Schueman Barrels
POB 50 PMB 177
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AET BARRELS

Background:

The motivation for developing the AET technology was to meet an accuracy specification of 1.25 inches at 50 yds.

It was possible to prove analytically that gun parts were therefore not likely to be the source of any accuracy problems. Subsequent accuracy testing of guns, and then separate accuracy testing of the barrels from those guns, verified that a gun's accuracy is essentially determined by the inherent accuracy and fitting of the barrel.

Experimental Program:

We manufacture our barrels on a computer controlled mill-turn center. The barrel goes from a piece of solid steel bar to a rifled, fully finished, and ready to ship barrel without any fixturing or handling, all in one step. The lack of fixturing and handling results in an incredibly accurate and reproducible product. Unless you see such a machine in action it is hard to imagine that any machine could do what it easily does.

The capability and flexibility of such a machine allows us to introduce experimental features into pistol barrels relatively easily.

Our ability to produce experimental barrels we began investigating how to improve pistol barrel accuracy. Remarkably, after testing all the commonly accepted ideas for improving accuracy, most of which are useful when applied to rifles, we determined that they either could not practically be applied to semi-auto pistol barrels or, more commonly, they had little or no effect on accuracy when applied to semi-auto pistol barrels.

A semi-automatic pistol has several features which explain this result: the cartridge fits relatively loosely in the chamber; the bullet is typically not in contact with the lands when the cartridge is fired; the diameter of the bullet at the mouth of the case is smaller than the groove diameter, the bullet is typically much shorter, for a given caliber, than a rifle bullet would be; and pistol bullets are less rigid and strong because they have thin soft jackets and soft lead cores.

After having identified several features which did improve accuracy, and arranging for patent protection on those features, we designed the AET barrel which includes those features. The experimentation on pistol barrel accuracy continues, however, and we expect that the AET barrel will probably be superceded by an AET-II line of barrels, which will incorporate other improvements we are currently perfecting, in about two years.

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The Existing Line of Schuemann Barrels and the New AET Line of Barrels:

Some of the AET barrels are identical, except for the feedramps and internal geometry, to barrels in the existing line of Schuemann barrels. The barrel geometries, which will appear in both product lines, are the Classics, the Ultimatch and the threaded Ultimatch, the four port HybriComp, and the newest version of the Tribrid-II.

There are several new kinds of barrel geometries which will only be offered in an AET version. These are: new variations of Hybrid barrels, which offer more protection for the front sight and more velocity; a new shorter Tribrid-II for use in Government and Commander slides; and HyComp barrels for use in carry guns, having two integral compensator ports at the muzzle and a front sight behind the ports.

The Technical Features of the New AET Barrels.

Gain Twist Rifling.

Intuitively, we'd expect a bullet to speed up gradually as it moves down the bore. In fact, the bullet has a large fraction of its final velocity before it exits the case mouth. Over ninety percent of final velocity occurs within approximately 1.5 to 2.0 inches of travel. With constant twist rifling the bullet therefore already has a relatively high velocity when the lands engrave the bullet and spin the bullet up to speed. Both the acceleration down the bore and the engraving and spin up of the bullet occur quickly and before the bullet moves very far down the bore.

By comparison a gain twist barrel engraves and spins the bullet up gradually. Just in front of the chamber the rifling is parallel to the bore. The twist of the lands gradually increases as the bullet travels down the bore and the bullet is not fully spun up until it reaches the muzzle.

Gain twist offers several advantages over constant twist. Instead of a sudden jerk, to engrave and spin up the bullet when the cartridge is fired, there is a gradual process of first engraving the bullet followed by a gradual bullet spin up which is completed just as the bullet leaves the muzzle. This process does not stress the bullet like a constant twist barrel does. Gain twist eliminates the jerk on the gun caused by the sudden spin up of a constant twist barrel.

It is known that gain twist barrels tend to be more accurate than constant twist barrels and, more importantly, gain twist barrels tend to retain their accuracy as the barrel heats up.

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Variable Width Lands.

With gain twist rifling, when the bullet is engraved the lands are parallel to the axis of the bullet. When the bullet reaches the muzzle the lands are at the final twist angle relative to the bullet axis. For optimum accuracy the width of the lands has to change as the twist increases. This is a geometrical requirement because the land angle varies as the bullet moves down the bore.

Chamber Fluting.

When the cartridge is fired it is usually resting against the wall of the chamber on one side. The rising gas pressure in the case expands the case walls until they reach the chamber walls. While this is happening the bullet will remain off center in the chamber. The gas pressure on the exposed side of the bullet then tends to keep the bullet pressed against the wall of the chamber as the bullet starts moving forward. By including chamber fluting, the case walls can always move away from the side of the bullet which was initially closest to the chamber wall because the case wall moves away from the bullet until it reaches the bottom of an adjacent flute. This creates a gap between the bullet and the walls of the case on all sides of the bullet and guarantees that the bullet is surrounded by a uniform pressure field. The uniform pressure field around the bullet allows the bullet to more easily be moved to the center of the chamber by the entrance to the freebore as the bullet starts moving forward.

These chamber flutes are very shallow (approximately 0.003 inch deep) and do not cause the case deformation so commonly encountered when the flutes are very deep, as they are in H&K rifles for instance. Thus far, no one has found case life or reloading affected in the slightest by the presence of these chamber flutes.

Freebore Fluting.

When the bullet approaches the corner at the beginning of the freebore it will likely still be off center. The bullet will likely touch the freebore corner on one side first as it is moving forward. Gas flow forward along the bullet will be impeded on the side of the bullet touching the freebore corner but not on the other side of the bullet. The pressure on the side of the bullet in contact with the freebore corner will be less than the pressure on the other side of the bullet, especially on the portion of the bullet forward of the bullet/freebore corner contact. This will tend to keep the bullet off center in the freebore as it moves forward. By including flutes in the freebore region gas from the case can move forward along all sides of the bullet, thereby reducing the pressure field holding the bullet off center, thereby allowing the bullet to be more easily moved to the center of the freebore as the bullet moves forward to be engraved.

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The diameter of the AET freebore region is generally slightly smaller than a conventional freebore would be. The depth of the freebore flutes is shallow (approximately 0.003 inch deep). The length of the flutes corresponds to the length of the normal freebore. Therefore, there will not normally be additional gas leakage around the bullet caused by the presence of the AET flutes, that wouldn't have been present if a normal, slightly larger diameter, freebore would have been present instead.

Curved Feedramp.

The normal feedramp on a ramped barrel is straight. The angle between the nose of the bullet and the feedramp changes depending on where the nose of the bullet touches the feedramp. As the point of contact moves down the feed ramp the bullet nose angle becomes more perpendicular to the feedramp. This is the primary reason for nosedive jams. When the nose of the bullet contacts the feed ramp at the bottom of the feed ramp, the nose of the bullet is less likely to slide up the ramp because there is too little angle between the nose of the bullet and the feedramp. The new curved feed ramp solves this problem. The curve in the feed ramp is designed to ensure that the angle between the nose of the bullet and the feedramp is the same regardless of where the nose of the bullet touches the feedramp. The feeding reliability is therefore high even if the bullet nosedives to the bottom of the ramp.

Chamber Chamfer.

If the corner between the feedramp and the chamber wall is a sharp corner the cartridge tends to jam as it attempts to enter the chamber. The typical solution is to round that corner which helps some, but still causes a momentary jerk, because the geometry is not optimum for a smooth transition as the bullet enters the chamber. The new chamber chamfer used in the AET barrels solves this problem. It allows the bullet to smoothly and reliably enter the chamber without any rounding of the corners.

The combination of the curved feedramp and the chamber chamfer gives a barrel which requires no gunsmithing to feed reliably. If the gunsmith tries to improve upon the geometry with his Dremel tool he will lower the feeding reliability.

Finish Chambered:

All the AET barrels will be prechambered. All the AET Cal.355 barrels are finish chambered for 38 Super or 9x19. All the AET cal.400 barrels will be chambered for 40 S&W and the AET cal.450 barrels will be chambered for 45 ACP.

The integration of the curved feed ramp, the chamber chamfer, and the finished chamber allows us to program the barrel for optimum feeding reliability. The gunsmith would have difficulty duplicating this geometry in his shop with a Dremel tool.

This does not change the requirement for the gunsmith to fit the hood and the lower lugs.