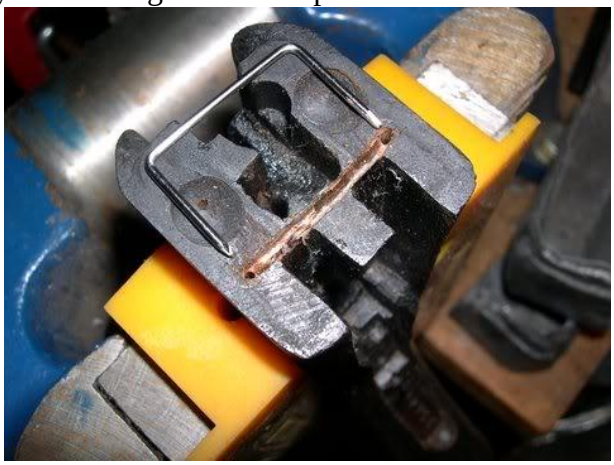
Split Stock Repair

Content taken from forum post by Jim Williams

We've all seen these guns for sale - often in beautiful shape except for a pin, dowel or even a bolt through the stock head, cheek-to-cheek. This was a common way to repair a common problem with Parkers and other fine doubles - a split stock head. It is an effective way to repair the damage, but a horrendous one in terms of aesthetics and value. It is also totally un-necessary. The stock can be repaired internally with all repairs invisible when the gun is reassembled. I learned this technique years ago when I read "Shotgun Technicana" by Trevallion and McIntosh. Many of you have seen this "staple" technique before, but I offer this pictorial as a work-in-progress for those who haven't seen it before. It has worked very well for me in the past, and I consider it necessary medicine on any stock I repair that has any significant cracking. Occasionally I'll refinish a stock with no visible cracks. For these I'll wick very thin Cyanoacrylate (CA) glue into all the inletting areas to stabilize any invisible or incipient cracks, and to seal the inletting from gun oil. Then I'll just glass bed the action to the stock and forego the staple, the thinking being that if the stock hasn't cracked yet in the past 100 yrs., and the CA glue and glass bedding will make it even that much more resistant to cracking, it should be fine. But if there are any cracks that are significant enough for movement, they get the staple.

The first step (not shown) is to repair the wood itself, and return it to it's original fit and stabilize the cracks with the appropriate adhesive. When cracks can be closed completely (no wood missing) through simple clamping and the fit is perfect, I use CA glue. The very thin formula will wick into cracks so tiny that they can be invisible. There is a medium viscosity formula that works better for larger cracks where small gaps may be present. Finally, when big chunks are broken out that must be replaced, Acraglass (an epoxy) is the best choice. Of course none of these work well if the wood is oil-soaked - you must get that out of the wood first. I've had stocks that separated into as many as five chunks of broken inletted wood when the receiver was removed. If they are all there, they can be carefully fit back together like a puzzle with the Acraglass, then the CA used to wick into the hairline cracks afterwards. This particular project is an 0-frame stock off of the VH 20 I grew up with (my first shotgun, given to me by my great uncle when I was 8). Before these pics were taken, all the chunks of broken inletting and cracks were glued as described above, and the fit to the receiver has been checked and found to be good (in fact I did that last year, and shot a few rounds of skeet, wobble trap, and a couple quail hunts while I had it reassembled).



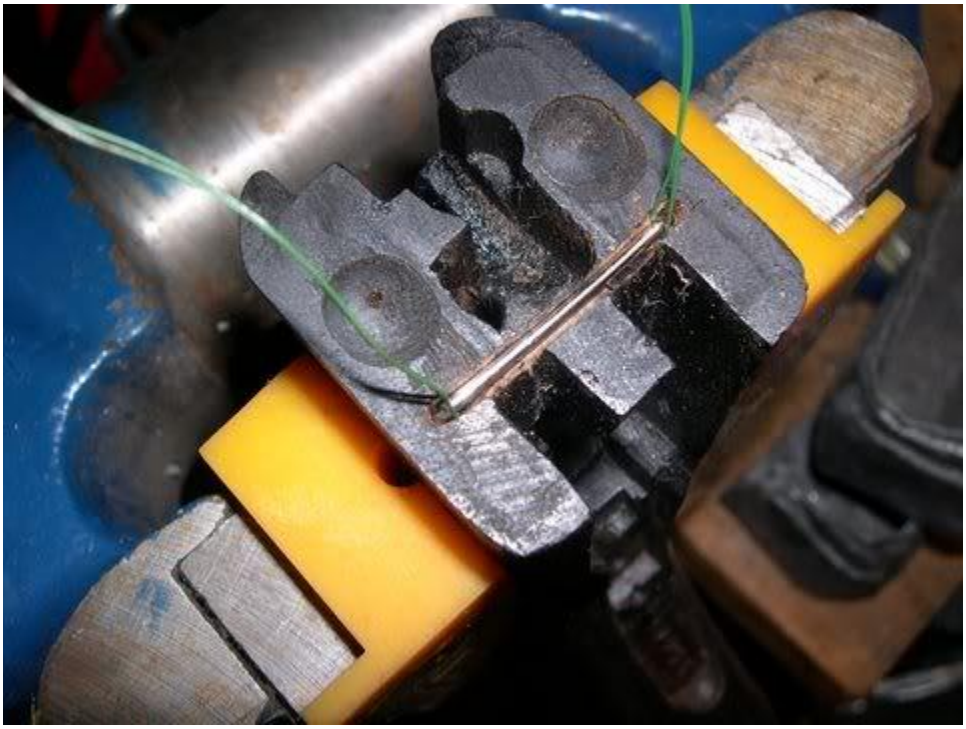
Satisfied with the fit and repair, I have disassembled it again to make the repairs permanent (staple, glass bed, then re-finish, re-checker, etc.) and get the gun finished for this year's season.

In the first pic, you can see the staple has been made from 1/16" stainless rod (actually, this is a cut-off from a surgical steel orthopedic Steinman pin, the remainder of which I installed in some dog's fractured leg somewhere along the way). On the face of the stock head, you can see the holes drilled for the "legs" of the staple, and a channel cut across the face of the stock to allow the crossbar of the staple to sink down below flush. Placement of the legs should be into the meatiest portion of the stock cheeks, and care must be taken to drill vertically to make sure that both leg-holes are parallel (and to make sure you don't drill out the side of the cheek). Hole-to-hole distance must match the dimensions of the staple legs precisely. Once the holes are drilled, a straight edge is used to scribe the borders of the cross channel across the face, then the channel is routed using a small burr in a rotary tool. The depth of the channel must be deep enough to allow the crossbar of the staple to fit below flush with the face of the stock (in order to avoid interference with the receiver fit). Also, where the channel meets each leg-hole, it must be radiused down into the hole to allow for clearance of the inside radius of the bend on each leg of the staple:

Once the drilling and routing is done, the staple is carefully fit into place. The holes are not over-bored, but rather drilled to the actual diameter of the pin for a very tight fit. However, repeated working in and out of the staple as it is worked to depth will allow the holes to be worried enough that the staple can be set most of the way with firm hand pressure:

Almost home. It starts to get real tight around here, and you can't go much deeper without providing a means for retrieval:

Fully home. If fit properly, it must be driven with a hammer the last 1/4 inch or so, using the flat blade of a small slotted screw driver as a punch. You must provide yourself a means for retrieval before doing this (see the small green wires). Otherwise you will never get it back out. If you were to commit to driving it all the way without means for retrieval, then find out it wouldn't quite go below flush for some reason, you'd be in a mess. But the wires can be used to provide traction and it can be rocked out. By the way, the shiny appearance of the inletting is not oil in the wood, but rather the hardened surface that results from being soaked in CA glue after thorough degreasing:



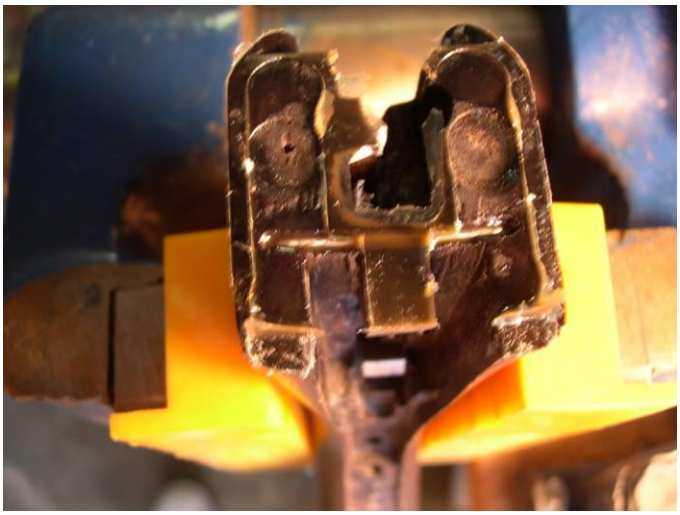
Finally, using a straight-edge to make sure that the crossbar of the staple is well-below flush with the face of the stockhead

This is the first 0-frame I've performed this procedure on. It is more difficult, the placement a little less optimal (more towards the bottom, rather than the center of the stock face) and the diameter of the pin is necessarily a little smaller than on the standard 2-frame 12 ga. repair. In fact, I have a 00-frame stock on my bench right now that actually would give me a little more room and a little better placement and maybe a 5/64 in. pin could be used instead of the 1/16 in. used here. Nevertheless, when this pin is installed in this 0-frame stock, it will be locked-in so tightly (first by an initial proper, tight fit, and second by filling in any remaining voids with Acraglass) that it will take incredible force to ever separate the left and right sides again. I am confident this repair will not be necessary again, unless it meets some disastrous fate.

That's about as far as I got tonight. After this pic was taken, the wires were used to remove the staple again. The receiver will now be coated with release-agent in all contact areas, in preparation for glass bedding to the stock. The next step will be to mix the Acraglass and work a little down into the holes and channel for the staple. Then the staple will get a light coating of Acraglass and driven home for the final time. Then I'll apply more Acraglass to the areas of the stock face that contact the receiver, making sure to apply enough to finish filling up the channel for the crossbar. Finally, the receiver will be quickly assembled to the stock (to full tightness) and the assembly will be allowed to cure for 24 hrs. More pics when I get a chance to get back on it.

Continuing on, the staple was ready and the receiver and trigger plate had been coated in the appropriate areas with release agent. A small amount of Acraglass epoxy was mixed along with some dye and fiberglass fiber floc for strength. A small pin was used to work some epoxy down into the holes drilled for the staple, then into the channel for the crossbar of the staple, and then finally a little was applied to the staple itself. Then the staple was inserted and driven fully home. A thin coating of the epoxy was then applied to the face of the stock, avoiding any in the circular

recesses that allow for tumbler clearance when the gun is cocked. Also enough epoxy was applied to fill-in the channel cut for the staple crossbar. Then the receiver is quickly assembled to the stock without any fumbling or allowing it to slide around and smear the epoxy out of place. It isn't necessary, but I put everything in the stock that will be in there at the end - the safety mechanism, auto-safety rod (if desired), and top wrist-pin ferrule. It is a good idea to practice the assembly of the receiver to the gun a couple times before applying the epoxy so that you can assemble it smoothly, quickly, and without excess movement once you are ready to do it for real. The idea is to press the receiver into place, hold it tightly to the stock while you flip it over and tap the triggerplate in place, and get some screws in it to hold it firmly in place. Then you tighten all the screws down to their working tightness. A common trick of stockers is to not tighten the last 1/16 of a turn (stopping before the slots are fully qualified) until final assembly. It saves wear on the threads and assures that they will be good and tight when they are fully-qualified (slots oriented precisely as they should be). That technique works fine here. When everything is tightened down, the epoxy is allowed to cure at least 12 hrs. I parted this receiver from the stock at around the 15 hour mark. It is always a moderately tense moment, as you hope you didn't overlook something and allow the epoxy to get in somewhere that will "lock" the receiver to the stock. When ready, the screws are removed, the trigger plate is tapped out the bottom of the receiver with a soft aluminum or brass drift, and then the receiver is parted from the stock. It will usually be stuck fairly tightly, but light taps with a plastic hammer will gently jar it loose with some patience. Hold the gun around the wrist using your thumb to press down on the top tang to keep the receiver from falling when it breaks loose, then tap gently in a downward direction on the water table. Eventually you will either feel it start to move, or sometimes they just break free all at once - that's why it's good to have your thumb on the tang to keep it from falling. Once broken loose, you can carefully remove the receiver. Here's what it looks like at that point, before the "flashing" (excess epoxy that has squeezed out) is cleaned up



Another view showing the footprint of the receiver on the stock, outlined by the excess epoxy

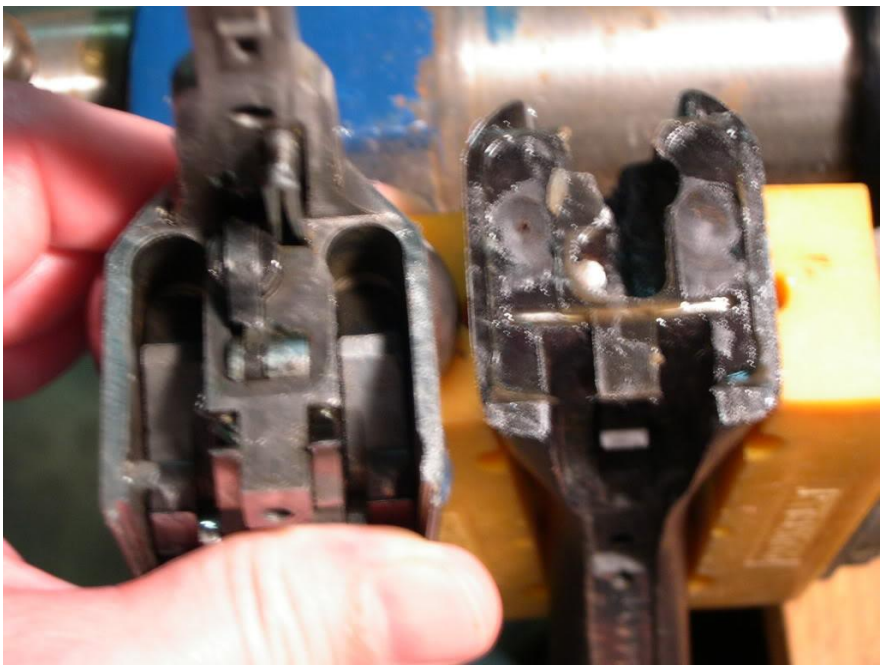
If you want to understand why Parker stocks split, take a look here (see pointer) at the thin outline, a little less than 1/8 in. wide around the outer border of the stock face. That is where the majority of contact between receiver and wood occurs - that little tiny bit of surface area is what supports most of the force of recoil. There is also a section in the center, but it has been my observation that the factory stockers usually didn't get *as good* wood-to-metal contact there because it isn't visible when the gun is assembled (I make this statement based on the observation that the thickness of the epoxy is usually a few thousandths greater in the center area than around the edges when a bedding job is examined). Consider that small area to distribute recoil force over, then concentrate it on the very outer edges of the stock which tends to create a spreading force, then remember that the rear of the top tang is shaped like a wedge and is being driven into the wrist under recoil, and it is a wonder that all of them don't split (and all of them don't). As good as the factory stockers were, it isn't humanly possible to get a 100% perfect wood-to-metal contact over the entire area where they meet. This means that recoil force is concentrated at pressure-points where wood and metal meet the tightest, and not over the other available surface area where the fit isn't as tight. Eventually the receiver will "set-back", or sink into the wood with repeated use as recoil crushes the wood fibers in the pressure-point areas. As the receiver sets back, the tang is driven into the wrist even further. The glass-bedding ensures that 100% of the surface area available for wood-to-metal contact is completely filled tightly. As a result, recoil force is evenly distributed over the widest possible surface area, and pressure points are eliminated. In addition, the epoxy is much harder than the wood, and receiver set-back is greatly reduced

Here is the center section of the stock face that is in contact with the receiver. As stated before, it has been my observation that the factory wood-to-metal fit often isn't as tight here, as evidenced by a slightly thicker (a few thousandths) layer of epoxy being observed here when a bedding job is completed. I'm not saying they didn't have any contact, just maybe not quite as good as around the outer edges, and not necessarily on every gun. There is also a very small thin area in contact with the receiver around the edges of the center, square-shaped inletting that is provided for the bolt to retract when the gun is opened (see the shiny areas around the square inletting in the center). Glass-bedding takes advantage of all available surface area to distribute recoil force over.

I should mention here that the rough, bubbly appearance of the bedded areas is due to the fact that the release agent is still partially adhered to these areas. The underlying epoxy is nearly as smooth as a milled surface, but the thin layer of release agent still stuck to it makes it look rough under this magnification. The release agent will be all removed before final assembly.

Don't forget to put release agent on the small part of the trigger plate that comes in contact with the wood when assembled (I have, but remembered before I tried to assemble it to the stock which had the epoxy already applied.) To forget could lead to a stuck triggerplate. Here's the release agent being removed from the mentioned area

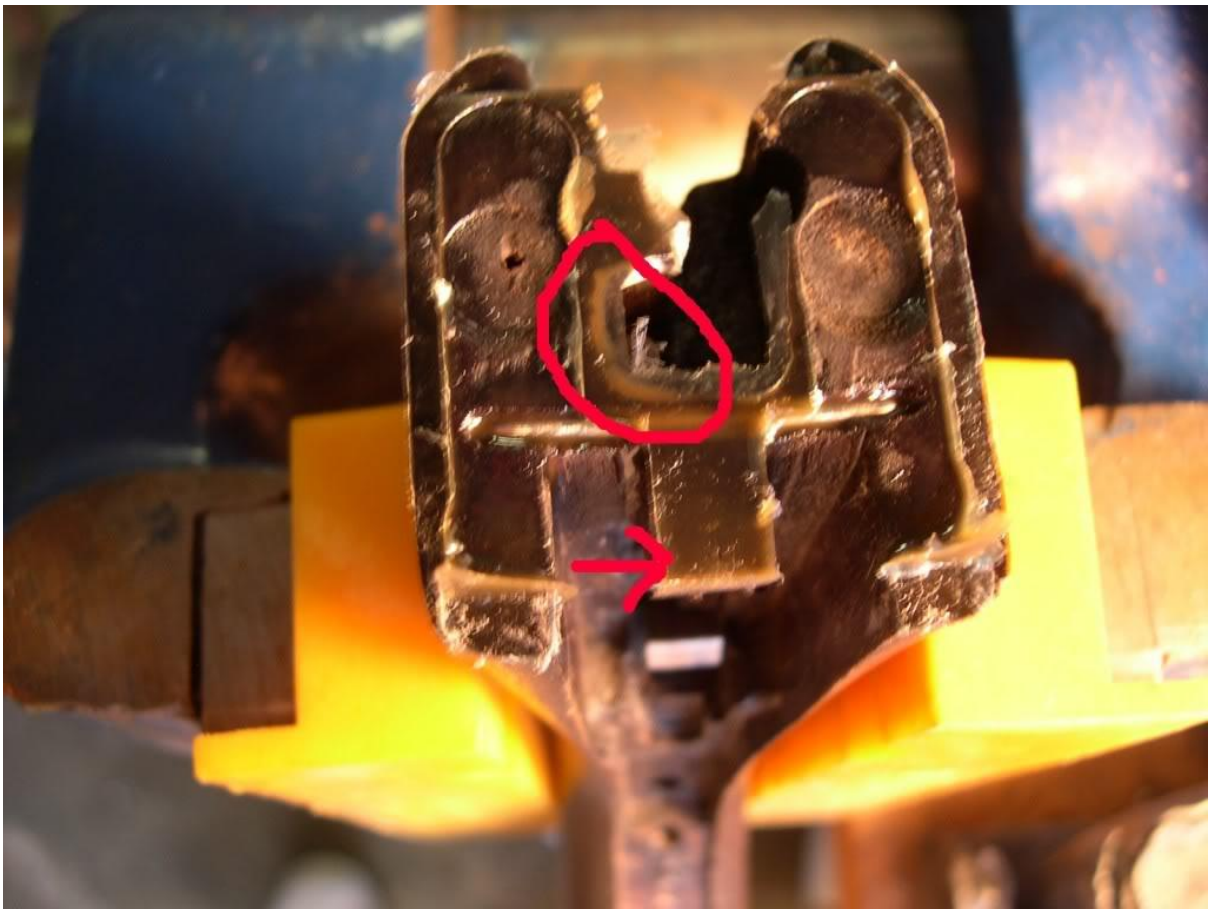
OK, here's a quickly-taken, poorly-focused shot comparing the back of the frame to the stock. It makes it apparent where the areas of wood-to-metal contact are (at least the available areas for contact). Keep in mind that much of that metal in the center may not actually be in 100% tight contact if it hasn't been bedded - something to think of when you shoot heavy loads with heavy recoil. On the plus side, this small amount of contact area is huge compared to a lot of sidelocks! The next step will be to clean up all the release agent still stuck to the epoxy, and sand/grind away the flashing where the epoxy has been squeezed out.



I just realized that one of my pics fortuitously illustrates the observation I made earlier about the original wood-to-metal contact being typically better around the edges of the stock than in the center, thereby concentrating recoil force around the outer surface.

In the pic below (post-bedding), the stockface wood is very dark brown since it has been previously saturated with thin CA glue to seal/toughen it prior to the bedding. The epoxy is a lighter, caramel color. In the areas where the wood-to-metal contact is very good, the epoxy gets squeezed almost entirely out and the resulting layer left behind is so thin it is transparent and the dark brown wood underneath shows right through. In the areas where the fit is not as good, less epoxy gets squeezed out leaving a thicker layer behind to fill the gap. The thicker areas show up as the caramel color of the epoxy itself, since it is too thick to be transparent and the dark wood underneath is not visible through it. The red arrow indicates the thicker area of epoxy near the bottom of the square-shaped piece of inletting, and you can see the fit is better just above where the caramel color gives way to the dark brown wood underneath as you move upwards towards where the staple is placed. It is also apparent that there was a good fit all around the edges of the

stock because those areas show no appreciable thickness of the Acraglass. In the circled area a smaller area of thicker epoxy is visible where the fit wasn't as good. Glass-bedding fixes these areas on poor contact, of course.



I use a oil/poly blended product called Permalyn (available through Brownell's) for sealing and filling the grain. It comes in a Sealer for initial coats, and a Finish for building up the finish. There is a very similar blended product called Pro Custom Oil that I hear good things about. After I've completely filled the grain with multiple wet-sanded coats, I give it a final wet-sanding (using the Permalyn Sealer as the lubricant) with 320 wet/dry, wiping it clean as I go. I use Galazan's Pre-64 Winchester stain which I think is a pretty good match for Parker color, and I use it ON TOP of the Permalyn. When dry, the final finish is Napier's Oil, which is an English product and it is a proprietary blend of all natural oils. It goes on right over the stain and it goes on very, very thin. In fact, only a few drops will do a coat for the entire stock, then I use nylon stockings (because they are lint-free) to wipe off almost all of it while it is still wet, and then rub it out with my hand to get an even sheen. It takes 3 or 4 of these cycles to end up with a good, consistent-all-over appearance, and it avoids any sanding-through of the stain (a very hard thing to fix).

One day I'll try and master the French Polish technique used by many here. It is far less labor intensive, is true to the original finish, and looks pretty good from the examples I've seen. Austin Hogan has written extensively on that technique. It's on my to-do list one day. I experimented with it some, but had trouble filling the grain and couldn't get a streak-free finish, but I admit I haven't given it enough effort yet to give up on it. I learned everything about the technique I use from a master stockmaker who is a good friend and lives nearby. He has said on many occasions that anytime stockmakers get together at a show, the hot topic is always "what finish technique are you using?" It seems everyone is always looking for a better look and an easier job. In the meantime, here's a couple of mine finished with the technique described

NOTE: CA glue is:

CA = Cyanoacrylate glue (i.e. "Super Glue"). However, the grade that is used for R/C aircraft building is far superior to the kind you usually find in the hardware store or Wal-Mart. Brownell's carries the "Hot Stuff" brand, which is an R/C product and works fine, but my favorite brand is the premium brand under the "Zap" label. In many years of R/C building, I found it to handle really well.

CA comes in several viscosities. The two that are most useful are the thinnest one, and the medium-viscosity one. The thin formulation will wick itself into cracks that you can't even see

(and across your hand and down your elbow before you realize it). It also works well to seal the inletting, or even toughen up "punky" wood that wants to tear instead of cut when you are doing checkering and such. The medium-viscosity is more useful when there is any more that a few-thousandths gap in the fit between the surfaces. If you are replacing a piece of wood that has broken completely off (but still fits well) it would be the one to use. The thin is best for stabilizing the kind of cracks that stay closed on their own. The very-thick formula available I never use, choosing to go to AcraGlas if it's that bad. In the "Zap" brand, the thin formula has a pink label and is just called regular "Zap". The medium-viscosity product has a green label and is called "Zap-A-Gap". The Hot Stuff brand that Brownell's carries is also available in thin and medium viscosity.