Subject: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Fri, 02 Oct 2020 04:52:49 GMT
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For the past few months, I've been working on a custom dial project. I'm still not ready to show my first production examples, but the project has gotten to the point where I'm comfortable sharing my progress. I've been documenting this process, and am committed to sharing my process notes. I believe in open source information, and I've benefited immensely in watches (and in life generally) from the wisdom and experience of other people who have been willing to share what they know with me. My hope is that by sharing my process notes, I might be able to encourage other folks to take a risk and try to make something cool. I've never attempted anything like this, and even if this project is ultimately unsuccessful it has been a ton of fun.

I'm sharing my progress and process notes on this forum before I share them anywhere else because folks here have been incredibly friendly and patient with me. If you have any questions about my notes, please feel free to let me know and I'll try to explain things better.

Background: Seiko & ETA 6498 Custom Watches

My project started with customizing my own Seiko watches, and with assembling several custom ETA 6498 watches using available parts from Chinese sellers on eBay. I greatly enjoyed manufacturing my own ETA 6498-1 based "marine watch" using high quality components, and produced a watch that is nearly equal to the Stowa Marine Original I wanted but couldn't afford. I could have saved more money using lower-quality components, but instead assembled a watch using high quality components (heat-blued hands, an especially nice 41mm case with a sapphire crystal, an elabore-grade ETA 6498-1, etc.) that was significantly less expensive than the Stowa offering.

On the Seiko side of the house, I've built a couple of custom Seiko watches using some of the really amazing dial and hand combinations available from lots of internet sellers. (My favorite seller is called Lucius Atelier.) In browsing their offerings, I saw that some suppliers sold higher-end dials made out of meteorite, damascus steel, carbon fiber, and other neat things.

Knowing how much I enjoyed building my ETA 6498 watch, knowing how many people enjoy modifying their Seiko watches, and being generally fascinated by exotic dial materials, I realized that it might be possible to design my own watch dials. I enjoyed reading many articles on restoring dials using film-free decals, and thought a lot about using electrolytic-etching to customize brass dials.

It was at this point that I stumbled across fordite and fell in love ...

Fordite

Several months ago, I ran across a limited series of very expensive TAG Heuer watches that featured unique dials made out of "fordite". There's no way I'll ever be able to afford once of those watches, but I couldn't get the idea of working with fordite out of my head.

Fordite is also known as “Detroit Agate,” and it’s actual industrial waste. Back when car manufacturers used to spray paint cars by hand, they generated a lot of overspray. This overspray accumulated over the years, and hundreds of layers of overspray built up into large chunks of waste material. This stuff was repeatedly heat cured at the same time the painted cars were heat cured, and the resulting chunks of waste are durable and nice to work with. I don’t know the first time it was discovered that cutting open the waste chunks revealed beautiful and psychedelic patterns of paint, but for some years jewelers have been using lapidary techniques to create bizarre and fun jewelry with fordite. One of the things that I find particularly fascinating about this material is that it’s possible to source fordite from specific assembly lines. Consequently, one can obtain fordite in Jeep, Corvette, Cadillac, Peterbilt, and other colors. I’ve also obtained some fordite from the “Cadillac Ranch” in the Mojave Desert. It’s much softer and more fragile than “normal” fordite, but it also has a wider variety of colors and textures. In order to work with this specific soft fordite, I'm going to need to stabilize it using some cool lapidary techniques.

Heat-Blued Steel

I have been enchanted by heat-blued steel watch components for a really long time. I started researching how I might myself heat-blue steel with an eye towards designing and selling heat-blued steel watch hands compatible with Seikos and other watches. For quite a few reasons, this isn’t feasible (yet?), but I’ve enjoyed polishing and bluing steel pocket watch hands.
As my dial project progressed, I realized that it wasn’t practical for me to add applied hour indices, and there are some significant obstacles to using film-free decals on the dials I'm making. I realized that some manufacturers of exotic-dialed watches got around the problem by attaching a short chapter ring directly to the watch dial. This solution really appealed to me, so I set about designing a chapter ring that could be cut out of very thin (0.01” or 0.254 mm) high carbon steel, polished, and then glued to the dial face without risk of fouling any of the watch hands.

I worked with an engineer on Fiverr, who converted my really rough sketch of a chapter ring design into a DXF file. My first 20 carbon steel chapter rings are currently in production at a laser-cutting facility.

Initial Approaches

Fundamentally, I had to figure out a way of cutting fordite into very thin discs that could be mounted onto brass dial blanks. I did quite a lot of research into how stone-dialed watches are manufactured, and spent a lot of time browsing the stone watch dials that are available from Chinese manufacturers on Alibaba. I believe that the most common way that stone dialed watches are manufactured sidesteps the problem as much as possible; they don’t aim for a total dial height of 0.4mm, the normal Seiko and ETA 6498 standard, but instead cut thicker (but still quite

thin) stone dials and achieve a final height greater than 0.4mm. The large manufacturers are able to do this because they can use movements with higher-than-normal hand pinions, in cases that may be deeper than normal, with hands that have longer pipes than normal ("long post" or "long tube" watch hands), under crystals that are taller than normal. It is possible, if not inexpensive, to find hour wheel-cannon pinion sets for ETA movements that accommodate thicker dials. But finding a case and crystal combination that could accommodate this thicker dial and higher hands was going to be challenging.

After a great deal of thought, and teaching myself some basic lapidary skills, I realized that it might be possible to cut a thin fordite veneer and mount it on a brass dial blank. I then planned on soldering the dial feet onto the dial one-by-one.

The first process I was going to try to use was broken down as follows:
Cut rough fordite into roughly-round chunks.
Use a lathe and turn those chunks into cylinders with precise diameters.
Cut thin (but still relatively thick) discs out of those cylinders, and mount them on a precisely-cut brass dial template.
Use a lapping machine to polish/grind the fordite down to the final required height.
Hand-drill the center hole, using the brass dial template as a guide. This would require laser-cutting a thin brass sheet to the correct diameter and adding the necessary central hole.
Solder dial feet onto the fordite/brass dial sandwich.
Final polish and assembly.

At this point, this project was still a pipe dream. I had some fordite samples, but was still researching the lathe and lapping machines that would be necessary to do this work. I had some key breakthroughs, that significantly decreased the level of effort necessary to make these dials.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Fri, 02 Oct 2020 04:54:11 GMT
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Process Improvement Serendipity

A jeweler I know was happy to lend me a “model-making lathe”, but he suggested that I skip the lathe step entirely and use a hole saw of the correct diameter instead. This was a great suggestion, as the fordite is tough enough to tolerate working, but still soft enough to cut with common tools. I bought an inexpensive bench-mounted drill press and a diamond-bladed hole saw and went to town. In short order, I cut several 29.5mm diameter cylindrical cores of fordite. These are great; they were easy to cut, they’re nicely straight, and the core diameter is really close to my final diameter of 28.5mm (for Seiko-compatible dials).

I found a supplier of half-height (0.2mm high) Seiko-compatible blank brass dials. These already have dial feet soldered on, compatible with both 3 o’clock and 4 o’clock Seiko dials. I bought 10 of these dials, enough to complete my first run of dials.

Most importantly, I was talking about this project with an archaeologist friend of mine. He mentioned that he had a very special saw, a Buehler IsoMet 1000 Precision Cutter, which he uses to cut 0.1mm (and thinner) slices of bone and teeth for microscopic analysis. This machine is specifically intended to cut extremely thin sections of delicate materials without causing fractures or deformation; it's very low-rpm, has a constant water feed, and is gravity fed. It does take a long time to cut, but it should have a very high success rate with fordite. This saw isn't cheap -- a Buehler IsoMet 1000 is $8,900 new, and each 5" blade is $438. If I didn't have a friend with a lot of experience with this saw, I wouldn't have thought it possible to reliably cut thin fordite sections. And if my buddy wasn't interested in this project and willing to let me use his saw, then this project would have stalled out completely.

With these process improvements, my manufacturing process becomes much simpler:
Use a drill press and a hole saw to cut a 30mm core of fordite;
Use the Buehler to cut a 0.3mm thick disk of the fordite;
Use adhesive (thinned jeweler's epoxy) to glue the fordite to the 0.2mm half-height brass dial blank;
Drill a central hole using a pin vise and the dial template's hole to guide me; and,
Final polish of the fordite to remove any "overhang" over the edges of the dial blank, and to get the final total height to the required 0.4mm.

Chapter Rings, Half-Height Dials & Next Steps

Right now, I'm assembling my first 10 Seiko dials, setting up my web store, getting my required business and sale licenses, etc. I'm still slicing the dial sections out of the fordite cores I've cut with the hole saw, and I'll post the first finished dials here when I can.

The first two example watches I'm building will have "plain" fordite dials. I'm using an SRPE69K1 and an SRPE51K1 for my first two model watches, since they have nice chapter rings but don't have diving bezels.

I will be constructing at least one example watch with a heat-blued chapter ring, since I believe folks might like having hour indices (especially if they're a pretty electric blue). I'll need to align these chapter rings by hand, which is something I'm not particularly looking forward to. I believe that I've found an adhesive that will give me enough time to make sure the chapter rings are aligned correctly, but won't take too long to set that I'm stuck holding the chapter rings in place for an extended period of time.

I was lucky enough to find and buy ten half-height (0.2mm thick) Seiko brass dial blanks when I started this project. Indeed, but for the availability of these half-height brass dial blanks this project would not have been feasible. Unfortunately, my supplier of these blank half-height dial blanks is out of stock, and he switched to a 0.3mm blank brass dial blank in his next production run. Because of this, I need to source a supply of 0.2mm thick Seiko brass dial blanks. Luckily, I've connected with a Chinese factory for this.

I connected with a Chinese factory via Alibaba, and they are currently producing a small (200-piece) run of ETA/Unitas 6498 half-height (0.2mm thick) dials with a diameter of 38.0mm.

For the last month, I've been going back and forth with them on the design. I should be receiving the first prototype in the mail soon, and I'll okay the full run of 200. I really hope that this factory does a good job, since I really need to have a run of 0.2mm thick Seiko brass dials made!

Also, I need to design and have laser-cut a chapter ring for the ETA/Unitas 6498 dials. Unlike Seikos, which have a lot of cases with chapter rings available, my 6498 dials will absolutely need an applied chapter ring. I'm looking forward to designing this -- I'm looking forward to finding a minimalist design that highlights the 6498's small seconds.

I'm absolutely focused on getting my first run of fordite Seiko dials finished, but I'd love to experiment with other exotic materials like "surfite" (made out of surfboard resin), "bowlerite" (made out of the interior of bowling balls), and semiprecious stone like turquoise, bloodstone, labradorite, sugilite, bumblebee jasper, etc. Here, I would be competing with Chinese manufacturers who already cut stone dials, so I'm less optimistic about this unless I can find and specialize in some really unusual materials. (Sugilite, for example, is beautiful and not super well known.)

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Fri, 02 Oct 2020 04:55:14 GMT
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Conclusion: Lots of Work Left to Do

I'll consider this project a complete success if I can build 1 or 2 fordite dials for myself (in Seiko and ETA 6498 sizes). If I can make 10 or 20 dials for the watch modding community, I'll be absolutely tickled.

Fordite polishes up really well with sandpaper and, funnily enough, Turtle Wax. Here are some scans of some of the dial cores I've polished up.

I'm happy to answer any questions, and I'll be sharing more photos as I can. I've had a lot of comments like "this is too hard to pull off", and but for the serendipity of finding a source of half-height Seiko dials and having free access to an incredibly expensive precision saw, I would have agreed. If anyone has suggestions or concerns that I'm missing something key, please let me know.

Cheers,

Dan

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by Gary on Fri, 02 Oct 2020 21:34:53 GMT
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Truly impressive work Dan and well beyond my skills for sure! Given my wife is Japanese we of course are into Seiko's. Reiko was a certified Padi diver and she was required to have a certified dive watch. She has an early quartz Seiko diver that is her holy grail, I tried make it mine but failed miserably. ;-)

So I ended up with an old Orient Mako diver, cal 469. Similar in size to the Seiko SXK007. The lume is what makes the watch, if I keep it on while I'm camping the lume lasts all night and never have to emerge from the covers to see the time. I've always wanted to mod a diver of sorts. I see a lot of mods out on WatchUSeek and the Nookies mods the Seikos and Orients.

I look very forward to seeing your finished 6498's, I'm sure they will look stunning!

Good luck!

Gary

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by Jenneke on Sat, 03 Oct 2020 06:58:56 GMT
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Great stuff. Like the idea of reusing waste material. A few weeks it was World cleanup day, today I am going to incorporate that in my bootcamp training.
For watches Gruen it is. and I like to keep them original. But what you’re making is definitely salable in a few different target groups. Looking forward to see your first prototype!

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by kastner on Sat, 03 Oct 2020 15:12:01 GMT
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I love everything about this! This is so very cool, thanks for sharing!

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by thesnark17 on Sat, 03 Oct 2020 17:14:16 GMT
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I can't wait to see one of these on a watch. Very, very impressive!

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)

Posted by dpn on Sun, 04 Oct 2020 00:50:54 GMT
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Thanks all. I've been dying to share, but I'm really tired of hearing "it can't be done". I should have some finished examples in the next week or so to share.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Mon, 05 Oct 2020 19:08:07 GMT
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Update: I couldn't get access to the Buehler IsoMet 1000 over the weekend, but will be working with it tonight. If all goes well, I'll have my first two watches with fordite dials complete to share this week.

I apologize for the non-Gruen-ness of this post, but I hope to earn enough money selling these dials to both cover my costs and pay for my grail watch: A 14k green gold Pentagon.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Tue, 06 Oct 2020 06:09:55 GMT
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Here's a video of the Buehler saw I'm using in action: https://youtu.be/rWUV9SNuA90

I'm getting close enough to feel it. I did a bunch of cutting today, and have come to the conclusion that I need to replace the 4" blade on the Buehler with a 5" blade. This will allow me to make my cuts thinner and flatter. It really is a cool machine though -- I was able to get three really good cuts that I've been grinding down by hand to make my first dials. Right now, the fordite veneers are coming out of the Buehler at 0.6mm thick, which I then hand-grind to the correct thickness. Because I'm having some flatness issues, I need to get the larger blade before continuing. (It's complicated -- the size blade I'm using is perfect for archaeology stuff, but too small for watch dials. As a result, I have to cut my dial sections in two passes rather than one smooth pass. Upgrading the blade will help a lot.)

I also assembled my first watch with an (imperfect and unpolished) Fordite dial. The concept works -- I'm focusing on execution now to be able to share something I'm really proud of.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Sun, 08 Nov 2020 01:01:12 GMT
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I've been really busy on this. Here are my first two completed Fordite-dialed Seikos.

Cheers,

Dan

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by thesnark17 on Sun, 08 Nov 2020 16:57:57 GMT
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They look amazing! Congratulations are in order. It's such a striking look. I like the left-most one the best.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by Gary on Sun, 08 Nov 2020 17:20:06 GMT
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Kudos Dan! I like the one on the left as well. How is the chapter ring prototype coming along? The sword hands are nice but have you thought of using thinner hands like a baton style?

Keep up the good work!

Cheers!
Gary

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Mon, 09 Nov 2020 20:45:43 GMT
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Thanks guys!

Yeah, I'm still trying to find my favorite hand combinations.

For the chapter rings:
1) I have the laser cut carbon steel chapter rings. (Yay!)
2) I've learned how to get a really nice polish on them using my bench grinder supplemented by some diamond polishing Dremel attachments. (Yay!)
3) Unfortunately, I'm having a devil of a time getting an even, consistent blue using my current equipment. Right now, I'm using a camp stove and 4" x 4" x 1" aluminum block for the heating. It takes forever, and doesn't heat evenly. I'll be buying either a precision digitally-controlled lab hot plate ($400) or will be crafting a brass heating platform that will slip over the end of a precision digitally-controlled soldering iron. (Glashuette-Original uses a soldering iron to blue hands and screws, but I worry that I won't be able to get even heat over the larger surface area a chapter ring requires.) It is pretty cool to realize that I can consistently heat-blue hands now, though! I've also thought about crafting a PID-controlled lab hot plate, but I just don't have the energy to take that

on right now.
4) In order to upgrade my bluing equipment, I've got to finish selling my first run of fordite dials.
5) I also have a box of 200 half-height (0.2mm) ETA 6498-compatible blank brass dials. Because this movement has small seconds, and because it absolutely needs a chapter ring, my ETA 6498-compatible fordite dials are on the back burner. If y'all want a couple of these dials, please let me know and I'll e-mail them to you for free.
6) I also have a box of 200 half-height (0.2mm) NH35/NH36-compatible Seiko dials. These are the basis for my fordite dials, and I'll also be selling them individually. If y'all want a couple, please let me know and I'll mail them to you for free.

So ... stay tuned. I'm a little embarrassed to share my "best" blued steel chapter ring to date, but here it is:

It does look better in real life than in this photo, but it's not nearly good enough for me to sell.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by kastner on Tue, 10 Nov 2020 14:56:20 GMT
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Those are fantastic! Great work, and thanks so much for sharing.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Fri, 13 Nov 2020 23:06:14 GMT
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Better shot -- I'm doing my darnedest to improve my watch photography too.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Tue, 24 Nov 2020 00:28:36 GMT
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Here are a few more shots of my first four fordite-dialed Seikos. I won't be posting any more updates here, but I will be updating my Instagram and web site if anyone is curious about how this project is progressing.

I'm still figuring out how to improve my photography, but I'm pretty happy with how these shots came out.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by afire on Tue, 24 Nov 2020 17:04:14 GMT
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They look great.

Subject: Re: Fordite & Flame Blued Steel (Custom Dial Project in Process)
Posted by dpn on Tue, 24 Nov 2020 17:57:02 GMT
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Thanks!

I would have been happy with this project if I had been able to make a single fordite-dialed watch for myself. Being able to make these for other people (and, hopefully, recoup my costs) is the icing on the cake.

If anyone from this forum wants one, please send me a message. I can't give them away for free, but I can sell these at cost. I need "beta testers" to help me improve my installation instructions, etc.

Cheers,

Dan