

# Solid Billet AR15 Style Receivers



**Text & Photos  
by Jeff W. Zimba**

SUN DEVIL  
MANUFACTURING  
MESA, ARIZONA

*Approximately 15 miles east of Phoenix, Arizona is the city of Mesa. Boasting an average of 313 days of sunshine every year, it is only appropriate that a business located in the southwest desert, manufacturing a version of the Black Rifle, would be called Sun Devil Manufacturing.*

*Small Arms Review* was contacted prior to **SAR Show 2005** and invited to tour the Sun Devil Manufacturing facility. David Beaty, the proprietor of Sun Devil Manufacturing, picked us up at the show and drove us to their location in Mesa, less than a 20-minute drive from the Arizona State Fairgrounds. In business for approximately 3 years in their current capacity with the Sun Devil name, Beaty has been working with AR-15 type rifles off and on for almost 20 years.

While talking with Beaty on the way to the shop, it was obvious that he has a great understanding of metals and their properties relating to the firearms manufacturing process. There are several opinions about the quality of methods of manufacture by means of forgings, castings and from solid billet material, and Beaty believes that billet manufactured receivers are superior to the others and that is his reasoning behind the process he utilizes. Beaty believes that a benefit of his billet receivers is that they

**Right: Before and after.** Above this finished receiver waiting to go out for anodizing, is an example of the raw billet from which it started from.



are much stronger than those manufactured from castings. He also claims the dimensional consistency is much more accurate with billet made receivers than with those built from forgings.

Upon arriving at the Sun Devil facility we took a brief walking tour beginning with the main machining room. Surrounded by CNC machinery, all performing different tasks, it was easy to see how quality and consistency could be appropriately controlled. Heading to another room we viewed the stacks of raw billet material that would soon be transformed into upper and lower receivers. The material used for the Sun Devil receivers is usually 6061 and are occasionally made from 7075. In yet another room the engraving, inventory and quality control took place. It was an interesting contrast to look

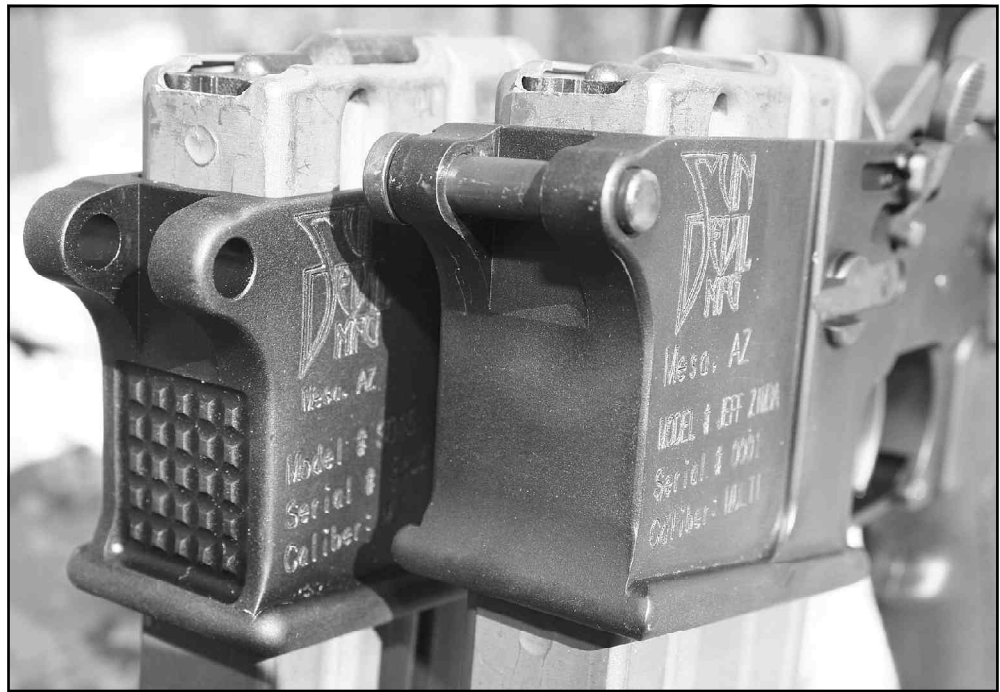
at racks of finished products not 10 yards from raw material that had not even been cut to lengths that could yet be easily handled. It is certainly a testimonial to all phases of manufacture being handled in

one environment. If everything is not absolutely right, there is no one to point a finger at and Beaty enjoys having complete control over ALL phases of manufacture to ensure the quality he strives for.

When asked what I wanted to see next, the answer was simple: "Let's make a gun." I wanted to start with the raw material and do a photographic run through the entire process for the readers of *Small Arms Review*. For purposes of proprietary information and tooling, we were asked to skip over a few minor functions. The following is a photographic guide sequence going through the process of transforming a bar of aluminum into a Sun Devil lower receiver.

Sun Devil lower receivers are now actually in their second generation. A first generation receiver can be noticed by the smooth area in front of the magazine well. The second generation receivers have a raised "stippled" pattern in this space. The later receivers also have more material in the front lugs for the takedown pin.

Sun Devil Manufacturing



**Above:** A second-generation lower receiver on the left compared to an early, first generation lower receiver on the right. The new receivers have a raised stippled area on the front of the magazine well and more mass in the front takedown pin lugs.



**Left:** The Sun Devil Lower receivers are strengthened with extra material around the extension for the buffer tube.

also manufactures their own matched, upper receivers for a perfect fit to their lower receivers. Their upper receivers are immediately noticeable due to their octagonal contour and lack of forward assist mechanism. They also have a 5.75-inch MIL-STD Rail (flat-top) to accommodate a number of scopes, mounts and accessories. They are extremely reinforced and mate to the heavily reinforced area of the buffer tube extension on their lower receivers.

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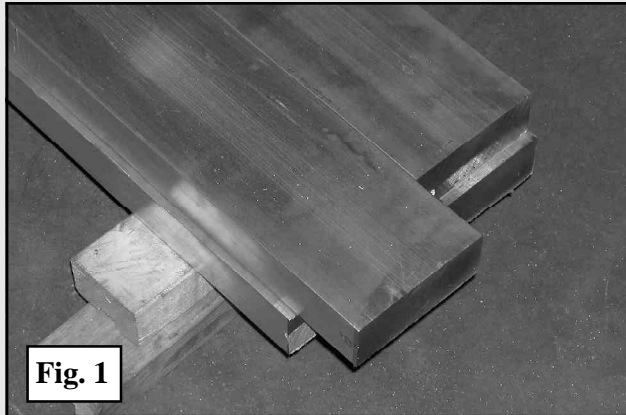
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**Above:** Sun Devil second-generation upper receiver and lower receiver prior to assembly. The Upper is easy to identify because of its lack of forward assist and octagonal shape.

## Sun Devil Manufacturing Process - From Solid Billet to Bullet Ready

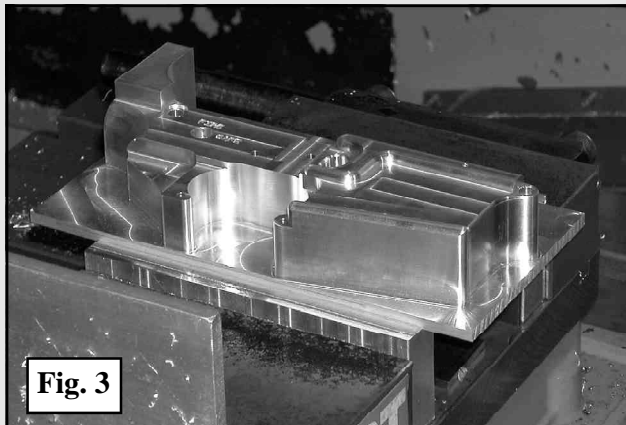


**Fig. 1**



**Fig. 2**

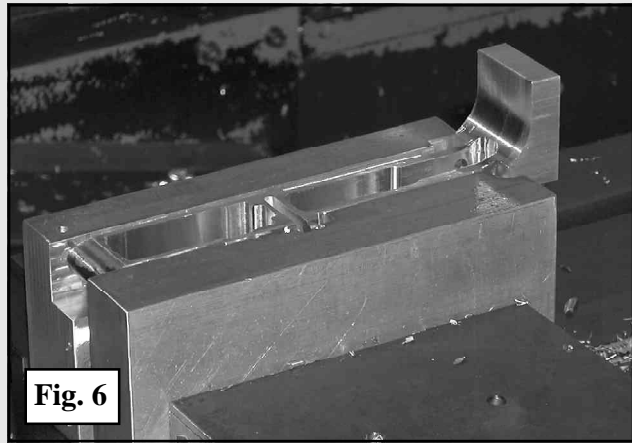
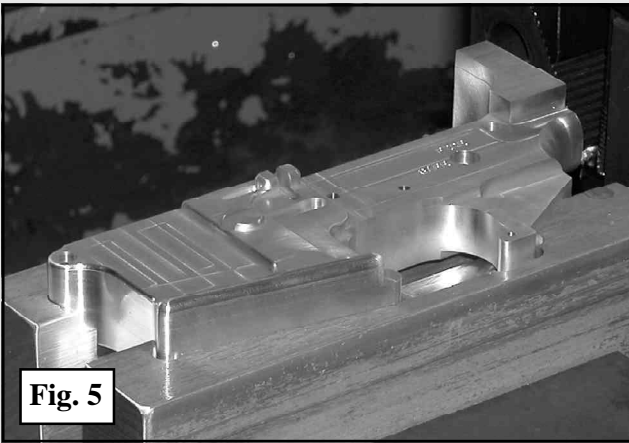
**Fig. 1** - When the raw material is delivered it is in 12-foot lengths weighing approximately 85 pounds each. These are cut to length and checked for any imperfections before going to the next step. **Fig. 2** - After cutting to length and inspection, the billet begins the journey through the series of CNC machines towards completion. **Fig. 3** - The first major machining step is to profile the right side of the receiver. This is done as a single operation and as can be seen some of the initial engraving is happening in this phase. **Fig. 4** - The material is flipped for the second phase, which is the basic profiling of the left side of the receiver



**Fig. 3**



**Fig. 4**



**Fig. 5** - Most excess material has been machined away at this point. Again, you may notice some basic engraving completed in this phase. **Fig. 6** - In this step the lower is locked into a new machine and all the pocketing, including the magazine well and trigger area are completed. A few simple operations later and the buffer tube area is finished including the threads. **Fig. 7** - As soon as the piece is removed from the machine it is immediately taken to be deburred. This is accomplished in a short amount of time and requires a trained eye and familiar touch to be consistent and accurate. **Fig. 8** - Bead blasting each lower receiver is done directly after the deburring process. **Fig. 9** - The last step before final finishing with their hard anodized satin black finish is the final engraving. This is where the model and serial number are added. 