

# Making Hollow Ogive (HO) Air Gun Slugs



## The HO or Hollow Ogive slug is formed in two steps.



First a lead cylinder with a large cavity is swaged to exact weight using the CSW-1-S Core Swage "Preform" die. This die adjusts the weight by bleeding off surplus lead beyond a certain volume that you can adjust.

Second, the precisely formed "core" is put into a point forming die PF-1-SP and the ogive or nose curve is gently rolled on the hollow cavity end of the slug.



Only enough force is used to form the nose. The top or external punch (which forms the base) is only set to push the lead core just to the end of the die cavity and no further. No extrusion of lead is done in this step.

Even though the PF-1-SP die has its own bleed holes for adjusting weight on a solid ogive slug, no lead extrusion is done in the die when forming HO Slugs. Attempting to do so will smash the hollow ogive and ruin the projectile. Also, the lighter weight of the hollow ogive core might tempt you to press the external (base) punch too far into the die, past the maximum insertion line on the punch. This will ruin the punch by swaging over the edge, so that a fin of lead will begin forming on all the bullet bases swaged with that punch (until it is repaired or replaced).

## For ALL slugs (solid or hollow ogive) made in PF-1-SP dies:

### RULE NUMBER 1: Never, ever push the external punch into the point forming die so that the "max insertion" line on the punch is below the mouth of the die.

Just one stroke, one time, can ruin the punch. When in doubt as to how far a given base punch (external or top punch) will fit into a given die, try gently placing the punch in the die BY HAND ONLY, not using the press. When the punch encounters the ogive that is absolutely the limit before the punch is ruined by swaging its edge. You can feel it stop against the ogive.

Another way to determine the maximum safe insertion is to locate the bleed hole on the die. If there is more than one bleed hole, locate the one that is closest to the die mouth (the end of the die with the larger cavity hole, where the slug goes into and out of the die).

Then hold the external punch alongside the die, so that the smaller, working end of the punch just comes to the start of the bleed hole with the punch positioned as it would normally be if the die and punch were in the press. The distance from the die mouth to the start of the bleed hole is the maximum insertion length for the external punch.

### RULE NUMBER 2: Always use the internal and external punches that were built for a specific die in that die.

Do not use different punches, or punch heads, or inserts, than those which came with the die or are made as precise replacements for them.

If you use other punches, even with the same diameter, in a PF-1-SP die, the precise depth of cavity in that die may not match the particular synchronization length of the internal (ejector, HP) punch.



The maximum insertion line on another external punch of the same caliber may or may not be right for that particular die. This is because the die cavities, while held to close tolerance in depth, are hand lapped and will change depth slightly as the die is finished with diamond lap to the final stage of polish. The punches are precisely fitted to four decimal places by individually making slugs and testing, measuring and carefully cutting the punch to obtain a perfect match.

If you get flashing or ragged thin lead extrusions at the BASE of the slug, it is almost certainly either a damaged punch that was driven into the ogive of the die at least once, OR the punch was fitted to another die, has been dropped on a hard surface and “dinged” the edge, or has been in some other way damaged at the edge.



If you get flashing or a ragged thin lead extrusion at the NOSE or tip (meplat) of the slug, the ejector or internal punch is not positioned correctly to exactly match the depth of the cavity and seal off the tip. This could be because that punch was not made for the die in which it is being used, or because the punch head has been changed without matching the combination of punch head and insert rod to the particular die cavity depth. Or it could be because the die is not screwed snugly into the press ram or for some other reason the internal punch is not being held exactly at the end of the die cavity. Swaging should always take place at the TOP of the ram travel, never part way up. Raise the ram and then bring the punch holder and external punch down to contact the core, and adjust for weight at the top of stroke.

Swaging of the slug should take very little effort. Pressing too hard can force lead to spurt around even a snugly fitted ejector. Inserting the external (top mounted, base forming) punch past the bleed holes not only will ruin the punch edge and cause base flashing or ragged thin extrusion around the base, but it will also block the bleed holes and raise pressure at the end of the stroke. This can force flashing to occur around a well-matched and fitted ejector. Lead extrusion that is coming out of the bleed hole as a ribbon, rather than as a small round “wire” or small round “pellets”, is being squeezed past the end of the base punch, which is partially blocking the bleed hole. It is simply adjusted to far into the die, probably in an attempt to make too light a bullet for that particular shape, hollow point, and base design.

HO slugs can be made lighter for the same length, or longer for the same weight, compared to a solid ogive slug. Solid ogive slugs can be made shorter for the same weight, or heavier for the same length as the HO slug. The PF-1-SP die is used to make both HO and solid ogive. Only the ejector design is changed to switch from one kind of slug to the other, in addition to using the HO preform CSW-1-S die first to make the HO “core” or hollow ended cylinder first, and then pushing it gently into the PF-1-SP die without making any further extrusion of lead from the point forming operation.

Please study and understand how the two-step operation must work in order to NOT collapse the hollow ogive in the second step. It is VERY important to grasp the concept and operate the 2<sup>nd</sup> step properly. If you are NOT getting excellent slugs in the 2 step HO process, you are most likely using too much insertion depth on the 2<sup>nd</sup> step, generating too much pressure, and crushing the hollow ogive rather than stopping before this happens and ejecting it.

The PF-1-SP die has two different operating modes depending on whether you are making HO or Solid Ogive slugs. With solid ogives you do not use the preforming core swage, and you DO pressurize the lead to make the bullet in one step with extrusion and weight adjustment in the PF-1-SP die. With hollow ogives, all weight control and extrusion is done in the core swage die as a 1<sup>st</sup> step while forming the hollow point cavity.

Please note that all references to the -S type dies also applies to the larger -H dies.