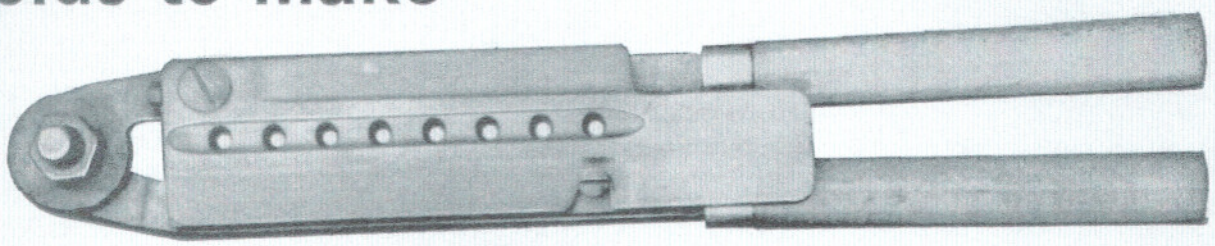
The Hardest Bullet Molds to Make



Eight-cavity bullet mold is used in casting of quantities of bullets.

By PARRY C. YOB

In the United States, few firms manufacture bullet molds, and of these, only Hensley & Gibbs make the big 4-cavity to 10-cavity molds. Of the many reasons which might be cited for the existence of only one such firm, difficulties in producing a product which will maintain tolerances is by no means the least.

A good multi-cavity mold is much more than several holes in blocks of metal. True, slight irregularities in external diameter disappear when the bullet is passed through a sizing die, but no correction can be made for errors in the depth or width of the grease grooves or the length of the bullet. These contribute to variations in bullet weight.

At Hensley & Gibbs the history of small shop craftsmanship goes back many years. The firm was started in 1893 by George A. Hensley, who began with a bicycle shop. Later, Hensley designed and manufactured a marine gasoline engine. The demand for this engine by fishermen was great in the days before refrigeration, because prompt processing of the catch was essential.

Unprofitable venture

Hensley ultimately expanded his facilities, and for a time manufactured a one-cylinder autocar. When this became unprofitable, and the marine engine business waned, he turned to marine engine repair and general machine work. This prospered until 1927 when the effects of the coming world-wide depression led him to devote his shops to the repair of farm and mining machinery. Being a man of unusual mechanical talent, Hensley was not happy with this type of operation and was ever on the alert for a new product to manufacture and add to his line.

The opportunity came in 1932 when a policeman named Bosler modified a Pacific loading tool, turning it into an effective multiple loading machine. The complete machine could not be manufactured since a Pacific patent covered the slotted shell holder which was essential to the unit, but a significant number of Bosler modifications were put into operation by various police departments. The ability to load cartridges quickly made rapid production of cast bullets necessary.

Although George A. Hensley had never seen a mold made, he turned to designing and manufacturing multiple-cavity molds. His designs and choice of materials were essentially his own, and met with immediate success. The molds complemented the modified loading tools, and when progressive loading machines came on the market, the demand continued.

Gibbs joins firm

James W. Gibbs, meanwhile, had grown up on a midwestern farm where he had spent a good part of his youth driving the big coal-fired steam tractors, and beginning a lifetime romance with machinery. By 1938 he was operating a home gunsmithing shop and in that year he joined Hensley, who was running a one-man operation, and found himself unable to keep up with the work or able to pay the price demanded by competent help. The two men had become acquainted through a common interest in firearms, and Hensley had allowed Gibbs to use his machines on frequent occasions. Two years later, Gibbs had proven himself competent to carry out all of the processes of manufacture, and a partnership was formed. This continued until 1950 when Gibbs purchased Hensley's interest in the firm.

The operation remained based in San Diego until late 1964, when it was decided to move it to a rural location near the town of Murphy, in Oregon's historic Applegate Valley. Here the firm remains the nation's only manufacturer devoted exclusively to the making of bullet molds. It is currently operated by J. W. Gibbs and his son, Wayne.

When he first joined the firm, Mr. Gibbs recalls, they made a wide variety of molds for both rifle and pistol bullets. Many of these had only one or two cavities. In addition, special molds were made to order to cast such difficult shapes as the cup-like Minie ball. Probably the most unusual of the special molds was a device to cast any number of balls on a length of string. The strings of balls were cut to length and loaded into shotgun shells for use as deer loads.

In 1932, the molds were manufactured for about $3 per cavity, and specials were made at prices consistent with the extra labor involved. Many persons had molds made to their own specifications, but as the price of raw materials rose from 32¢ per mold to almost $2, and the selling price of standard molds increased to $7 per cavity, the interest in such units declined. Eventually, specials were discontinued.

World wide distribution

Today, Hensley & Gibbs molds are shipped to almost every country in the free world, and although many of these countries, such as England and Canada, have restrictions on the ownership of handguns, their police departments are among the most frequent purchasers of multiple cavity bullet molds.

Throughout the ages, bullet molds have been made from a variety of materials including iron, brass, and even stone, but at Hensley & Gibbs, Meehanite (a special process, treated cast iron) is used. In large molds it remains free of warping, and maintains dimensional stability throughout a wide temperature range. A foundry supplies the Meehanite blocks which are about one foot long and 1" x 2" in cross section.

The mold block begins its machining in an atmosphere of slow, patient craftsmanship which prevails throughout the

operations. It is first planed in a metal shaper until a smooth flat surface has been prepared. In all, 11 steps take place before the block is finally removed from the shaper. It is given a rough cut on 4 sides to make it smooth enough to hold, then squared on the same 4 sides. The inner surface is given a dead smooth skiving cut, followed by the careful cutting of the vent grooves to allow the escape of trapped air from the mold cavities during casting. Finally, the handle slot is cut. Since each block makes up only one side of a mold, all of these operations are repeated for the second block.

The blocks are now clamped face to face and cut to length on a milling machine using a cutter similar to a circular saw. When smaller molds are being made, as many as 3 pairs of blocks are clamped together in a fixture, where each pair is cut into several sets of 4-cavity blocks.

Next, the blocks are drilled in a precision fixture and placed on a sensitive reaming machine where the dowel pin holes are finished to close tolerances. Careful placement of the dowel pins insures that the molds will always close with the blocks in the same relation to each other.

Pins ground to form

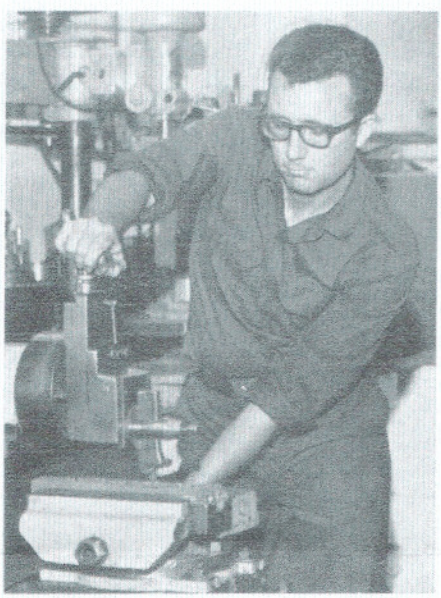
The dowel pins are made from carbon steel drill rod, ground to form, and sized for a precision fit in their holes. This allows the owner to adjust the pins by driving them in or out to compensate for wear. The pins cannot be heat-treated as the high temperature of the mold would draw their temper.

Bolt holes for the sprue cutter, handle, etc., are now drilled and tapped, and the cavity holes are spotted before the mold is ready for the cherry.

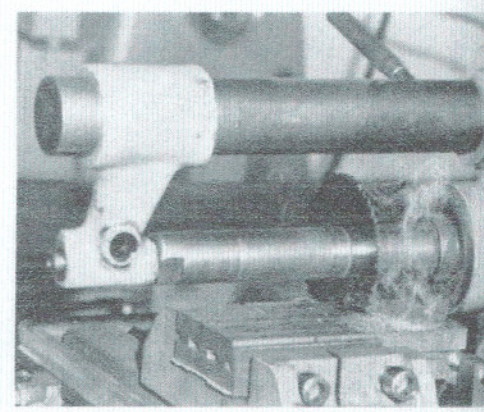
The cherry is a reamer in the exact shape of the finished bullet, but having flutes cut along its sides. The cherry is machined on the lathe to a size somewhat larger than the final dimensions, fluted, and then filed to shape by hand. It is then heat-treated in a gas-fired muffle furnace while packed in charcoal, and tempered to suitable hardness before final grinding and hand stoning to finished dimensions.

Carbon tool steel has proven most economical for the making of the cherries. This steel holds its edge somewhat longer than high-speed steel, and will make up to 100 cavities on the first cut. When the cherry becomes worn, it is reduced in size and used to make final cuts for bullets of smaller diameter, or to rough-cut molds of the same diameter prior to final sizing. After about 5 such runs, the cherry must be discarded.

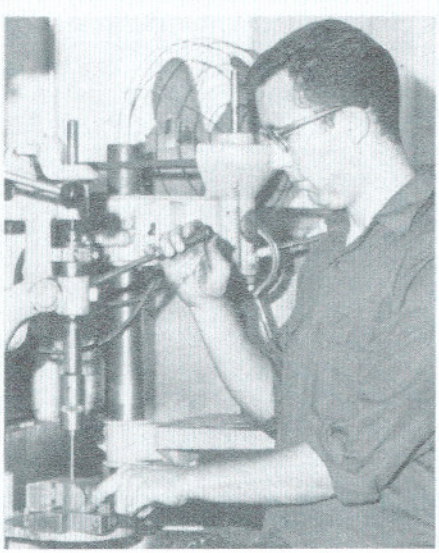
For the rough cherrying, a pair of mold blocks are locked into the jaws of a special vise. These jaws are arranged so that they move toward each other, and are equally spaced on either side of the center line. The cherry is held in the collet of a horizontal milling machine with the spindle turning at about 200 revolutions per minute. The jaws are slowly closed by hand, and reopened frequently to brush away the chips as the cut proceeds. Each cavity is rough-cherried in turn, but the term rough-cherry is somewhat misleading in that the interior of the cavity is any-



◀ Wayne Gibbs uses a shaper to plane a Meehanite casting into a rectangular block which forms one half of the mold.

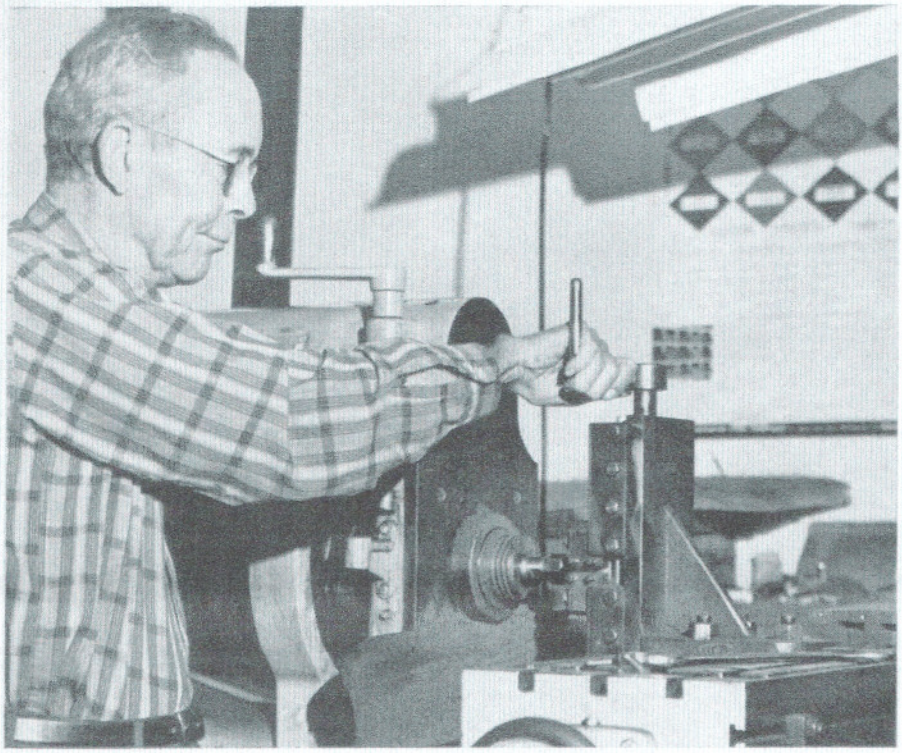


With smoke curling from the slitting saw as hot metal strikes the cutting oil, the cutter saws the blocks to length. ▶

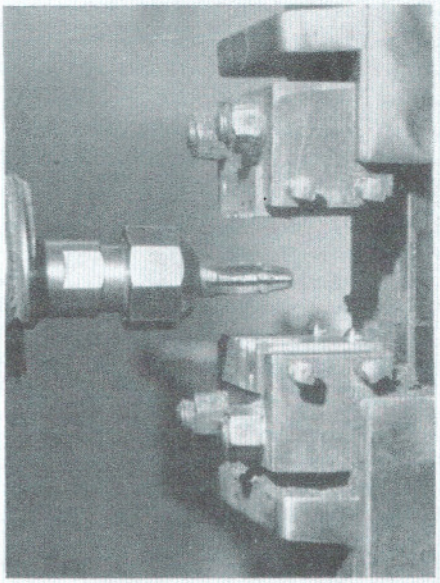


◀ Locked in a special fixture, a pair of blocks are drilled and then moved to this reaming machine for exact sizing of the holes.

Dowel pins are driven into the block and held in place by a force fit which provides for future adjustment. Protruding rounded ends enter matching holes in the other block. ▶



J. W. Gibbs closes the mold blocks on the revolving cherry. The rate of feed is controlled by feel, and depends on the size and shape of the bullet as well as the condition of the cutter.



As the cut proceeds, the blocks are repeatedly opened and the chips brushed away. Two cavities have been rough cherried and cuttings remain on the cherry.

thing but rough. Actually, the term rough refers only to the dimensions of the mold at this point.

The finishing touches

The mold blocks are now ground and polished on a precision surface grinder to insure accuracy of bullet length and give a finish which reflects the careful workmanship which has gone into the preceding steps. Finally, the cavities are finish-cherried by hand just as is done in the final chambering of a fine rifle barrel.

Only the bolts, washers, and wooden handles of the big molds are mass-produced outside the shop. Metal parts of the handles are produced by standard machining operations at the Hensley & Gibbs shop, and carefully fitted before assembly on the mold.

Before shipment to the customer, each mold is tested by casting a run of bullets from a standard bullet metal and weighing the bullets. For preheating, the mold is placed on an electric hot plate and allowed to remain there until it has reached equilibrium temperature. The bullet metal is heated in a temperature-controlled pot so that the test conditions remain constant.

When asked what tolerances are required for the finished molds, Mr. Gibbs stated that bullets are held to within less than .001" in length. Referring to his records, he pointed out that they had recently shipped sixteen 4-cavity molds for the 158-gr. wadcutter bullet to the police department of a large southwestern city. Of the 64 cavities, the total difference in weight between the heaviest and lightest bullets was less than one-half grain. However, a person buying a mold should remember that the bullet weight is determined by the density of the alloy from which it is cast, and variations in the amount of tin or antimony will change the density. Also, small defects such as air pockets will cause variations in the weight of the bullets if casting is not carefully controlled.

The Gibbs family was reluctant to determine the number of hours of labor which go into an individual mold, but admitted they work some "pretty long hours" at times, and turn out from 60 to 100 molds per month.

Demand for molds has remained fairly constant throughout the years, and even during World War II, Hensley & Gibbs was kept busy with priority orders from the security forces of defense plants.

In America today, it would be difficult to find a better demonstration of the traditional craftsmanship of a father and son team than the Hensley & Gibbs operation. ■

Each mold is tested by casting and the bullets are weighed as a quality control measure. A sample bullet cast by this mold will accompany it at the time of shipment.