

# **MAKING CARTRIDGES: THE UNKNOWN ART OF BRASS EXTRUSION FOR THE MANUFACTURE OF AMMUNITION**

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## **INTRODUCTION**

Or might it better be characterized as "the secret art" ?

Anyone familiar with the instructional materials on gun building must certainly know that it is difficult to locate usable information on the fabrication of cartridge brass. This is not to say that it is nonexistent, but only scarce. Almost all of the information I have been able to locate was published in the early part of the 20th century, and centered around the promotion of wartime production by companies catering to the United States Army and its participation in World War I. After this point in time, the majority of the books and articles relevant to this subject teach

general principles of brass extrusion, but very little specific to cartridge manufacture.

This situation is rather curious, because books covering the building of firearms delve into challenging aspects of metalworking. We need only consider recent treatises on rifling machines and the construction of single shot receivers to notice that anybody using the techniques described will need solid instruction and a reasonable amount of experience in the use of machine tools. Are the prerequisites for making quality rifle barrels less demanding than constructing the tooling for brass extrusion?

### **Why Has This Process Been Neglected?**

Several possibilities come to mind which might explain the dearth of instruction on cartridge manufacture. Foremost among these is the wide availability of commercial ammunition, and the prevalence of tools and materials with which it may be reloaded. Perhaps there is a lack of interest in producing articles so common and relatively easy to acquire.

Another explanation which comes to mind is the tedious nature of making extrusion tools, at least if precise results are required. Properly described, the making of these tools is not a matter of deep insight or gifted genius, but it requires tenacious attention to detail and patience. I learned this when I was called upon to manufacture press tools to extrude tantalum cups. These cups were to be of exactly prescribed height, diameter, and wall thickness. Eventually, I got it right, but only after a number of failures attributable to the metal's refusal to behave as I predicted it would.

Finally, extruding metal for any purpose requires a press of high tonnage, and to produce many extruded parts will require a fast acting machine with convenient operator controls. My foray into tantalum extrusion was a bit aggravating for many reasons, but prominent among them was the fact that I did the press work with a hand pumped hydraulic cylinder press. My experience would have been much better had I been given access to a fast acting hydraulic press. Of course, small shops which are equipped only with a lathe, mill and surface grinder are

seldom provided with a large press, and one can understand the reluctance of hobbyists and even small scale manufacturers to pay for such a machine.

### **Alternatives To Extrusion**

We should note that extrusion is not the only method available for producing cartridge brass. Several sources report that Harry Pope, the great barrel maker, produced straight walled cartridges by machining them on a lathe. He made these in small batches, about a dozen at a time, and would reload them many times over with black powder. They served him well in rifle competitions, where he won great renown as a marksman. This is a possible solution to manufacturing cartridge casings, at least if our goal is to make straight walled casings, but it would also entail the generation of large volumes of chips. At the present cost of suitable brass alloy, this does not appear to be an optimum solution.

I am confident that the industrial processes used in extrusion of cartridge cases can be scaled down and made functional in a small shop. However, my confidence does not extend so far as to think the development of this process will be easy. To simplify the manufacture of casings, it would seem that a technique of "partial machining" might be used; that is, a brass rod might be hollowed out by drilling. The resulting closed tube, approximating a cartridge case in shape, could be finished by extrusion in a press. The void created by the drilling operation would mean that less material displacement would be required than would otherwise be needed if pressing a casing from a solid blank. However, the drilling operation means that we are once more turning costly brass into chips.

### **Two Books Which Address Our Topic**

Returning to the question of instructional literature on the brass extrusion process, two books stand out as promising sources of actionable information. The first of these is *Cartridge Manufacture* by Douglas Hamilton (New York, Industrial Press, 1916). This work was clearly inspired by the prospect that the U.S. would soon intervene in World War I, and is addressed to American manufacturing companies. It is useful because it describes the process of brass extrusion in great technical detail.

Another more recent book is also valuable, *Ammunition Making*, authored by chemical engineer George Frost, (Washington D.C., National Rifle Association Publications, 1990). Mr. Frost was a professional consultant to ammunition manufacturing concerns, and his work also explains the brass extrusion process in detail.