7 treasurers (*shippou*) ground.



Kan figure 31.a: segment of lower pillar *kanagu*, top layer

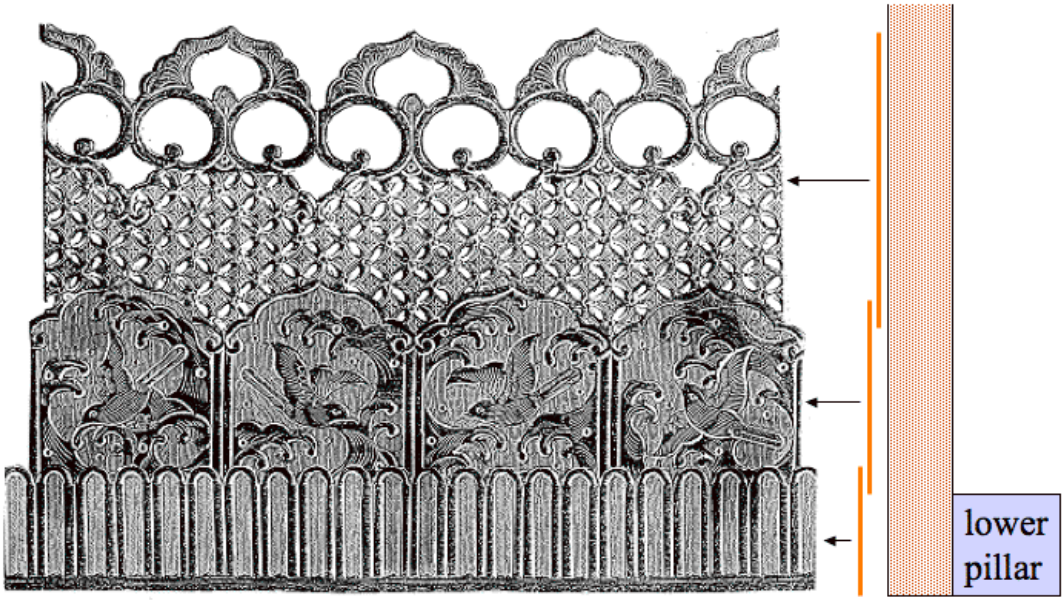
b) The middle layer has a traditional pattern of plovers and waves with a punched *nanako* ground (see *Kan* fig.31.b).

c) The bottom layer is a reverse of the ridged pattern found at the top of the piller.



Kan figure 31.b: segment of lower pillar *kanagu*, middle & bottom layers

These layers when combined have the following appearance.



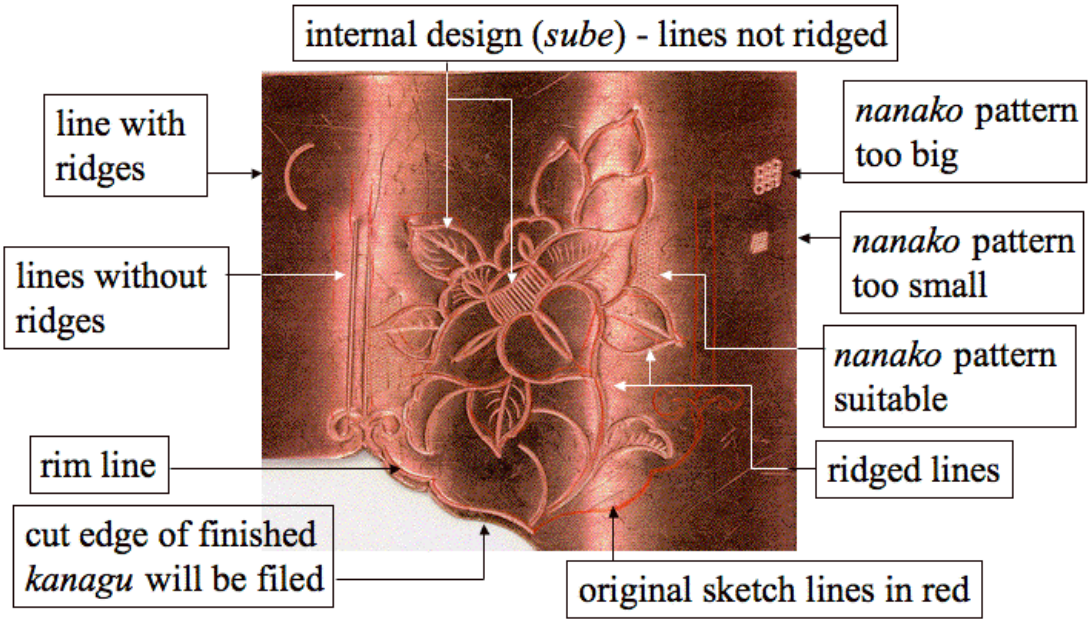
Kan figure 31.c: segment of lower pillar *kanagu* combined into three layers

These pictures show some interesting points about Masaaki's style. Firstly, the *kanagu* for the lower part of the pole tends to have more cut work. Secondly, although some of the shapes appear the same, the proportions are slightly different, for example the swirl-edged designs with birds and flowers.

Having dealt with the important aspects of the patterns, let us move on to a brief outline of tools and materials and then finish with a discussion of the processes involved. For this final section we will particularly concentrate on the *kebori* and *jibori* techniques.

7.3. TOOLS:

"The principle of decorative metal working is the use of the punch or burin (*tagane*)," explains Masaaki. "Theoretically you can make any pattern or any line using a *tagane* with one sharpened tip. Because of course, a series of dots (….) will eventually make a line (__). But it takes too much time. Various kinds and sizes of *tagane* are produced to make better patterns more quickly. For example the pattern of plum (ume), the size of the flower pattern can vary from small to large. Anyway, I have about 800 *tagane* now. Some of them were used by my father before me, and by my grandfather before that." Therefore, because artisans used to work with just 1 or 2 *tagane*, Masaaki feels that having so many is cheating a bit. But it makes the work a lot easier. One reason why it is helpful to have so many is that when he makes a set, say, of five pieces of kanagu *shouji*, he uses different flower patterns for each level (see *Kan* figs. 11.i & ii and 28). Also if the size of the area for placement of the pieces varies slightly, he keeps the same number of pieces, but adjusts the sizes and proportions of the designs. Moreover, it was clear from his demonstration that he could do the old style of punching very skilfully. When he sees old metal fittings, he can guess the kinds of *tagane* they used. He can see that they used only 1 or 2 types.



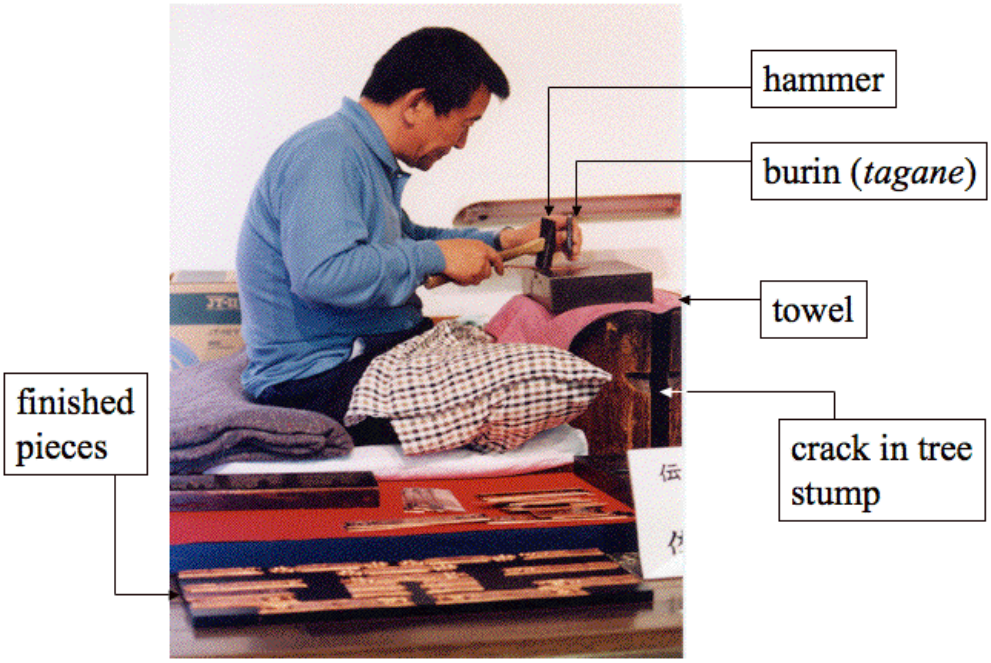
Kan figure 32: photocopy of demonstration punching (showing Masaaki's skill using separate *tagane* for each part)

"My father used to both buy and make *tagane*," he continues. "I don't make them. I sometimes buy a new style. When I want a very special shape, to make a new design on a *butsudan* fitting, I prepare a prototype from the soft metal remains of an old worn-down tool. Then the toolmaker can make a real *tagane*, with a tip of well-

tempered steel, using my model." For instance, he has recently devised a '*shippou*' pattern for ground punching (see *Kan* figs. 25.a, b& c). For this he needed a new burin. So he used an old one and made the exact size and shape. Then took it to the burin maker to copy. This needs to be hardened steel and he cannot fire it himself.

Thus it can be seen that for an artisan setting up in his own business, tools are a major consideration. According to one artisan, "the setting up cost is very high but usually he inherits tools from his father or master. He buys *tagane* one by one when it is necessary; or buys all the *tagane* from a retiring artisan. But then he gets some that are near the ends of their lives; or ones he doesn't want. But the price is cheap." He described his equipment as follows: "I have about 600 *tagane* and the average cost of one is around 20,000 yen. There are 30 *tagane* for cutting out (*kiritori*), costing, on average 3,000 yen each. I have fine-tipped detail (*sube*) *tagane* for engraving inner details. And there are six types of fish roe (*nanako*) *tagane* with 1, 2, 3, 9, 16, and 20 points and each type has five sizes from small to big. I also have a reserve set. So I have 30 *nanako* punches and a reserve set of 30, because when the tip is flattened by a lot of punching, I send it for repairs so I need a reserve. Each *nanako tagane* costs from 4,000 - 5,000 yen." On the other hand Massaki prefers to buy new ones when necessary.

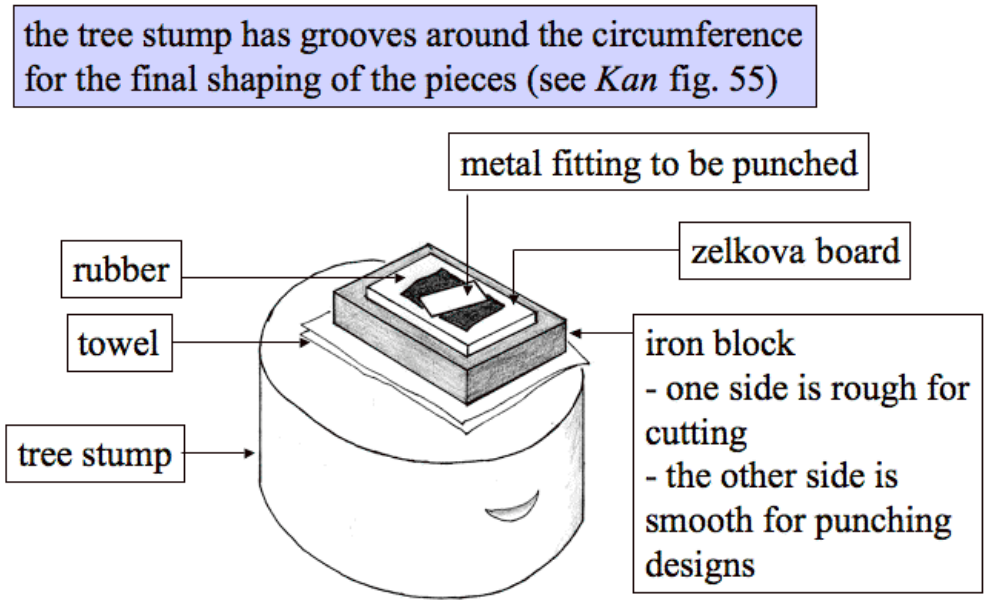
Before going on to a discussion of these *tagane*, let us have another look at Masaaki sitting on his two cushions, with pieces of *kanagu* laid out beside him.



Kan photo 26: Masaaki at work (also see *Kan* photo 06)

The zelokova tree stump, which belonged to his father, and which is easy to sit cross-legged in front of, has a split that he uses as a handle to turn the stump around when he wants to use a particular shaping groove. On top of stump, he has a cloth to stabilize the metal block and stop it damaging the surface of the wood. Then on top of the cloth sits his metal block.

We have already looked at this arrangement for *kebori* work (cf. *Kan* fig. 04). However when greater pressure has to be applied, such as in *ukibori* embossing, he adds other features. "Some artisans," says Masaaki, "do embossing directly on the tree trunk. When deep embossing is done, plywood is sometimes used because it is softer. But I don't like it. I use a harder wood, such as zelkova (*keyaki*). He puts this *keyaki* block on top of the metal one and then a piece of rubber made from a tyre inner tube. Instead of a rubber sheet, some artisans use a zinc sheet under the copper.



Kan figure 33: embossing style (*ukibori*) punching arrangement (cf *Kan* fig. 04)

"I use rubber sheeting to prevent the upper surface of the copper from being damaged while I'm punching it from the underside. It prevents the wood grain from showing on the design. And it makes a smoothly curved embossed pattern when I hit the metal with the burin - especially when using a rounded one. It also stops the worked parts from getting too thin and even breaking through. And it stops the copper from slipping," explains Masaaki.

"When I hit the burin I concentrate my attention into the top of it," he continues. "There is a knack to hitting it, not necessarily strongly, but to prevent it from slipping. With my left hand I control the angle and prevent slipping. So my left wrist sometimes aches. And my shoulders get stiff. My right hand only automatically hits

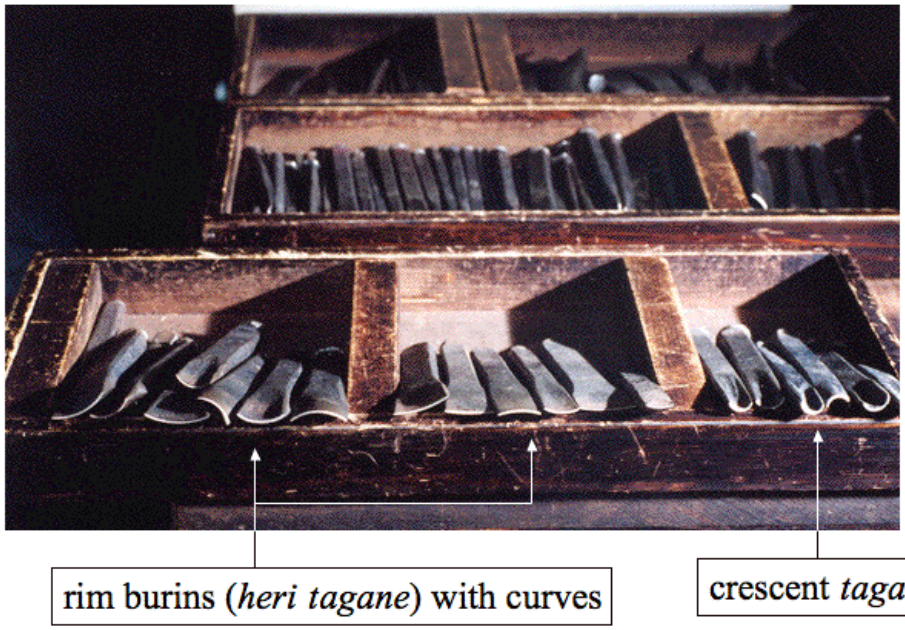
with the metal hammer, so it doesn't ache." As he works he keeps the most important *tagane* on his lap for easy access.

TYPES OF BURINS (*tagane*):

General:

Punches or burins (*tagane*) come in different sizes, shapes and styles. Using these *tagane*, whole designs, such as a complete leaf, can be punched or composite designs can be done with each part (leaf, midrib and veins) being punched separately. Also there are special *tagane* for punching the grainy texture (*nanako*) of the ground design.

Kan photo 27.a: boxes of burins (*tagane*)



Kan photo 27.b: boxes of burins for punching rims (*heri tagane*)

Masaaki uses the burins pictured above for his style of work. These are more or less the same for all kinds of metal work. Generally the artisans, such as Sawatari Masaaki, who work without heat, for *kebori*, *ukibori* and *sukashibori*, punch directly downwards using the sharp point to indent or cut the metal. The *jibori* artisan, such as Okamura Masao, uses these skills too, but has an additional type of tool, which is punched at an angle and pushed along scooping out the heated metal rather more like carving. The table below gives an overview of the types of *tagane* these artisans use:

TABLE of BURIN TYPES:

Burins used for all types the metal work (used by both Masaaki and Masao):

1. Pattern-making burins (*hori tagane*) – this is a general name for the following three kinds: (see *Kan* photo 28)

a. **Rim** burins (*heri tagane*)
Straight rim burins (see *Kan* photo 32)
Curved rim burins (see *Kan* photo 27.b)

b. **Detail** burins (*sube tagane*)
For making straight and curved lines inside the main pattern shape

c. **Whole pattern** burins (*moyou tagane*) (see *Kan* photos 29.a & b)
Flower patterns (eg chrysanthemum, cherry blossom, Chinese bell flower, peony, lotus, lotus petal – see *Kan* figs. 28 and 34.a, b & c)
Leaf patterns (see *Kan* fig. 34.b)
midrib and veins (see *Kan* fig. 34.b)
newel post patterns (*giboshi*) (see *Kan* fig. 35 and photo 30)

2. Fish roe burins (*nanako tagane*) (see *Kan* photo 31)
3. Cutting out burins (*kiritori tagane*) (see *Kan* photo 32)
4. Inward pattern burins (*iribana tagane*) (see *Kan* photo 33.a)
5. Embossing burins (see *Kan* photo 34)

In addition to the ones listed above, Masao uses other special *tagane* for his *jibori* work:

6. Sculpting burins (*suki tagane*) (see *Kan* fig. 37)
7. Embossing burins for *jibori* (see *Kan* fig. 38)
8. Side burins (*soba tagane*) (see *Kan* fig. 39)
9. Flattening burins (see *Kan* fig. 40)

Now let us consider these in greater detail, looking first at those used by Masaaki.

1. **Pattern-making burins** (*hori tagane*): These are used to make lines, outlines of patterns, or details inside the pattern (*subeire*). They are made of soft tempered steel with an iron handle. Masaaki has two types: those with plain non-ridged cutting edges and those with ridges.

The kinds of *hori tagane* other artisans have are without ridges in most cases," explains Masaaki. "Ordinary ones have no ridges. I have an assortment of *hori tagane* with ridges and without, in various sizes and various curves. That's why the number of *tagane* is as many as 800. For every *hori tagane* I have with ridges, I have an identical one without ridges. I use the ridged ones with big designs. Ridged lines sparkle more after they have been gilded. But in a small design, the ridges spoil the design.

single edged rim burins (*heri tagane*)

double edged whole pattern burins (*moyou tagane*) for making arabesque designs

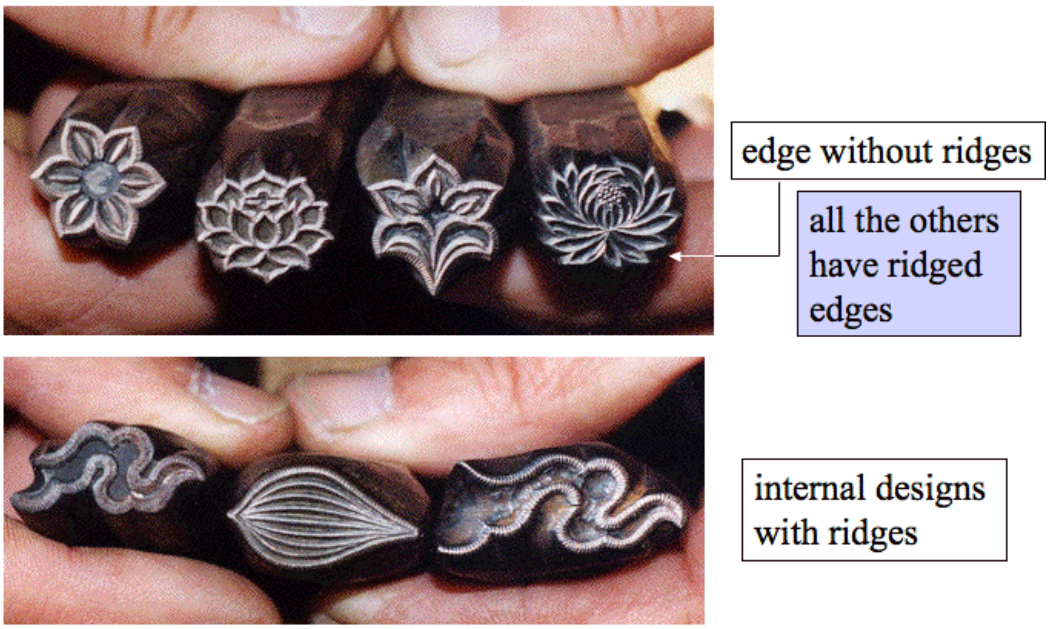
Kan photo 28: pattern making burins (*hori tagane*) with ridged edges

a. **Rim burins** (*heri tagane*): There are two types of *heri tagane*. *Mokko tagane* have a curved edge and the angle of the curve is different. *Ichi monji* is a *tagane* with a straight edge and the length of the line differs from 3mm to 1.2cm. Rim burins are used for punching both rim lines and straight or curved lines inside the pattern. An artisan will have about two dozen, and they can cost around 4,500 yen each. (See *Kan* photo 28 - top row)

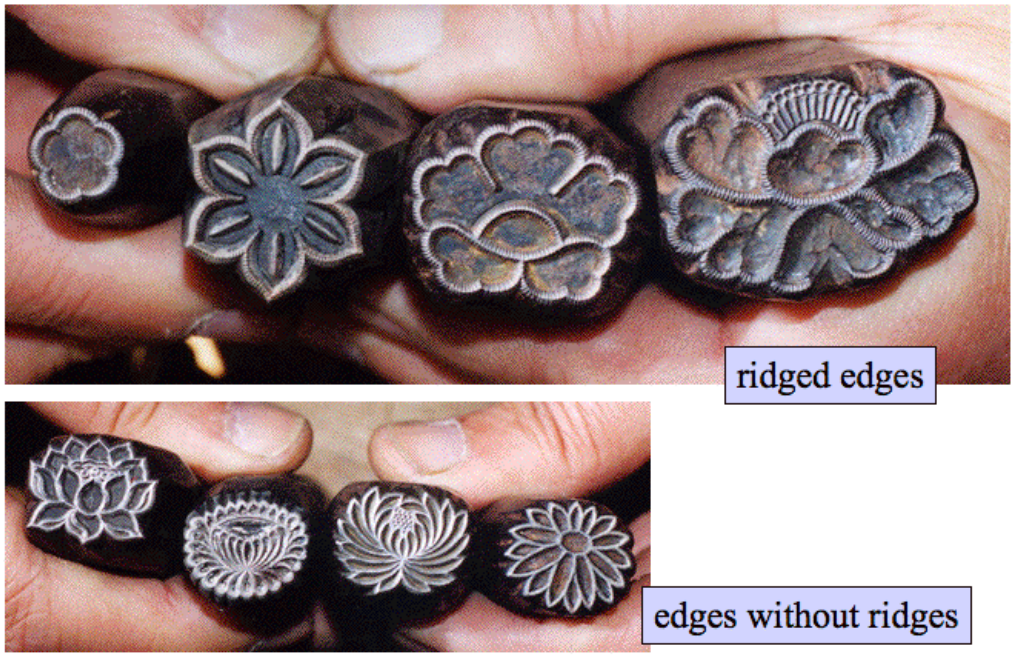
b. **Small detail burins** (*sube tagane*): "Small *hori tagane*, below 3mm, are called *sube tagane* and they don't have ridges," says Masaaki. For punching small details (*subeire*) he mostly uses smaller *tagane* with no ridges. They give sharper, finer detail. Rim burins may also be used for *subeire*.

c. **Whole pattern burins** (*moyou tagane*): These are a kind of *hori tagane* that give a complete design in one punch. They are also called *ikkoku* mono meaning one punch tool and, understandably, are especially expensive. For example, a *tagane* of a chrysanthemum or peony flower costs about 40,000 yen. This is compounded by the fact that for one kind of flower there are several designs: open, half open, buds, backside and front side in several sizes, so just one *tagane* would never been enough.

They are suitable for small (under 2cm) and complex patterns such as chrysanthemum and plum flowers. If you punch a pattern bigger than 2cm it cannot be punched evenly. The larger the *tagane*, the more difficult it is to place flat, and the resultant pattern is not beautiful. Thus if the pattern is big, Masaaki does each line by hand. Even though most artisans have many of these *moyou tagane*, they hardly ever use them. "To be honest I don't like to show these to other people, because in a sense these are for mass-production."



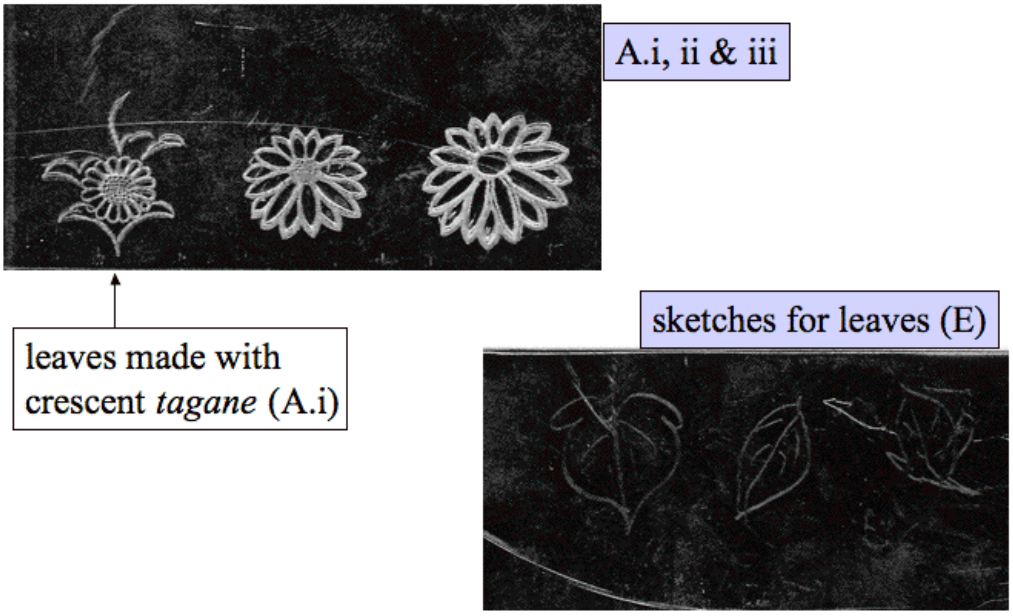
Kan photo 29.a: whole pattern burins (*moyou tagane*)



Kan photo 29.b: whole pattern burins (*moyou tagane*)

He made a copper plate to demonstrate some of the burins (see *Kan* figs. 32 & 34.a, b & c).

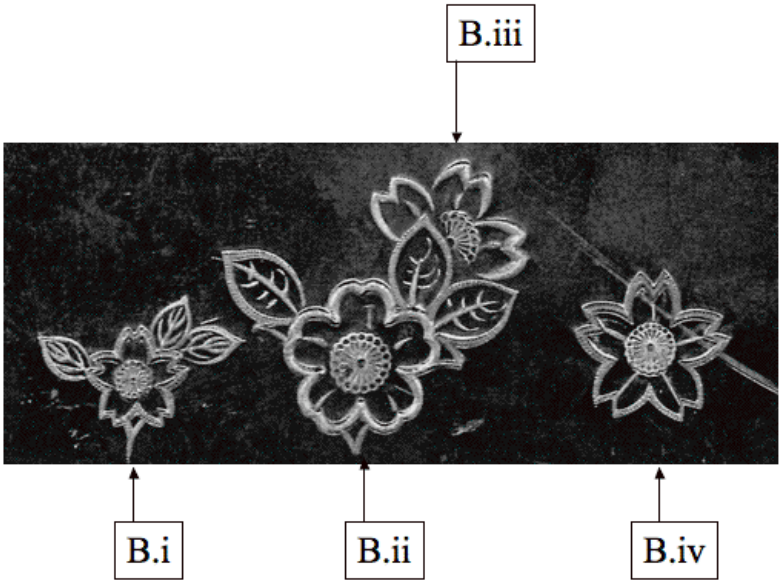
A. Small chrysanthemum patterns are too tiny to punch well using individual segments (*Kan* fig. 34.a). Therefore they are punched as a whole (A.i & ii & iii). The more complex the pattern, the harder it is to punch skilfully and thus it may need two strikes. Then leaves may be added in different ways. Tiny leaves are produced using a crescent burin (A.i).



Kan figure 34.a: photocopy of chrysanthemum patterns on copper

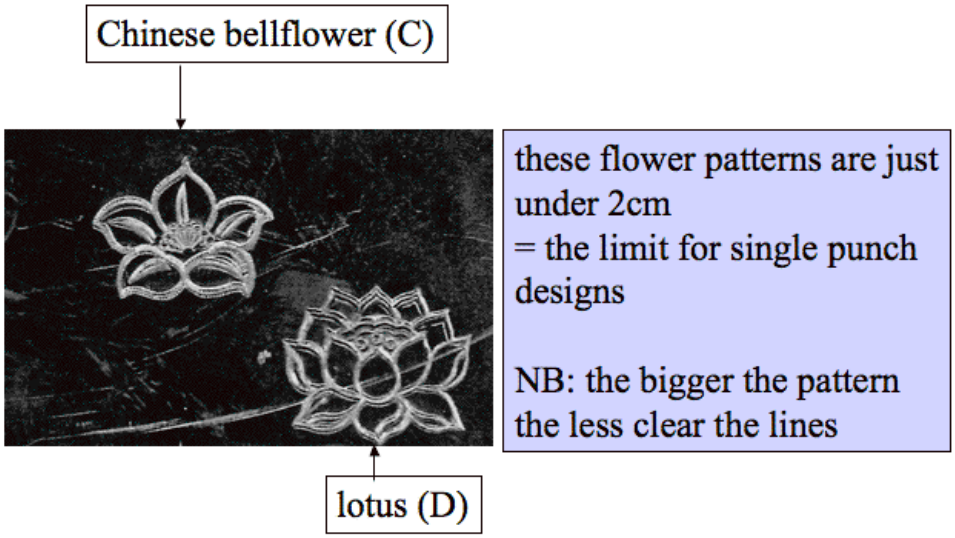
Sometimes the whole leaf is done as one (B.i) and sometimes the leaf, midrib and veins are each done separately (B.ii). There are two kinds of leaf pattern *tagane*. One is a single leaf and the other is a 3 lobed leaf. Both are used for chrysanthemums (E).

B. There are two kinds of cherry blossom (*sakura*) patterns (*Kan* fig. 34.b). “For *sakura* petals, I like the one with the rounded petals better than the pointed one,” he explains demonstrating on the copper plate with the two kinds. “So I usually use this rounded one (B.ii).” Sometimes the whole flower including the centre is one burin (B.i). And the leaves are also one (B.i) In this case the stem is the crescent burin again. However, sometimes the flower and centre are separate. This is the case in B.ii and the centres of the petals use the crescent burin. The leaves are three separate punches, leaf, midrib and veins. In B.iii each of the three petals is separate as is the centre. So this background flower takes 7 punches, including the crescent on each petal. In B.iv, the flower petals are one punch while the centre is a second one.



Kan figure 34.b: photocopy of cherry blossom (*sakura*) designs punched onto copper

C. The Chinese bellflower (C) and lotus (D) *tagane* are large (*Kan* fig. 34.c), so they need to be punched twice to make them deep and even. The larger designs take two hits to make the pattern stand out enough on the back for the embossing to be done well. The largest pattern that works satisfactorily is just under 2cm. The lotus is punched with one pattern *tagane* while the Chinese bellflower requires two: one for all the petals and another for the flower centre.



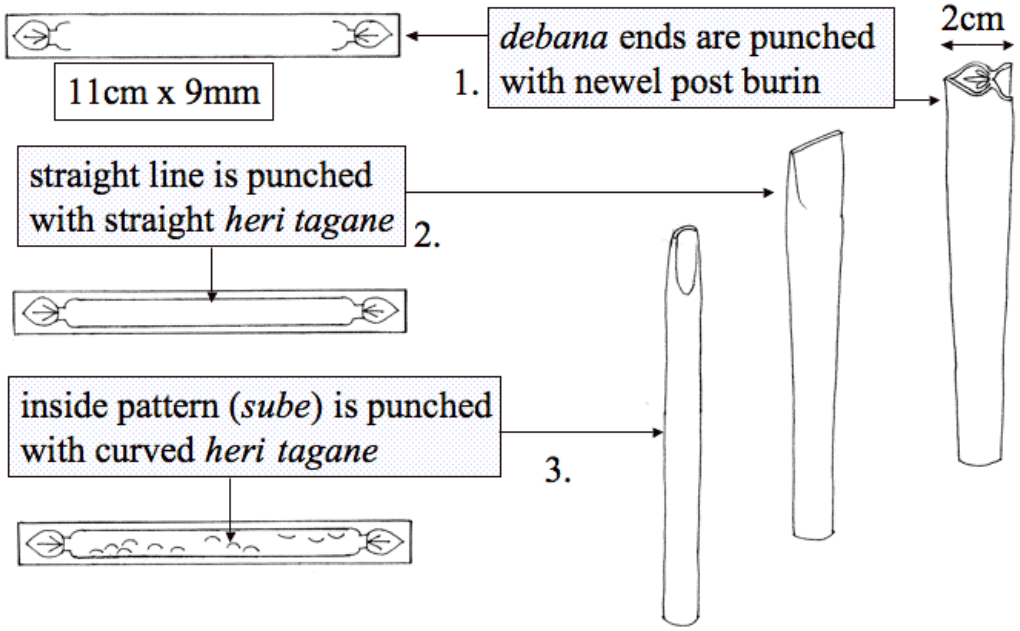
Kan figure 34.c: photocopy of copper plate showing lotus and bellflower punched with whole pattern burins (*moyou tagane*)

Newel post burins (*giboshi tagane*): Some *tagane* have the newel post (*giboshi*) pattern on a single punch, in other words they are a kind of *moyou tagane*. They are usually in five sizes from 6 to 18mm (2 to 6 *bu*). They are used at the ends of pieces that run horizontally or vertically and are called outward or *debana* designs as opposed to inward or *iribana* designs.

these can be used to punch the newel post end of small pieces

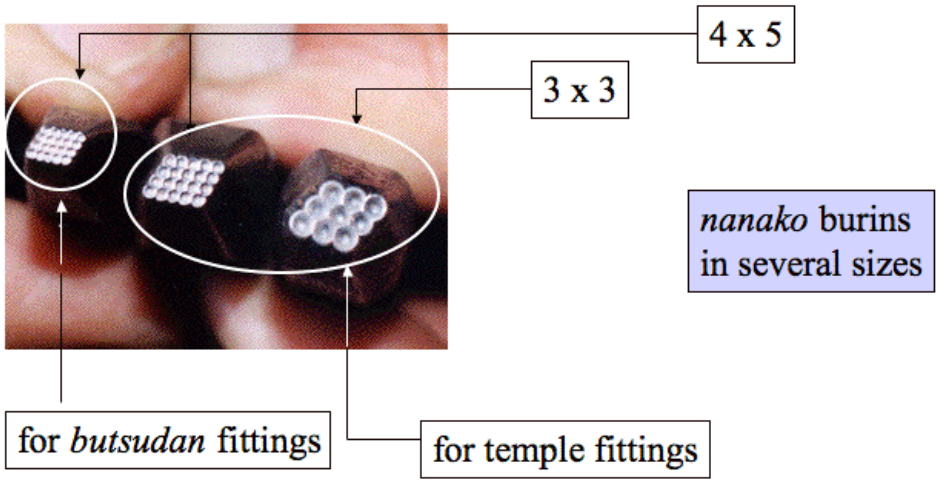
however, Masaaki usually just punches the shape and then does the internal design separately **(see *Kan* photos 11 & 13)**

Kan photo 30: newel post (*giboshi*) burins



Kan figure 35: making a piece with *giboshi* end design (such as for *shouji*)

2. **Fish roe burins** (*nanako tagane*): As mentioned previously, fish roe (*nanako*) burins come in different end sizes with different numbers of depressions per end (see *Kan* fig. 22). For a very high quality 'TH' item, instead of the multiple *nanako* burins, Masaaki will use a single punch for all the ground punching. He never combines the use of a single one with a multiple one. Using the single one allows him to put a single 'nib' between delicate parts of the pattern.



Kan photo 31: fish roe (*nanako*) burins (please compare size with that of just visible finger nails)

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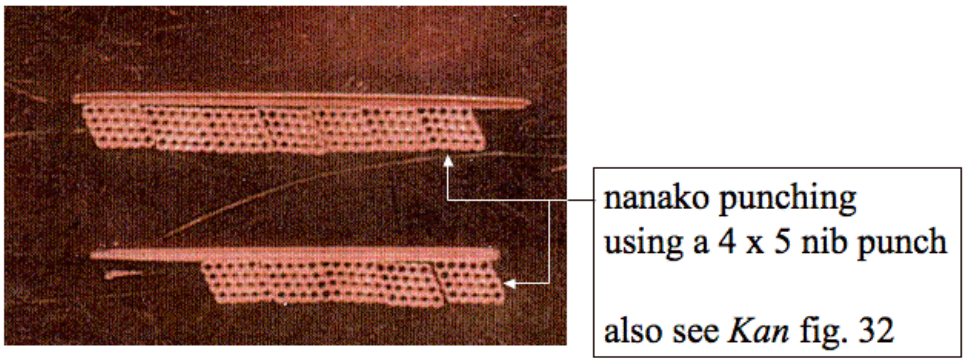
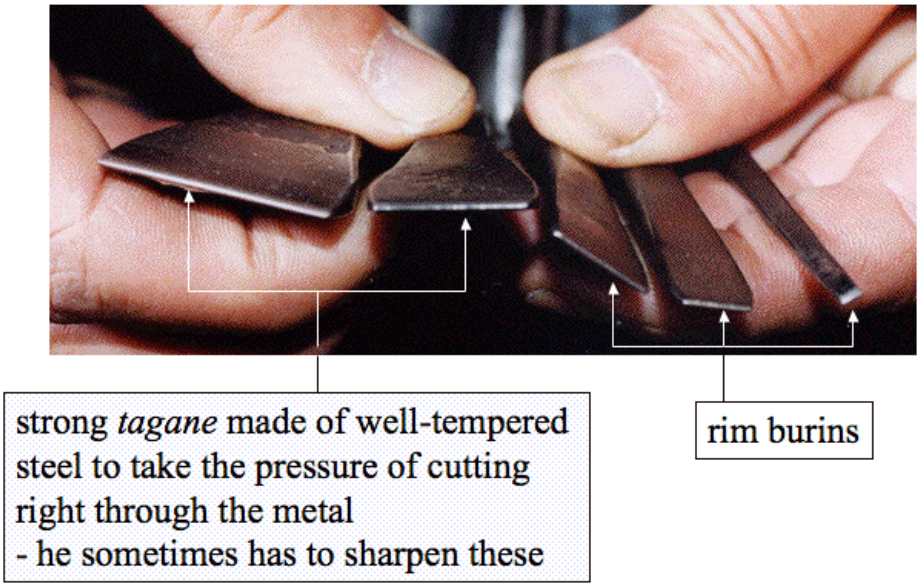


Kan figure 36: demonstration punching of fish roe (*nanako*) design on copper plate

3. **Cutting out burins** (*kiritori tagane*): These are used to cut off the extra metal around the edge of the piece or from the cut out patterns (*sukashibori*) (see *Kan* photos 01.a & 19 & 21) (also see processes). The tips of these burins are well-tempered steel. As with the rim burins, there are two kinds, those with straight edges of various lengths and those with curved edges of various angles. They also come in an *iribana* shape to cut the ends of the pieces when they are finished (see *Kan* photo 49).



Kan photo 32: cutting burins (*kiritori tagane*) and rim burins (*heri tagane*)

4. **Inward pattern burins** (*iribana tagane*) – (see *Kan* fig. 27): These *tagane* are used to make the inward pointing ends of the pieces on the door and drawer frames such as in *Kan* photos 15 & 22 and 49. After drawing the parallel cutting lines, Masaaki punches the *iribana* ends, cutting them almost completely through (see *Kan* photos 47 & 48).

punches for making the *iribana* ends of some pieces **(see *Kan* photo 22)**

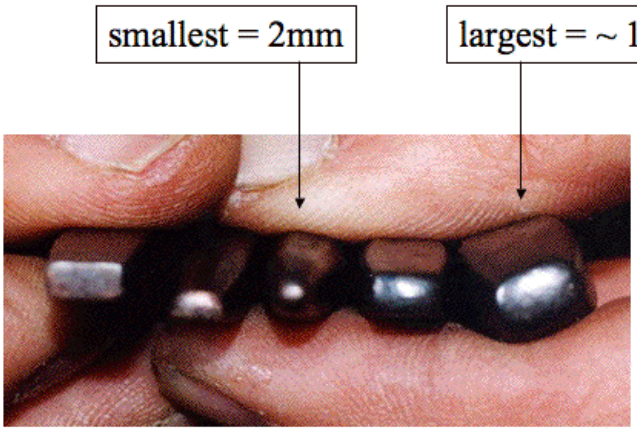
the edges are sharp and they are used to cut out the piece with one blow from the hammer (therefore functioning as *kiritori tagane*) **(see *Kan* photo 47)**

Kan photo 33.a: inward pattern (*iribana*) burins

iribana punched almost completely through the metal

Kan photo 33.b: punching with *iribana tagane*

5. **Embossing burins** (*uchi dashi tagane*): For Masaaki's *ukibori* work these are rounded single-tipped burins used for punching the design from behind to make it stand out from the front. The tips of the burins are smoothly rounded, of various sizes from 2mm to 1.2cm. Masao's *jibori* embossing *tagane* will be discussed later.

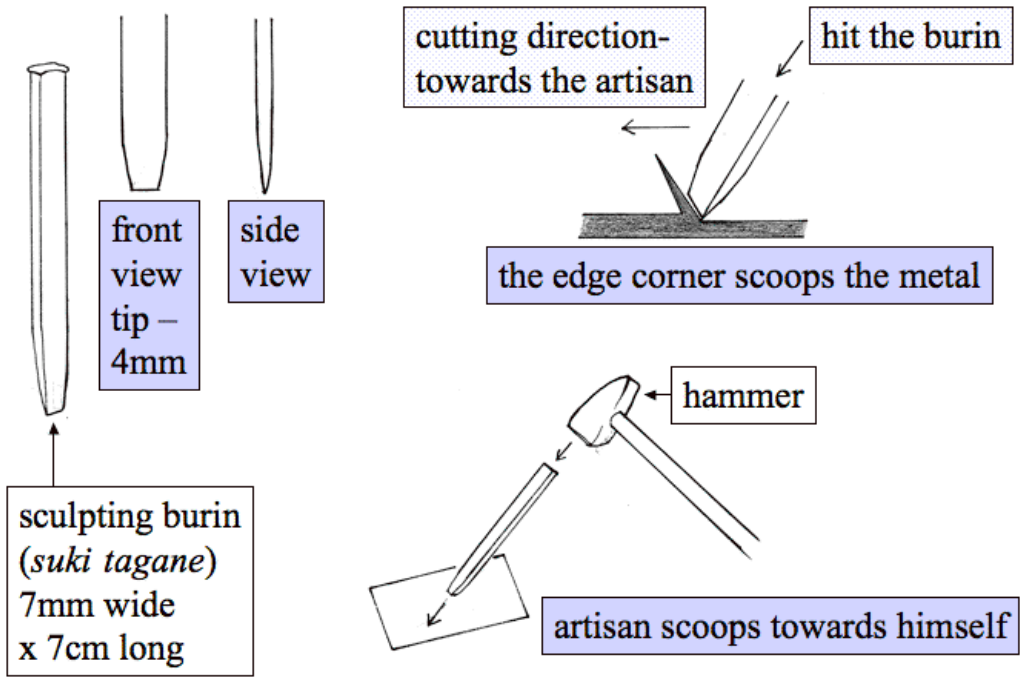


these have rounded tips and are used by Masaaki (cf *Kan* fig. 38: *jibori* artisans' embossing burins are flat tipped)

Kan photo 34: embossing burins

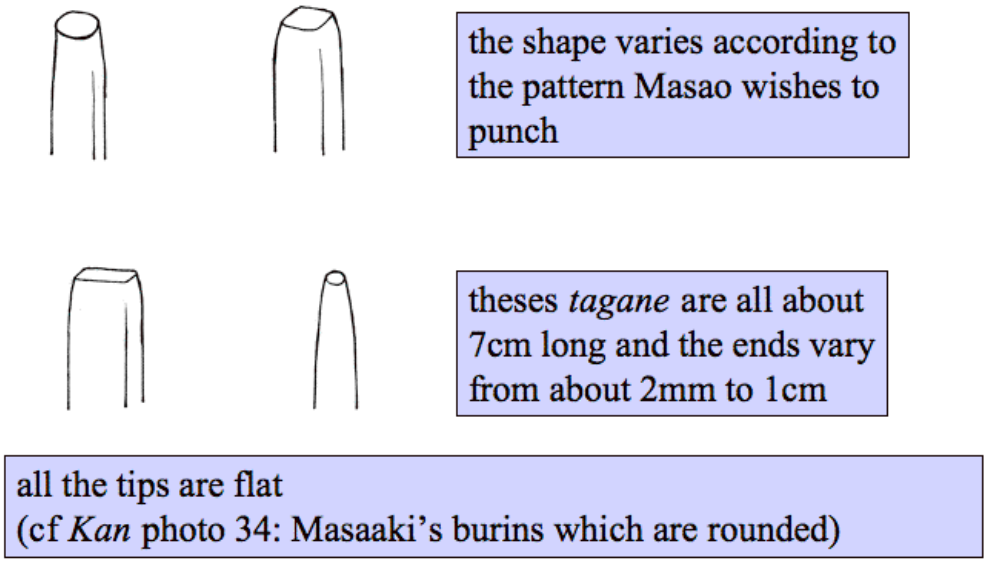
The *jibori* artisan uses most of those tools mentioned above, but also has some special ones for carving and sculpting the warmed metal. Special tools used by *jibori* artisan Okamura Masao:

6. **Sculpting burins** (*suki tagane*): When the metal has been heated to soften it and embedded in the resin to hold it steady, this tool can be used to gouge out the background thus raising the pattern. The burin is moved towards the artisan while banging the end with a hammer.



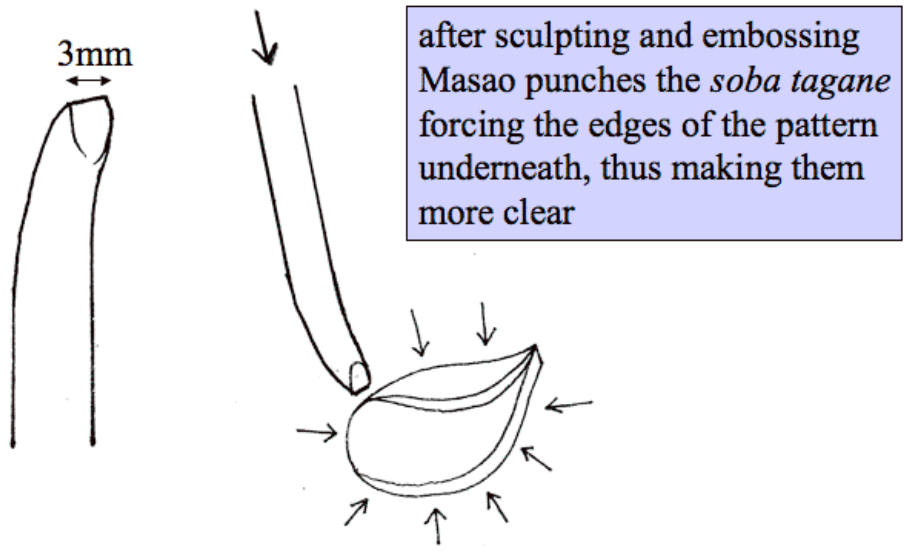
Kan figure 37: sculpting burin for *jibori* work

7. **Embossing burins** (*uchi dashi tagane*): special embossing *tagane* for *jibori* work are flat and come in different shapes and sizes from 2mm to 1cm.



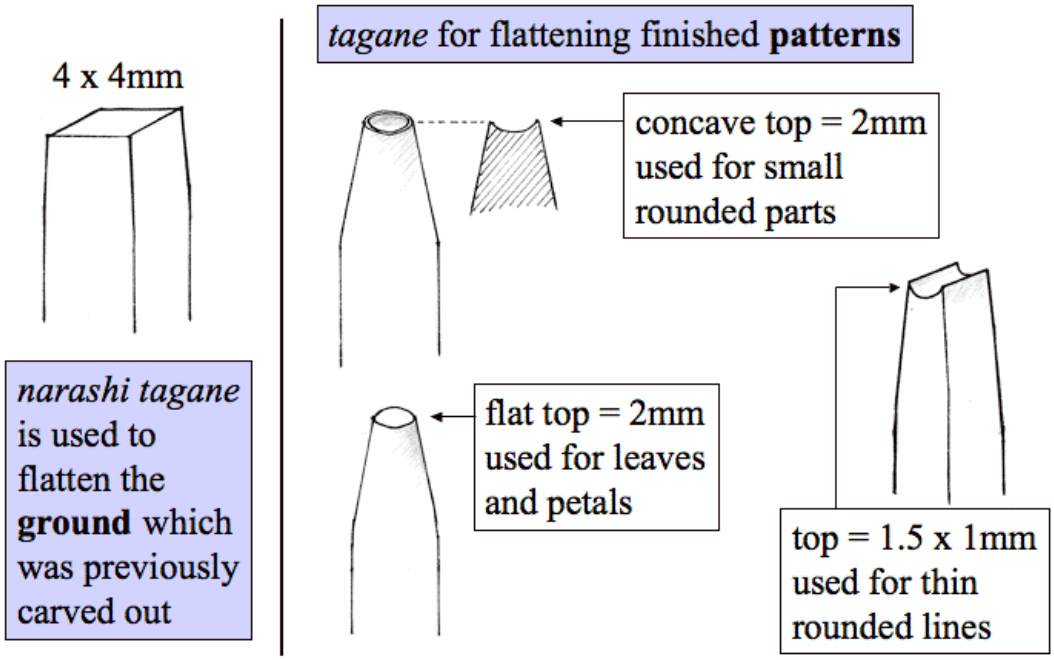
Kan figure 38: embossing burins for *jibori* work

8. **Side burins** (*soba tagane*): These burins are used to define the borders of the pattern making them stand out more clearly. The *tagane* is slightly curved and the tip is slanted. When the background metal is hit next to the pattern, the tip undercuts the pattern slightly making it stand out.



Kan figure 39: side burin (*soba tagane*) and how it is used

9. **Flattening burins**: After scooping out the background, Masao uses *narashi tagane* to flatten the work. Then, when the patterns are finished, he uses various other *tagane* to smooth the surfaces. The surfaces become a little flattened and the edges become clear.



Kan figure 40: flattening burins used for various purposes

Before we go on to discuss other tools used in metal working, let us look briefly at the grinding process used to sharpen the *tagane* mentioned above. "Only once a year," says Masaaki, "I grind 2 or 3 blunt *kiritori tagane* at the same time." Since these are cutting *tagane* they get the hardest wear and need to be sharpened most often. About 3mm at the edge of the burin, which is tempered steel, needs to be ground.

Sharpening of *tagane*:
1. Masaaki uses an electric grinder for the initial rough grinding of *tagane*.
2. Middle grinding is done with half round and flat files covered with the tiny particles of industrial diamonds. "I think we can grind even ceramics, with these," says Masaaki. These are similar to those used for filing the edges of the finished *kanagu* (see *Kan* fig. 43).
3. Finishing grinding is done with two types of whetstone (*toishi*). To grind the inside of the half-round *tagane* the edge of the rounded edge of the stone is used.
   a) The rough whetstone (*ara toishi*) is used for the intial grinding process;
   b) The fine whetstone (*abura toishi*) is used for the final grinding. Masaaki's stone was grooved, because of years of grinding the outside surface of *tagane*.

"But basically," concedes Masaaki, "I buy both *hori tagane* and *kiritori tagane* which are already ground by the *tagane* shop. Or where necessary, without using electric grinders, I grind lightly using only a file and whetstones. If the tip of the *tagane* is broken, I don't grind it, I get a new one. I buy all burins from a factory in Nagoya. All metal artisans in Hikone buy them from this shop."

OTHER TOOLS and EQUIPMENT:

Kan photo 35: mallets, hammers and other tools such as pliers, cutters, pincers

Electric drill: To make nail holes in the finished piece Masaaki uses an electric drill (see *Kan* photo 19). The drill is fixed onto a wooden working table and he drills vertically to make tiny holes, with the metal piece resting on the wood.

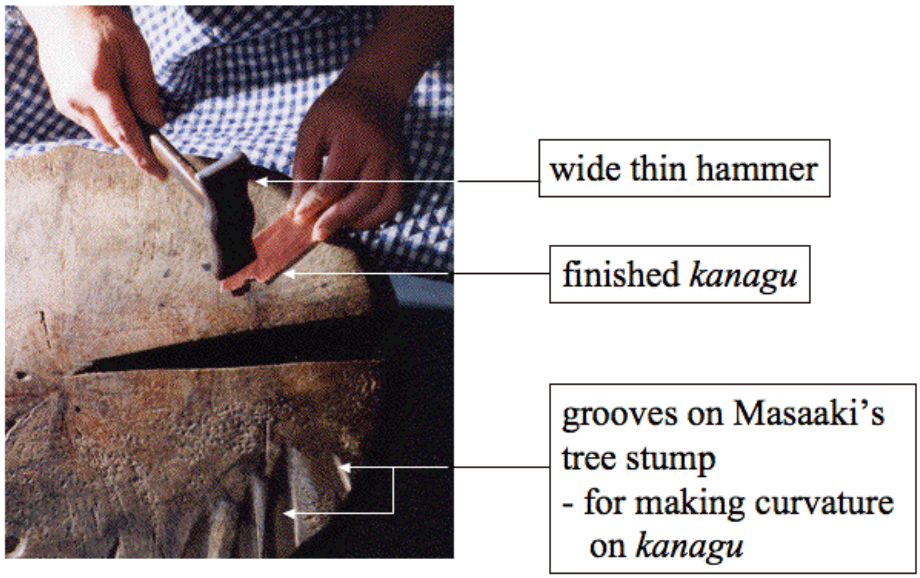
Rulers: Masaaki uses wooden and metal rulers with the traditional *sun* (1 *sun* = 3.03 cm) and *bu* (1*bu* = 3mm) divisions. However, recently orders in metric measurements are increasing. Sometimes he gets an order by fax and then the measurements are usually in mm. "I guess many customers are younger than before," he says, "and they put orders through to the *butsudan* shops, in metric. But basically, in most cases, we measure the size of the *butsudan* or its parts using the traditional Japanese measurements, *shaku* (30.3cm) or *sun* (3cm). As Hikone *butsudan* are made using the 'assembly' system, the pieces are slotted together and not nailed permanently. They make the parts of the frame to fit rather loosely with pegs and tenons and grooves, so that they can be put together or taken apart easily. So it isn't necessary to measure the size so accurately using millimetres. In *butsudan* you don't worry about tiny discrepancies. The drawers don't have to fit perfectly. If the parts fit too tightly it's more difficult. There has to be a gap for the lacquer. If nails are used (as in Nagoya *butsudan*) a good fit is more important."

Hammers: Metal hammers are needed to hit the *tagane* with the force necessary to mark the metal. Two types of action are used. In the *kebori* style of work the stroke is vertical and presses the sharp edge of the *tagane* down into the metal. It is lifted, replaced and hit again until the lines of the design are completed. *Jibori* work also uses this method. Additionally the *jibori* artisan digs out the softened metal by hammering in the *tagane* at an angle and moving it along towards him (see *Kan* fig. 37).

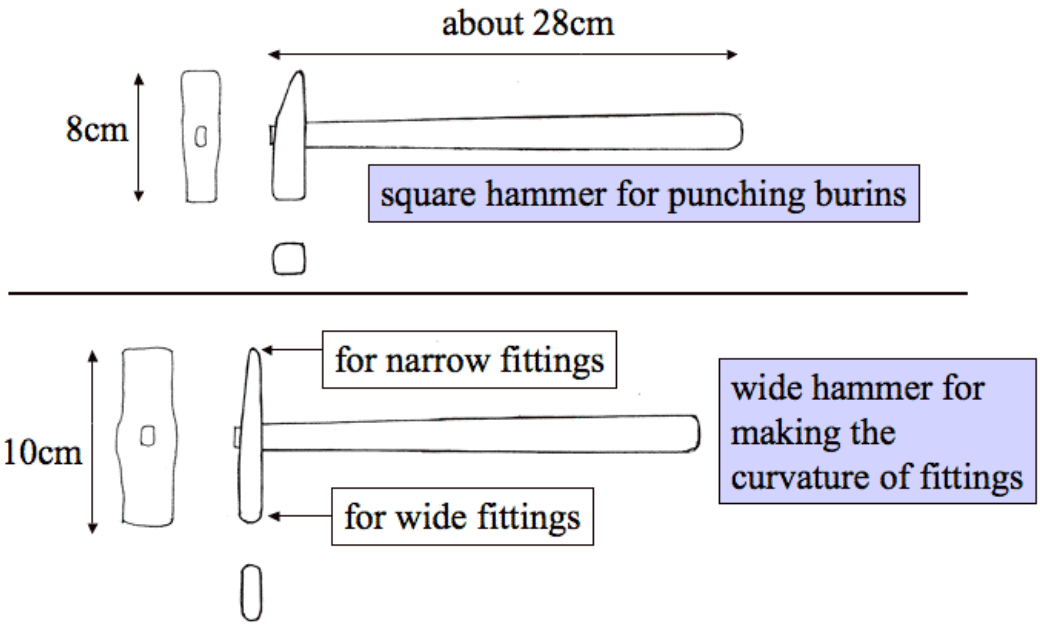
also see *Kan* photo 49

Kan photo 36: hitting the *tagane* with metal hammer

After each piece is finished, it is given a slight curve so that it rests snugly against the *butsudan* surface. For this, Masaaki uses the grooves on his tree stump and a wide thin hammer that matches the width of the curvature



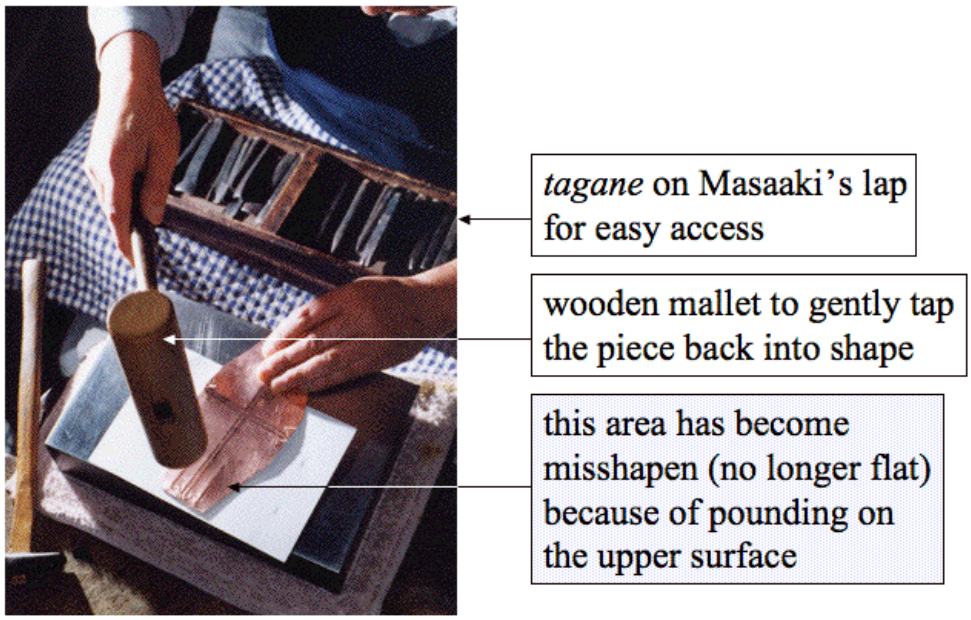
Kan photo 37: hammer for curvature on the piece



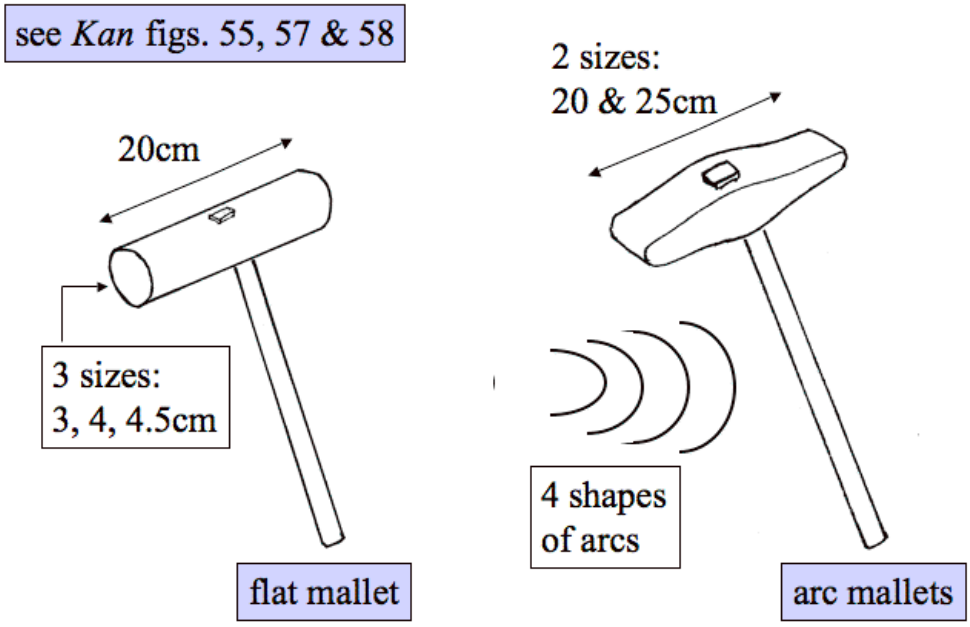
Kan figure 41: metal hammers for different purposes

Mallets: After the piece of metal has been punched, it tends to become misshapen and has to be flattened occasionally so that Masaaki can punch the design accurately. For this he uses a wooden mallet, tapping it from the back or sometimes the front. He also uses wooden mallets for shaping the roll on the hinged pieces (see *Kan* fig. 58), for

shaping pillar fittings (see *Kan* fig. 57) and for giving the edge of the piece a lip so it fits well against the *butsudan* surface (see *Kan* photos 41 & fig. 55).

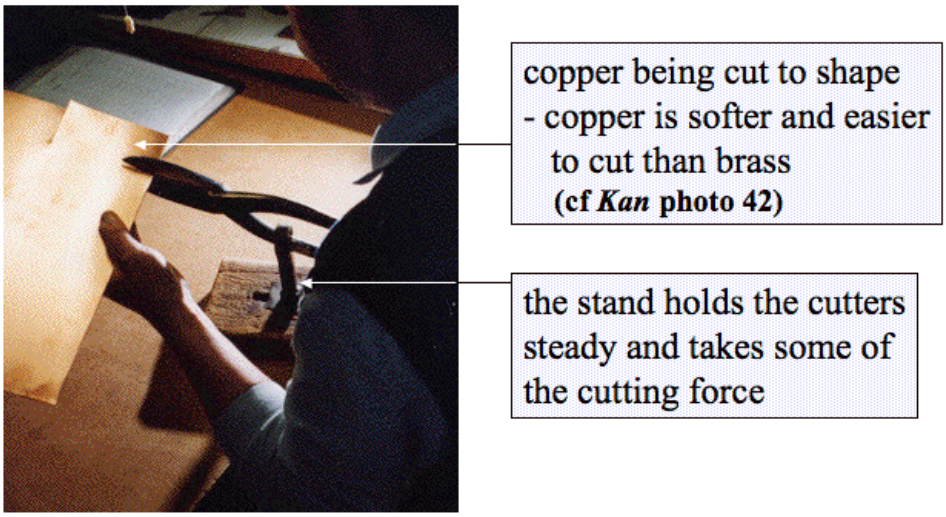


Kan photo 38: flattening the *kanagu* from underneath



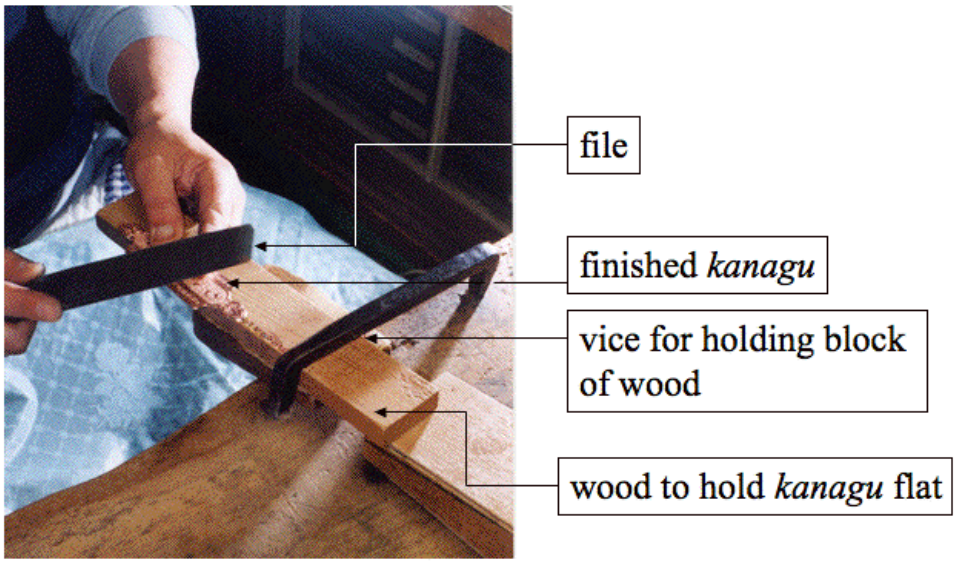
Kan figure 42: wooden mallets for different purposes (see processes for how they are used)

Cutters: Masaaki needs strong cutters to cut the metal roughly to shape. First he scores the metal sheet and then uses the cutters to slice through the metal. Of course they are heavy duty because the metal is thick so the lower handle is held in a stand and pressure is applied only from above.

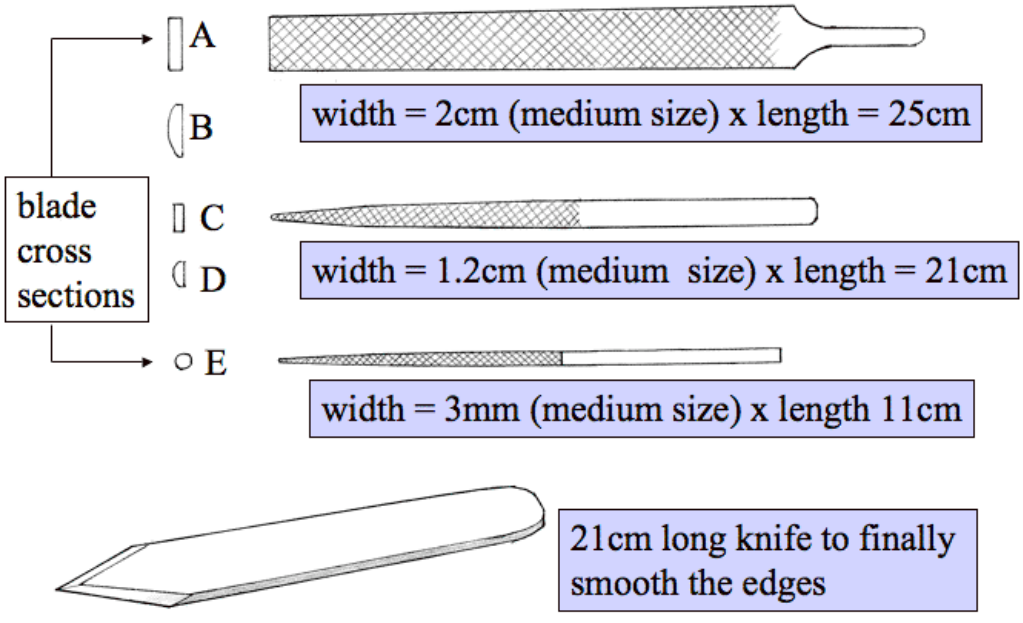


Kan photo 39: rough cutting the metal

Files and knives: As mentioned above, rough cutting is done with a heavy pair of cutters. However when the piece is finished, it is punched out from the surrounding metal, using cutting out burins (*kiritori tagane*). This leaves an uneven edge that will be filed using different grades of steel file from rough through fine. Unlike files for sharpening *tagane*, these are not covered with tiny particles of industrial diamonds but rather the steel surface is scored to give an abrasive surface. Masaaki has five shapes of files (A, B, C, D and E), each with three different sizes (small, medium and large) and three different grades (rough, medium, smooth). He selects the most suitable shape, size and grade to match the straight or curved edge of the fitting. Finally the edge will be smoothed with a knife (see *Kan* fig. 56 & photo 59).

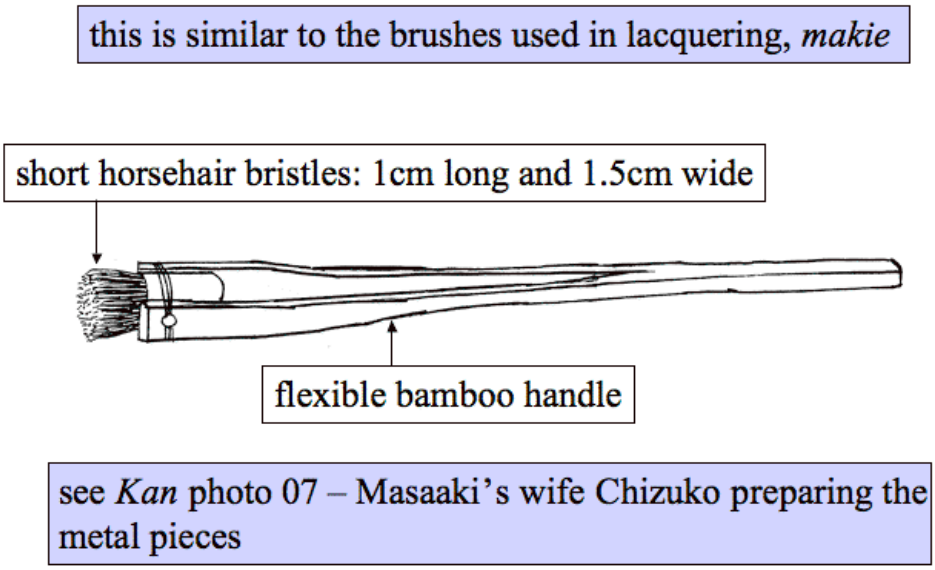


Kan photo 40: filing the edge of the cut *kanagu*



Kan figure 43: files and knife for smoothing the cut edges of *kanagu*

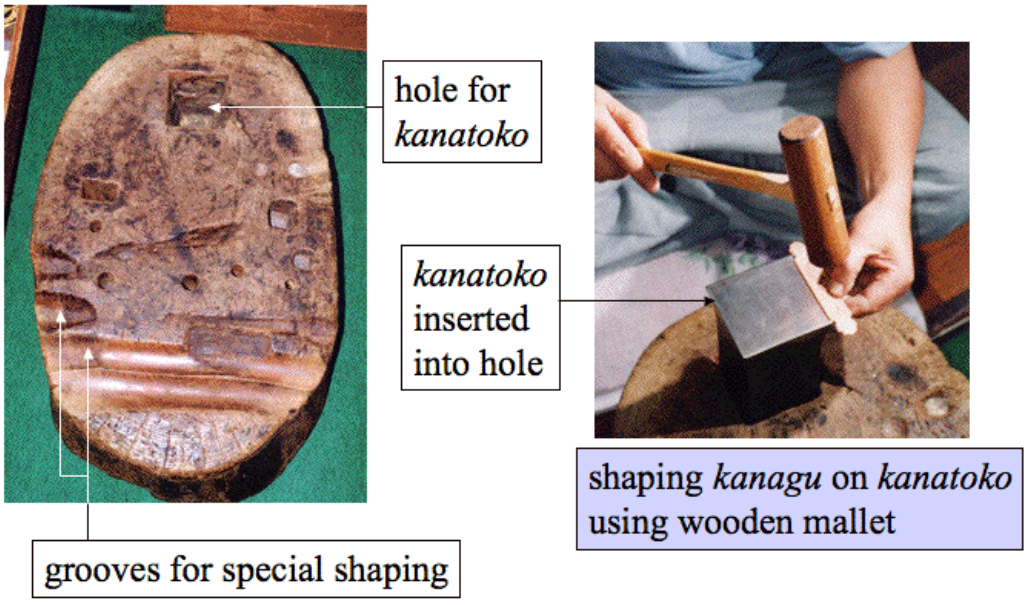
Brushes: These are used to apply the Chinese ink when inking the patterns onto the metal (see *Kan* photo 07). The handle is made of bamboo for flexibility and ease of usage. The bristles are horsehair. They are short so that pressure can be applied and all the nooks and crannies of the pattern template can be accessed easily.



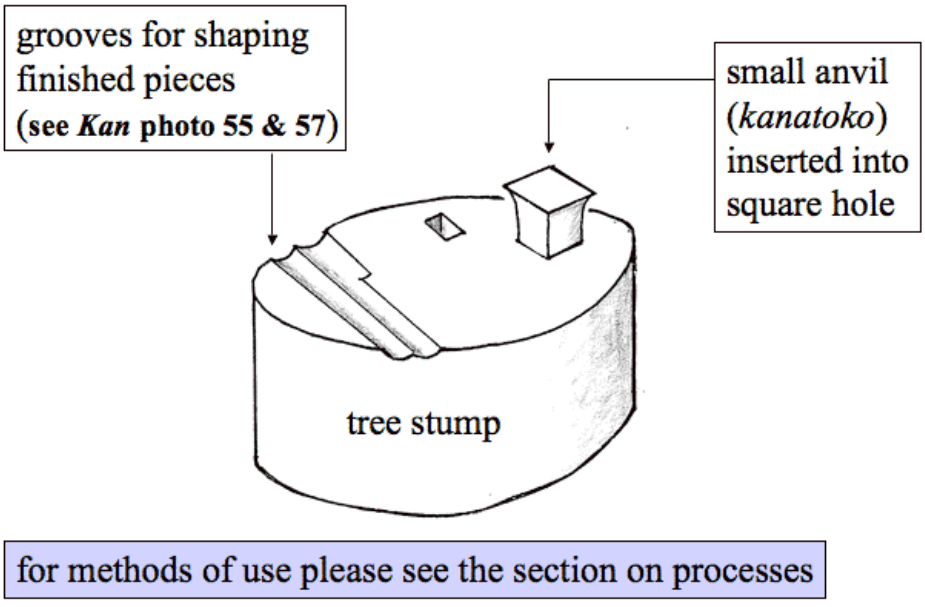
Kan figure 44: brush for inking patterns

Pattern paper: *Katagami*, a strong waterproof paper also used for kimono stencilling, is used to make the paper patterns. The paper is not damaged when rubbed vigorously with the solution of Chinese ink to transfer the design to the metal, so the pattern can be used again and again (see *Kan* photo 07).

Anvil: Besides the tools discussed above, we should just mention some of the equipment used by Masaaki. His tree stump has already been described. However he has another one with various holes and grooves necessary to his work. It has deeper grooves for shaping larger pieces than those shown in *Kan* photo 37. Additionally it has a square hole to insert the anvil-like *kanatoko* he uses to shape the fittings and hinges.



Kan photo 41: equipment for shaping the pieces: tree stump and anvil (*kanatoko*)



Kan figure 45: small anvil (*kanatoko*) for shaping *kanagu*

This finishes our description of the tools used by both types of metal workers. Now we will explain a little about the materials used and then go on to the processes.

7.4 MATERIALS:

General

In the past, artisans did not have the financial resources to buy the metal themselves. Generally the *butsudan* shops supplied copper, brass and silver sheet to the artisans when they placed orders. However, if the metal artisan (*kanagu shi*) could, he bought materials for himself.

Masaaki says, "I buy copper and brass from Futaba Kinzoku in Hikone, which deals in metal sheeting. *Butsudan* manufacturers usually supply silver sheet themselves because it's rather expensive (about three times the cost of copper) and isn't used very often. But in principal I even buy that myself. I heat up the silver sheet I have bought by myself over a gas fire and anneal it (*yaki modoshi*), to strengthen it and prevent it from becoming brittle. I heat it for several seconds, depending on its thickness."

Kinds of metal sheeting:

There are three kinds of metal commonly used by *kanagu* artisan: copper, brass, and silver. The thickness runs from 0.4 to 0.8mm (in 0.1mm increments), then 1.0 and 1.2mm and finally from 1.5, to 3.5mm (in 0.5mm increments). Masaaki keeps all these kinds stacked on shelves at the entrance to his house (*genkan*). His work area is at the front of his residence, with the living quarters at the back.

Copper: As with many of the artisans, Masaaki has a rather vague understanding of his raw materials. One time he says, "The copper plate is not pure copper but an alloy of copper with 2 or 3 % of zinc. We call it *douban*, which means a sheet made of copper alloy." Then later he says, "What I mean by 'not 100% copper' is that, when copper ore is refined, some impurities remain in it. Therefore I suppose the impurities to be minute, say, less than 0.1%. A copper ingot is flattened with a roller to make a sheet. Oil is applied to the roller so that the copper won't stick to it. Therefore the finished copper sheet has some oil on it. When I use it, my wife wipes off this oil first." This copper sheet is softer and easier to work than brass sheet and can be gold plated better. The price is a little over twice that of brass.

"In the case of 'pressed' fittings (see introduction)," explains Masaaki, "they use a copper alloy with more zinc than the alloy for handcrafted items. It is to reduce the cost. Pure copper is not good for 'pressing' because it is too soft and the patterns will turn out crooked. These kinds of fittings are made mainly in Osaka or in Kyoto, but not in Hikone. I heard that the companies which used to make pressed metal fittings for cars are now making metal fittings for *butsudan*, using the same machinery."

As mentioned in part 7.1 Structure, there are certain specifications concerning the thickness of the fittings in special areas of the *butsudan*. Because of the carving work done on *jibori kanagu*, they are made with thicker metal than the pieces worked without heat (*kebori*, *ukibori*, *sukashibori*).

Brass: Because hinges are weight bearing, they are made with brass (copper + 30 to 45% zinc). "Brass is harder than copper and hard to work on," says Masaaki. "The

more zinc it has, the harder it will be and I choose the percentage depending on use. I make the outer doorplate (*hassou*) of copper, because it is not load bearing, but some artisans use brass. Then it is lacquered and fired. Even inside hinges of *shouji* are made of brass and then gold plated." The price of a brass sheet is about 40% of that of a copper sheet.

Silver: It is quite unusual to use silver because it tends to tarnish. If used it is often treated with sulphur, which turns it a dull matt grey (see *Kan* photo 05). The cost is about three times higher than copper.

Other materials:

Resin (*yani*): As described in the previous section, two important features of the *jibori* artisan's work are the sculpting and embossing techniques. For these processes, the pieces of metal must be held fast in a bed of resin so that sufficient pressure can be applied. *Yani* is a mixture of resin and clay (*jinoko*: see lacquering section) that can be softened to allow a heated metal piece to be pressed into it. For removal the piece can be pried up and it will snap free.

7.5 TECHNICAL PROCESSES:

In this section we will discuss the actual processes used to produce the different styles of metalwork. We will concentrate first on the flat engraved or line punching style (*kebori*) as practised by Sawatari Masaaki. As his techniques include the embossed (*ukibori*) and the cut out (*sukashibori*) styles, we will next mention how these two differ from the basic *kebori* processes. Then we will move on to describe the sculpting style (*jibori*) of Okamura Masao.

"It takes 1 1/2 months to do the complete *kanagu* for a big sized high quality DKH *butsudan*," says Masaaki. He says there is no strict way to do things - you can follow your own way. "If you find a way to do things easier, it's OK," he adds with a shrug.

"I am making *kanagu* for 3 *butsudan* in parallel," he explains. "I do the pattern making (*katadori* or *torigata*) and designs of all the *kanagu* I get orders for in that month. Now I have orders from two local *butsudan* shops here in Hikone and also one from Fukui prefecture." At the beginning of every month he makes the patterns for all the orders and cuts the sheet metal into pieces. He feels pressured at that time, while doing the measuring and planning the designs, but when that is finished he can relax a little and enjoy the punching processes.

"To make patterns using *hori tagane* is the most difficult of all the work and I do it 'concentrating my nerves'. The result I get by punching the rough sketches is different from the rough sketches themselves. The end result is what counts," he continues. "To make the patterns vivid is difficult. Punching a copper plate is very different from drawing on paper. Birds must look like birds and flowers like flowers, as realistically as if they were drawn on paper. When you look at the design you have to give the effect as of a picture on paper."

Having discussed the basic types of metalwork and the tools used in previous sections, let us now look at how these types of work are done, starting with the *kebori* style.

1. KEBORI KANAGU or metal fittings done in hairline engraving (punching):

This is the flat engraved or line-punched style of metalwork found inside the *butsudan*, adorning the drawers, pillars, three shelves (*sandan*), Buddha pedestal (*shumidan*) and inner lattice doors. On the outside of the *butsudan*, it can form the hinges, opening mechanism (*hassou*) and decoration on the doorframe, the upper (*kamidaiwa*) and lower (*shimodaiwa*) parts of the body (*kiji*). This has already been detailed, with pictures, in part 1 - introduction and structure.

OVERVIEW of Masaaki's *kebori* work:

1. pattern making
2. cutting the metal sheeting
3. transferring the pattern (basic shape) with Chinese ink
4. rim punching using straight or curved burins
5. drawing the design inside the basic shape
6. punching the design outlines
7. punching the inner details
8. punching the ground eg fish roe or triangles or *shippou* (**see *Kan* fig.** 21)
9. cutting away the excess metal
10. finishing (shaping and edging)

Kan figure 46: processes of line punching (engraving) style (*kebori*)

1. **Pattern making** (*torigata*): At the time Masaaki receives the order from the *butsudan* shop, he negotiates about the design, the type and thickness of metal and the price, in other words what profit he wants to make. Then he proceeds. "I go to the shop to study the *butsudan* and put a piece of rather thick stiff Japanese paper, such as *minogami* (from Gifu prefecture) onto the cabinet (*kiji*) where the metal fittings will be placed. I rub over the edge with a piece of ink (*sumi*) stick to copy the shape," he explains. "When I get home from the shop, I measure the size of the *kiji* spaces marked on the paper. Then I make up my mind about the length and width of each metal fitting according to tables in my file." He looks in his file and finds the number of pieces he wants based on the size of the *butsudan* (see *Kan* figs. 08, 11.i & ii, 13 and 28), his experience and his tables and all the information he has in his file about how many and how big the pieces should be. "I decided the contents of all these tables myself, using my 20 years' experience. The measurements that I think will produce the best balance (appearance) are all written here," he says shuffling through the pages of his folder. After making this decision, the pattern shapes are cut out. As previously mentioned, *katagami* (see section 7.3: tools) is a suitable quality paper for these patterns.

2. **Cutting the metal sheeting** (*kanetori*): This means measuring, marking (scoring) and cutting the metal roughly to shape using the previously made patterns. The copper sheet is 36cm x 121cm (1 *shaku* 2 *sun* x 4 *shaku*) and the brass sheet is 18cm x 121cm (6 *sun* x 4 *shaku*) so it is cut down to make it more convenient. He scores lines on the plate according to the width and length of *kanagu* and then cuts it. For metal up to 1.5 mm in thickness, he uses cutters (see *Kan* photo 39), and for 2.0mm or more, he punches it with a burin (*kiritori tagane*).

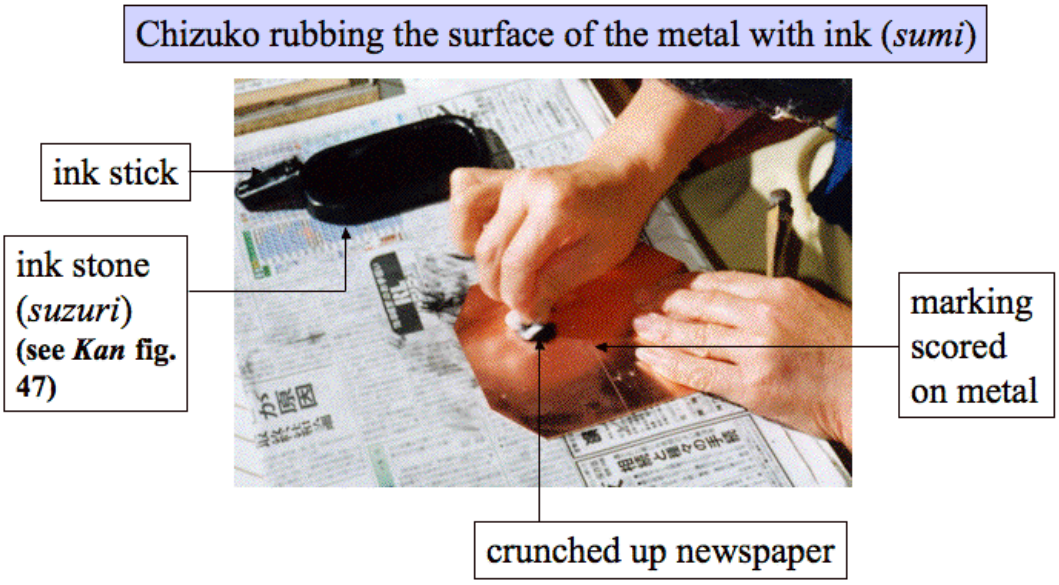
Masaaki cutting copper sheet roughly to the shape he wants

using shears (cutters) held firmly on a stand

Kan photo 42: cutting sheet metal

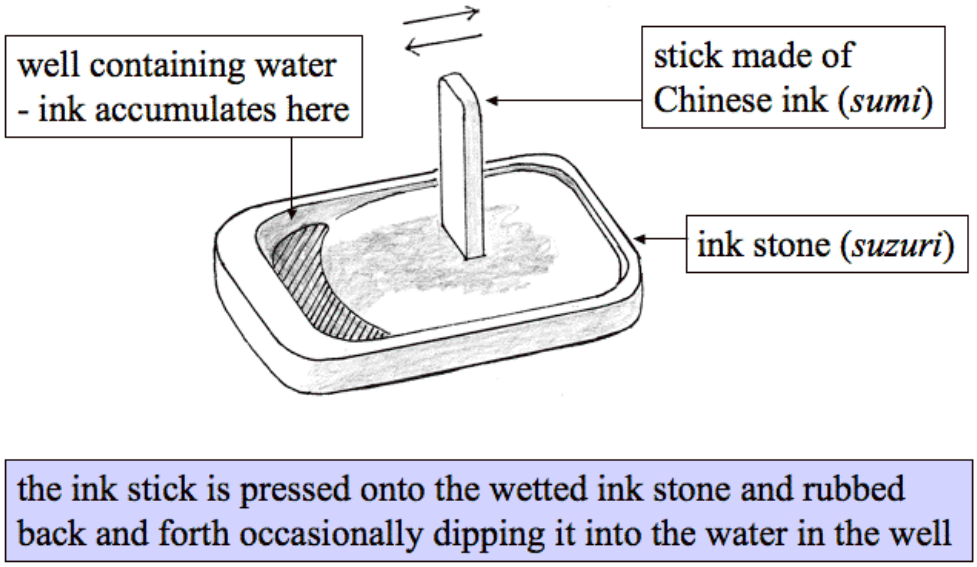
"I leave some space for the edges (*sotsu*) around the metal fittings. This is because after punching the patterns, it is inevitable that some parts are extended a little and some parts aren't. So after finishing punching, I draw a straight line using a ruler again and cut it. So I need to leave some extra metal around the edge. Extension due to the punching process is very little; but drawing a new line and cutting it makes the pieces look more 'finished'. Some metal artisans do their work without leaving this space around the edge."

3. **Transferring the patterns with Chinese ink** (*sumi*): Masaaki's wife, Chizuko, often has responsibility for transferring the patterns. "These days copper sheet has oil on it because it is made by machine," she explains. "So to remove the oily substance, I dip a crumpled newspaper into the ink made using an ink stick and ink stone and wipe the surface of the copper sheet. On a fine day the ink dries quickly so I have to work fast."



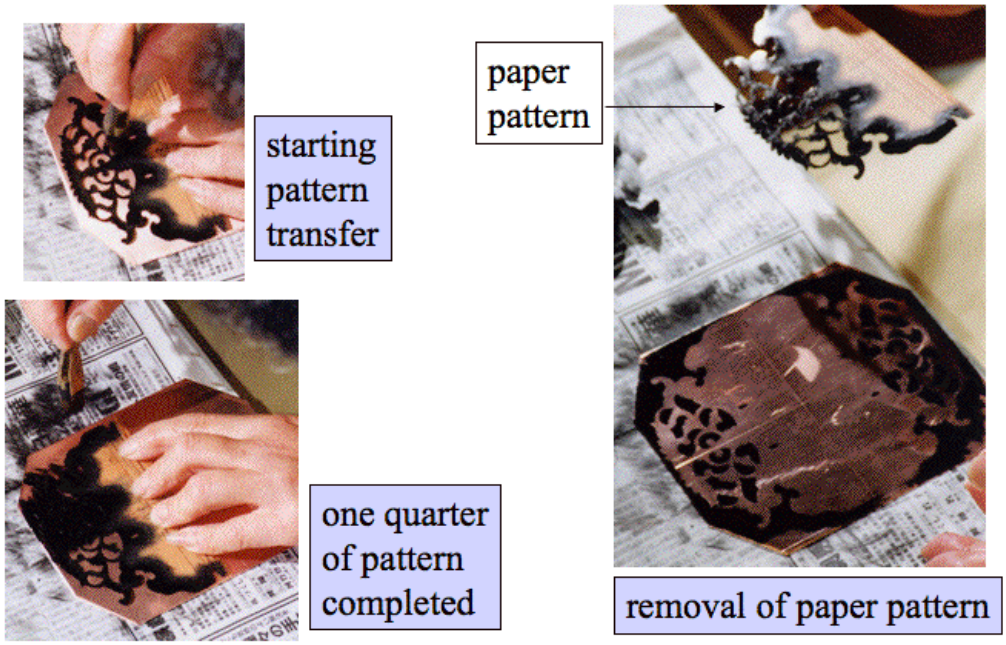
Kan photo 43: removing grease from trimmed copper sheeting

Then she holds the paper pattern onto the metal plate (0.4-3.0 mm thick) and dips a short bristled brush (see *Kan* fig. 44) into the well on the ink stone. “Chinese ink has to be good quality or else it won’t spread well,” says Chizuko. “So we bought the ink stone in Nara, which is famous for calligraphy materials. We buy the best quality ink sticks available in Hikone. Copper sheets have become inferior in quality because oil stays on the sheet. Therefore good quality ink is all the more necessary.”

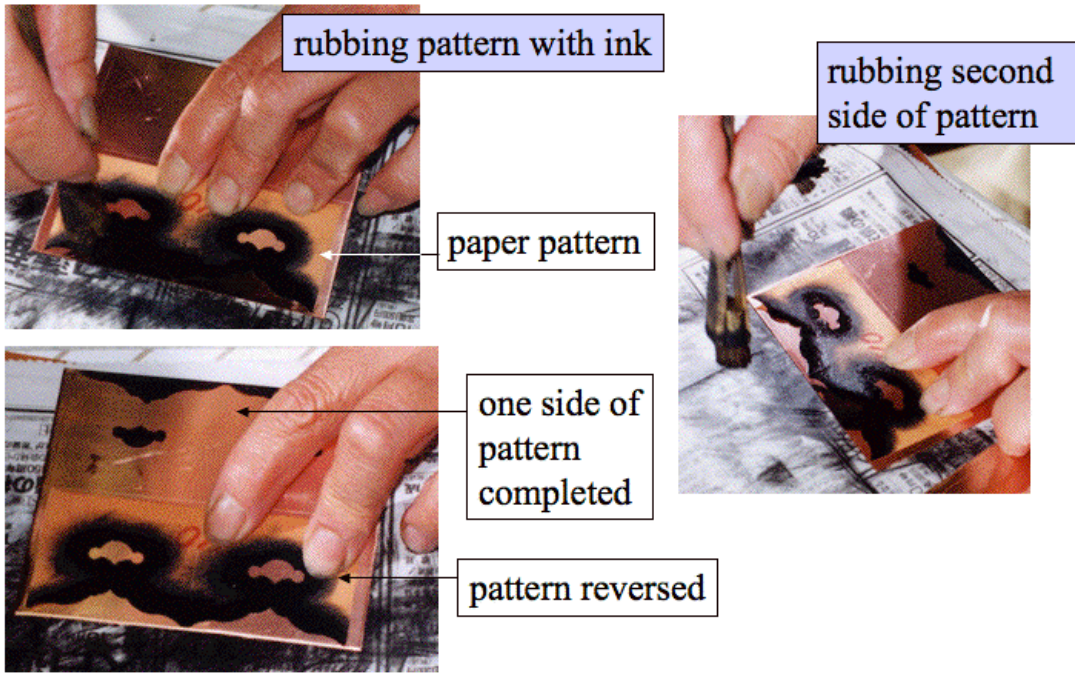


Kan figure 47: making ink

The pattern is rubbed firmly and repeatedly until the mark made by the ink remains on the metal, making sure it gets into all the tiny holes. This is especially important for the door plaque (*hassou*), which has a very intricate border (see *Kan* fig. 26), as Masaaki says: “I have the paper pattern with only the outer border marked. Chizuko brushes around the outside to mark the pattern onto the copper plate. But I sometimes change even the outline depending on my feeling at the time.” The result is a black plate with the shape of the *kanagu* left in its natural colour. After working on one side of the copper, the pattern is reversed and repeated on the opposite side (see *Kan* fig. 06).



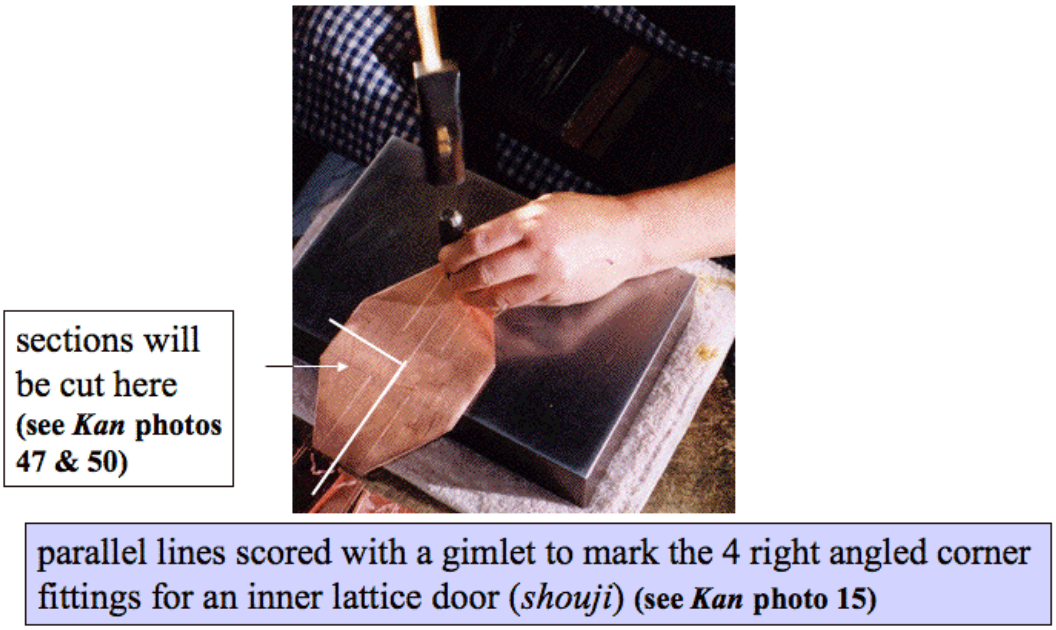
Kan photo 44: marking pattern on copper



Kan photo 45: reversing patterns

An alternative method of marking, where the lines are straight and parallel is to score them with a gimlet. For example to make four metal fittings to be attached to the four drawer corners, Masaaki draws the same 4 patterns symmetrically. Then, before beginning the rim punching he punches the inward pattern (*iribana*) with an *iribana tagane* (see *Kan* photos 33.a & b). He punches it so hard that, when you hold it up,

light can be seen through the punch mark. However, the piece doesn't fall apart because the sides are still attached.

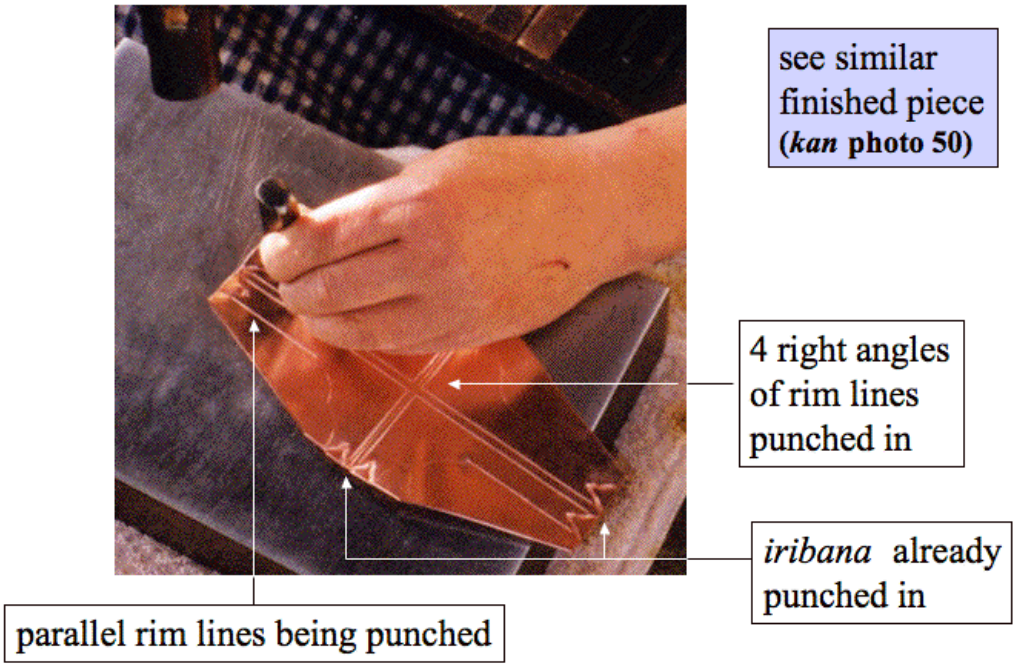


parallel lines scored with a gimlet to mark the 4 right angled corner fittings for an inner lattice door (*shouji*) **(see *Kan* photo 15)**

Kan photo 46: showing parallel lines marked

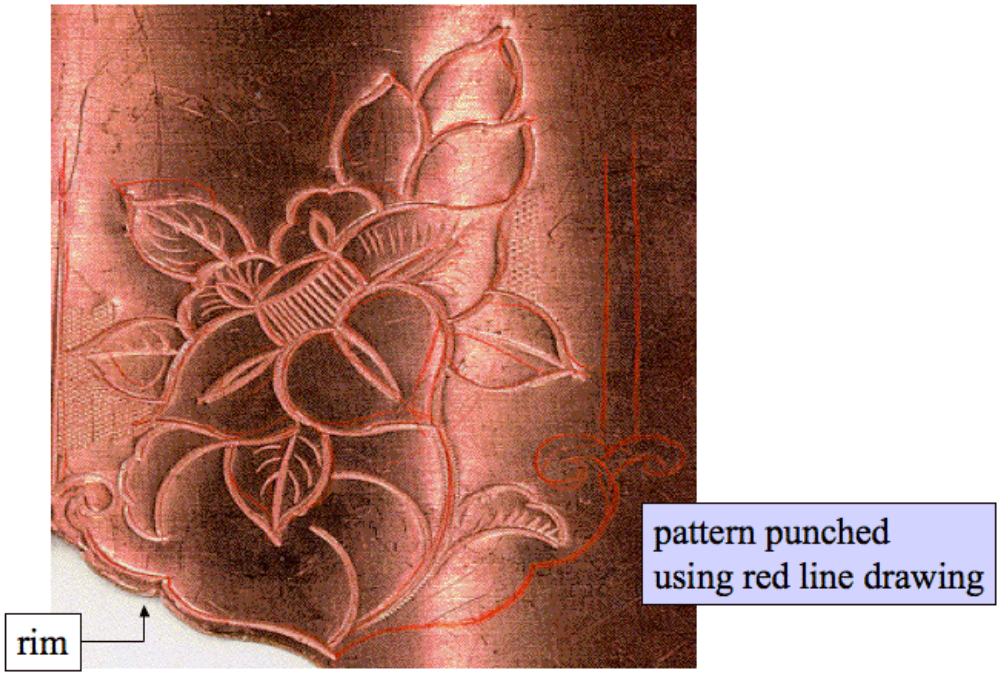
4. **Rim punching** (*heri uchi*): Using a hammer and rim burin (*heri tagane*) the outlines of the patterns are punched deeply to define the final shape of the piece. Masaaki punches each line twice. This is for two reasons. First, since the punch marks overlap a little (similar to *Kan* fig. 50) and are not end-to-end, they gradually extend the line. Second, it deepens the punch mark.

"When I do rim punching on a big fitting, I use a ridged *heri tagane*," explains Masaaki. "If I used the plain one, the punching edge of the *tagane* can easily slip. If I use a ridge-tipped *tagane*, the finished rim line will be soft and natural because the border between the *nanako* and the rim line is vague. Also after gilding, the rim will sparkle a little. In the case of smaller fittings, I punch the rim line with plain tipped *heri tagane*.

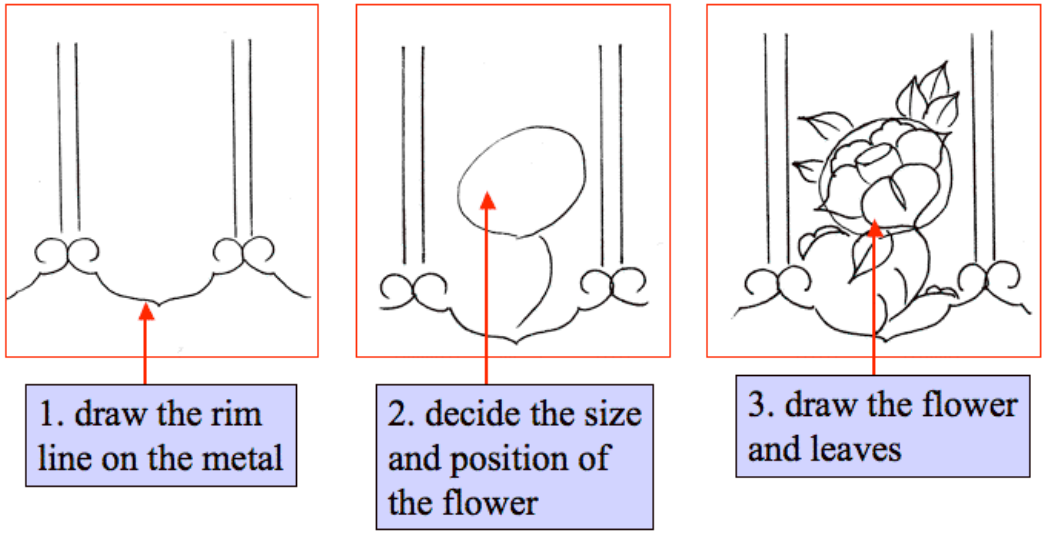


Kan photo 47: punching rim lines

5. **Drawing the design**: For drawing the pattern onto the shaped and marked metal piece, Masaaki uses a double pointed wax pencil – red at one end and blue at the other. He demonstrated on a piece of copper, using a camellia design (see *Kan* fig. 32). First he decides the size and position of the flower. "I draw a line for the central branch and a circle," he says flipping the pencil back and forth in his fingers as the design begins to take hold in his mind. "I decide on the circle size, and position it according to the size of the piece and its outline. And I draw a camellia flower in the circle and leaves around the flower, coming out of the circle, so it looks natural. I base my punching work on the rough sketch (*shitae*) therefore it must be well drawn or else I won't get a good result," he goes on. "I have drawn pictures of the same pattern in big or medium or small sizes hundreds of times each. I can draw them with ease. When I was young I used to make *kanagu* with my father in the day and in the evenings I drew pictures, at my father's suggestion."

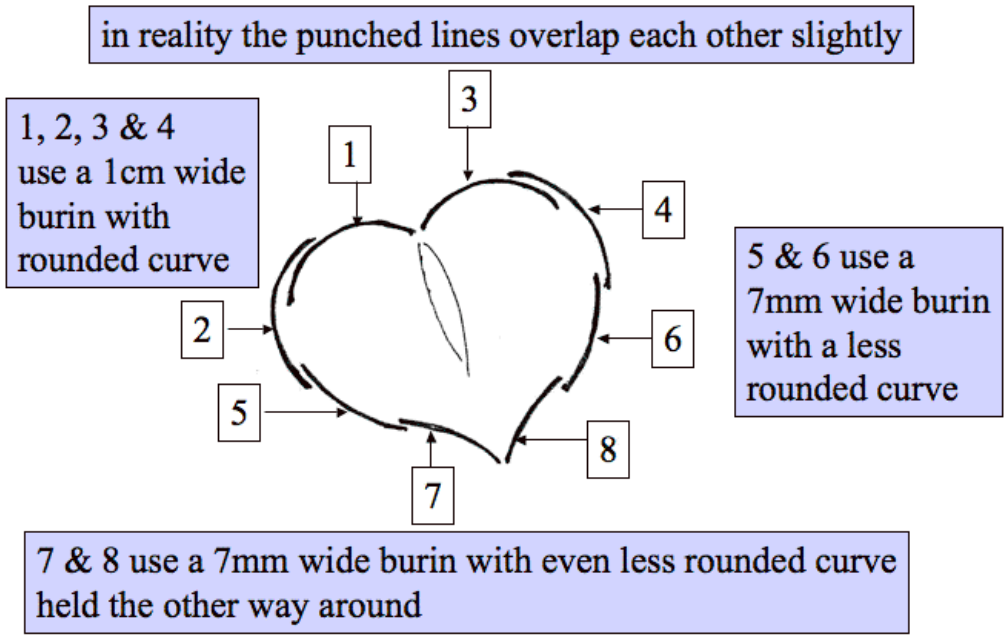


Kan figure 48: copper plate with camellia



Kan figure 49: stages of making the camellia pattern

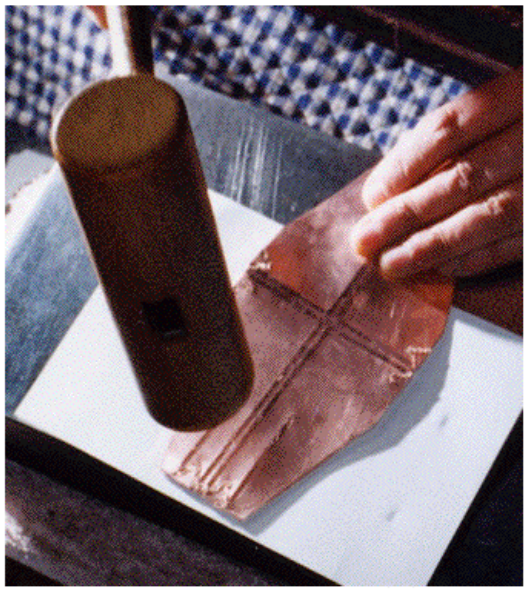
6. '**Rough carving' - punching the design outlines**: Although this is called 'rough carving' it is neither 'rough' nor 'carving' in the sense that we saw in woodcarving and we also find in *jibori* works to be discussed later. Rather it means that the larger parts of the pattern, such as leaves, petals and arabesque lines, are punched in with a hammer and pattern-making burins (*hori tagane*) (see *Kan* photo 28). He chooses the *tagane* carefully, finding one with the same shape as the outline he has drawn, or matching the curve.



Kan figure 50: stages of punching a petal in order

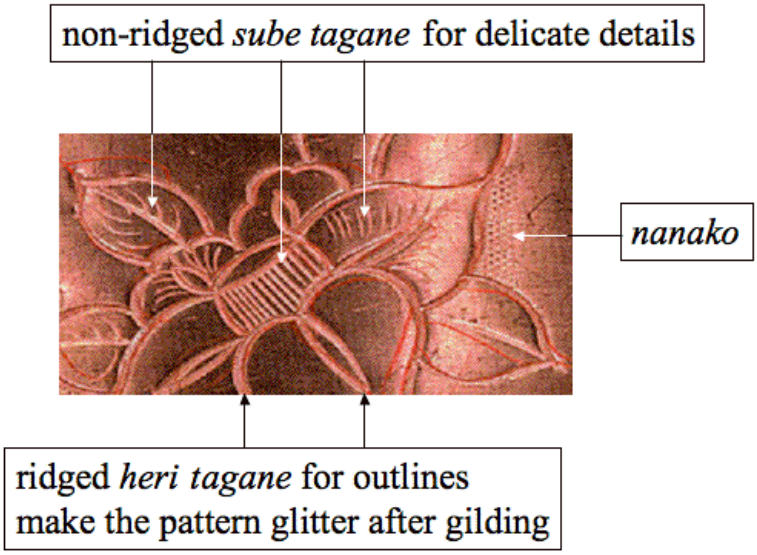
"The punching edge of the *hori tagane* is ridged, because I want to make a punch mark as it would have looked, using a single point punch, like in the old days," explains Masaaki. "And the ridged mark will sparkle after gold plating."

Punching makes the piece go out of shape so Masaaki often uses a wooden mallet to hit both the upper side and underneath to flatten them during the punching process.



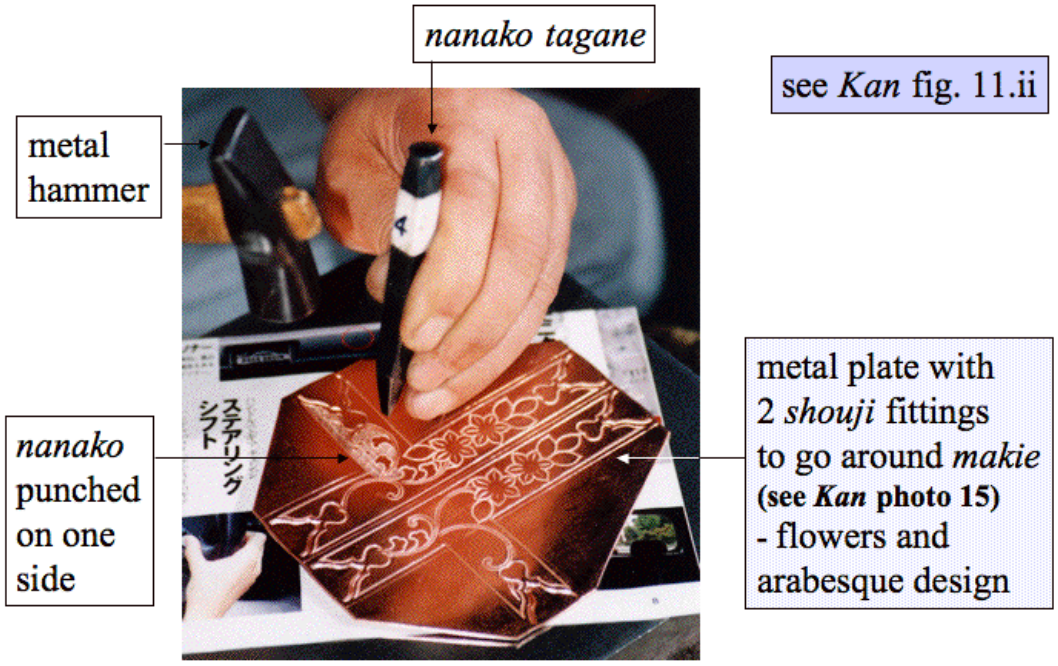
Kan photo 48: flattening the piece with a mallet

7. **Punching details** (*subeire*): Using a hammer and a rim-punching burin (*heri tagane*) or an inner detail burin (*sube tagane*), delicate or elaborate details are added to the design. If stamens, petal details and leaf veins are done with a non-ridged *tagane* it gives a 3D effect to the flowers and leaves.

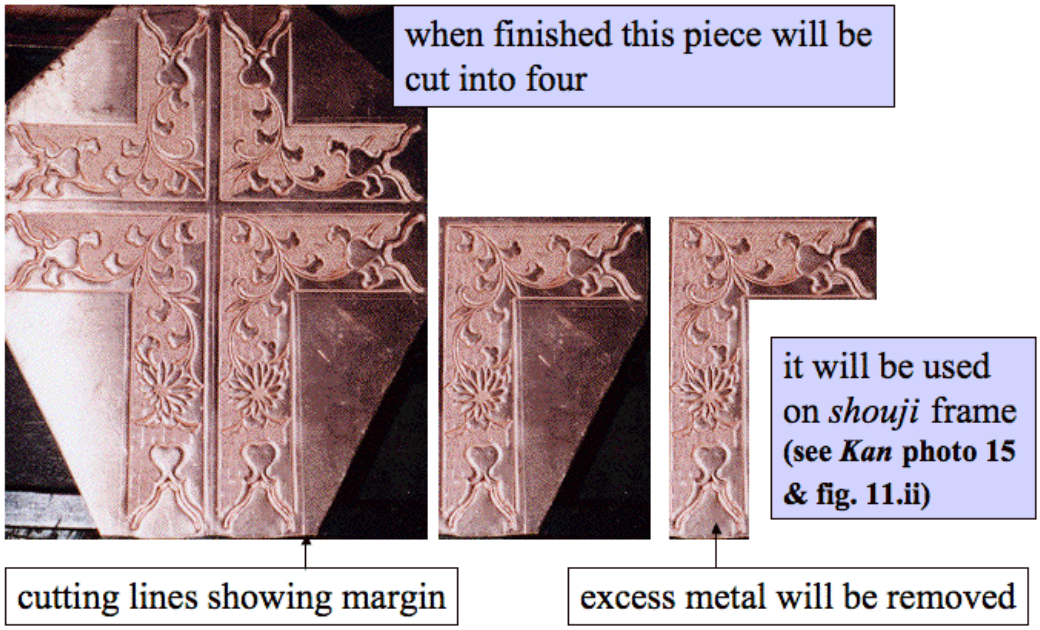


Kan figure 51: delicate internal details

8. **Fish roe ground punching** (*nanako* maki): For *nanako* punching Masaaki puts newspaper on his wooden block and puts the copper sheet on the paper. It functions like a cushion so that the tip of the *nanako tagane* does not get damaged. It also prevents the copper sheet from sliding and makes the punching clear. A *nanako* burin looks like a waffle, with little depressions, so when punched it produces rows of little mountains (or nibs), like a waffle iron (see *Kan* fig. 22). The number of depressions on the *nanako tagane* differs. The resultant standard nib patterns are 4x4, 4x5 and 4x6; but most of his are 4x4.The size of the nibs also varies and it is important to match the nib size with the size and complexity of the pattern. With the hammer in his right hand and the *nanako* burin in his left, Masaaki punches the nibs between the pattern and the rim moving quickly down the left side of the design, turning it and then moving down the other side. This technique allows for the evenness of the design essential to its beauty.



Kan photo 49: *nanako* punching on one side



Kan figure 50: *nanako* punching almost finished

"I put a numbered sticker on each *nanako tagane* depending on its size. From 1 (smallest) to 7 (biggest) are for *butsudan*, 8 to 10 are for temple fittings. I choose the *nanako* punch that seems in the correct proportion for the delicacy of the flower. I use 6 most commonly. If the pattern is too tiny, it takes too long to fill the space; if it's too big, it swamps the design. If it's right, the balance is good and it fills the space quickly," he explains.

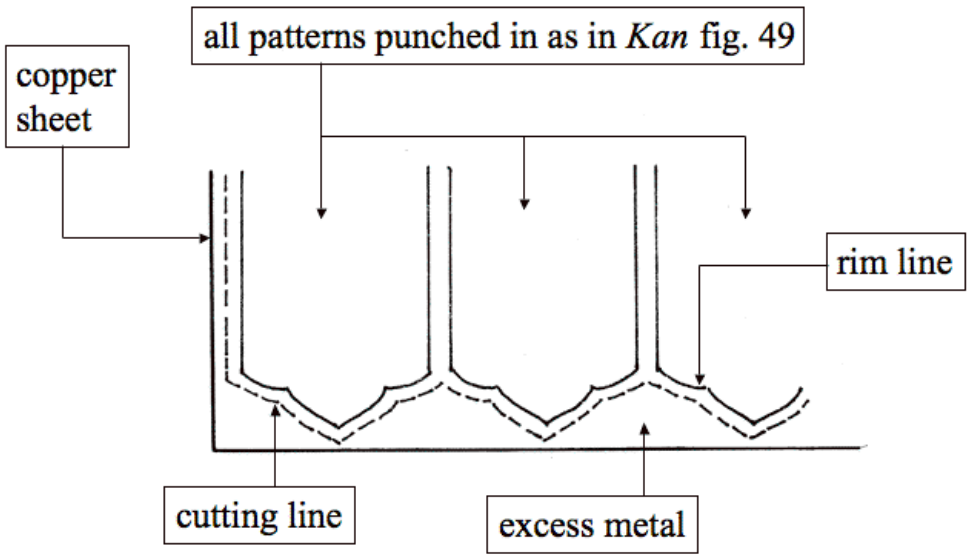
Masaaki feels strongly about the importance of this ground punching, especially the *nanako* design, because of its historical connection. "In very early times they'd have used a single pointed burin to make all designs," he says. "Then after that they used two types. One was a single *nanako*-point burin and the other type was a single one of about 0.3mm wide and less than 0.1mm thick. Using the corner of this, moving it steadily along a line and hitting it with the hammer you could get a ridged line looking like one hit with a single ridged *hori tagane*." [FN 5]

Regardless of his feelings for the traditional *nanako* pattern, as we have seen in section 2 previously, he has devised his own styles of ground punching such as triangles and *shippou* (see *Kan* figs. 24 and 25.b & .c)

9. **Cutting away excess metal**: When the punching is complete, the excess metal from around each piece is cut away. For this, he turns over his metal block to the roughened and scratched cutting side before punching along the cut-lines. As mentioned before (see *Kan* fig. 33), one side of the iron block is smooth for pattern punching and the other side is rough because of wear and tear from cutting. This is because the hammer for cutting is heavier and the head is bigger than that for pattern punching. In addition, he hits the metal more strongly. "On the cutting surface it gets

many scratches and will become uneven," explains Masaaki. "So if I do the pattern punching on this side, the roughness of the surface will come through onto the pattern when it is punched."

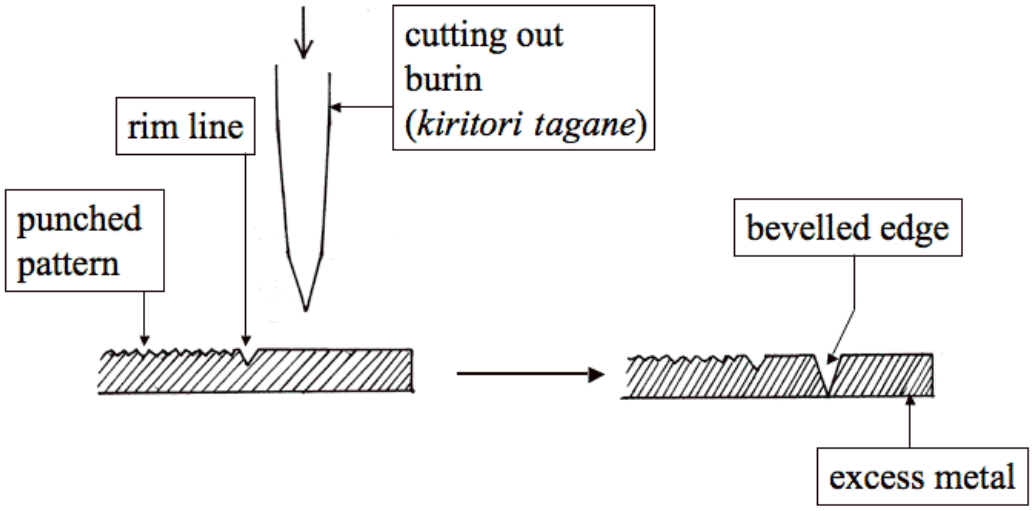
One of the most important things to affect the final appearance of the piece is the margin left outside the rim line. After punching the design and then the *nanako* within the rim, he cuts the edge off leaving a margin of even width outside the rim line. After punching or cutting all the edges, the excess metal is removed by hand.



Kan figure 52: cutting the margin outside the rim line

Straight lines are cut with cutters (shears) for metal under 1.0mm thick and with cutting burins (*kiritori tagane*) if it is more. Masaaki hits the *tagane* hard and goes right through each place before moving on to the next. In all cases of cutting curves or circles, Masaaki uses *kiritori tagane*, because it would be difficult to get a smooth line with scissors. For a circle with a diameter of 0.5cm or less he uses a circular tipped *kiritori tagane*. For larger curves or circles he uses a curved cutting out burin, punching around in overlapping arcs until it is completely cut through.

The cut edge is slightly slanted or bevelled. Although Masaaki uses the *kiritori tagane* straight and hits it straight, the blade is angled so the cut edge will be angled.

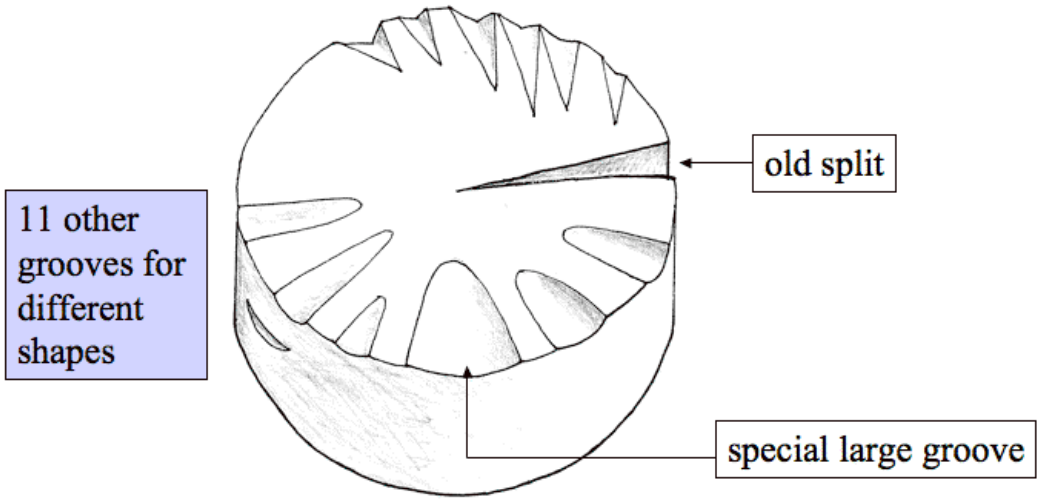


Kan figure 53: making the bevelled edge

10. **Finishing**: Finally if it is to be attached to the flat surface of the, it is given a slight curve to make a snug fit. Then the edge of each piece is filed and smoothed. If it is to be either a hinge or a pillar fitting, it must be rolled. We will look at these aspects separately.

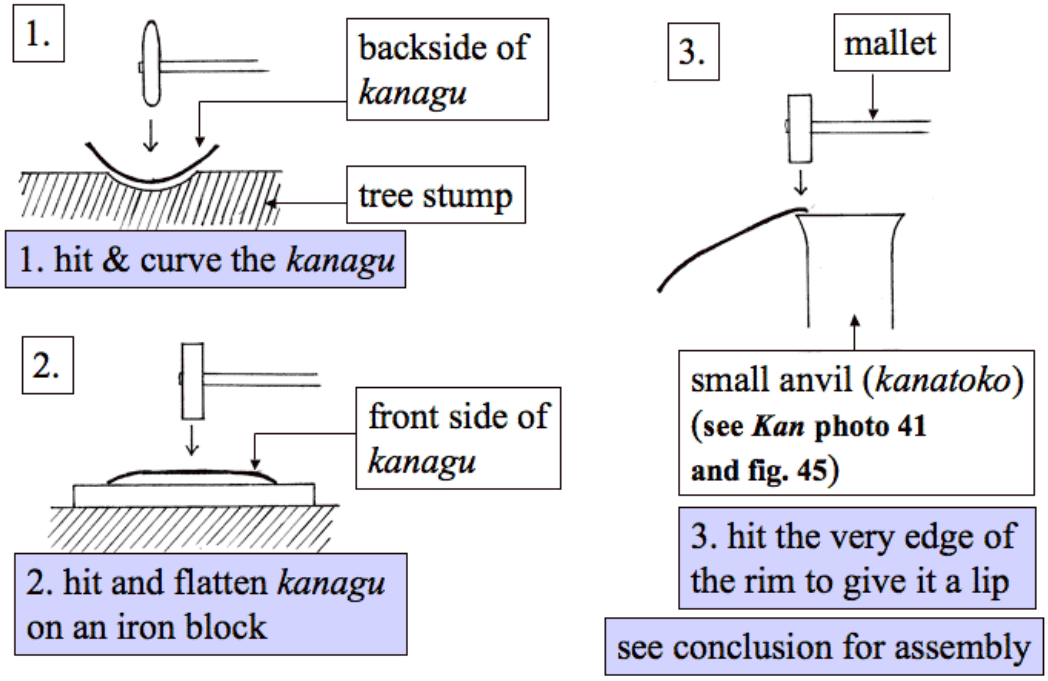
A. **Curving the pieces**:

Kanagu that will be fitted to the lacquered or gilded surfaces of the *butsudan* look flat when *in situ*, but actually they are a little convex to fit snugly without any lifting at the edges. The convex curve will be made in one of the tree stump grooves using a metal hammer with a convex shaped head. Ranging around the outer edge, there are 11 grooves of different shapes (widths and depths) for 11 different kinds of curving, for various *kanagu*. There is also one bigger dented surface for larger pieces. The head of the hammer has two different sizes of curve and is rounded in both directions to prevent the metal being damaged. For more details on hammers please see the tools section (see *Kan* fig. 41). Depending on the width of the fitting he decides which groove or which hammer to use.

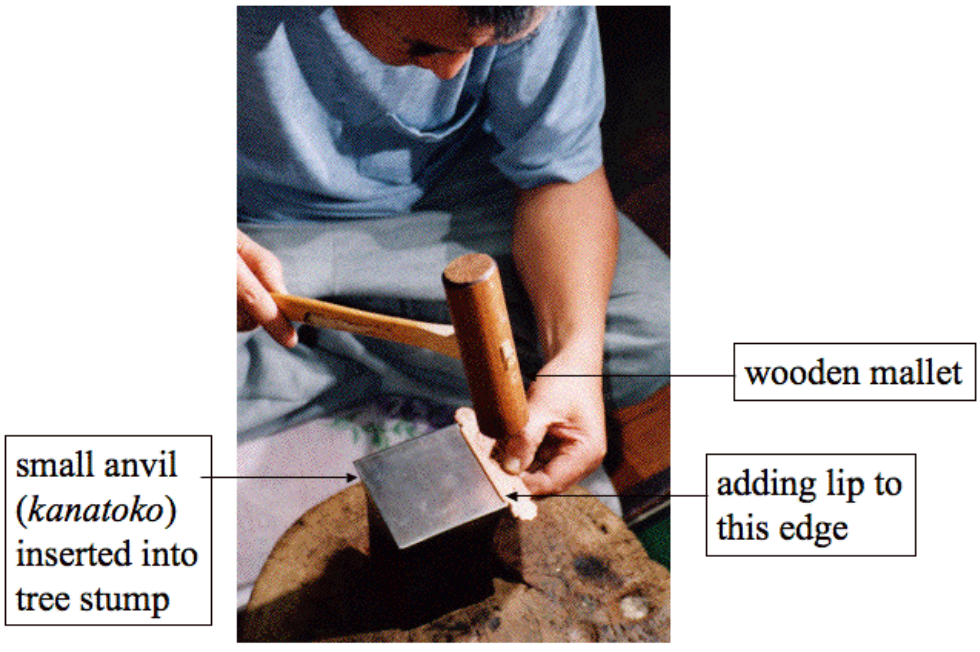


Kan figure 54: grooves in tree stump for curving *kanagu*

To get the convex shape, Masaaki turns the piece upside down and gently hammers it with a rounded metal hammer into the shaped groove. Then he puts the convex fitting on an iron block and hits the top with a wooden mallet to flatten it a little. Finally, using a small finishing anvil (*kanatoko*), inserted into a hole in an oval shaped tree stump (see *Kan* photo 41) he hits the rim of the *kanagu* a little to bend it in. This is to give it a lip so that it fits well to the *butsudan* surface (see conclusion).



Kan figure 55: making the curve on *kanagu*



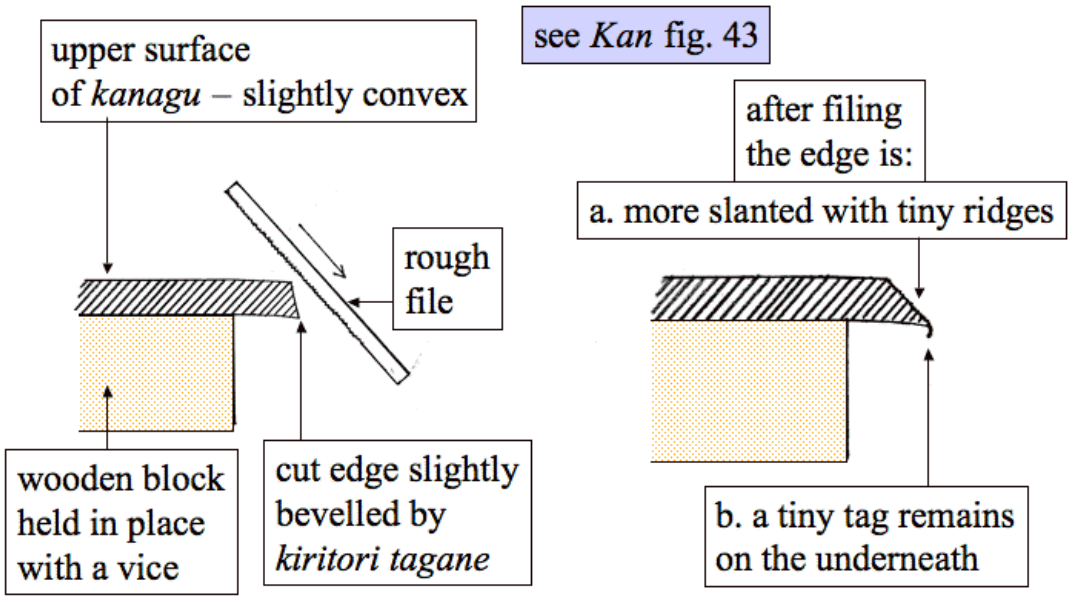
Kan photo 51: adding lip to the edge of *kanagu*

B. **Finishing the edges**:

In the case of metal with a thickness of about 0.7mm or less, no further finishing is necessary for either straight edges cut off with shears and curved edges cut off with *kiritori tagane*.

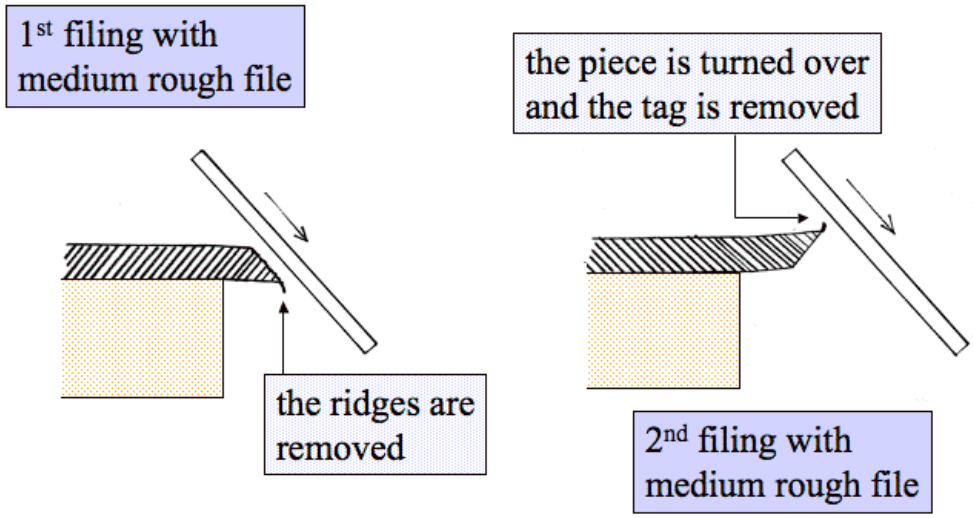
As for thicker metal cut with *kiritori tagane*, the edges are rough, sharp and dangerous to handle. The following finishing process makes the plate smooth and also makes it seem thicker and firmer.

(i) Working from the top surface downward, the edge is filed to make it more slanted with a rough (*arame*) file.



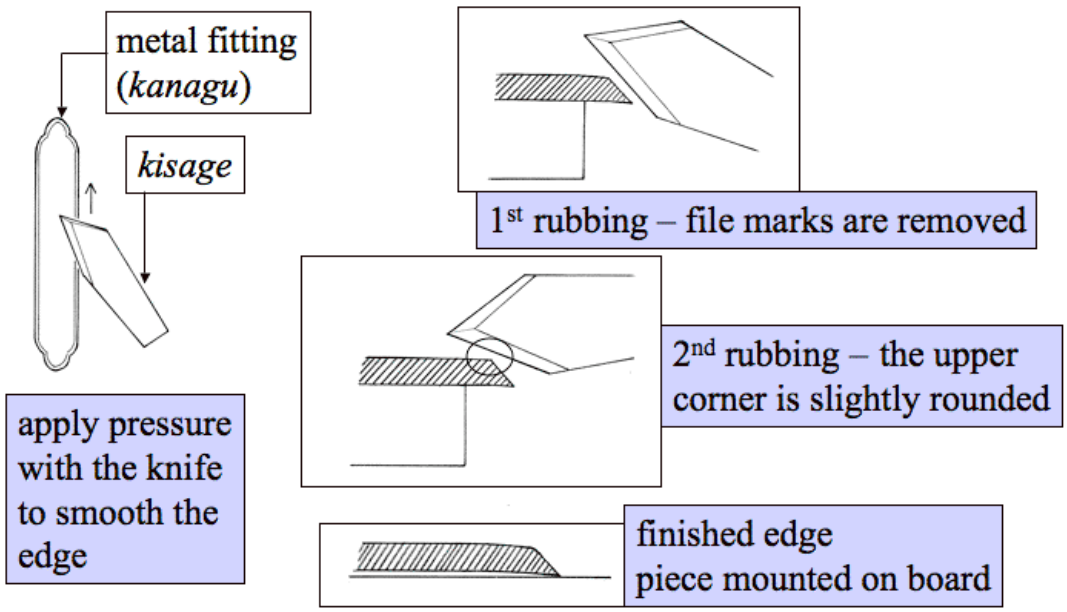
Kan figure 56.a.i: stages of filing the edge of the *kanagu* (using rough file)

(ii) Again working downwards from top to bottom, the ridges left by the rough file, are removed using a medium-rough (*chume*) file. Then the fitting is turned over and the tiny tag remaining on the back surface from the rough filing is also removed.



Kan figure 56.a.ii: stages of filing the edge of the *kanagu* (using medium rough file)

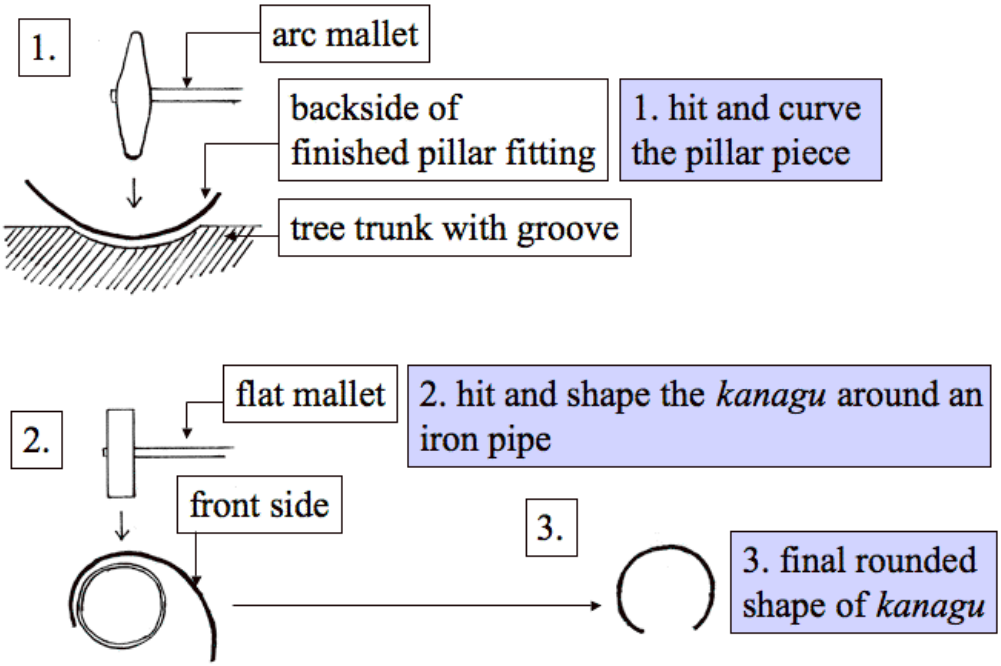
(iii) With a stone blade (*kisage*) looking rather like a big knife, Masaaki presses the blade onto the slanted edge of the metal and slides it evenly sideways. He does this once to remove the file marks and make it smooth; and a second time, using the blade on the upper corner, to round it slightly.



Kan figure 56.b: final stages of finishing the edge of the *kanagu* with a knife (*kisage*)

C. **Rolling pillar *kanagu***:

Firstly the pieces are slightly rounded in the grooves of the tree stump, using an arc mallet (see *Kan* fig. 42). Then they are finished off around a pipe (for *butsudan kanagu*) or a telephone pole (for temple *kanagu*).

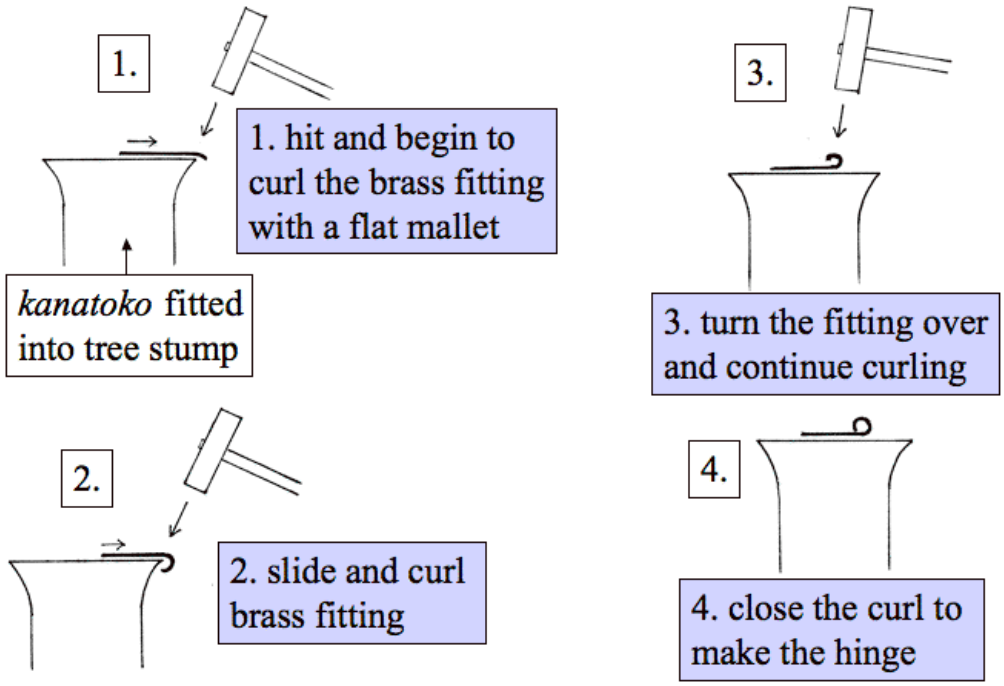


Kan figure 57: shaping rounded pillar *kanagu*

D. **Making the hinges**:

Although Masaaki thinks of the hinge making processes as functional in comparison with the more artistic techniques used in making beautiful fittings, they are nonetheless important.

Again he fits the hinge-making or small finishing anvil (*kanatoko*) into a hole in one of his tree stumps. Because the *kanatoko* is wider at the top than the bottom, the upper surface overhangs providing a lip where the hinge can be curled. Masaaki puts the brass (all hinges are weight bearing and therefore made of brass) *kanagu* on the edge of the small *kanatoko*, and hits it, little by little moving it farther over the edge to get a rounded curve. Then he wraps it around a stick and taps it to close the circle, thus making a hinge.

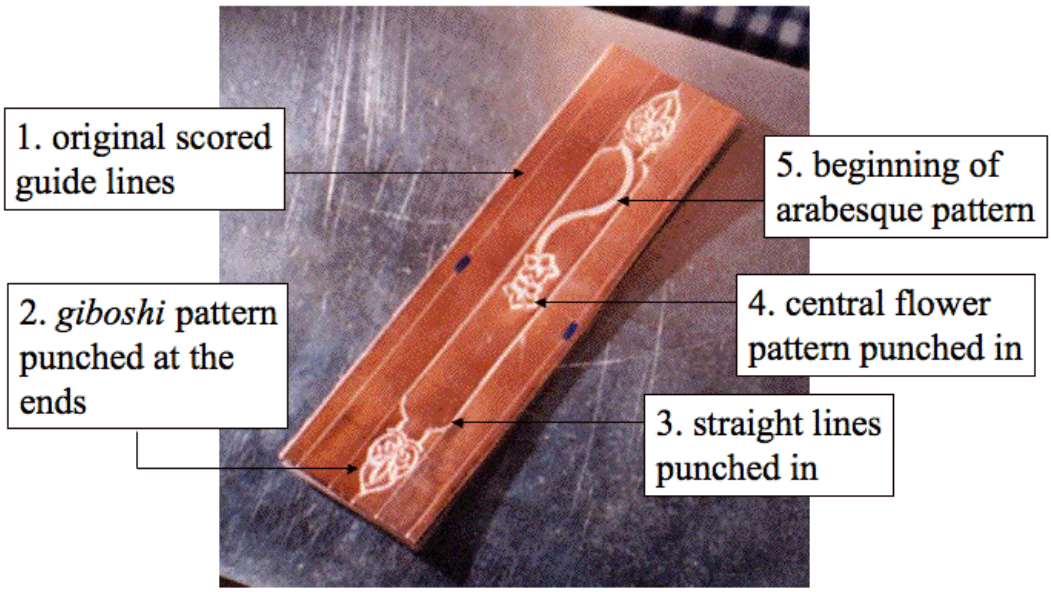


Kan figure 58: making a hinge

This completes all the technical stages of making fittings using Masaaki's *kebori* style. Now let us follow the making of one piece from start to finish. This piece will be put on the central bar of the inner lattice door (*shouji*) (see *Kan* fig.11.i and photo 50).

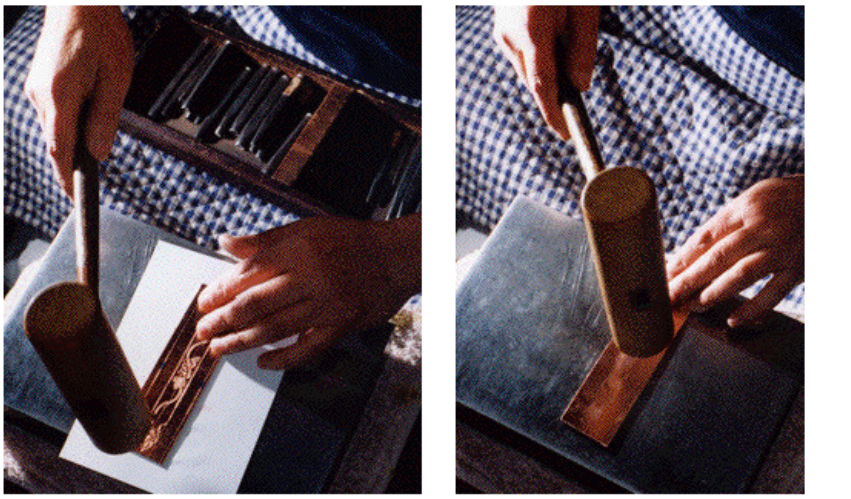
1. He first decides what thickness of metal to use, then the width and length. The thickness of the copper plate is 0.8mm. The width is 9mm (3 *bu*), and the length is 10.9cm (3 *sun* 6 *bu*). He draws lines on the copper plate with a gimlet, using a metal right-angle ruler. The shape is made with parallel lines, so marking the pattern is quite straightforward.

2. Since the piece is small, he uses a newel post (*giboshi*) burin (see *Kan* photo 30) to punch the shape at each end. For bigger fittings, he uses a paper pattern that his wife paints on using Chinese ink (see *Kan* photo 45). Then he punches the straight line, between the newel post ends, using a straight edged burin.



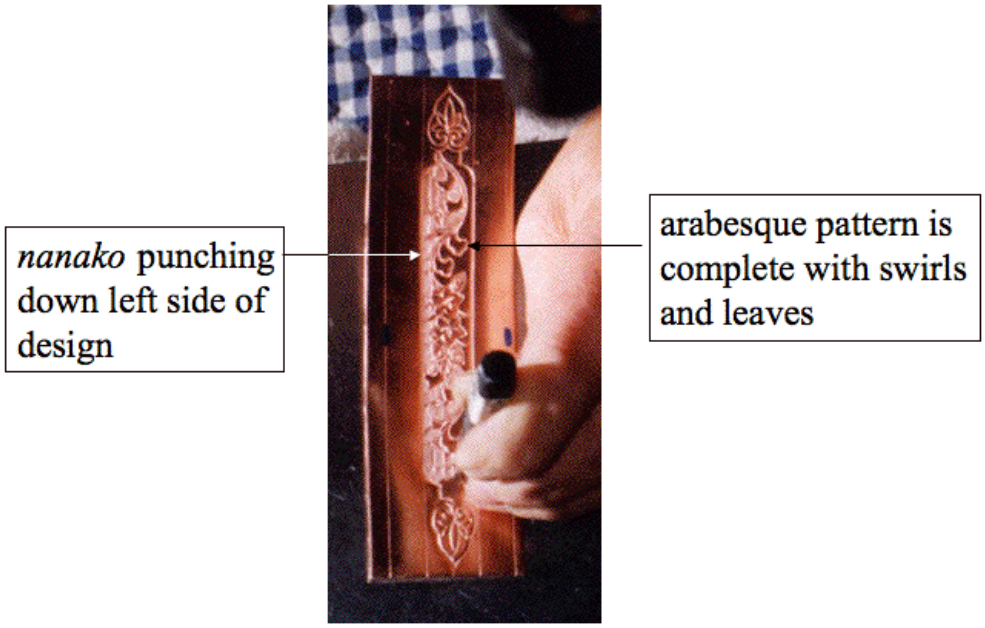
Kan photo 52: starting sample piece (stages 1 – 5)

3. Then the important thing is to decide what pattern is to go into this basic shape. He chooses a flower with leaves and a swirling arabesque (*karakusa*) design. He draws the design into the space trying to match the pattern with his *tagane*. "When the curves of my *hori tagane* match the curves of the newly designed *karakusa* pattern, it's relatively easy to punch the pattern, even if the design looks difficult," he explains. "When the new design doesn't match any of my *tagane* I will change the design a little to fit. If I can make a good design and it matches with my *tagane* it's best. But that kind of thing would only happen a few times in my life." If the designs he creates matche the size of the burins he can produce good pieces at low cost. Occasionally he taps the front and back surfaces of the work with a mallet to flatten them, or hits the end of the handle of the hammer on the metal block to force the head down and make sure it isn't going to fly off.



Kan photo 53: flattening the piece, with wooden mallet, as work progresses

4. For *nanako*, he punches all down one side of the arabesque pattern. He turns the piece around so that he is always punching down the left side of the pattern. He holds the *tagane* in his left hand and the hammer in his right.



Kan photo 54: *nanako* punching

5. Then he punches a swirling pattern down each side of the piece.

all the internal designs are finished

Masaaki is adding swirling design outside the main shape

Kan photo 55: adding external design

6. Now that the punching is finished he cuts the piece out of the surrounding metal using a *kiritori tagane*.

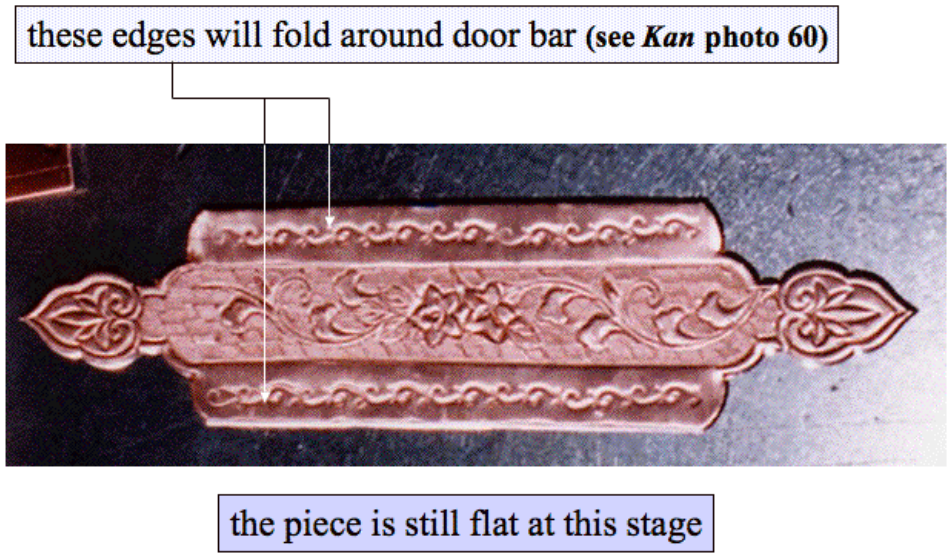
brass plate with cutting marks

starting to cut the *giboshi* end

finished piece

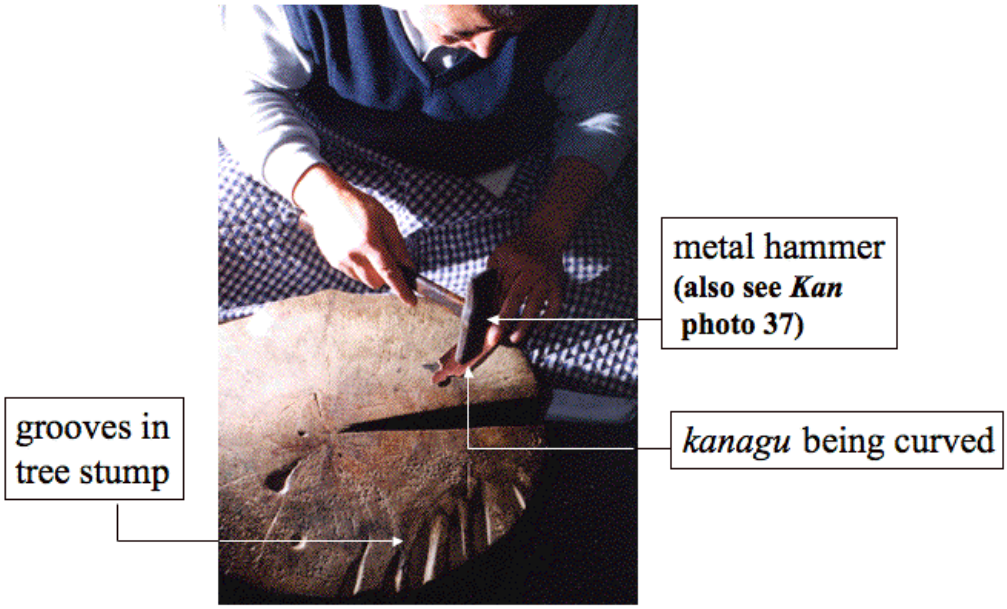
cutting continuing

Kan photo 56: cutting the piece out with *kiritori tagane*

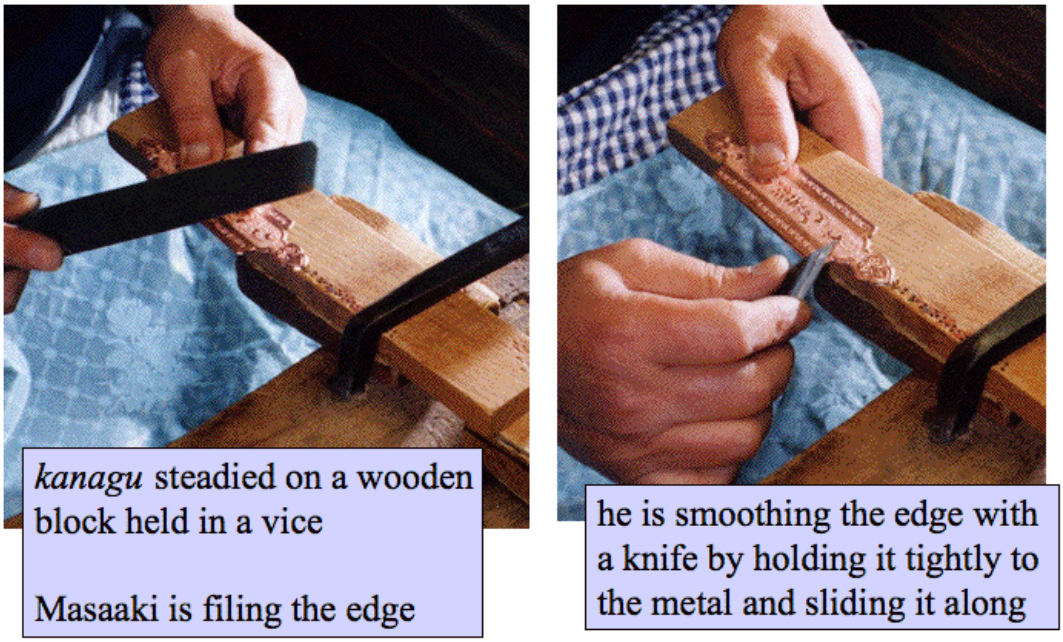


Kan photo 57: finished work completely cut out

7. Finally the piece is shaped in the tree stump groove. Then holding it against a wooden board Masaaki files and bevels the edges, then smoothes them with a knife.

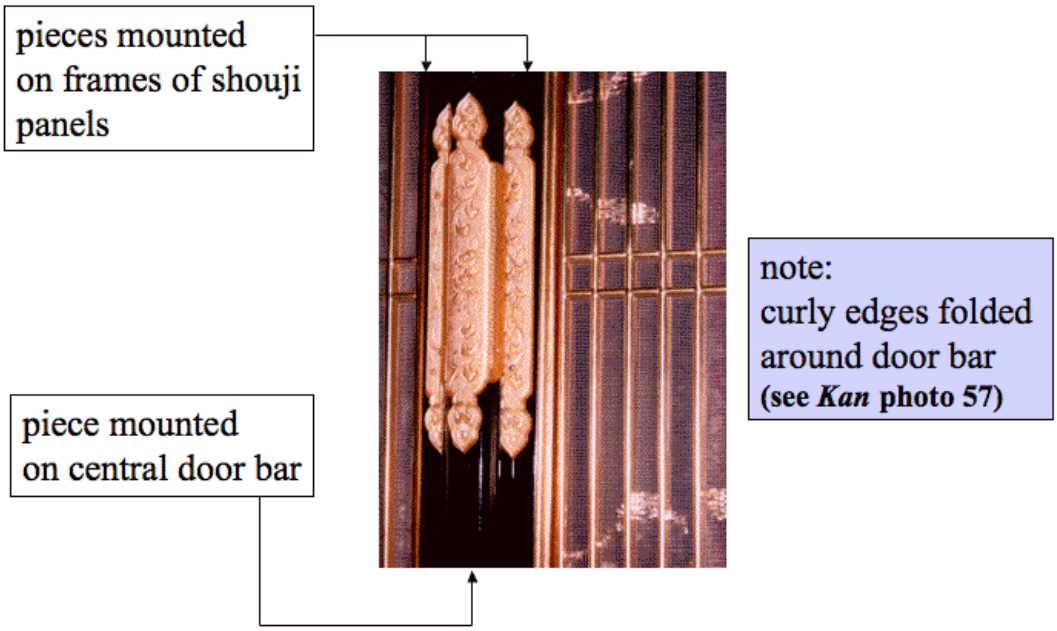


Kan photo 58: curving the *kanagu* in tree stump groove



Kan photo 59: finishing the edges

To see how these pieces are attached to the *butsudan* please refer to the end of this section. Assembly (*kumitate*) is dealt with at the end of each section and will be summarized in the final conclusion. As mentioned earlier, the pieces are returned to the manufacturer who will send them for gold or silver plating. They will then be mounted on the *butsudan*.



Kan photo 60: prepared *kanagu in situ* on the central bar of *shouji* (photo courtesy Sawatari Masaaki)

Now that we have looked at Masaaki's flat engraved (*kebori*) style of work let us briefly note the differences to be found in his embossed (*ukibori*) and cut out (*sukashibori*) styles.

2. UKIBORI KANAGU or metal fittings done in a cold embossing technique:

As described previously, this *ukibori* style of metalworking is different from the flat engraved style (*kebori*) in that some embossing is done but without the use of heat (annealing), so for simplicity we will call it cold embossing. The pieces are made for the same parts of the *butsudan* as those made using *kebori*. Because the metal hasn't been annealed and is therefore quite hard, the height of the imprint is less than that of the sculpting style (*jibori*) and there is no need to embed the metal pieces in resin while working. The metal used for *jibori* techniques, to be discussed next, has been softened with heat and must be fixed into a resin bed to hold it steady while being worked, will be referred to as hot embossing. Thus *ukibori* is a technique somewhere between *kebori* and *jibori kanagu*.

"*Kebori*," explains Masaaki, "is expressed only with lines so it's all the more difficult. In a way, it is a starting point for *ukibori* and *jibori*. If the lines are not firm and clear we can't get good results in the embossing stage."

Doing different types of punching can produce interesting effects. Flowers or leaves can be made to look more distant by making them smaller (see *Kan* fig. 07), and punching or embossing them more lightly. On the other hand, nearer parts of the design are bigger, punched more strongly or embossed more deeply. Various combinations of these techniques can be used to produce appealing results.

The processes of *ukibori* style *kanagu*: As a reminder, these will simply be listed where they are the same as the *kebori* style. Only where they differ will details be given (see *Kan* fig. 46 and text). However we will provide a complete overview of this style here.

OVERVIEW of Masaaki's *ukibori* work:

1. pattern making
2. cutting the metal sheeting
3. transferring the pattern (basic shape) with Chinese ink
4. rim punching using straight or curved burins
5. drawing the design inside the basic shape
6. punching the design
7. punching the inner details
8. punching the ground eg fish roe or triangles or *shippou*
   (**see *Kan* fig.** 21)
9. embossing
10. cutting away the excess metal
11. shaping and finishing of the edges

Kan figure 59: processes of the cold embossing style (*ukibori*)

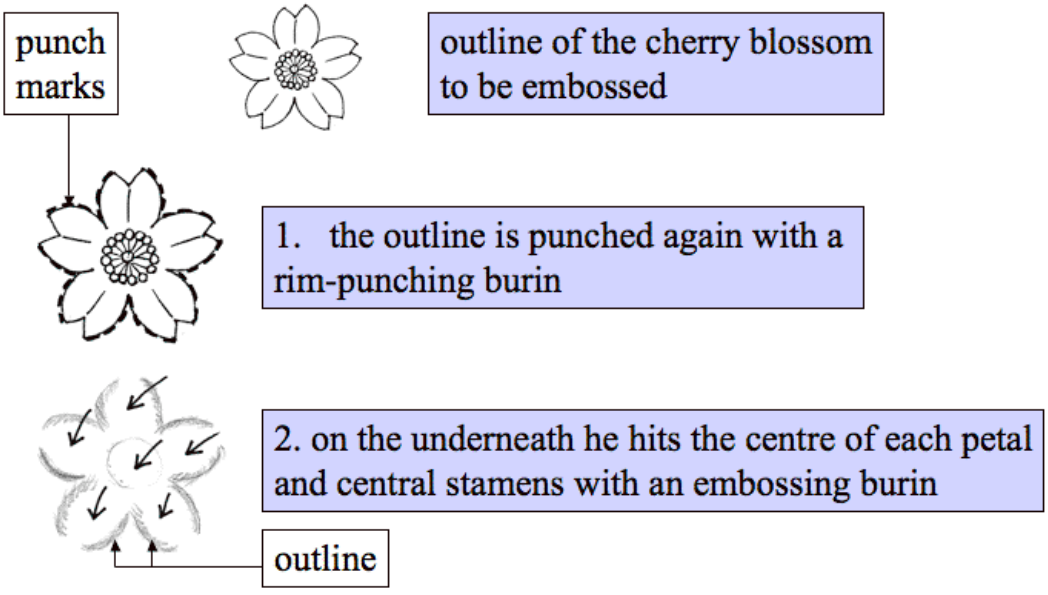
1. The pattern is made (*torigata*).
2. The metal sheeting is cut to shape.
3. The paper pattern is copied onto the metal with Chinese ink.
4. The rim is punched (*heriuchi*).
5. The design is drawn.

6. The design is punched onto the front surface of the metal. In our demonstration example, Masaaki uses two whole-pattern burins (*moyou tagane*) to make a cherry blossom design on the top surface of the metal. One burin has five petals and the second has just the central stamens.

7. The fine details are punched in (*subeire*).
8. The fish roe (*nanako*) background is punched in.

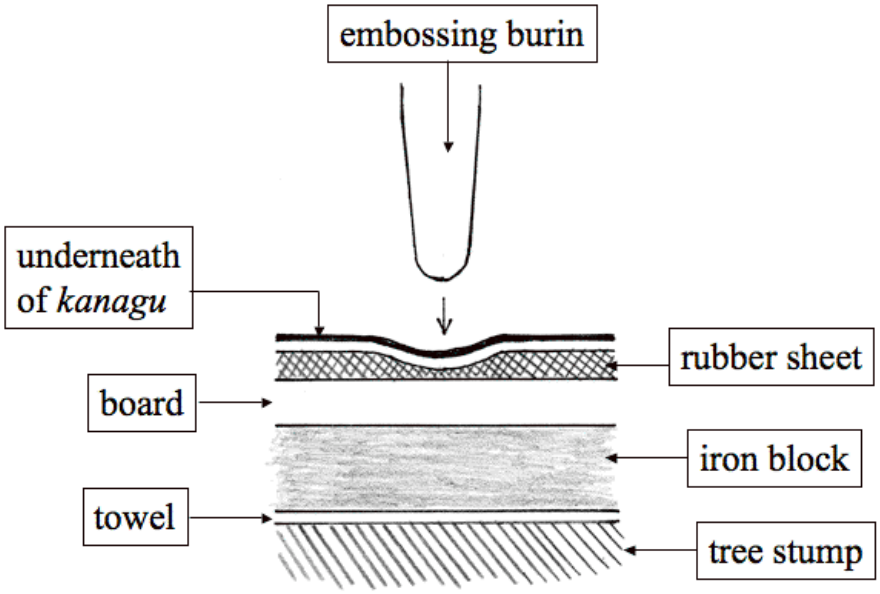
9. Embossing is done on central, conspicuous or attractive small parts of the design, such as flowers, birds or clouds. Since this is where the techniques differ from *kebori*, we will discuss it in more detail. Embossing is done on a tree stump with an iron block and a wooden board on top and a layer of rubber on top of that (see *Kan* fig. 33).

The pattern (as described in 6 above) appearing on the back surface is rather vague, so firstly he hits it again, using a thin (sharper) rim-punching burin (*heri tagane*), but this time in separate sections, rather than as a whole. This is especially important when the metal is thick or the whole-pattern burin is large. To get effective embossing, the raised part must be within the punched outline, so it must be clearly visible from the back.



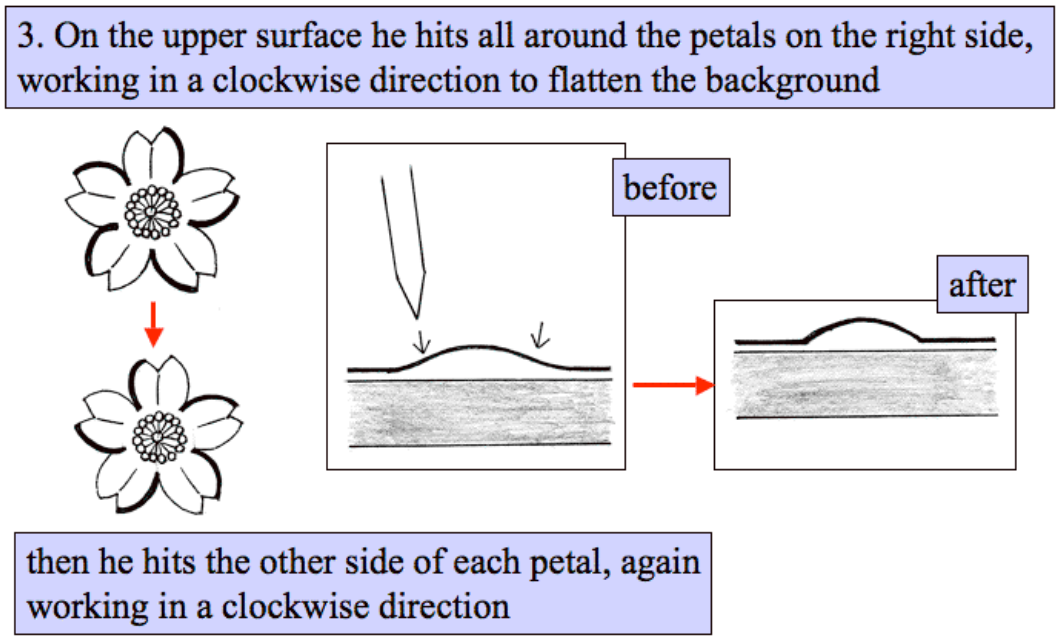
Kan figure 60.a.i: embossing processes for *ukibori* (Masaaki's work)

Secondly, he turns the piece over and from the underneath he hits the centre of each petal with a rounded single-point embossing burin to shape each petal into a smooth curve (see *Kan* photo 34)



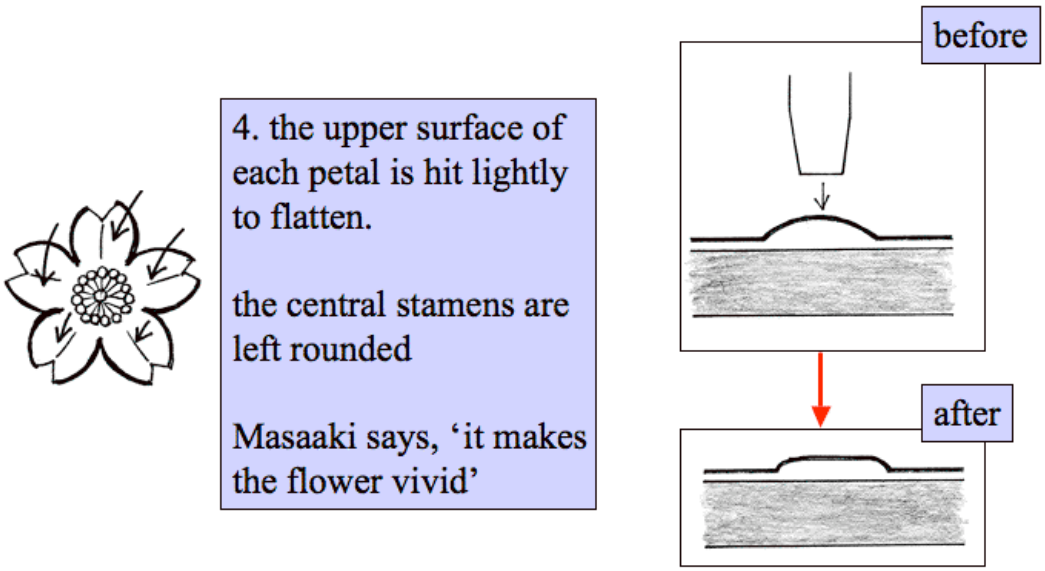
Kan figure 60.a.ii: arrangement for embossing of *ukibori* kanagu

Thirdly, on the upper surface, he uses a half rounded burin to hit the outline of each petal. He hits around the right side of each petal, then around the left. This is to make the background flat again.



Kan figure 60.b: Masaaki's *ukibori* embossing continued (flattening the background)

Finally, on the upper surface he hits the embossed part of the pattern lightly with a blunt *tagane* to flatten it a little.



Kan figure 60.c: final stages of embossing

As with the other processes, he has to flatten the background occasionally so that it is nearly at right angles to the raised pattern, otherwise it will not fit flush against the lacquered surface. To do this, he hits around the finished pattern from both the upper and under sides with a flat mallet.

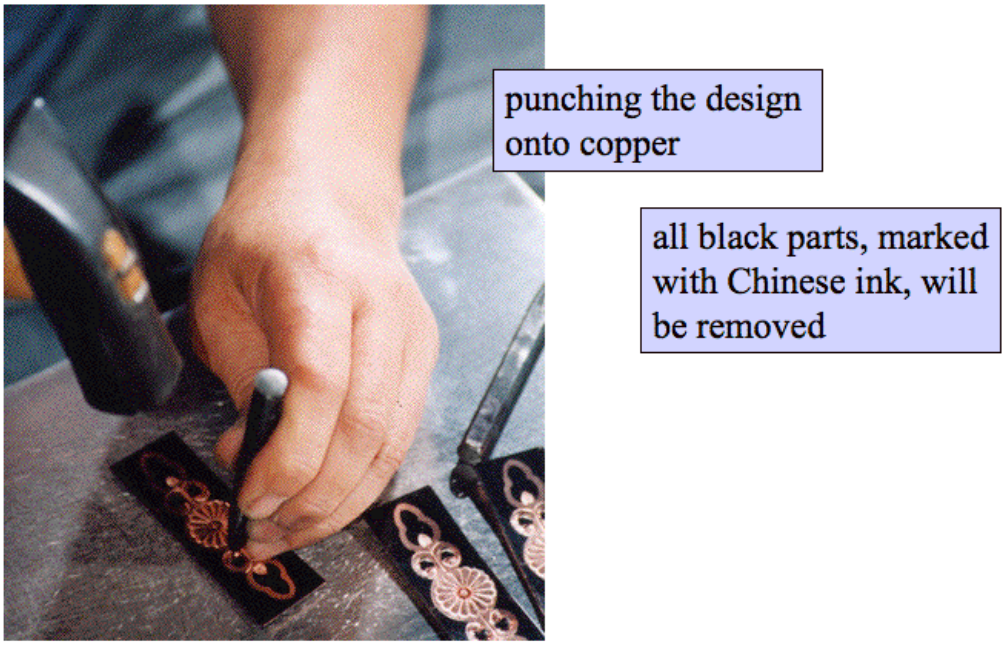
10. Excess metal is cut away.

11. The pieces are curved and the edges are finished.

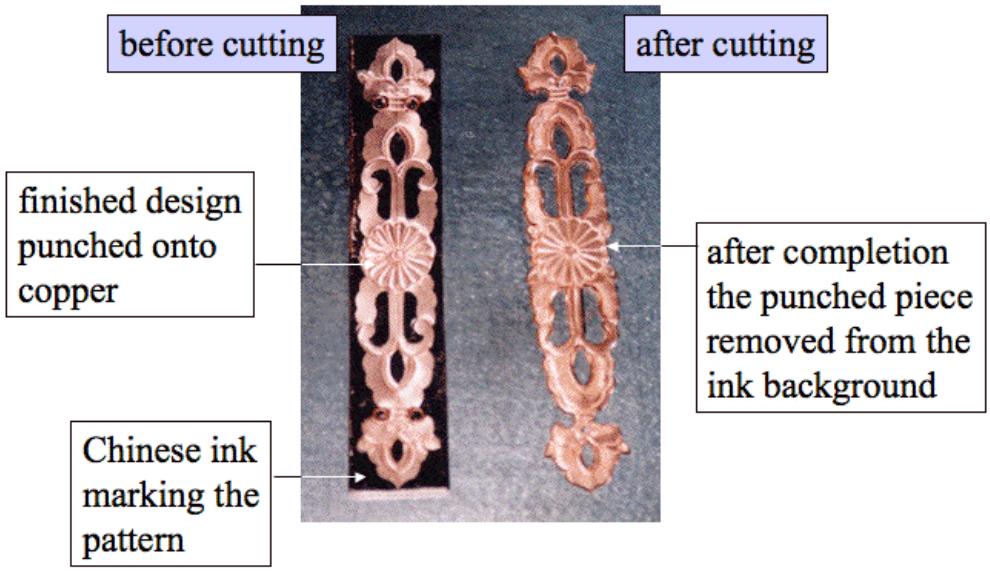
This then completes the processes in the production of *ukibori* style pieces.

3. SUKASHIBORI KANAGU or metal fittings done with a cutting-out technique:

Before going on to *jibori* work, we should just mention a third style of work which Masaaki does, that of cut out (*sukashibori*) *kanagu*. In this process when all the punching is finished, some internal parts of the design are removed and finished using the same techniques as outlined for cutting and finishing in *kebori* and *ukibori* styles.



Kan photo 61: punching the design on cut out (*sukashibori*) *kanagu*



Kan photo 62: completed work – before and after cutting out

4. JIBORI KANAGU or carved and embossed metal fittings made using heat: Stated simply, *jibori* is a three dimensional carving style used for ornamental fittings on small and large pillars and the three main internal shelves (*sandan*: *chuujiki*, *chuudan* and *nageshi* – see section 1: *kiji*). Unlike the types of metal work already discussed, heat is used to facilitate the carving and embossing necessary to get the final 3D effect. As explained by *jibori* artisan, Okamura Masao, "this type of work requires different training from that for *kebori*, *ukibori* and *sukashibori*." An overview of the *jibori* processes is given in *Kan* fig. 61.

OVERVIEW of Masao's *jibori* techniques:
1. & 2. pattern making & cutting the metal sheeting (as previously described)
3. 1st annealing and transferring the the basic shape with Chinese ink
4. cutting out the shape
5. punching the rim
6. drawing the design inside the rim of the basic pattern shape
7. punching the pattern outline
8. fixing the piece into the resin and carving the background & pattern
9. 2nd annealing and embossing
10. fixing the piece into the resin and carving the embossed parts
11. punching the pattern outline to make it clear
12. 3rd annealing and ground punching to flatten
13. fixing the piece into the resin and accenting the pattern parts
14. punching or carving internal details (*subeire*)
15. 4th annealing and fish roe (*nanako*) ground punching
16. finishing the edges

Kan figure 61: sculpting style (*jibori*) processes

Masao demonstrated how to hold the sculpting burin (*suki tagane*) with the thumb and index finger holding the handle and the other three fingers at the back, behind the blade, helping to balance and guide the *tagane*. Then he described how to punch. "First punch the pattern outline roughly. Then from beginning to end, punch again along the line moving the *tagane* continuously little by little. The whole *tagane* is made of steel; only the tip 2mm is tempered. All my *tagane* are plain, non-ridged."

Annealing (*yaki namashi*) or heating in order to soften the metal is perhaps the most significant difference between the two main categories of metalwork (see *Kan* section 7.2 styles of metalworking). Without this, the metal would be too hard to carve or emboss. As this is done several times throughout thesse will be labelled 1st annealing, 2nd annealing etc.

The most gorgeous of the *jibori* types is called true (*hon*) *jibori*. In this case the heating, carving and embossing is used to maximum effect and the final product is very elaborate, compared with the delicacy of *kebori kanagu* (see *Kan* photos 01 a & b). There are two other *jibori* styles, *hana jibori* and *chuu jibori*, which use less

complicated techniques and are thus less expensive, while still looking fairly ornate. They will be mentioned briefly at the end.

Now let us look in detail at *jibori* techniques.

4.a Process of HON JIBORI:

1. **Pattern making** (*torigata*): see *kebori kanagu*.

2. **Cutting the metal** (*aratori* or *kanetori*): For *jibori kanagu*, the metal is 2.0 to 3.0mm thick, thicker than that for the *kanagu* made without heat, which is usually 1.0mm or under in thickness. In this case the copper sheets are cut roughly, according to the pattern shape, using cutting burins (*kiritori tagane*) on an iron block.

3. **1st annealing or firing** (*yaki namashi*) **and transferring patterns**: Using a special gas ring kept for metal working, Masao puts the cut metal piece straight into a strong flame and heats it for about 10 minutes until red hot. Then he plunges it immediately into cold water in a metal basin to cool it suddenly. The colour of the copper sheet will change to black. After that, he puts it into a dilute solution of sulphuric acid for about 10 minutes to remove the black colour. "It's dilute enough to put my finger in," he explains. "Then I take it out and wash it under running water, rubbing it with rice straw (*tawashi*) to remove the black particles. *Namashi* is done to make the copper sheets soft and easy to cut or carve. I can't use the kitchen cooker because if there is resin on the metal it will drip into the flame."

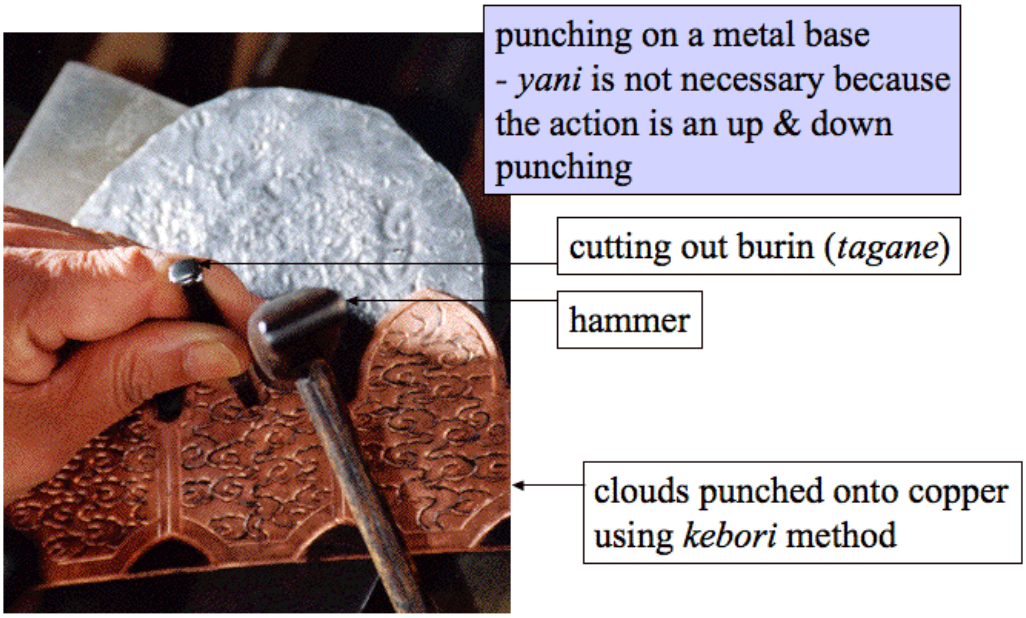
After the metal has been annealed, the patterns (basic shapes) are transferred by laying the paper onto the metal and wiping over it with a brush and Chinese ink as we have seen in the section on *kebori* (see *Kan* photos 43 - 45).

4. **Cutting** (*tachigata*): Now that the metal has been softened, the excess from around the outside of the piece is removed, making it ready for carving. Using the cutting out burins (*kiritori tagane*), Masao cuts the outline of the piece as marked by the Chinese ink. By comparison, please note that this process was left to the last in the *kebori* techniques.

5. **Rim punching** (*heri uchi*): Using a *kiritori tagane*, Masao punches a rim line around the border of the piece. This will make the design stand out.

6. **Drawing the design**: Masao explains, "I draw the pattern inside rim line with a black pencil and then trace over the pencil line with ink and a brush, making it more exact." He uses an ink stone (suzuri) to make ink as in *Kan* fig.47.

7. **Punching the pattern outline**: "Then, I punch the outline of the patterns, for example clouds or leaves," says Masao, "including borders of folded or overlapping leaves and the border of the central medallion with cutting out (*kiritori*) *tagane*." Because this technique is an up and down punching action, similar to *kebori* work as seen for Masaaki, there is no need to fix the metal into pine resin. Later, when he does the carving, which uses a pushing action, he will need to hold the metal piece steady in the resin.



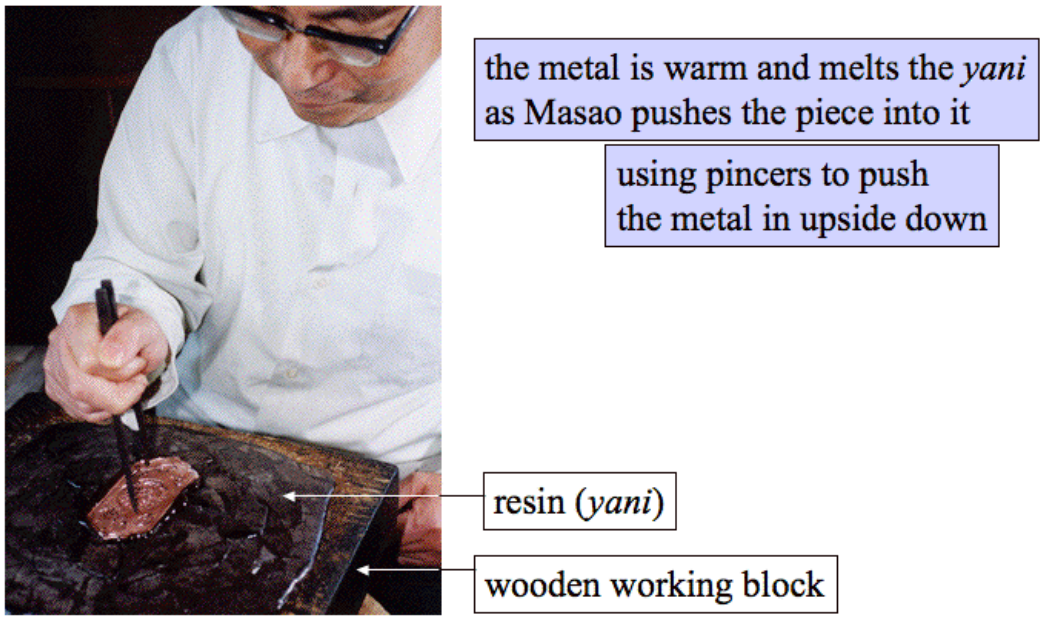
Kan photo 63: punching cloud pattern before carving or embossing

8. **Fixing the metal piece into the resin** (*yani*) **and carving the background and pattern**: The next stage of work is the carving out of the background making the rim and internal design stand at a higher level. During this process the metal must be fixed into a bed of resin to keep it steady. First therefore, let us look at how this resin (*yani*) base is made.

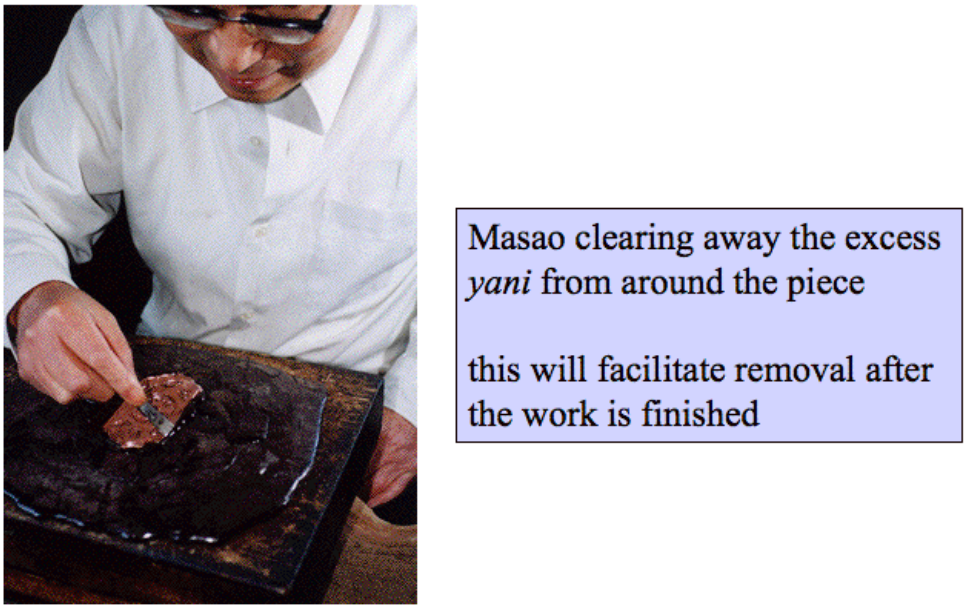
Yani is a mixture of pine resin and clay (*jinoko* – see lacquering (*nuri*) section), which Masao spreads onto a slab of wood. It can be quite temperamental with the consistency depending on the weather. "When the weather becomes cold, the *yani* becomes brittle and sometimes it can break while I'm carving," he says. "So in winter, I take the *yani* off the wooden block by inserting a *tagane* and prying up the edge between the *yani* and the wood and hitting it with a hammer. It breaks into pieces. I put the pieces into a heavy cast iron pot and put a little used rapeseed or salad oil into the pot and heat and stir until it's melted. When the melted *yani* becomes a little cooler, I spread it onto the wooden block and it cools and hardens. In July when the weather warms up, I put the *yani* back into the pot and add some new resin and heat and stir and melt it again, to make it harder." When ready, the *kanagu* can be pressed into the *yani*.

"I heat the metal fittings using an electric ring from spring to autumn. In winter I use a small ceramic hibachi with little balls made from a mixture of animal glue (*nikawa*) and powdered charcoal. These are covered with a layer of hot ash. [Masao's wife says this will hold the heat for up to 24 hours, so it is more useful than charcoal.] Under the ash there is a smouldering fire," explains Masao. This heating process is different from annealing in that it does not involve the plunging into cold water; therefore although it heats, it does not soften the metal. He puts the metal halfway into the ash and then tests it periodically with his fingers. When it is hot enough, he takes it out with metal tongs and tests it again with a damp finger. When it sizzles, he puts it onto

the mounded *yani* and presses the metal firmly down. The *yani* around the metal fitting will melt and the fitting will be pressed in to the same level as the *yani*. Then with a spatula he pushes the raised edges of resin away from the metal plate.



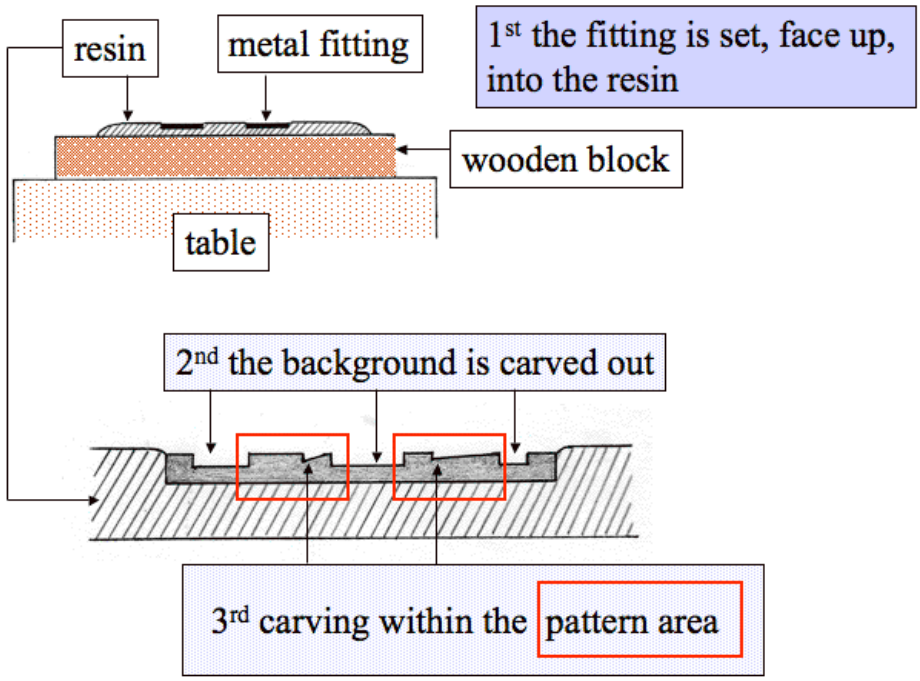
Kan photo 64: pushing the piece of metal into *yani*



Kan photo 65: clearing pine resin (*yani*) away from the edges of the piece

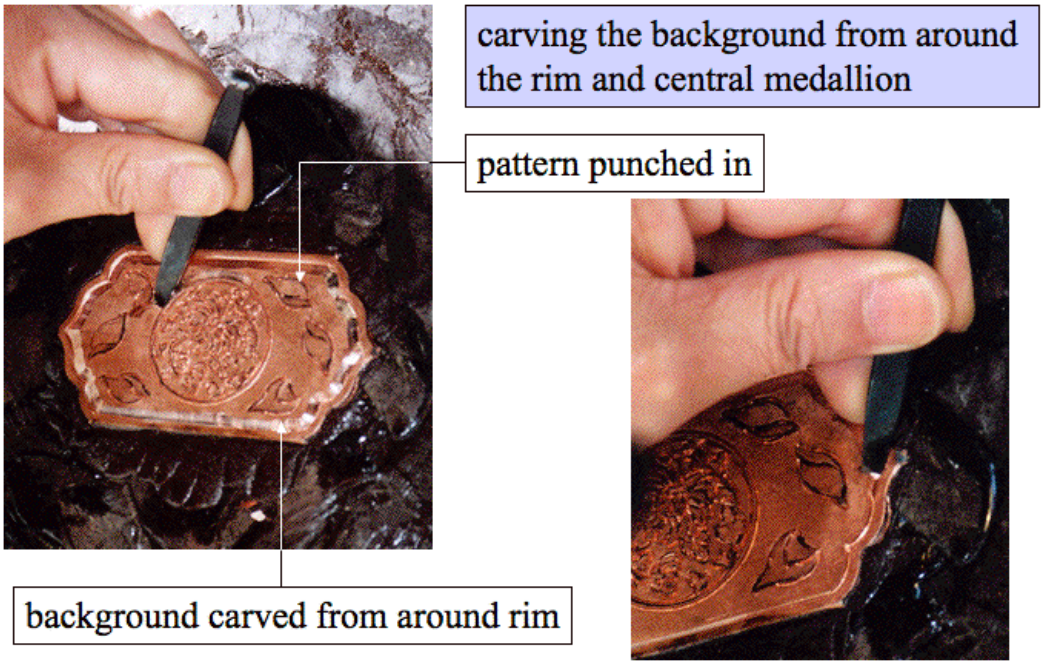
Before he can work on the *kanagu*, he has to cool the metal down so it will not slip in the resin. In winter he takes it outside to cool. "In summer," he says, "I put a wet cloth on the metal fitting and press lightly and cool the fitting and the surrounding *yani*. This process is to fix the metal fitting so that it won't move when I do the ground carving (*jisuki*). When I make several fittings of the same size at the same time, I put them all into the *yani* together."

Next Masao does the **background and pattern carving** (*sukibori*). Within the punched rim line, he carves out the background (*jisuki*). Then he carves out the internal patterns, even working within the small delicate patterns and between branches and leaves. "I do *sukibori* with a sculpting burin (*suki tagane*) which is like a chisel. The function of the *suki tagane* is the same as the chisels of wood artisans," says Masao. "It is for carving out rather than punching (see *Kan* fig. 37). But I carve towards myself while wood carvers carve away from themselves. I hit the top of the *tagane* with a hammer."

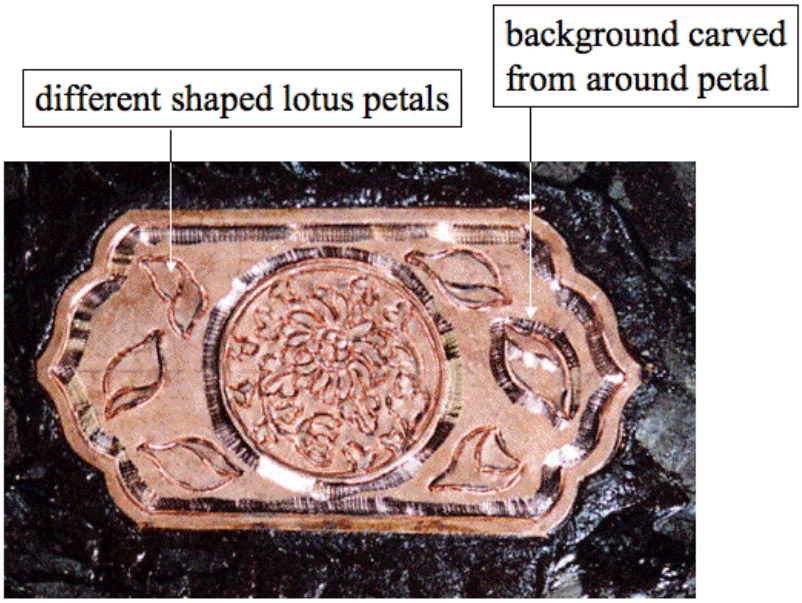


Kan figure 62: fixing into resin and carving

"First of all," he continues, "along the rim line I carve just inside the rim. Then I carve around the outline of the medallion border. Then I carve out the ground between the patterns. Then I carve out the clear borders within the patterns to give the 3D look. I often lick the cutting end of the *tagane* to make it slippery. My father used to do it this way. And now I feel it's just like my habit, I do it without thinking. When several metal fittings are fixed onto *yani*, and after doing the process with one *tagane* on each fitting, then I shift to the next process. I turn the wooden block in whatever way needed to make it easy and convenient for me to do the work."



Kan photo 66: carving around rim and pattern



Kan photo 67: carving background (*jisuki*)

Then, to make sure the outlines of the patterns are visible from the back, before he starts embossing, he re-punches them from the front using *hori tagane*. He also re-punches the lines within the patterns already carved with *suki tagane*. This is to make the outline of the pattern details visible from the underneath.

When this work is done, Masao has to **remove the fittings from the yani** (*yanitori*). To do this, he pries the fitting loose from the resin with a *tagane* by hitting it with a hammer. Then he chips the resin from around the edges of the piece. He has to warm it again, either in the hibachi or on a hot plate, to melt the resin and get it all off the back so that he can see it clearly for embossing. "For instance," he explains, "I put the fitting upside down on a mesh over an electric ring. With heating, the *yani* on the underneath will melt. When it is almost melted, I use the metal tongs to transfer it to the wooden block. Then with a *tagane*, which has been dipped in water to wet the end and keep the resin from sticking, I scrape off the *yani* and put the scrapings back onto the *yani* pile."

before the 2nd annealing and embossing the piece is removed from the resin

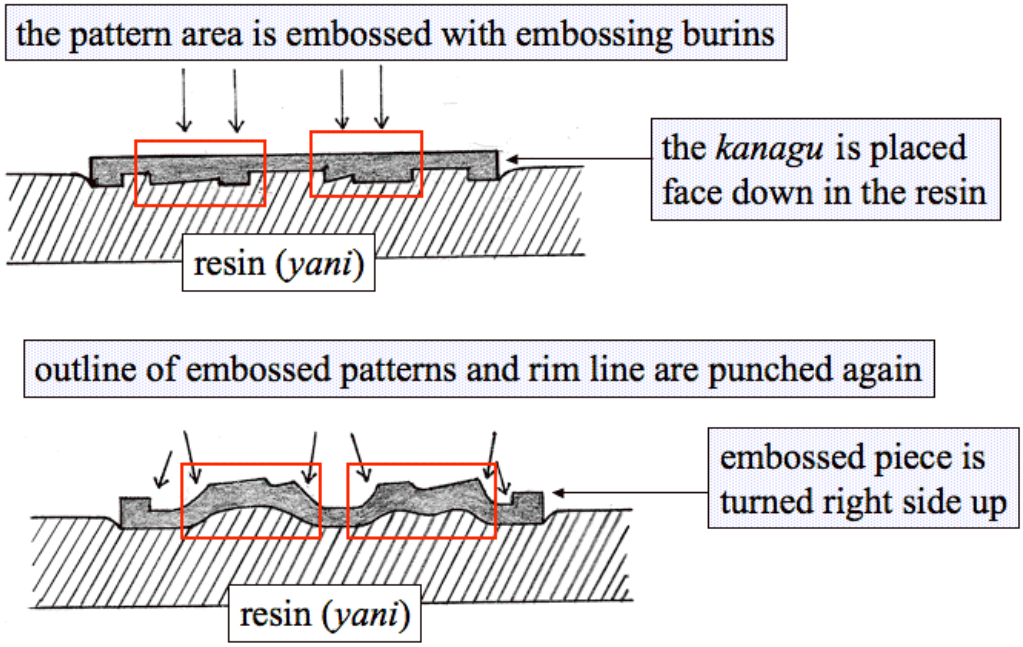
Kan photo 68: showing how to remove the piece from the *yani*

9. **2nd annealing and embossing**: Because of the work already done on the metal, it has now become brittle so Masao has to anneal it again. The process is the same as the first time: gas heating for 10 minutes in a strong flame until it is red-hot. The first annealing makes the metal softer and easier to cut out the shape. This time, the annealing makes the metal soft and easier to emboss.

Then he can proceed with the **embossing** (*ukidashi*). "With a hair-dryer, I make the central area of the *yani* warm and a little soft, so it presses in when I press it with my finger. Then I sprinkle a little clay (*jinoko*) over the area so that when I put the metal

face down into the resin the resin won't stick to the areas with delicate patterns. The metal is cold but it can bed down into the soft resin. I put the *kanagu* upside down on the soft area of the *yani* and punch the parts of the pattern to be embossed with an embossing burin (*uchi dashi tagane*) (see *Kan* fig. 38). The length of the *uchi dashi tagane* is about 7cm and the tip is flat. There are several kinds, depending on the shape of the patterns and the harder it is punched, the more raised the pattern will be.

Next, Masao turns the fitting over and **punches the outline** of the embossed pattern, and rim (*heri*) line with the *hori tagane*. This is to make the pattern line and *heri* line clear.



Kan photo 63: embossing (*ukidashi*)

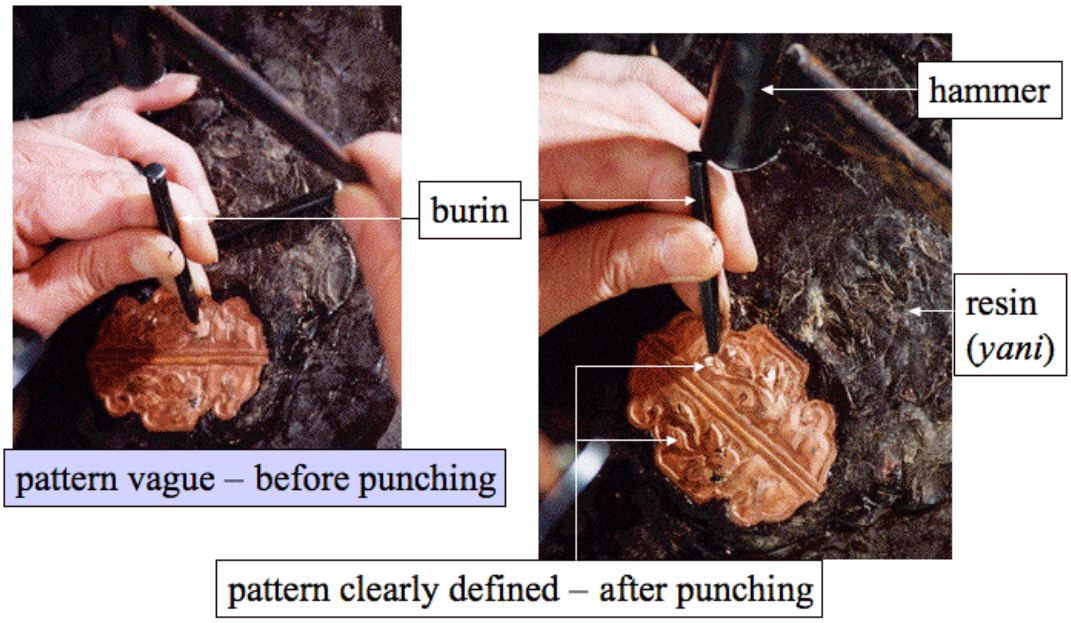
10. **Surface carving** (*sukibori*): Again, Masao puts the fitting into the pine resin in the same way as already described. Then, with *suki tagane*, he carves features of the embossed pattern such as the borders where leaves overlap or are curled, carving the underneath areas deeper. If he is working on small pieces, he fixes several to the resin and works in parallel as before.

4 pieces embedded in *yani* to be worked at the same time

jibori artisan punching the borders more clearly

Kan photo 69: punching several pieces at the same time

11. **Making the rim and pattern borders stand out more**. Masao uses a curved *soba tagane* (see *Kan* fig.39) to punch all around the outline of the patterns and make the borders even more clear than before. The *tagane* is a little curved and the tip is slanted. This time it is a punching action and the pattern curves in very slightly from the background. Then the piece is removed from the *yani* as described before.



Kan photo 70: punching the rim and around the pattern edges

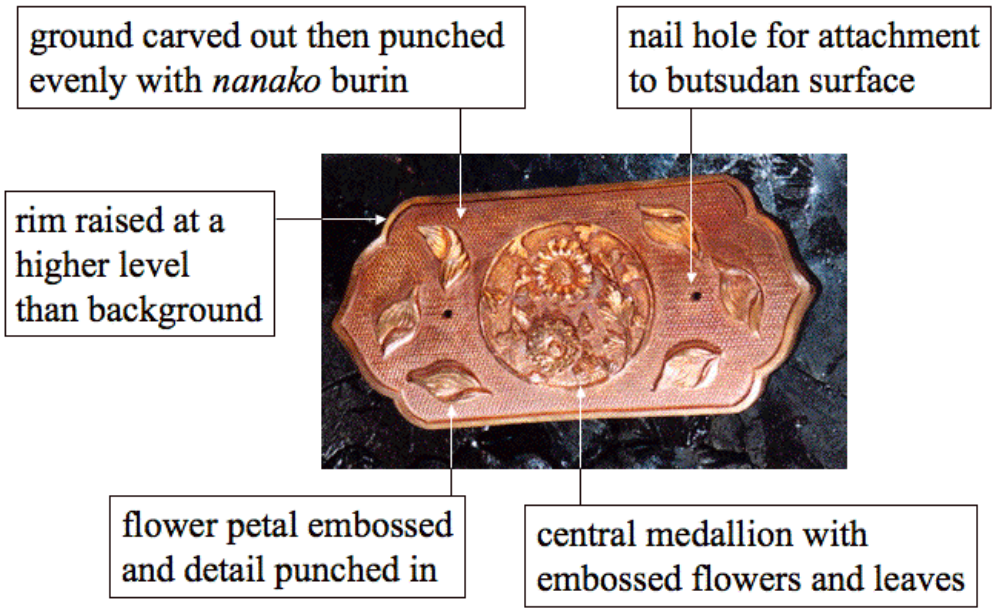
12. **3rd annealing** (*namashi*) and **ground flattening** (*ji narashi*). This is done as detailed previously but this time it is necessary to soften the metal so he can punch and flatten the carved-out parts with a square tipped burin (*narashi tagane*) (see *Kan* fig. 40). "I punch the ground, which was already carved out in the *jisuki* process, using a *narashi tagane* to make the part flat," explains Masao.

13. **Fixing the piece into the resin and accenting the patterns**: Next, the piece is bedded into the *yani* again, as before. Then sliding the *tagane* over the surface, Masao punches each part of the pattern to make it smooth. "I move the *tagane* towards myself, sliding it and hitting the head with a hammer. The shape of the *tagane* varies depending on the shape of the pattern (see *Kan* fig. 40)," he explains. For leaves, he uses a flat round *tagane* with a diameter of about 2mm. For small round parts he uses a concave round *tagane* also about 2mm in diameter. For thin rounded lines like branches he uses a concave rectangular *tagane* about 1.0mm x 1.5mm. Finally he makes those parts even smoother using the tip of a pointed file, before starting to punch the internal details (*subeire*).

14. Punching or carving **internal details** (*subeire*): For short lines, like Masaaki, he uses a *tagane* with a punching action. For longer lines, he carves with a pointed *tagane*, sliding it towards himself as he hits it with a hammer.

15. **4th annealing and ground punching**: After annealing the metal again Masao punches the fish roe (*nanako*) background. He uses burins with one, two or three depressions. "I put a sheet of paper on the iron block (see *Kan* fig. 04 – Masaaki's working equipment) and the metal piece on top of that and punch *nanako*. When I punch *nanako* using 1-nib *tagane* sometimes I fix the *kanagu* onto *yani*," he says. "A 1-nib *nanako* burin is used only for the highest quality *butsudan*. I usually use either a 2-nib or 3-nib *tagane*. Each row must be straight and fit into the 'notches' of the previous one. Thus both the vertical and diagonal rows are straight and neat (see *Kan* fig. 22).

16. **Finishing** (*shiage*): Masao cuts out nail holes using a *kiritori.tagane*. He makes the outside edges smooth, first of all with a rough and then a medium file, then with a knife similar to that used by Masaaki. Finally, he uses sandpaper.

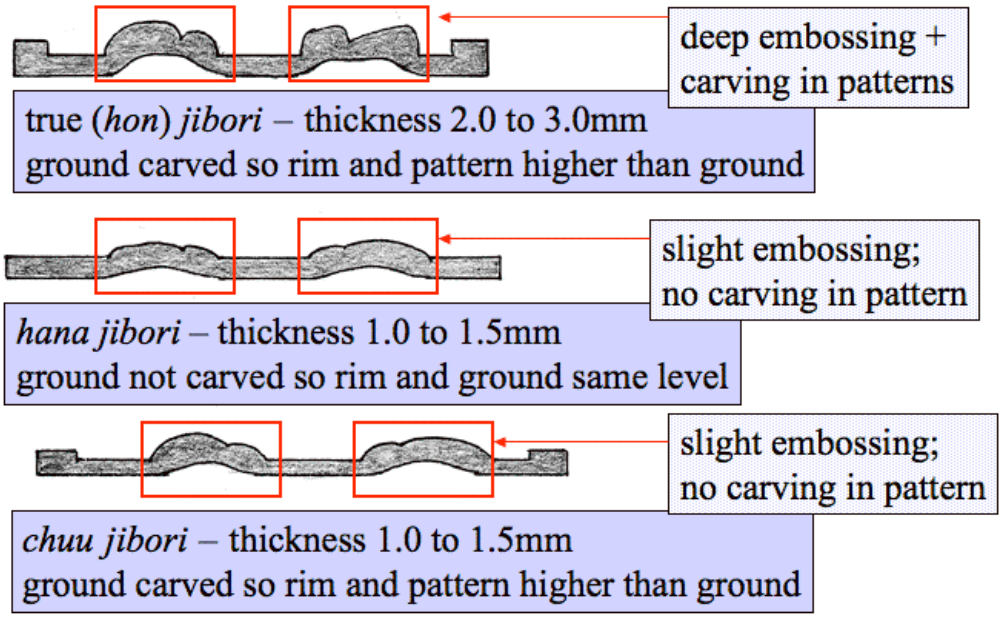


Kan photo 71: finished piece done in the *hon jibori* method (also see *Kan* photo 01.b)

If the pieces have to be shaped to go around the *butsudan* pillars they must be annealed for a 5th time. To round the *kanagu*, he follows the same procedure as Masaaki (see *Kan* fig. 57). He uses the tree stump with the groove cut in it first and then puts it around a pole and hammers with a wooden mallet. "I hit the piece with a wooden mallet and bend it roughly," says Masao. "Then I put the fitting around an

iron pole, and hit it with a mallet to bend to fit the curve of the pole. I hit the *nanako* parts, not the embossed parts."

Basically this finishes our description of the true (*hon*) *jibori* processes, but we should just touch on two other techniques close to that of *hon jibori* which are neither as labour intensive nor as expensive to produce. They are *hana jibori* and *chuu jibori*.



Kan figure 64: cross sectional comparison of types of *jibori kanagu*

4.b Process of HANA JIBORI:

The thickness of the copper sheet for this style of work is from 1 to 1.5mm. "For this I don't carve out the background (*jisuki*)," explains Masao, "so the level of the rim and *nanako*-punched ground is the same. And I don't carve the patterns either. Using only embossing techniques (*ukidashi*), I give a 3D effect to the pattern parts. I do not heat the metal before the *ukidashi* process, as with *hon jibori*." Using the same techniques as Masaaki, he punches the patterns on an iron block with *hori tagane*. Then on a lead plate placed on top of the iron block, he re-punches the pattern lines to make them clear on the underneath. Then he turns the piece over and embosses it. The only time he heats the metal in this technique is before cutting, because although the metal is thinner than for *hon jibori*, it is thicker than Masaaki would use so it is difficult to cut without warming first.

4.c Process of CHUU JIBORI:

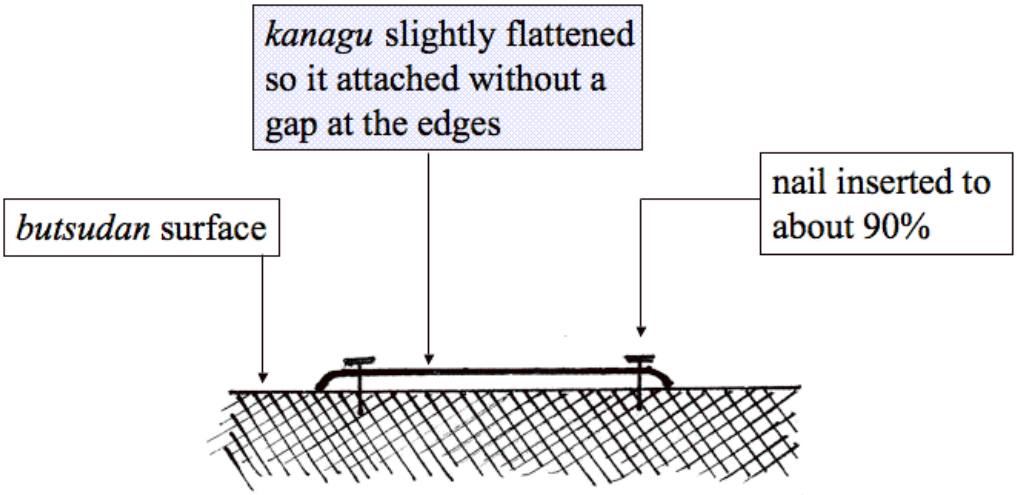
The thickness of the copper sheet is from 1 to 1.5mm. The style is between that of *hon jibori* and *hana jibori*, but the ground is carved out making it lower than the rim. The patterns are punched and embossed in the same way as with *hana jibori*.

CONCLUSION:

This finishes our description of how the decorative metal fittings are made for a *butsudan*. As a reminder, the pieces destined for the inside of the *butsudan* will be silver or gold plated. Those for the outside will be lacquered and fired to strengthen them and make them resistant to handling and atmospheric conditions.

Naturally they have to be attached to the *butsudan* surface during assembly (*kumitate*), and in the future, when the *butsudan* needs cleaning (*sentaku*), they will have to be removed and treated as described below.

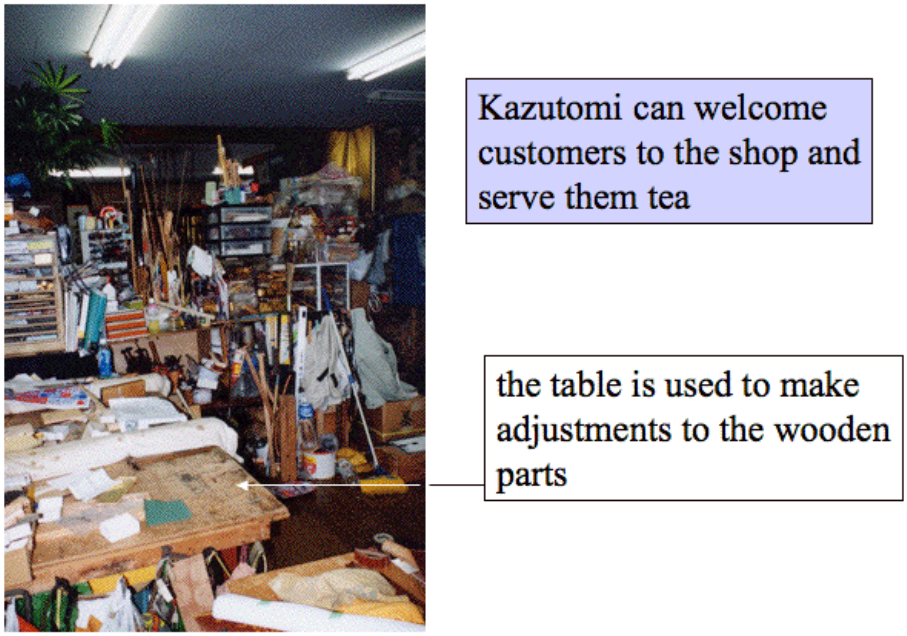
Assembly (*kumitate*) - During the assembly process, when they attach metal fittings, they do not hit the nails completely into the wood. Rather, they hit them in 90% of the way and then stop. "If they hit the nails in completely, the edges of the fitting will be lifted away from the lacquered surface. This is the best way to attach the fitting and make it look as though it is glued on," explains Masaaki.



Kan figure 65: attachment of *kanagu* to *butsudan*

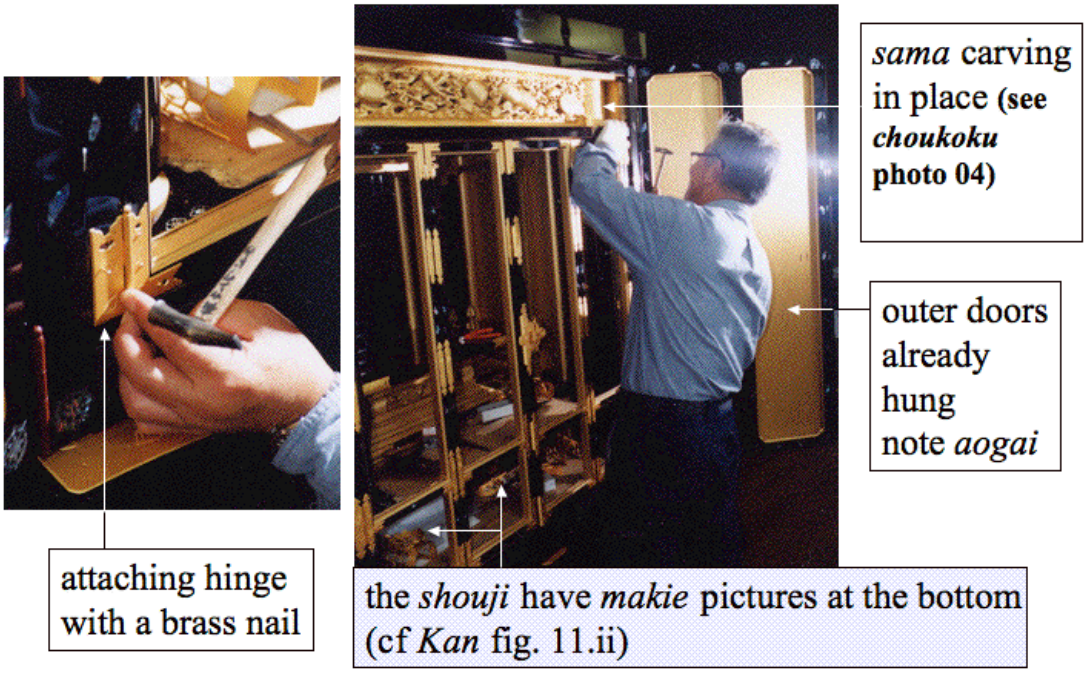
That being said, we would like to illustrate the *kumitate* process with some photos that relate directly to some of the text above. Kanwado is a small family business buried in the back streets of Hikone where the semi-retired father (Takeda Kazutomi) assembles the *butsudan* designed and lacquered by his son, Yoshikazu. Working and greeting customers in a small area surrounded by a clutter of tools and finished and

half finished *butsudan* does not stop Kazutomi from producing very beautiful and high quality items.



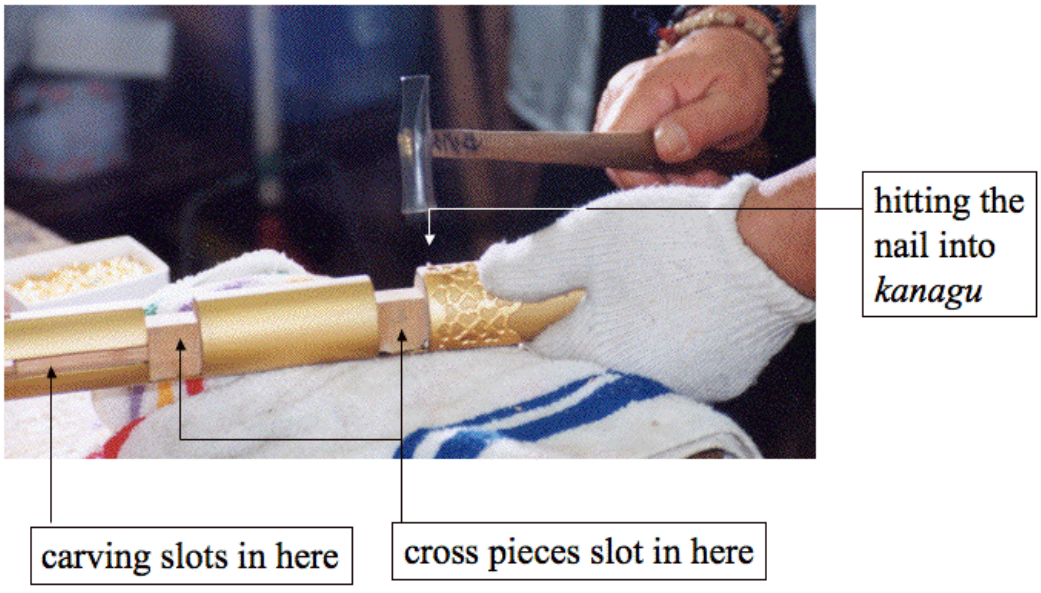
Kan photo 72: a cluttered workshop

The metal fittings (*kanagu*) can be attached to the separate lacquered and gilded parts of the *butsudan* either before assembly of the main body, or after. The final section of this website is on assembly (*kumitate*) and although a different *butsudan* is being assembled in that section some comparison might prove useful and interesting. In that case most of the *kanagu* were applied before assembly. In the following case Kazutomi is attaching the fittings after the main body parts are in place. After the basic body (*kiji*) is put together he adds the outer doors (*amado*) and the inner lattice doors (*shouji*). In both cases they have to be balanced and then the hinges are screwed on.

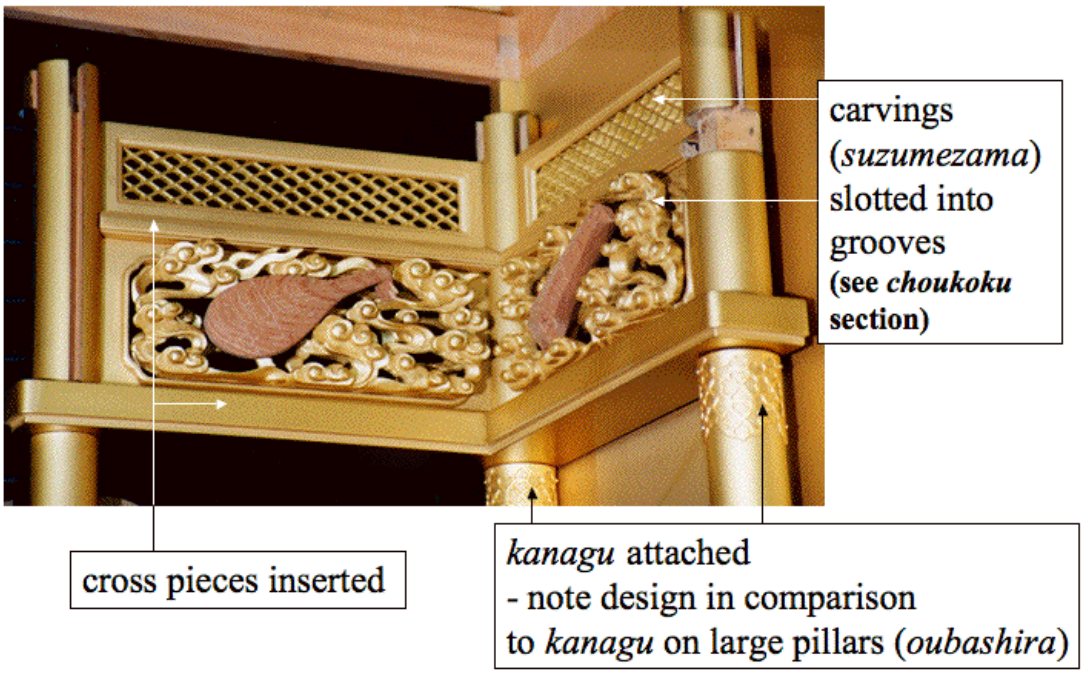


Kan photo 73: hanging *shouji*

Working on the innermost pillars that are smaller than the outer ones (*oubashira*), he attaches the *kanagu* to the upper part. Note how the design of the fitting mimics that of the large pillar, but much more delicately (see *Kan* photo 79 & 80). The two grooves in the pillar are for attachment of other cross pieces and decorative carvings.



Kan photo 74.a: attaching kanagu to small pillar (see *Kan* photo 74.b)

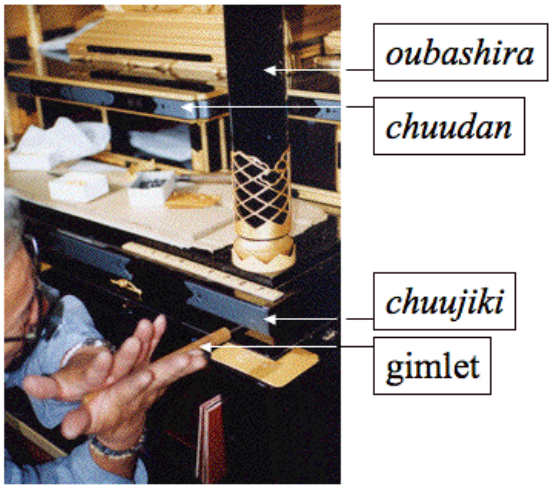


Kan photo 74.b: cross pieces and carving in place

After the main body of the *butsudan* is put together, Kazutomi attaches the *kanagu* to the three main shelves (from bottom up: *chuujiki*, *chuudan*, *nageshi*). For the positions of these shelves please see the first photos in the *kumitate* section.

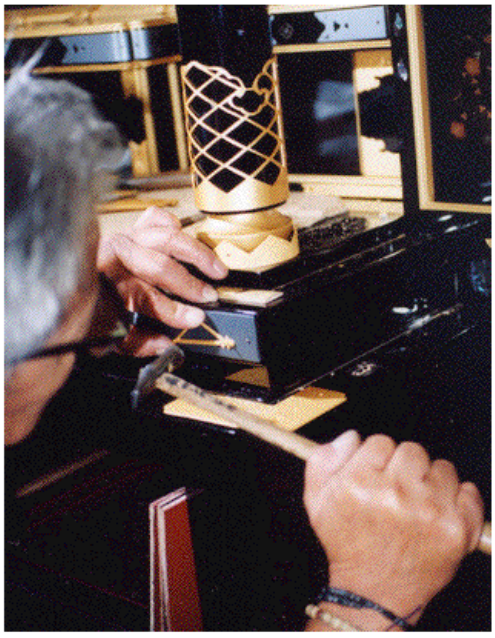
The *chuujiki* is the lowest shelf and is hidden when the outer doors are closed, but visible when they are open even if the inner doors (*shouji*) are shut. The large front pillars (*oubashira*) sit on this shelf. The pine needle designs for the *chuujiki kanagu* are Masaaki's originals (see *Kan* photo 05). After attaching the silvered (*gin ibushi*) pieces, Kazutomi has to make a hole with an electric drill and then enlarge it with a gimlet and finally attach the gold plated 'pine needle' *kanagu*.

silvered *kanagu* attached
now drilling a hole to
attach *kasane* (pine needle)



twirling a gimlet to
enlarge the hole
in the metal piece

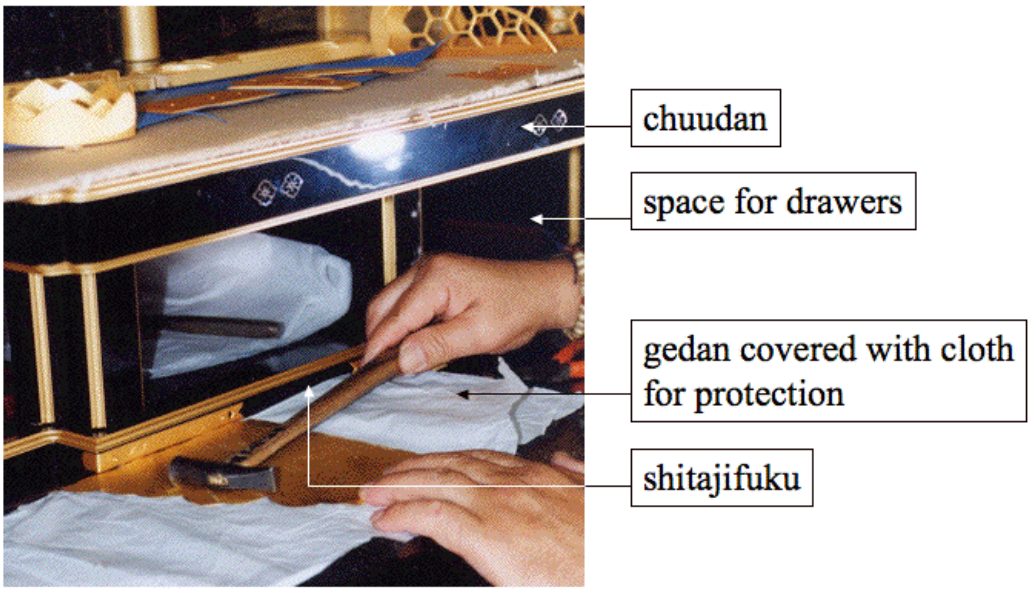
Kan photo 75.a: preparing to attach *kanagu* to *chuujiki*



great care has to be taken
- because it is so delicate
and could shift while being
hammered

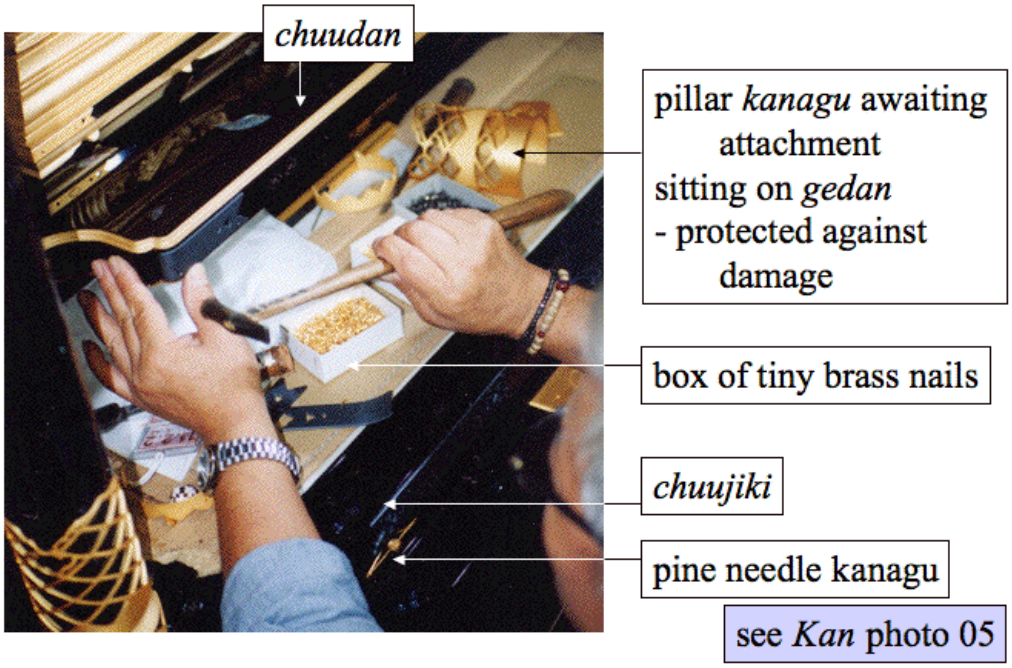
Kan photo 75.b: attaching gilded pine needle

Moving up the *butsudan*, the next *kanagu* to be attached are those on the *shitajifuku* (see *kumitate* section). This is on top of the *gedan* and below the internal drawers (*naka hikidashi*) and the *chuudan*. In this case the *kanagu* are gilded and attached after the parts have been assembled (cf *butsudan* in *kumitate* section). Thus great care has to be taken not to damage the *gedan* surface while hammering the *kanagu* in place.



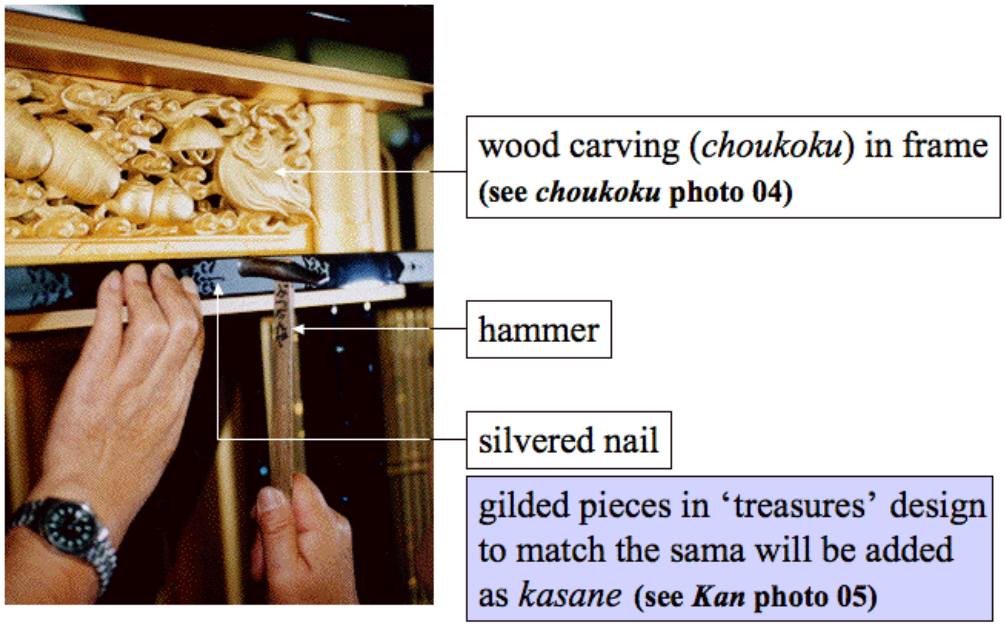
Kan photo 76: attaching gilded kanagu to shitajifuku

Then the silvered pieces are attached to the *chuudan* (see *Kan* photo 05).



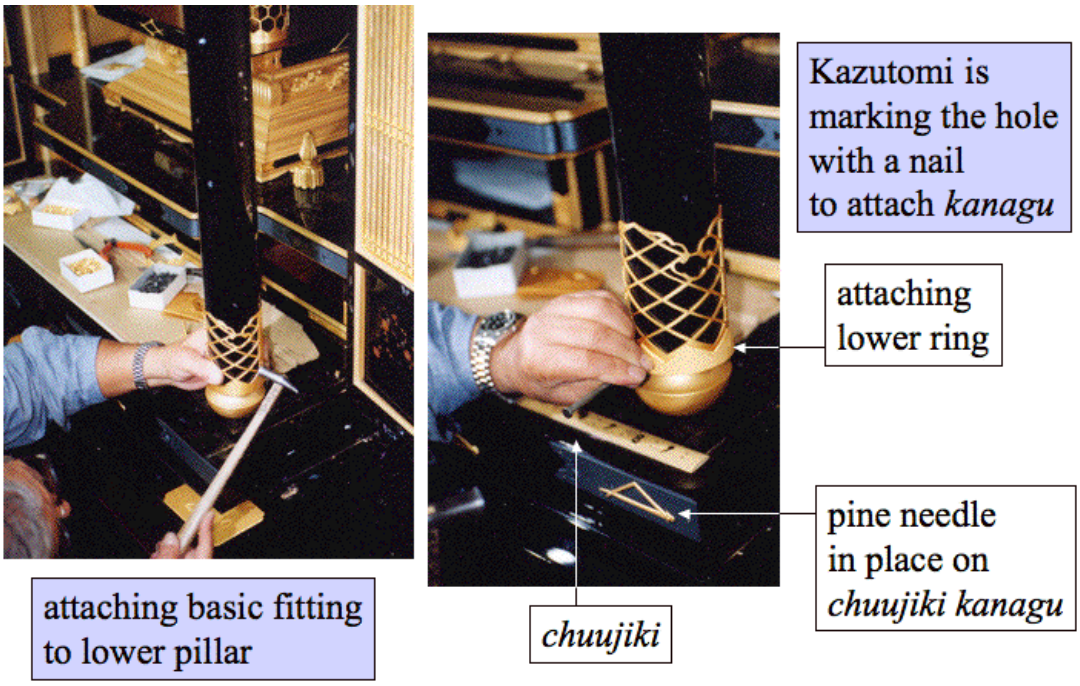
Kan photo 77: attaching *kanagu* to *chuudan*

Then Kazutomi works on the *nageshi*, which is found below the transom or *sama* carving (see *Kan* photo 05). We have already seem this *sama* carving in the *choukoku* section, photo 04.



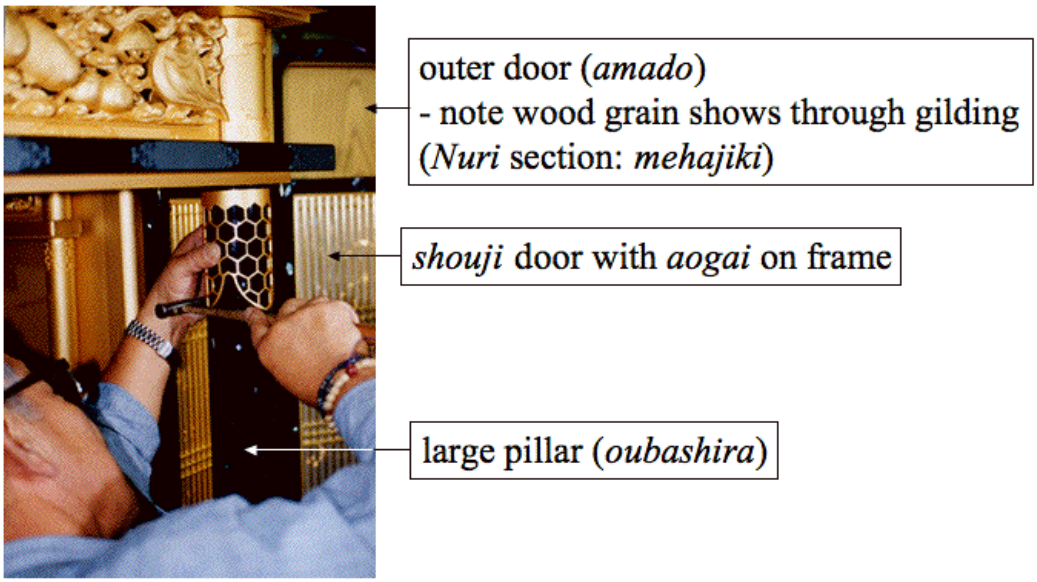
Kan photo 78: attaching silvered pieces to *nageshi*

Naturally it is easier to attach the metal fittings to the deeper inside areas, such as small pillars and shelves first, and then work outwards. Therefore, having reached the outer areas, Kazutomi next puts the *kanagu* on the lower part of the large pillar (*oubashira*). He attaches the diamond design open-worked (*sukashirbori*) piece on first and then he will attach a ring around the bottom (see *Kan* photo 23.b). As can be seen in the photo holes are already punched in the outer ring, but he has to mark the position for the nails on the inner piece. Because this is a high quality DKH *butsudan* the pillar pieces go almost the whole way around the pillar, so actually hammering them in place sometimes requires the *kumitate* artisan to be a bit of a contortionist.



Kan photo 79: adding *kanagu* to lower pillar

And finally he fixes the hexagon design *kanagu* to the upper part of the pillar.



Kan photo 80: attaching *kanagu* to upper part of pillar

Cleaning and repair (*sentaku*) of metal fittings: "These days I don't do that," says Massaki, "but in the past I have done it. I put the metal fittings into plum juice (*umezu*) for a while (see *Kan* photo 25), and after taking them out, and rub them with a straw scrubbing brush and some ash to take the dirt off. If I use sulphuric acid or nitric acid, I only put them into it for a few minutes and they will become clean. If I put them into those for too long, the metal base will be dissolved. Nowadays, artisans who do gold plating clean metal fittings as well. But." Masao assures us, "I could do it if I wanted to."

FOOTNOTES:

(FN.1) Mercury: In the past a mercury (Hg) amalgam was used for gold plating. Furthermore, copper plating was not done prior to gold plating as it is today. The gold was plated directly onto the copper sheet using the following method.
1. First flatten some pure gold as thin as possible. Then heat Hg in a pot and add the gold foil to melt it little by little. Then filter it to separate the excess Hg.
2. Remove the remaining alloy from the filter paper into a mortar and grind it well to make a gold amalgam.
3. Make plum juice (*umezu*) by mixing green plums and salt together and pressing until a salty, sour juice comes out. Then polish the part to be plated well to remove any grease such as from handling.

4. Next dip a copper spatula into the *umezu* to coat it. After that, take an amount of gold amalgam with this spatula and apply it to the part to be plated. Then heat the part to evaporate the Hg and polish it with a brass-wire brush. This process should be repeated 2 or 3 times until the copper piece is completely gold plated. Finally, you have to heat it well before brushing with a wire brush. Then polish with a steel brush to make it shiny.
Although mercury facilitates the adhesion of gold to copper and gold to itself, this process is very dangerous and it not used anymore.

(FN.2) "For example," explains Masaaki, "the standard Hikone style has fittings only at the corners on both *daiwa* (see *Kan* photo 03) and Kyoto style has no metal on either *daiwa*, In Takayama, there are twice as many fittings, up to five on both *daiwa*, with fewer lacquered parts. They put so many fittings that the lacquered base can hardly be seen. In Mikuni, there are no metal fittings inside. They are put only outside, but they are thick and have complex decorative patterns, especially the doorplate (opening mechanism). In Kanazawa, the metal fittings on the outside are made of brass and they are gold plated, as well as the inside ones."

(FN.3) By comparison, festival floats from Takayama have more than 2,000 pieces.

(FN.4) To compare, the *shumidan* pillars of a temple measure from 8.0*sun* (24cm) to 1.0 *shaku* (30cm) in diameter so telephone poles are used for rounding.

(FN.5) The *nanako* technique has been used since olden times. Originally it was used as a kind of shading to make designs stand out on metal fittings of swords. In the past some artisans specialised in it as family businesses. Today the techniques of *nanako* are handed down by a very few specialists to be used in such places as ornaments on shrines, temples, portable shrines and of course butsudan.

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