

# EUGENE 5160 CLUB ~ JULY/AUGUST 2016

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## SEPTEMBER MEETING

September 1<sup>st</sup> – 6:00pm at David Thompson's shop. If you didn't get the directions in the meeting notice, email me for them: [michael@elementalforge.com](mailto:michael@elementalforge.com).

Bring your share-and-tell!

Note from the Thompsons:  
“Please **drive very slowly** down our lane. The maintenance is all ours. Thanks.”

## **NO AUGUST MEETING**

**BUT WE'LL DO A**

**HAMMER-IN**

**SATURDAY - JULY 30<sup>TH</sup>**

At David Thompson's shop - starting around 9:00am (please do not arrive before 9:00) and going for – well – as long as folks last! Bring lunch and if you

have a portable forge and/or anvil, get it prepped to bring along... don't forget tongs, hammers, steel, what-have-you. If you don't have equipment but want to watch & learn – here's your chance!



## NOTES AND REMINDERS

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**Northwest Blacksmith Association** – see <http://blacksmith.org/events/> for all events.  
**Mentoring** at the Cowlitz Expo Center – Longview, WA: generally on the 4<sup>th</sup> Sunday of the month.

**Blacksmith Week** will be August 18<sup>th</sup> to 21<sup>st</sup> at Government Camp (Mt. Hood) “A fantastic event for the whole family. Demonstrations, open forge time, and great times with fellow smiths. Don’t miss it! Demonstrations by top Pacific NW Blacksmiths, including Ben Czyhold, Dave Thompson, Dave Tuthill and Silas Maddox.” Here's the link:  
<http://www.cascadiaart.org/blacksmith-week-2016-2>

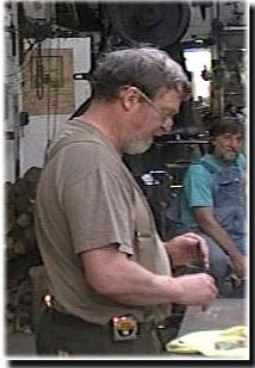
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**North West Knife Collectors** and Washington Arms Collectors will have a joint **show in Puyallup, WA** August 6<sup>th</sup>/7<sup>th</sup> <http://www.nwkc.org/show-information.html>



## JUNE MEETING NOTES

**STEVE GODDARD** got the evening fired up with a pickup bed full of free give-away items.



Once things settled down, I (**MICHAEL KEMP**) started the meeting by sharing a couple of Damascus failures I'd had recently. After having several successful billets in a row I've had a couple with lamination failures. And more troubling to me – I had a 9" western chef blade warp on me during final normalizing. After much work during tempering, I got it

straightened out – only to have the warp reappear during final grinding. Strangest thing – I was doing some belt sanding, felt the blade heat up so immediately removed it from the belt. No discoloration, but the warp had reappeared. At that point I felt I could not sell the blade even if I re-straightened it – so I broke it to look at the grain structure. It looks OK to me, but not as fine as I'd ideally like. I passed it around to get feedback on the grain size from the more experienced knife makers in the group and got reassurances that it was “fine grained,” “better than mine,” or “not bad.”



There was a lot of discussion about my heat treat process – and alternatives like quenching with aluminum plates prior to grinding in the bevels, etc. and just in general, quenching full thickness then grinding the hardened steel. If you do that, Craig Morgan recommends knocking the edge off the profiled blank before hardening – because if you grind hardened steel with a sharp, square, edge it will peel grit off the belt.

Lynn Moore cautioned that if you grind too much on one side versus the other you can induce warpage during heat treat.

A comment from Blair Goodman reminded me that when I posted this issue on bladesmithsforum.com someone mentioned that Ed Caffrey has posted that he has warpage issues in Damascus when using 1095 – which is what I've been using. So another thing is that the next time I order up steel I'll drop down to 1084 or 1080 to interleave with my 15N20.

**FRANK BOBBIO** talked about issues with his new anvil. When he did the ball-bearing-bounce-test it would leave divots in the anvil face. That didn't seem right to any of us and it didn't seem right to Frank.



He had a lot of back-and-forth with the manufacturer. The surface was supposed to be 52Rc. Frank borrowed a set of hardness testing files and found that some of the anvil was, indeed, between 50-55Rc, while other parts of the face were as low – one spot between 40-45Rc.

The manufacturer maintained that the entire surface needs to be work-hardened... but agreed to swap Frank for another new anvil.

Frank went on to show us a binder of articles he'd gleaned from Knife Illustrated and Blade Magazine on heat treating. He highlighted an article called Telling The Truth About Forging – wherein the author (a metallurgist) insists that you want **large** grain size going into the hardening process as small grain size impedes hardenability. As Frank noted this is the opposite of the general consensus on best practice – not only from scores of knifemakers but from respected metallurgists like John Verhoeven. So there's a head scratcher.

Frank recently had the opportunity to talk with ABS Master Smith Adam DesRosiers about his heat treat process. Adam does a couple of quick thermocycles before normalizing – heating the blade to 1450°f and letting it cool to about 900°f (black).

Next Frank shared some extra-hard drill bits that can



cut through hardened steel. For those times when you harden the tang and then realize you should've drilled holes in it first! Frank saw a guy demoing these at a show spending all day drilling through old files.

Frank has been working with some CruForge V “that was air hardening ... just getting so hard I couldn't drill through it after normalizing. So I pulled these bits out and went right through it.”

Frank showed samples of the bits from two brand names – Rodman and ARTU-USA – as well as a file that he'd drilled a sample hole through. You can find ARTU-USA at Ace Hardware.



“The trick is that it doesn't cut through like a normal bit, it burns through – so you have to run at 2,000rpm... it throws out bright blue chips of steel but you can go right through hardened steel without a problem.” And also: “You don't want to use it on interrupted cuts or drilling a broken bolt out of a block – anything like that will just fracture the bit.”

... then on to the knives: “Here's another RR spike knife ... I did the selective hardening a little different so the line go up a little more ... and finished with a wood handle.”



Frank wanted to try making a blacksmith's knife. And after making this one with flat stock and dealing with the 90° change in 1084 “flat” between the blade and handle he recommends starting with ROUND stock next time!



Frank has been looking at what to use for non-stainless “that I can make an exceptional kitchen knife out of.” He passed around a knife in 1084 with Wayne Goddard style mustard finish. It's been in use for six months – “it could be thinner – I took it down to 1/8 inch – not that impressed with it overall.”



“I had a piece of A-2 from years ago. I made this a month ago – ground to 1/8 inch. Really good tool steel. Put a simple handle on it. For the first month its showing less patina [than the 1084] ... overall – I guess it's OK but not that impressed with it either.”



“I thought 'I've got these bandsaw blades' that are already at the right thickness – 0.075” – I don't have to grind it down because I'm looking for 0.090” or less – because thickness makes a massive difference for how it cuts.” Frank asked the group if other folks had made knives out of 15N20 [bandsaw blades are generally made of 15N20 or similar steel] and how they liked them. Several had – and reported the resulting knife as being “very good.”

“I did this one yesterday – 15N20 – I selectively hardened the edge.” The handle is water buffalo horn and myrtlewood. The blade is bead blasted then etched.



Before making the knife, Frank experimented with some cutoffs from the bandsaw blade. He put a quick edge on the samples. One sample he passed around was selectively torch hardened in water and the other in oil. Tempered at 375°f. He had to use vice grips and a vice to bend-test them “I really had to pull – so is it strong enough for kitchen use? And being selectively hardened? I can't imagine any way you're going to break that.” Then he cut through 3/32” welding rod and a 1/4” bolt with the samples to see how the edge would hold up. Neither of the samples chipped but the 1/4” bent the edge. Frank mentioned a 60 Rc hardness. “So overall – I think an excellent kitchen knife.”

*There was a question about chromium in 15N20. The spec's are C 0.75; Ni 2.00; Mn 0.40; Si 0.30 and a dab of S and P according to Zknives.com and Bohler-Uddeholm. I gather that the composition of bandsaw blade steel may vary from official 15N20 depending on the bandsaw manufacturer.*

Frank also talked about trying to use a jig with the belt grinder when grinding in the bevels – but dropped back to free-handing. There was general agreement from the group that jigs for bevel grinding are more trouble than they are worth.

Frank likes to grind with nitrile gloves with one wrap of “Gator tape” wrapped around each finger. This gives him good sensitivity and keeps his hands dry.

**CRAIG MORGAN** was up next. “I had a hankering to make a miniature. I had some scraps of Damascus and some mammoth ivory so I made a miniature sword and it was pretty challenging!”



“I put a picture on Facebook and in 18 hours I had an order for another one from a guy in Alaska. And I sold this one. \$250 each.”

There were some joking questions from the crowd asking the Rockwell hardness – and what belt grinder he used. “All hand done – lots of magnification.”

He also brought in the 1<sup>st</sup> miniature he ever made. It was a commission from a lady in the OKCA – but

when Craig showed the finished piece to his wife and daughter – his daughter persuaded him that it had to be kept “for ever.” So Craig had to explain to the client that she'd have to wait a little longer for him to make another one!

But he *did* have it at the meeting and passed it around. It's the Bowie knife in the photo below – he also made an ebony stand for it. He scrimshawed his initials on the butt of the ivory. It won Best Miniature in the 2007 OKCA show.



Craig responded to questions by describing some of the working processes. “You have to come up with different ways to hold things... the guard sits on to end of my finger!” He started with a round hole in the guard – filed it rectangular with a tapered square needle file and an OptiVISOR. Once he had the hole made he used a Dremel mandrel – with the screw through the guard – to give him a handle on it.

“... and I've got a plastic rain gutter on the front of my bench...” to catch any small parts that get dropped. “Then I've got my denim apron tucked into the gutter” so if he drops anything that he's holding in his hands it doesn't reach the floor.

**ELIJAH AMEZCUA** had been to our January meeting displaying a couple of getting-started knives – which looked good for first attempts - but were made of mild steel. “After that meeting I met with Steven at Wayne's shop and got a ton of steel...” Elijah allowed that he has a tendency to start a number of





projects and set them aside (he's not alone!) but he's been focusing on a couple of blades recently – a Bowie and a hunter.

He heat treated them in canola oil last weekend and the Bowie got good and hard but the hunter – not so much – so he plans to re-heat-treat the hunter. I believe he said these were 1050.



Lynn Moore reminded us of the workshop we did years ago at Jeff Crowner's place where we used 1050. In that case we were learning about hamon lines and we clayed the backs of the blades. After the clay dried we heated the blades above non-magnetic and did an interrupted quench in water. *My memory is that we held the blade in water until we felt a slight vibration – quickly removed the blade from the water for a second – then re-immersed the blade to finish the quench.*

There was some discussion about pre-heating oil for the quench (most of us use a hot piece of scrap steel and stir the pot with it to bring it to the 120-140°f range). You can pick up a candy thermometer at a grocery store to test the oil's temp. Have a lid handy in case the oil catches fire when doing the quench.

Frank Bobbio shared that DesRosiers' shop fire was started when Adam lost control of a quench oil fire while quenching a large power hammer die.

**JIM JORDAN** came to the front and showed us an engraved metal box he's been working on – prototyping for an engraved metal knife case *if I understood correctly.*

He passed around a box he welded up – but has not attached hinges to the lid yet.



Jim also passed around some pieces of plate and a pocket knife he'd done some engraving on:



**JOSH** – a friend of Elijah's – showed us a couple of knives he's been working on – made of 1084. He's made himself a coal forge with firebrick and a hair dryer for the forced air. The blades were heat treated in vegetable oil.



Unfortunately Josh did not drill pin holes in the tangs before hardening... so there



were suggestions from the group – ranging from the ARTU/Rodman drills that Frank shared earlier to ways to protect the blade while softening the tang.



**TIM** – A new-to-knifemaking guy – showed us what he's been up to. “Most of you know I've only be at this for a month or two... so half of what you guys have talked about tonight – I don't know what you were talking about!” To which a number of folks chimed in that we also don't know what we're talking about half the time. “I'm having a lot of fun making this stuff. I've made 2 knives so far and both of them are messed up but I'm learning!”

The first one he shared was a RR spike knife. “I think I pounded it out too thin. By the time I finished grinding it and got all the hammer marks out of it the thing's about 1/8” thick now.” *Been there, done that – lots of times!*

He noted that he's using hydraulic oil for quenching. Frank Bobbio spoke up to note that for low carbon steel like RR spikes, oil quench isn't going to do it. Frank recommended “Superquench” which is a home-brew brine quench. Frank's version is:

- 4-1/2 gal water
- 5# bag of salt
- 8oz bottle of original blue Dawn dish soap
- 8oz to 16oz Simple Green

*Note: **ONLY** use this on low carbon steels – a high carbon blade would pretty surely crack in this stuff. And you don't need to pre-heat a water or brine quench like you do with oils.*



Frank and Lynn noted that even if the RR spike is stamped “HC” for “High Carbon” it's not “high carbon” in the knifemaking world. At most it would be 0.35-0.4% carbon whereas 0.5% carbon is the low end for what knifemakers buy from the mill – and might not refer to steel as “high carbon” until you get to at least 0.8% carbon. You can still make a good

knife from RR spikes – you just have to use a **very** aggressive quenchant (like Superquench) and even then you have only a split second to get the heated blade into the quench. Frank uses a torch to heat the blade while he holds it over the quench tank. After getting it up above non-magnetic he can get it in the quench fast enough to create martensite.

He noted that his next project would be making a knife from a file. If you quench a file-knife (true high carbon) in water or Superquench it will break – so the advice was to use the hydraulic fluid or a vegetable oil like peanut or canola.

*Here's my notes on the science of steel phases that makes heat treating possible:*

[http://elementalforge.com/tips\\_notes/?page\\_id=87](http://elementalforge.com/tips_notes/?page_id=87)

*It's pretty dense writing – I was trying to put it all in a nutshell but still hit all the high points. IMHO it's good to get exposed to the current scientific theory – but it takes trial & error & advice of those who know how to make it work to get a handle on this stuff. Not that I've got that great grip on it. I still get surprised.*

Erik Land advocated for using a known steel – so that “you could say 'I'm using 1084 [for example]' and half a dozen people in this room use it and can tell you just how to treat it.”

And that about wrapped up the June meeting. We broke into informal discussion clusters and drifted into the night...



## JULY MEETING NOTES

**DAVID THOMPSON** announced that we can do a **hammer-in Saturday July 30<sup>th</sup>** at his shop (same place as our 5160 club meetings). Bring lunch – and a portable forge & anvil if you have them. “Portable anvil” yah, right. Hammer and tongs. Steel. Gloves, glasses, maybe even earplugs... and if you don't have any of that come anyway to see and learn! We'll start around 9:00am – please do not come early. We'll bang on steel until we get tired of it or the Thompsons kick us out.



**ERIK LAND** was first up to show off a set of 4 folders he's been making. "I had a set of folders to make for a father and his 3 sons. All matching folders." Erik had set the pins that very day and had some finish work yet to do before he was to deliver the order.



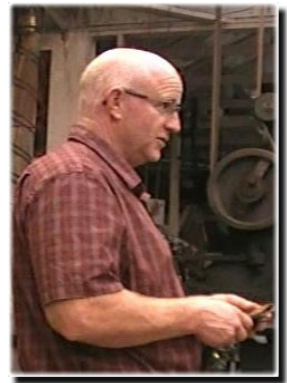
"I tried a mustard finish – first time I'd ever tried one – and it turned out pretty neat... it didn't react near as quick as I expected..." Erik noted that the mustard worked very slowly – but eventually got there. The group ruminated about this and asked specifics on his technique – but no solid answer was forthcoming. Erik noted that he found on-line advice to finish it off with Birchwood Casey gun die bluing. These are in O-1 steel with macadamia nut wood taken from the dad's place.

"If you work all of them, they all have a slightly different action. They all use the same pattern. I ground all of them at the same time. I used the same rise/fall gauge to set the spring tension. They all have a nice 'walk and talk'..." but they all have a little different feel. *All are beautiful, if you ask me.*



The wood is finished in by sealing in 4 coats of cyanoacrylate (Superglue), sanded smooth, then 3 or 4 coats of Renaissance Wax.

**BLAIR GOODMAN** took the floor. He'd been to Utah to help his mom through knee surgery. "My nephew is into leatherwork – so he wet-formed this leather..." using a folder (both bare and in plastic wrap) to shape down the sheath for that particular knife. He used a roller at one point to get a tight fit to the blade contour. And yes – it's "tight."

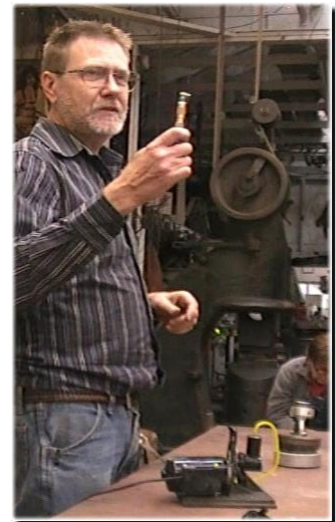


"He forgot about it – you know how life is... he went on-line and found one of those Tippmann Boss sewing machines... a cast steel rather than the aluminum ones they do now – for \$500 rather than \$1,500 new ones – and had every attachment..." He finished the sheath and gave the knife & sheath to uncle Blair!!



**JIM JORDAN** keeps taking his engraving work one step further. He up his smaller engraving ball on the table with an auto-engraver setup that he has constructed from the ground up.

"I've got a MagnaGraver – but this [the engraving head he's holding in the photo] I made out of a Harbor Freight \$3.99 automatic center punch. Just modified it a little bit... trying to see if I can do this whole setup [including the reciprocating air pump] for about \$100."



*If he gets anywhere near that target he'll have a*

*couple of sales within the group before he has a chance to offer them on the web.*

He has tried out different chuck designs and different cylinder lengths for his modified center punch. Basically he opens up the punch handle, reams it out, puts in a sliding weight, drills an inlet & outlet air hole, and he's got something he can actuate with a reciprocating air pump.

The pump he showed us was based on a used sewing machine motor hooked up to an air pump. Start with a tire pump – block the air intake valve – remove the air output valve – so the air pushes & pulls air through its “output” port. Hook that up the the inlet on the modified punch and you've got a reciprocating engraving head!



He likes the sewing machine motor because it is quiet and comes with a foot pedal.

He makes his engraving tools from high speed drill bits – sharpened to the tip he wants for the job.

Jim demoed the engraver for us – then invited anyone interested to give it a whirl. I do believe there was some interest!



Jim talked us through other options he's tried or mused about.

From there conversation drifted to building your own 2x72 belt grinder. Erik believe he spent \$200 max building his (most of which was the motor). \$500 was another person's estimate for how much they spent. And for starter grinder or kit both Coote and the No Weld Grinder were mentioned. There's also Grinder-In-A-Box. The **Coote** gives you a simple grinder – you provide the base, motor, and drive belt – in the \$400-500 range depending on the model. **Grinder-In-A-Box** gives you all the parts to bolt together starting around \$275 and you supply your own base, motor, and drive belt. **No Weld Grinder** is plans and instructions for \$25. Links for all of these options are in the “Equipment” section at the end of the newsletter.

The cost of a motor is not to be ignored – they are spendy. One alternative is to find a 2<sup>nd</sup> hand treadmill and salvage the motor and variable speed controls. The belt speed will depend on the motor RPM and the size of the drive wheel or drive belt pulleys. Belt speed (in linear feet per minute aka surface feet per minute - SFM) can vary from 700 to 7000 SFM – although I think it's rare for anyone to run their grinder over 4500 SFM. Personally, I run fast for course grits – slow for finer grits. Others have great results running fast on all grits.

**Hear Ye, Hear Ye: If you have built your own 2x72 grinder please send me a photo or two, notes, and a ballpark guess as to how much it cost – and I'll put out a special bulletin to the club so folks can get ideas for how to do it themselves! Get 'em to me by mid August and I'll combine that with photos from our upcoming hammer-in to send out for the September meeting notice.**  
<mailto:michael@elementalforge.com>

We had gotten rather disorderly at this point until...

**MARTIN BRANDT** gavelled us back to order with his “hot work” hammer – with radiator fins!

OK it looks like it was made from a spline shaft with the handle eye





drifted out. “Jim keeps bringing in those strange hammers so I figured I'd bring mine in – they're not very small, though.”

Martin said the hammer is about 3-3/4 pounds. It's domed on one face and pretty flat on the other. The splines have been rounded back from the faces so if you are careful it doesn't leave any spline marks. But you can't use the edges of the hammer to fuller or set up a step!

He also brought out a 20oz hammer with a wiggly handle “for working around corners.”



Martin said his day job has kept him busy – but he has got a puukko knife in process. The handle is Oregon White Oak crotch wood – “you can see what you get when you start cutting wood out of crotches – really fine figure – hard and dense – and you really want to let it dry a few years. I just stash it in my garage and forget about it.”



“White Oak – it's nice to boil it.” Martin recommends cutting down wood like White Oak or Madrona into handle block sizes, then boil it to release the internal stresses before drying.

“I had a Madrona burl. I totally waxed it... but it started tearing itself apart – like expanded metal...” so he salvaged what he could into handle sized blocks. He threw it all in a big stainless pot and boiled it for an hour per inch of thickness - “and that saved it.”

Martin likes to keep the water and boil it down for use as a dye. He also keeps sawdust from dark woods to make a slurry for dying antlers.

Next up he shared a parang-like knife that he has in process. It has a curved tang, so he was only partly able to drill and file in the tang hole – and the rest of the way had to be burned out. “A tip of advice: take a break every so often [when burning in a tang hole] to let the wood cool off!”

The ferrule had to be fitted over the square-shaped handle. Martin made a special mandrel to get the corners set.

The recycled blade steel sparked like 1084. He tempered it at 425°f so it would be good and tough for use as a chopper.



Martin described the decorations traditionally used on these knives – and the way they use a smaller long-handled carving knife for tasks like splitting sticks or making tinder.

Martin noted that they always have split firewood drying over their fire – either at home or out in the jungle – set up on a frame so they dry without burning – so they always have dry firewood in process even in the wet jungle.

Martin shared his spark test samples... a collection of known steels that he can compare to sparks of recycled steel.

“I don't make any money off using junk steel. You're probably better off buying 1084 or 5160 somewhere if you're trying to make money [at knifemaking]... but I like making knives out of old junk! And with a set of known materials you can



spark test unknown materials and come up with a pretty close guess as to what you've got and about how much carbon it has." He started out doing spark testing for welding with recycled steel so he'd know if he was trying to weld with high carbon steel or not. High carbon having more of a tendency to crack at the weld if not cooled slowly.

**FRANK BOBBIO** was our final presenter for the evening. He started with a couple of layered Damascus billets – one of 1084/15N20 and the other of 1084/15N20/ 5160. "These were my first layered Damascus, so I tried one with flux and the other without flux." But since Frank was not sure of the atmosphere in his forge, on the flux-less billet he welded sheet metal box around it to protect it from oxidation.



Frank described the evolution of modern Damascus making by bladesmiths. For years the norm was to use a lot of flux (borax) to dissolve any scale but also to insulate the steel from oxidation and prevent new scale from forming. Molten borax is extremely corrosive on the forge – and probably not that great to be breathing the fumes. Some smiths migrated to dipping the billet in kerosene instead – and eventually to using nothing at all... but unless you sealed off the billet from the atmosphere you would get a lot of scale – so for awhile it was the norm to stack your billet; tack weld it; and encase it in sheet metal to keep the Damascus from scaling.



J.D. Smith and Bob Kramer started championing going without any flux or kerosene or WD40 or sheet metal sometime around 2012/2013. You have to have good control over your forge atmosphere to make

this work. You need a slightly reducing atmosphere. "This is sort of a modified ladder pattern..." Frank pressed in ladder lines but didn't grind all the way through the high points, then forged it flat. There is a lot of stock loss in Damascus any way you do it.

"Here's the knife that I made from it – about 140 layers. The handle is Cocobolo ... stick tang."



"I just about finished up two cable Damascus knives" [except for additional coats of finish on the handles]. The light handled one is from 1" cable, the dark handled one is 7/8" cable.

Frank had some issues with hardening and etching. After redoing the heat treat John Emmerling gave him some straight ferric chloride from <http://www.micromark.com> – John said "get rid of your RadioShack stuff because that's got ferric chloride and hydrochloric acid. The straight ferric chloride works better."

The knives got "good and hard" but Frank's looking for more consistent results – and ordered up some Parks 50 quench oil from <http://www.maximoil.com> so we should hear how that works at future meetings.

This one has brass, malachite, and black palm handle – with 2 coats of TruOil and he's going to add more coats to fill up the pores.





The other cable knife handle is finished in Minwax Antique Oil – which dries much slower than TruOil so it takes longer to build up multiple coats. This one is turquoise and a wood that Frank got from Gilmer Wood in Portland [he believes it's cyprus].



Frank sounded as impressed by Gilmer as I was when I dropped in there. Great deals on good-to-excellent handle wood.

They have isles of shelves full of handle-sized blocks of exotic woods – plus “in the front they've got 30 gallon cardboard drums filled with seconds or remnants – like cocobolo for \$1.” Some of the “defects” are trivial, so it pays to rummage through the remnants. Frank got several nice chunks – like a nice piece of African Blackwood for \$6.

Then Frank passed around a couple of RR spike knives – one of which he'd drawn out to 14”! He tried both a hand rubbed finish and a matte finish to see which would show off the temper line better. Bead blasted and etched:



Bead blasted then hit with 220 grit and etched:



“I think they're both appropriate.”

Frank's final pass-around was the filing jig he made. It has carbide tops. It took him 1-1/2 hours to hone the carbide and this one is \$90 [or he'll just keep it for himself]. “The next one is gonna be \$10 cheaper but you've gotta hone it yourself! I made this one so

it's perfect – but you can get one at Harbor Freight and sand off the high spots – it's not going to be perfect but there you go.” Frank indicated that he's not planning on going into manufacturing these.

Frank's anvil saga (see last newsletter) ended well with a harder faced replacement that Emmerling trucked back from the Spokane area. That's why Frank was in Portland and dropped in on Gilmer Wood. He also dropped in on West Marine to pick up some G-Flex epoxy.

Frank tested the G-Flex and found that if he let it cure for a week it was very strong – but in the first few days it isn't strong yet.

*I'd tested G-Flex a few years ago and was disappointed in it – but now it sounds like I just didn't give it long enough to cure!*

Frank is testing several glues and found that if he sandblasted the surface (as opposed to 60 grit finish) the bonding strength doubled. He will be testing JB Weld, G-Flex, golf shaft epoxy, and JB Quick Weld.

Frank is looking for a low viscosity option to get into the minimal gap when gluing up a Japanese kitchen knives. JB Weld is too thick to do this with.

**TIM** got up next. “I've just started – getting in there having fun – not knowing much about it yet... I have a brother-in-law that's a farrier – he gave me a bunch of these rasps.”

He forged the rasp then ground it. He's been having a hard time getting a flat grind with his 1”x30” grinder and is thinking about a 2”x72” grinder.

As Tim is just getting a handle on the heat treat process, there was some discussion of annealing, quenching, and tempering.

In response to his questions about fitting a guard, it



was noted that if you file out the guard hole too wide, you can sometimes salvage the guard by hammering it edge on to close the hole back down. Then you need to re-sand the guard to remove hammer marks. You want the guard fully formed and sanded before you glue or solder it to the blade. There seemed to be general agreement that shaping the guard is a by-hand operation.



Frank offered some advice on cleaning up a solder joint. You can use a brass or copper scraper or pointed wire to scrape off excess solder without marking the steel of the blade. Follow that with 400 grit sandpaper to clean it up.

Jove noted that if he has cleanup work to do on a guard that is already attached to the blade he will protect the blade with blue painter's tape so he doesn't scratch the blade. He'll take a small stick of wood and put a point on it with the belt grinder – like a chisel – and then use that to wrap the sandpaper on.

Frank noted that he will use an automatic center punch to work the brass in against the tang on the handle side to pinch and hold the guard against the tang. Then he wraps the blade with a damp rag 3/4" from the guard (to protect the blade from heat). Put a little Stay-Clean flux (comes with Stay-Brite solder) into the joint. Frank hammers the solder paper thin and cuts tiny rectangles which he places at the junction. These will melt quickly into the joint. Then he applies the flat-hammered end of the solder to the joint under the torch to finish filling the gap. Frank cleans up afterward by taking a wooden toothpick that he dips in Stay-Clean flux and draws that across the still-liquid flux. "You draw that line and it sucks the solder into the joint" and cleans it up. Then when the joint cools down a little he uses a spray bottle with diluted ammonia (1/2 ammonia 1/2 water) to neutralize the acid.

Frank noted that you need to match the flux to the type of solder you are using. Solder comes in several heat ranges. And it was noted that the solder fumes

are somewhat toxic – and since the fumes attack nerves first, you may not be aware of any damage it's doing to your lungs. Use plenty of ventilation.

Tim asked Frank about the size of the RR spike that Frank made the 14" blade out of – which Frank said was 6-1/2" or 6-3/4".

**DAVID THOMPSON** finished up the meeting with a bucket of steels "the last of the Goddard stash." Free for the taking.



**MIKE JOHNSTON** couldn't make the meeting but sent along a picture of a dog-face hammer he made by taking a Harbor Freight sledge, bandsawing off one side, welding it to the other and voila! Harbor Freight dog-face hammer:



Mike also sent along photos of his latest dagger. The blade is from a coil spring. The handle is paper Micarta, red spacer, and a copper guard. Sally Martin mosaic pins.







Have fun all – and work safe!

~ ~ ~ Michael Kemp



## FREE DE-CLASSIFIEDS

Email me a brief description of what you are selling/buying/looking for with your preferred contact (phone/email/...). Unless you let me know you want a shorter run, I'll run the note for 3 months and then send you an email to see if it's still valid. No charge – just email me at [Michael@ElementalForge.com](mailto:Michael@ElementalForge.com)

\*\*\*

25# L6 Power Hammer  
Complete Rebuild  
2 hrs use  
\$3,000  
Eric Sprado  
541-964-3224  
[spradoeric@gmail.com](mailto:spradoeric@gmail.com)

\*\*\*

Starting Position – Foundry/Casting at Oregon  
Pattern & Foundry.

Sand casting etc. Hard work. Rewarding.  
Must be 18+. Hours: Monday-Thursday 6:00am-  
4:30pm Friday being overtime day. Very real  
opportunity to grow and learn all foundry skills.  
Starting wage \$10-12 depending on experience.

Contact: [terry@oregonpattern.com](mailto:terry@oregonpattern.com)

If you know anyone who would be serious about  
learning the foundry business - pass this on!

\*\*\*



## WEBSITE LINKS

### 5160 CLUB

5160 Club Newsletters are archived at:  
<http://www.elementalforge.com/5160Club/>

Hint: to Google the archive for a specific knife style  
or presenter name, use a search like this:

**sami site:**<http://www.elementalforge.com/5160Club>

or this:

**ron lake site:**<http://www.elementalforge.com/5160Club>

### OREGON KNIFE COLLECTORS ASSOCIATION (OKCA)

The OKCA hosts monthly dinner meetings where  
you are guaranteed to see treasures from the wide  
world of “things that go cut!” OKCA also puts on the  
big knife show in April – if you haven't seen it you've  
been missing something special!

<http://www.oregonknifeclub.org/index.html>

Go to the “Knewsletter” link and scan a recent  
newsletter for a membership form and contact info.

### FORUMS

Bladesmith's Forum aka Don Fogg Forum

<http://www.bladesmithsforum.com/>

Knifedogs Forum (USA Knifemaker)

<http://knifedogs.com/forum.php>

American Bladesmith Society

<http://www.americanbladesmith.com/ipboard/>

Usual Suspects Network

<http://www.usualsuspect.net/forums/forum.php>

Blade Forums  
<http://www.bladeforums.com/forums/forum.php>

Julious Griffith groups on Facebook:

- Custom Knives For Sale by Maker - Available now
- Knifemaking - Works in Progress (w.i.p.'s)
- Knifemaking Equipment Buy, Sell, or Trade (used only)
- Knifemaking - Masters to paying Students connection
- Knife shop photos
- Knife Calendar - Events, shows, hammer-ins, schools, misc.

These are all closed groups – to keep them focused – so if you want to join one of the groups, click the “+ Join Group” button and also message Julious and give him some info on yourself so he knows you have real interest in the group.

## REFERENCES

Our own Wayne Goddard's books are available at Amazon:

<http://www.amazon.com/Wayne-Goddard/e/B001JS9M10>  
And you can email the Goddards directly for his DVD at [wgoddard44@comcast.net](mailto:wgoddard44@comcast.net)

Most of the companies in the “Knife Maker General” links (below) have a section for how-to books and DVDs.

Verhoeven's Metallurgy For Bladesmiths PDF – this is a very deep dive, not an introduction.  
<http://www.feine-klingen.de/PDFs/verhoeven.pdf>

Verhoeven's updated book:  
<http://www.amazon.com/Steel-Metallurgy-Non-Metallurgist-J-Verhoeven/dp/0871708582>

ZKnives – Knife steel composition/comparison/etc.  
<http://zknives.com/knives/steels>

Kevin Cashen's Bladesmithing Info  
<http://www.cashenblades.com/info.html>

Tempil Basic Guide to Ferrous Metallurgy  
[http://www.tempil.com/wp-content/plugins/download-monitor/download.php?id=Basic\\_Guide\\_to\\_Ferrous\\_2010.pdf](http://www.tempil.com/wp-content/plugins/download-monitor/download.php?id=Basic_Guide_to_Ferrous_2010.pdf)

From the Heat Treating Society of the ASM – the Heat Treater's Guide Companion for Android devices. Look up heat treating details on hundreds of steels in the palm of your hand.

<https://play.google.com/store/apps/details?id=com.pfiks.mobile.heattreaters&hl=en>

My “Knife Info” has some knife musings and cheat sheet charts – plus Oregon and Eugene knife laws:  
[http://elementalforge.com/tips\\_notes/](http://elementalforge.com/tips_notes/)

## CLASSES FOR KNIFE MAKING, ETC.

Gene Martin offers personal instruction at his shop south of Grants Pass for a daily rate.  
<http://www.customknife.com/>

Michael and Gabriel Bell of Dragonfly Forge offer an ongoing series of small group classes in Japanese style sword forging and fittings. Located on the southern Oregon Coast.  
<http://dragonflyforge.com/>

Murray Carter offers small group classes in a variety of subjects, primarily focused on traditional Japanese cutlery. Located in Hillsboro, Oregon.  
<http://www.cartercutlery.com/bladesmithing-courses/>

David Lisch is an ABS Master Smith who teaches classes in Seattle. I've heard rave reviews from his students. Lisch is very skilled at blacksmithing in general and bladesmithing in particular.  
<http://www.davidlisch.com/Learn.html>

Jim Hrisoulas now offers both formal classes and mentoring sessions in 2 hour blocks at his shop in Henderson, Nevada:  
<http://www.atar.com/joomla/> and click the “Bladesmithing Classes” link.

The ABS (American Bladesmith Society) offers classes in Washington, Arkansas and elsewhere – if you are up for traveling across the country to take classes, check out their “Schools” link:  
<http://www.americanbladesmith.com/>



James Austin offers forging classes in Oakland, CA – axes, tongs, viking anvil, etc.:

[http://forgedaxes.com/?page\\_id=148](http://forgedaxes.com/?page_id=148)

Blacksmithing and some bladesmithing workshops are hosted regularly by the Northwest Blacksmith Association: <http://blacksmith.org/>

USA Knifemaker has a lot of fun & informative videos on their YouTube channel:

<https://www.youtube.com/user/USAKnifemaker/videos>

... and hey - “free” is a hard price to beat!

Nick Wheeler also has a good YouTube channel with a lot of how-to videos:

<https://www.youtube.com/user/NickWheeler33/videos>

## **GENERAL TOOLS & SUPPLIES**

Woodcraft of Eugene – thanks to Joe & the crew for six years of hosting 5160 Club meetings – we've had to move on, but the hospitality was appreciated.

<http://www.woodcraft.com/stores/store.aspx?id=515>

MSC Direct

<http://www.mscdirect.com/>

McMaster-Carr

<http://www.mcmaster.com>

Grainger

<http://www.grainger.com>

Surplus Center

<http://www.surpluscenter.com/>

Victor Machinery Exchange

<http://www.victornet.com/>

## **KNIFE MAKER GENERAL**

Knife kits, steel, tools, machines, supplies such as handle material, fasteners, belts, glues, finishes, etc.

Jantz Supply

<http://www.knifemaking.com>

Texas Knifemaker's Supply

<http://www.texasknife.com>

USA Knife Maker's Supply

<http://www.usaknifemaker.com/>

Knife and Gun (K&G)

<http://www.knifeandgun.com/>

Alpha Knife Supply

<http://www.alphaknifesupply.com/>

True Grit

<http://www.trugrit.com>

## **KNIFE STEEL SOURCES**

New Jersey Steel Baron

<http://newjerseysteelbaron.com/>

Kelly Cupples (High Temp Tools) – Alabama

<http://www.hightemptools.com/steel.html>

Niagara Specialty Metals – New York

<http://www.nsm-ny.com> (click Products/Knife Steels)

SB Specialty Metals – New York & Texas

<http://shop.sbsm.com/>

Bohler Uddeholm – numerous U.S. locations

<http://www.bucorp.com/knives.htm>

Sandvic – stainless steels – Texas & Pennsylvania

<http://www.smt.sandvik.com/en/products/strip-steel/strip-products/knife-steel/sandvik-knife-steels/>

Pacific Machinery & Tool Steel – Portland, Oregon

<http://www.pmtsco.com/tool-die-steel.php>

## **EQUIPMENT**

Beaumont (KMG) [Ohio] – the industry's benchmark  
2x72 belt grinder

<http://www.beaumontmetalworks.com/shop/>

Travis Wuertz [Arizona] – premium versatile grinder  
[http://www.twuertz.com/Home\\_Page.php](http://www.twuertz.com/Home_Page.php)

Pheer [Gresham, Oregon] – affordable grinder made in Oregon  
<http://www.2x72beltgrinder.com>

AMK [Ohio] – affordable grinder, quick-change between platen & contact wheel  
<http://amktactical.com/>

Coote [Port Ludlow, Washington] – affordable, simple grinder – you supply the motor  
<http://www.cootebeltgrinder.com>

Marinus Kuyl [Hillsboro, Oregon] – another affordable grinder made in Oregon – and parts – you provide the motor.  
<http://oregonblademaker.com>

Grinder-In-A-Box – grinder kit, assembly required  
[http://www.polarbearforge.com/grinder\\_kit\\_order.html](http://www.polarbearforge.com/grinder_kit_order.html)

The “No Weld Grinder” plans can be purchased from  
<http://usaknifemaker.com>  
either as a booklet or as a download – just use the search box to enter “no weld grinder”

Wayne Coe [Tennessee] – grinders, motors, VFDs...  
<http://www.waynecoeartistblacksmith.com>

Contact Rubber Corp – wheels etc.  
<http://contactrubber.com/contact-wheels.asp>

Sunray – drive wheels  
<http://www.sunray-inc.com/drive-wheels/>

Renaissance Metal Art [Mulino, Oregon] – 80# ram air hammer  
<http://www.rmetalart.com/tools.htm>

Anyang [Texas] – air hammers from 20# to 165#  
<http://www.anyangusa.net/>

Meyer Machine Tool [Ohio] – treadle hammer  
<http://www.meyermachinetool.com/Blacksmith-div-.html>

Spencer/Clontz tire hammer plans/workshops  
[http://www.alaforge.org/Trading\\_Post.html](http://www.alaforge.org/Trading_Post.html)

Appalachian Power Hammer plans  
<http://www.appaltree.net/rusty/index.htm>

Helve Hammer and Quick-Change Dies Video – from a BladesmithsForum.com thread.  
<https://www.youtube.com/watch?v=uzruqYkKGNM>

## **FORGE & REFRACTORY**

Chile Forge  
San Marcos, Texas  
<http://www.chileforge.com/>

Mankel Forge – Muskegon, Michigan  
<http://mankelforge.com/forges.html>

Western Industrial Ceramics Inc.  
All things refractory – Tualatin, Oregon  
<http://www.wicinc.com/>

High Temp Tools (scroll down the page for the category buttons) Tuscaloosa, Alabama  
<http://www.hightemptools.com/supplies-mainpage.html>

High Temp Inc. has also been recommended for Kaowool etc. Portland, Oregon  
<http://hightempinc.net/>

Omega – thermocouples & measuring equipment  
Stamford, Connecticut  
<http://www.omega.com/>

Auber – more thermocouples and controllers, etc.  
Alpharetta, Georgia  
<http://www.auberins.com>

Hybridburners – home of the venturi T-Rex  
Smithville, Georgia  
<http://www.hybridburners.com/>

Pine Ridge Burners – for ribbon burners and all associated fittings, blowers, valves, etc.  
Conway, Massachusetts  
<http://www.pineridgeburner.com>

Zoeller Forge – low cost venturi & parts: Z Burners  
Lanesville, Indiana  
<http://zoellerforge.com/>



Here's the original article on making a ribbon burners that John Emmerling wrote back in 2005 for the NWBA Newsletter:

<http://blacksmith.org/2005-1-hot-iron-news/>

You can download the PDF from that site. John's article starts on page 11.

## **BLACKSMITH**

Blacksmith Depot

<http://www.blacksmithsdepot.com>

Pieh Tool

<http://www.piehtoolco.com>

Centaur Forge

<http://www.centaurforge.com>

Quick and Dirty Tool Co.

<http://quickanddirtytools.com/>

## **LOGO/ETCHING**

Ernie Grospitch – Blue Lightening Stencil

<http://www.erniesknives.com/>

IMG International Marking Group

<http://img-electromark.com/>

Electro-Chem Etch

<http://www.ecemmi.com/products.html>

## **HEAT TREAT SERVICES**

Here are some folks who provide heat treating services for blades. While all of these have been recommended by one reputable person or another I have not had experience with them. If you use one, let us know how it went!

Paul Bos Heat Treating at Buck Knives. Paul Bos has retired and handed the torch to Paul Farner. Highly

reputable. Post Falls, Idaho:

<http://www.buckknives.com/about-knives/heat-treating/>

Peters Heat Treating is another highly reputable operation. Meadville, Pennsylvania:

<http://www.petersheattreat.com/cutlery.html>

Texas Knifemaker's Supply offers heat treat services. Houston, Texas:

<http://www.texasknife.com/vcom/privacy.php#services>

Tru-Grit provides heat treat services. Ontario,

California: [https://trugrit.com/index.php?main\\_page=index&cPath=34](https://trugrit.com/index.php?main_page=index&cPath=34)

K&G also provides heat treat services but I can't find a reference on their web site – you'll have to contact them for details. Lakeside, Arizona:

<http://www.knifeandgun.com/default.asp>

Byington Blades heat treat service is in Santa Clara,

California: <http://www.byingtonblades.com/>

It's my understanding that Chris Reeve Knives uses ACE Co in Boise Idaho – which is enough for me to add them to the list:

<http://www.aceco.com/heattreat/index.html>

## **WOOD SUPPLIERS**

Burl Source – handle blocks/scales – So. Oregon

<http://www.burlsales.com/>

Shelton Pacific – stabilized wood – Shelton, WA

<http://stores.sheltonpacific.com/>

Gilmer Wood – N.W. Portland

<https://www.gilmerwood.com/>

North Woods Figured Wood – Gaston, OR

<http://www.nwfiguredwoods.com/>

## **OTHER GOODIES**

Sally Martin Mosaic Pins – So. Oregon  
<http://customknife.com/index.php?cPath=13>

Oregon Leather – 810 Conger Eugene and 110 N.W.  
2ND Portland  
<http://www.oregonleatherco.com/>

Coyote Steel – wide variety of new steel, scrap,  
copper, brass, bronze – Garfield & Cross St. Eugene  
<http://www.coyotesteel.com>

Cherry City Metals – Salem, Oregon – metal  
recycling and useful objects  
<http://www.cherrycitymetals.com/>

Amtek – tool steel & cutting tools  
<http://websales.amtektool.com>

Rio Grande – jewelry tools/supplies  
<http://www.riogrande.com>

Otto Frei – jewelry tools/supplies  
<http://www.ottofrei.com>

M3 Composite – space age mokume & other  
<http://www.m3composite.com/>

Minarik automation & control  
<http://www.minarik.com/>

Valley Stainless (that does water-jet cutting) is one of  
Craig Morgan's customers. They told Craig “bring in  
a pattern” and they'd work with you on small batch  
cutting. They don't have a website yet. 29884 E Enid  
Rd, Eugene, Oregon 97402 (541) 686-4600.