

## Japanning or The Art of Embracing the Arcane



Spend an afternoon Googling “Japanning” and you can find a good deal of information on this ancient process, most of it concerned with the process of finishing wood. Search “Japanning cast iron” and the amount of data shrinks considerably. Lastly, look for a how to on “Japanning antique cast iron hand planes” and only a handful of articles or videos can be found. Mark Nickel at Plane Dealer, Rex Mill, and Hand Tool Rescue all have some good information and informed my techniques.

You will find more people looking for a how-to on japanning than you will find instructions. Every technique you try will have pros and cons. Your level of success may well differ from the my own as the process is mired in technique and not just chemistry. The challenge is, japanning is both a noun and a verb. As a noun, japanning is a mixture of asphaltum and solvent/binder. As a verb, japanning is the application, thickness, type of brush, cold curing time, heat curing, if used, rate of heating, rate of cooling, duration of heat, and number of heat cycles used to japan a plane. The process is at least as important as the mixture.

Re-japanning a cast iron hand plane is not the same as original japanning. First, it is unknown exactly what the components of the factory japanning were, how it was applied, and how it was cured. Japanning recipes were well-kept manufacturers’ secrets. Some 1800’s era metal japanning mixtures from Pontypool, England call for burnt umber, litharge, and cobalt resinate in addition to the more well-known ingredients of asphaltum and turpentine. The finish could have been brushed on or dipped. The planes may have been japanned, then left to sit for months depending upon demand/throughput/specified processes. They may/may-not have been heat cured. If heat cured, the number of cycles, temperatures, and duration are unknown. The planes may have been japanned prior to some of the final grinding processes. Thus, the process used here is designed to achieve the same finish as an original antique hand plane using very similar materials, but the overall process cannot be exactly duplicated when refinishing a plane.

We must first establish your goals for refinishing a plane bed. If your goal is simply rust prevention, any painted finish will suffice. There are even chromed or plated planes that will mitigate rust. If the goal is to simulate the original factory finish of the plane, prevent rust, and minimize effort, there are several very good spray paint techniques you can find on the internet. I have used one of these techniques recommended by a long-time plane refinisher and found it takes me as long or longer than japanning a

plane. Nevertheless, modern spray paint finishing is a simpler more trouble-free method than japanning and it meets all the above stated goals.

If you desire to replicate, as closely as possible, original cast iron hand plane japanning, read on.

For all japanning mixtures, the plane body and frog must be completely cleaned of rust, old japanning, and any dirt, oil, or other contaminants. The parts should be cleaned with turpentine, then wiped down with acetone just prior to application. Use care not to touch any surface that will be japanned as the oil from your hands can disrupt the japanning. Work in a dust free environment. Uncured japanning is very sticky, and any debris will adhere to the surface like flypaper. Once baked in, the pieces of sawdust, eyelashes and brush fibers are a permanent part of your restored hand plane. I prepare my hand planes and frogs for japanning by glass bead blasting the parts. This leaves a pristine cast iron surface. I then use the turpentine and acetone as final prep.

I will discuss three different japanning mixtures and the advantages/disadvantages of each. It is my goal that those of you with a penchant for duplicating the original finish will find mixtures and methods here to help you bring new life to these wonderful pieces of our past.

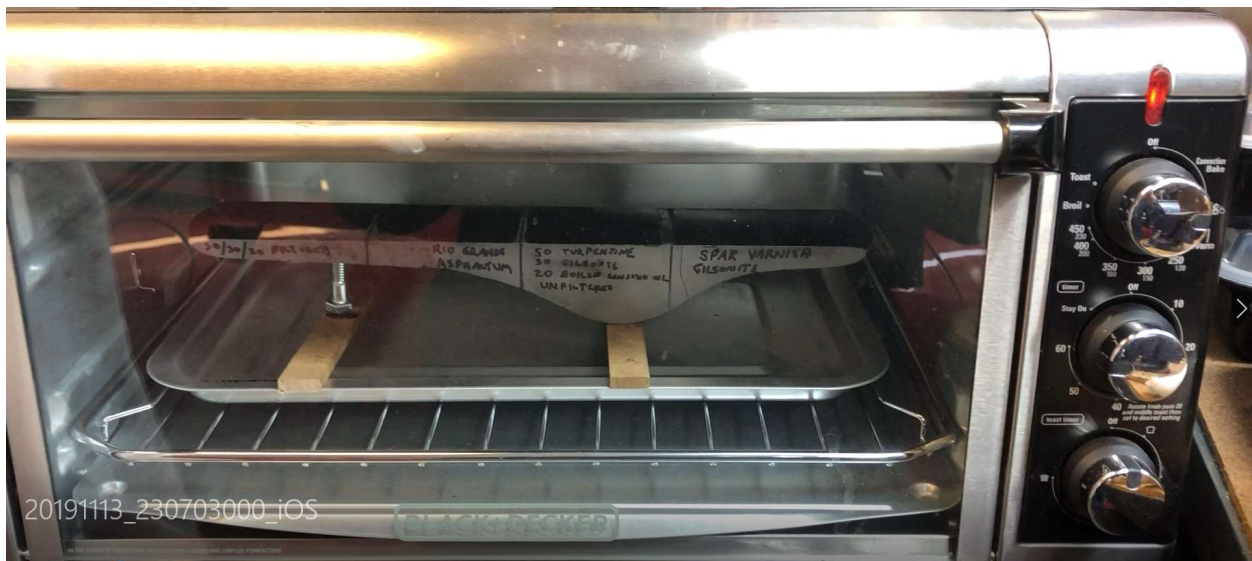


Perhaps the easiest japanning method I have tested is an “off-the-shelf” asphaltum varnish ready to be applied. This has the benefit of not requiring any measuring, mixing or fiddling with consistency. Asphaltum Varnish, from Rio Grande Jewelers of Albuquerque, NM, is available online from their website.



It is used in the jewelry trade to mask precious metals when etching. The actual ingredients of their product are unknown, but one can assume the trade name provides some information, asphaltum and varnish. Duh. Affordable, economical size and delivered to your door, pretty easy. This product delivers a very deep, rich finish. Absolutely beautiful. The downside, in my research, was a weaker japanning to metal bond than other mixtures. This product will chip easier than other mixtures, about the same, in my experience, as high-quality spray paint finishes. Not bad performance, but there may be better choices for the intrepid.

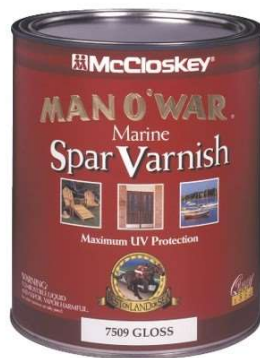
The Rio Grande Jewelers Asphaltum Varnish needed to settle after shipping to eliminate suspended undissolved asphaltum particulates. I recommend letting it sit undisturbed for about a week. Application is straight forward. Using a quality ¼" to ½" wide ½' long or shorter artist's brush, apply a thin to moderate layer on all desired surfaces. There is minimal sag or flow to this product. You should have a dark brown to slightly transparent black finish with the first of two coats. If in doubt, thinner is better. After application, allow the parts to sit for about an hour and the japanning will flow out to a uniform smooth finish at room temperature. Heat curing is required to harden the japanning. Always begin with a cold oven. Place the japanned parts in the cold oven and begin the two-stage heating curing process.



For the first heat treatment, heat the parts to 180F and hold at temperature for 1 hour. Apply additional coat as desired and heat treat as before. Repeat this process until the desired depth of japanning and color are achieved. For the second phase of heat curing, place the parts in a cold oven and slowly raise the temperature to 400F over the course of 30 minutes. Hold the parts at this temperature for 1 hour, then let cool in the oven. Let the parts sit for 24 hours. The parts should not be tacky and may have a slight rainbow sheen akin to petroleum on water. If the parts are still tacky or can be impressed with a fingernail, repeat the second stage heat cure process for up to 2 hours. Once the japanning is fully cured, any rainbow sheen can be buffed off by hand with a cotton cloth without damaging the finish. Congratulations, you should have a beautifully japanned plane with a “black-hole” like depth to the finish.

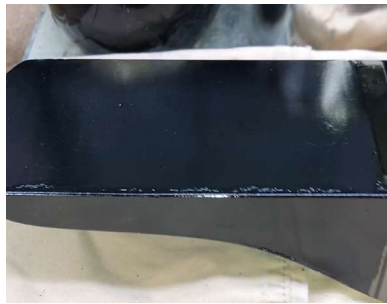


The next japanning mixture is referred to as “Cold-cure” japanning. Consisting of spar varnish and asphaltum, this mixture is simple to prepare and provides a very deep black, glossy finish closely matching original japanning.



It is not a quick process, requiring days or weeks to mix and settle. It can require weeks to harden, although you can speed up the curing with careful application of heat. I have experimented with McCloskey's Spar varnish and gilsonite asphaltum with beautiful results. Creating the mixture is a simple process. I recommend mixing what you intend to use within 1-3 months as the mixture will form a dried skin in the container between uses. Transfer the amount of varnish you believe will be necessary to apply 2 coats to your projects to a resealable container. A small mason jar or a 1-pint paint can works well. Starting with a ratio of 3:1 varnish to asphaltum, mix in the asphaltum adding additional asphaltum until you have a syrup like consistency. The mixture will thicken over the course of a week or so, eventually reaching the desired heavy syrup or cake batter consistency desired. Set the mixture aside to settle for 24 hours. Re-stir scraping the undissolved asphaltum from the bottom of the container. Mix for 5-10 minutes. Set aside and let it settle for a minimum of 2-3 days. The longer it sits undisturbed, the less particulate matter you will have in the finish. Prior to application carefully remove the dried skin that has formed on the surface of the japanning and discard, it will not reabsorb into the mix. Application is the same as the previous mixture. Multiple thin coats are preferable to a heavy coat as the japanning can sag on the vertical surfaces and pool at the corners formed by the plane cheeks and bed. This is a real disaster and requires you to strip the plane and start over. Avoid this by using

multiple thinner coats. Generally, 2-3 coats will produce a beautiful finish. Allow each coat of japanning to cure at room temperature at least a week or until the surface is barely tacky. If you apply the next coat too soon the japanning will take months to cure. The curing time can be reduced significantly through a two-step heat curing process. Always start with a cold oven. Place the japanned parts in the cold oven and raise the temperature to 170F on initial cure. Use a thermometer to monitor this. If the temperature exceeds 170F you will get a badly wrinkled finish and will have to strip the parts and start over. After 2 hours at this temperature allow the plane to completely cool in the oven. Apply additional coats of japanning and repeat this heating cycle until you have the desired thickness and color of japanning. Once you have the desired finish, you can then bake up to 350F for up to 2 hours to speed curing. If you get wrinkling, you have heated too high, too fast (you can see some minor, but unacceptable wrinkling on the edge of this test bed resulting from overheating).



If your goal is to reproduce original cast iron hand plane japanned finish quickly and efficiently that mimics the original finish and has high durability, my technique may provide a path to success. I have tried several more traditional japanning formulations and many different curing routines.



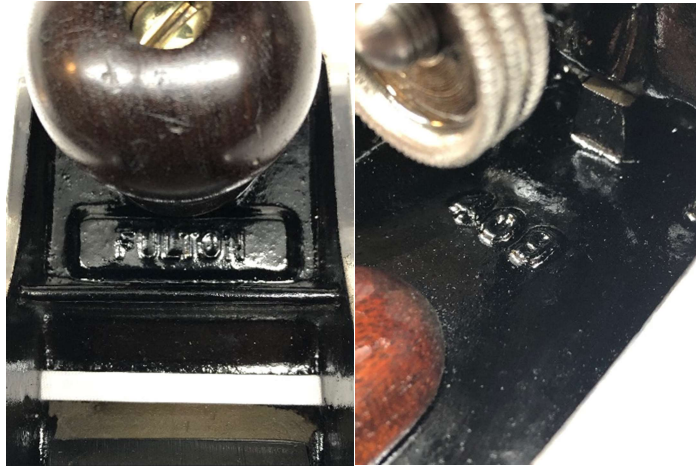
The best japanned finish I have achieved is using a 40/40/20 mixture of turpentine, gilsonite asphaltum, and boiled linseed oil. Dissolve the gilsonite asphaltum in the turpentine in a resealable container. Let stand at least 24 hours and stir to check consistency. If not like a thick cake batter, add additional gilsonite asphaltum, mix, seal and let stand 24 hours. Repeat until desired consistency is reached. Some material will remain undissolved. Once you have the consistency correct, add the boiled linseed oil, mix, seal, and let stand 24 hours or more. The longer the better. 24 hours or more before use, filter the mixture through clean linen cloth. It may be necessary to transfer the mix into the linen, close the linen around the mix forming a ball and slowly force the mix through the linen by twisting the linen ball tighter and tighter. This is extremely messy. Wear rubber gloves. This filtering reduces particulate

matter and allows product use sooner with better results. It is not mandatory if you let the mix sit undisturbed long enough to allow undissolved material to settle to the bottom of the resealable container. If you are not filtering the mixture, I recommend letting it settle for at least 72 hours.

After you have completed all the above, let the mix rest, undisturbed at least 24 hours. Once your japanning mixture has settled out, do not shake or disturb the material that settles out or you will get rough, undissolved particles in your finish and must wait for the mix to settle out again.

Working in a dust free environment, use a quality ¼" to ½" wide short bristle artist's brush to apply a thin coat to all horizontal and vertical surfaces you want japanned in one application. Do not dip the brush too deep in mixture. You do not want to pick up any of the settled particulate material near the bottom of the container. The first thin coat of brushed-on japanning will not have a dark black appearance, but a black-brown appearance. Allow to sit about an hour to self-level. Place in an unheated oven either outdoor or in a well-ventilated shop due to possible fumes from the heat curing. Start oven and bake at 180F for 2 hours. It is important to heat the plane and the oven together. Do not pre-heat the oven. After the heat cycle, allow to cool completely in the oven. Apply a second thicker coat of the japanning mixture to all previously japanned surfaces. If you get it too thick, it will sag or settle from vertical surfaces into corners. You are better off repeating this process with a third coat rather than risking applying too heavy. Allow to sit about an hour to self-level. Place in an unheated oven, start oven and bake at 180F for 1-2 hours and allow to cool completely. If your finish is not as black or thick as desired, repeat the previous step. If you are satisfied with the appearance, place the plane in unheated oven, start oven and raise the temperature slowly, maybe over the course of 30 minutes to 400F. Bake at 400F for 2 hours and allow to cool completely in the oven. Allow plane to rest for an hour or more. The finish should be completely hardened.





As far as troubleshooting your finish, here are some of the issues I have encountered and what I believe are the underlying causes and solutions:

#### **Rio Grande Jewelers Asphaltum Varnish**

- Finish has debris or bumps. Probably undissolved asphaltum disturbed during shipment. Allow the product to sit undisturbed for a week. Only dip brush in top of product when applying. Monitor your environment when applying and cooling plane to ensure it is dust free.
- Finish has rainbow sheen to it. This appears when heat cure temperature exceeds 300F. It should buff off with a clean linen cloth once fully cured. If not, try reducing final heat cure temperature and extend cycle time.

#### **Cold cure mixture Spar Varnish and Asphaltum**

- Mixture too thin or too thick. This is simple. Simply add varnish or asphaltum as needed to achieve a thick syrupy consistency.

- Japanning is wrinkled like a Shar Pei puppy. I am assuming you are using the spar varnish cold cure mixture as I have never experienced this with the traditional mix. Verify your oven temperatures with a thermometer. I do not believe you can correct this finish and will have to strip and start over. Ensure the first cure is from a cold oven, warming up to no more than 170F. You can add an interim second cure at this temperature after the first stage and complete cooling.
- Finish still tacky, or soft enough to leave an impression with a fingernail. Either repeat the heat curing cycle or simply allow more time to cure at room temperature.

### **Traditional mixture of turpentine/asphaltum/boiled linseed oil 40/40/20**

- Mixture is too thin. The asphaltum may not be completely dissolved. Either thoroughly stir the mix for at least 5 minutes, then let settle for a minimum of a day (longer is much better) and check viscosity. Or, discard the mix and start over. Dissolving the asphaltum in the turpentine prior to adding boiled linseed oil seems to really help. Stir the asphaltum/turpentine for 5-10 minutes when mixing. Let stand at least 24 hours, re-mix and let stand 24 hours, then adjust viscosity, all before adding the boiled linseed oil. You want a viscous mix at this stage as the boiled linseed oil will thin the mix. A thick cake batter consistency before adding boiled linseed oil is best. After taking these steps, add asphaltum until you get the desired consistency. Then add the boiled linseed oil to get to the proper ratio with a normal or thin cake batter consistency.
- Mixture is too thick. Does not self-level or too difficult to brush out. This is an easy one, add turpentine to thin. Just a few drops can quickly make a difference in a pint of japanning. Stir and allow to rest at least 24 hours, longer is better.
- Mixture does not harden after heat cycles. Most likely it was applied too thick. You can add additional baking cycles and may, eventually get a cure. Or set it aside for several weeks and it may harden. I have stripped (turpentine will make quick work of it) and started over when faced with this. I tried up to four heat cycles and still did not overcome a thick application.
- Cheek/plane bed meeting points have too much japanning. If you apply too thick of a coat, the japanning will slowly sag into this area while cold curing and again when heat curing. Apply multiple thinner coats. If you have not heat cured the plane yet, you may be able to thin out the heavy areas with your brush dipped in turpentine. Dry most of the turpentine out of the brush with a paper towel before brushing the thick areas out.
- Japan finish is bumpy like there are grains of sand in it. Mixture needs to be filtered or allowed to settle. The particles in the finish are likely undissolved asphaltum. It is also possible dust settled onto your plane before it was completely heat cured or your brush was contaminated. The japanning is sticky until fully heat cured. Any dust in the shop will attach to the surface then bake in. You can try adding another coat and see if it will self-level to improve appearance but be prepared to strip the plane and start over.



- This is taking too long, or the process is too complex. It's all about learning to enjoy the process of reviving old, neglected tools that will live on for generations. If you don't enjoy the process, learn to live with the original japanned finish and all its chips, or break out the spray paint. Just be an honest broker and let people know your plane is enameled, not japanned. There is enough distrust in the world; don't drag our antique hand planes into the mess.

Lastly, share your experiences, successes, failures, improvements, alternatives and, most of all, pictures, with me at [Fulton.Planes@comcast.net](mailto:Fulton.Planes@comcast.net). I look forward to hearing from you and especially learning from you.

Watch for an upcoming video on developing, testing, and applying japanning mixtures for cast iron hand planes at [www.aPlaneLife.us](http://www.aPlaneLife.us).