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Pillar Bedding Article – Part I

by Kelly McMillan

In the firearms industry, it seems there is always a “trend” that is accepted as state-of-the-art, at least until something else comes along to replace it. Right now aluminum bedding blocks seem to be the trend. I recently posted our views on the ABB, so I won’t go into that now, but there is a related trend that I think needs addressing—pillar bedding or bedding using aluminum pillars.

First, a bit of history is in order. When wood stocks ruled the world, few things could improve the accuracy of a rifle as much as glass bedding. Hardly any factory guns came bedded and most shot barely acceptable. In general, glass bedding enhanced accuracy, as well as increased the dependability by limiting the effects of humidity and weather, which plays havoc with point of impact (POI). By using an epoxy-based product reinforced with fiberglass (thus the term glass bedding) you could form a superior mating surface between the stock and the receiver. By reducing or eliminating any stresses caused by poorly matched surfaces, it allowed the rifle to shoot more consistently.

In the benchrest community, shooters found that by torquing both guard screws with a torque wrench they could actually tune the way the gun would shoot. Shooters were constantly checking the torque between matches and even between groups. Most found that the more they shot their rifle, the more the amount of torque would decrease. It was reasoned that the stocks must be compressing due to the pressure and stress associated with shooting. As a result, they drilled out the holes around the guard screws to the next larger size (usually from 5/16 to 3/8 or 1/2 inch). Bedding the action would allow these larger holes to fill with bedding material. After removing the screws (of course, they waxed them first), they would then drill out the screw hole to 5/16” for some clearance, but that would in effect, leave a pillar of 1/16 to 3/16” wall thickness of bedding material. The bedding material was dense and rigid so it made a nice pillar that would keep the stock from compressing under the pressure of 40-60 lbs torque, plus the stress of firing the rifle.

Pillar Bedding Article – Part II

Not long after the pillar bedding process was developed, fiberglass stocks came onto the scene. While benchrest shooters were convinced that pillar bedding had a positive effect on the accuracy of their rifles, they assumed the same process would help to improve accuracy of a fiberglass stock rifle. The process quickly adapted itself to “glass” stocks.

When Chet Brown and Lee Six first introduced fiberglass stocks to the competitive world in the late 1960s, they used a process that left the stock with a “foam” core. The stocks were made of fiberglass cloth outer shells with the action area and barrel channels actually molded during the initial process. They used low-density urethane foam to expand the material from the inside and forced it out against the walls of the mold to form the gunstock. As a result, between the receiver area and the bottom of the stock (where the guard screws are) there was a foam core. The foam was lightweight to keep the weight of the stock within reason and when cured was rigid (unlike polystyrene or foam rubber) but had very little compression strength. In short order, it was found that pillars were absolutely required to keep from compressing the stock when tightening the guard screws.

As a general rule, the same procedure was used to make the pillars as was used with wood stocks. Simply drill the guard screw holes over size and fill them up with bedding material. The drawback was that occasionally there would be some excessive shrinkage in the bedding material due to the volume of bedding compound that flowed down around the screws. While this resulted in a less than perfect job from a cosmetic standpoint, it had no adverse effect on the performance of the bedding.

When guys like my father, Wally Hart and Fred Sinclair started to take on this type of work for their fellow competitors they felt a need to produce a better looking product, and the use of pre-cut aluminum pillars was introduced.

When Gale McMillan introduced his fiberglass stocks in 1973, they were made pretty much the same manner as Brown Stocks. Urethane foam was a major component; thus, pillar bedding was a main ingredient in all benchrest stocks he made. (Gale made only benchrest stocks for the first two years he was in business.) Due to the weight limitations in benchrest, light stocks were a must and the materials used were not nearly as strong as they could have been in a stock weighing much more. Pillar bedding was one way to make up for the lack of strength in the receiver area.

Pillar Bedding Article – Part III

When pillar bedding gained acceptance, there was little argument about how to do it right. It seemed almost everyone in the competitive arena used similar techniques. That changed with the introduction of precut aluminum pillars—experts started to disagree on the proper way to install the pillars. As with standard pillars the function was the same, which was to ensure the action area of the stock did not compress when tightening down the guard screws. How to accomplish this however became the topic of debate.

I won't suggest the way we install our pillars is the only right way, but it is our belief that it is the best way. To be perfectly honest, the difference in performance of the various types of techniques is probably immeasurable. We believe that regardless of whether or not you can prove your ideas to be the best, what's important is to use the technique that you believe produces superior results.

When installing aluminum pillars, we measure the depth from the bottom of the receiver to the bottom of the stock where the pillars are to be installed. We then cut our pillars about .035 shorter than this measurement. We apply the bedding materials to the stock and the receiver to ensure a uniform non-porous surface finish, filling the pillar holes with bedding material.

We then place the pillars (with the screws inside of them) in the stock from the bottom of the stock. Holding the barreled action in the vise, we bring the stock up to the barreled action and start the screws. We tighten each of the screws a half turn at a time cleaning off the excess material as we go. By placing the pillars in from the bottom, along with the fact that the pillars are shorter than the distance between the bottom of the stock and the action, we create a small space between the top of the pillar and the action.

This .035 gap between the pillar and the action is filled with bedding material. By using this technique, we create a completely uniform bedding surface that is 100 percent consistent. One of the objectives of glass bedding is to produce a stress free union between the stock and the action. By bedding the entire receiver area (as opposed to the recoil lug and rear tang), we have effectively created the only “perfectly stress free” union possible. By not allowing the aluminum pillar to come in contact with the receiver, we have eliminated one possible source for unwanted stress. While other techniques are used, we believe ours creates the perfect relationship between the stock and action.

Pillar Bedding Article – Part IV

A number of well-respected, successful gunsmiths and gun builders use techniques that are different than the one I described in Part III. As I said, they are successful gun makers that build very accurate guns. No one can say that their technique doesn't work. As I stated, we "believe" that ours is the best way, but realize that having a choice is always a good thing. Following is a description of the other technique most widely used.

Kenny Jarrett of Jarrett Rifles in Jackson South Carolina is one of the most respected gun builders in the South. He specializes in high dollar hunting rifles that perform like benchrest rifles. As a matter of fact, he uses "benchrest" techniques for building all of his rifles. His pillar bedding differs from ours in that he allows the pillar to come in contact with the receiver. He contours the top of a 1" diameter aluminum pillar to match the radius of the receiver (that is of course allowing that the receiver is round, he uses most exclusively the Remington 700 for actions). Jarrett had a special tool ground to cut a 1.365 radius to precut his pillars to fit a Remington 700. The rest of his technique is similar to ours, but he ends up with this large shiny aluminum piece embedded in the action of his stock that is very visible when you take the barreled action out of the stock. In our case, we have had customers question whether or not to even put pillars in because with .035 of bedding materials covering the top of the pillar, you have to look really close to see it.

There are basically two things we don't like about this method. As I stated, the top of the pillar is contoured to cut a 1.365 radius. Remington receivers are put through a process where they are actually polished by hand. Because each is done independently, not all actions are exactly 1.365. They may vary as much as .005. I know this doesn't sound like much and probably has little effect on accuracy, but the purpose of glass bedding is to make a "perfect" union between stock and action. If you were to allow for at least the smallest amount of bedding material to cover the pillar, it would compensate for any irregularities in action diameter and come closer to making that perfect fit. Secondly, remember what the pillar is designed to accomplish. Its only function is to eliminate any compression of the stock material under the receiver. Why use a 1" pillar when 3/8" is enough and 1/2" is plenty? In our stocks, we prefer not to remove too much of the material from the stock.

Remember the front screw is always near the recoil lug (in some actions it screws into it) so having as much material intact is important. Though pillars give the stock compressive strength, they don't offer much in the way of shear strength, which is what's needed around the recoil lug.

One last item on pillar bedding, I am often asked by customers who would like to bed their own stock but lack the confidence to try pillar bedding, “Do I need pillars?” Because of the construction techniques and materials we use in making our stocks, it is not necessary to use pillars. With the exception of benchrest stocks, which are always glued in and use a lighter fill in the action area than all of stocks, pillars are unnecessary. Tests have proven that the materials we use to fill the action area of our stocks have less than one percent compression at 100 lb psi. What that means is that there is no way you are going to be able to torque your guards screws tight enough to compress the material under the action. Why do we put them in every bedding job we do when installing our stocks? Because it’s state-of-the-art. It’s what has become the excepted way to do things. It’s not a fad. It is a valuable technique that is necessary when bedding stocks that use a different method of construction (which almost all other synthetic manufacturers do). It’s just that with ours, it is not really necessary.