

USER MANUAL

HYDROFORM DIE OPERATING PROCEDURE



MANUFACTURED BY:



Armaments by Design Pty Ltd,
Edmonton, Queensland 4869, Australia

www.armamentsbydesign.com.au

December, 2024.

SAFETY FIRST; Whenever you use tools that can or may create flying particles or pressurised fluid you should always use safety glasses as a minimum or preferably a full-face shield and safety glasses.

1. INTRODUCTION.

Hydroforming of cartridge cases is a very economical and fast process. It will save the cost of the dies usually with the first 100 cases processed as it removes the need to load the case with primer, powder and a projectile of some type as well as saving on time spent travelling to and from the range and wear and tear on your barrel and rifle in general. The actual process is as fast or faster than loading a case with powder and projectile.

Hydroforming with our dies does require that you fit a used primer into the case to seal it so that the fluid is retained while carrying out the process. We save our used primers when reloading for this very purpose.

2. THE HYDROFORMING PROCESS.

The process of hydroforming cartridge cases is a procedure that uses hydraulic force generated inside the case in the fluid placed in the case to expand the case wall to the shape of the die internal dimensions, usually cut by the chamber reamer that has cut the respective rifle barrel chamber. The faster the force or pressure increase inside the case is generated, the better the case will be formed and so it is usual to strike the die drive pin with a hammer of some sort. The principal of hydroforce generation is simply one of the fluids being displaced by the volume of the pin being driven into the die body and not being able to escape fast enough to prevent some generation of pressure in the fluid. For this reason, the more accurately the die is machined and the better the seal of the pin surface on the inside of the case neck, the less fluid is displaced, the higher the pressure generated and the better the forming result.

The most common fluid used is water with a few drops of detergent added to help fill the case when it is placed in the container holding the water. Light oils can also be used but are harder to clean out of the case after it is hydroformed and before loading. A light oil is thicker (has a higher viscosity) than water and so resists travelling up the stem of the die pin when it is hit to generate the internal pressure. This can be useful if the die is not well manufactured and has excessive clearances through which the fluid can escape.

Hydroform dies manufactured by Armaments by Design work very well with water as the forming fluid due to the close tolerances in the die and the overall die design. They do not need or use any sort of o'rings or seals to retain the fluid and experience very little fluid escape during use.

The pressure generated during hydroforming is not usually sufficiently high enough to expand the case base area due to the thicker brass in that section of the case and is most effective in altering the shape of the upper section and neck and shoulder area of the bullet case.

Hydroforming dies can also be used to expand the case neck to a larger calibre diameter as well as reshape the case walls. This is achieved by having a drive pin that has been designed and manufactured to the correct diameter and include the necessary tapered lead in at the start of the pin. These dies also seal the case neck very tightly as they are expanding the brass as they are driven into the case, and this results in the brass sealing tightly on the pin stem.

When hydroform dies are used to expand the case neck diameter, the internal pressure generated during the forming process help combat the collapse of the neck and forming of “donuts” at the neck and shoulder junction.

The hydroform dies manufactured by AbD are manufactured with 416 stainless steel bodies and D2 tool steel hardened and ground to the close tolerances required. In normal operation, this results in drive pin life of thousands of case forming operations without scoring or damage to the pin, but damage or contamination can cause the pin to become scored and stuck.

The normal cleanliness levels used in all reloading procedures should be maintained while hydroforming and it is beneficial to wipe the case dry after filling with fluid and blowing any fluid out of the die after each case is formed. Excessive fluid in the die body around the outside of the case will result in the case body being compressed inwards as the hydroforming is carried out as that fluid cannot escape from the die.

The use of a “dead fall” hammer around 2lb or one kilogram in weight is recommended as the die pin will rebound out of the die body at a rapid rate if a solid steel hammer is used. We sometimes find the best results are obtained with a steel hammer due to the higher impact force and pressure peaks obtained and we lay a cloth over the die held in the vice on a sturdy bench to restrain and catch the rebounding pin to prevent it landing on the workshop floor and suffering damage.

When you have finished forming, remember to blow all water out of the die body, wipe it dry and preserve with an anti-rust coating of your preference. The 416 stainless steel will rust as will the hardened die pin, so look after them or next time you go to do some hydroforming they will be destroyed and unusable.

At Armaments by Design Pty Ltd, we can design and manufacture hydroforming dies to expand almost any cartridge case but remember they can't shrink a case inward, only expand it. Making a case smaller in diameter or shorter in base to shoulder length is a resizing operation and uses a different die design.

3. SAFETY FIRST; Whenever you use tools that can or may create flying particles or pressurised fluid you should always use safety glasses as a minimum or preferably a full-face shield and safety glasses.