6" Crossette Canister Shell

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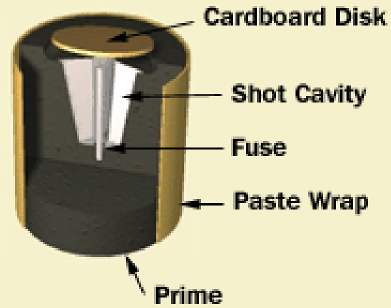

Figure 1: Basic crossette components.

Introduction:

Crossettes, also called split comets, are a special breed of comet that split into four pieces midway through their trajectory. Figure 1 shows a cross section of a typical crossette, which reveals an inner cavity where a high-energy break charge is placed. The comet is pasted in on the sides and top so that it can only burn from one end. When the flame front reaches the inner cavity, the burst charge blows the remainder of the comet into four pieces (ideally).

The inner cavity of a crossette is usually a tapered hole with the profile of a four pointed star or square. Although it is possible to make crossettes with a rounded cavity, the weak points caused by a four pointed polygon help insure that the comet breaks into four equal sized pieces. The taper is neccessary to ease the removal of comets from the pump after pressing, where they are fragile and prone to cracking.

Figure 2: Crossette pump and PVC sleeve.

Crossette shells typically suffer from two problems: crossettes that don't break properly and crossettes that don't all break at the same time. The first step in making a crossette shell is to make sure your crossettes break properly through repeated testing from a star gun. The illustration below shows two of the most common crossette failures seen when testing individual crossettes.

"Jetting" **Fragmenting** **Perfect**

Figure 3: Star shaped cavity former with pin at tip.

Jetting is the most common problem and can be caused by a number of factors. It most often occurs when testing from a star gun, since the setback from the lift can compact the break charge into one side of the cavity and turn the crossette into an end burning rocket. This is why it is important to test your crossettes from a star gun rather than just placing them on a post or hanging them from a string. Star guns create the actual conditions your crossettes will experience when being thrown from a shell, whereas other methods do not and may lead you to think that your crossettes are working only to find that many of them fail when fired from a shell.

The use of too little or too weak of a break charge can also cause jetting. Since the cavity can not hold much powder, a high strength flash type mix must be used. The types of aluminum used for the flash will effect it's strength, with Indian Blackhead being the strongest, followed by German Black and then American Dark.

Another method some builders prefer is to hand roll small firecracker-like "shots" that fit into the cavity, thus insuring that the charge will have adequate confinement to split the comet apart. I personally find that this method adds too much work to a component that is already a lot of work as it is!

The most common trick to eliminate jetting is the use of a fuse that inserts into a small hole at the bottom of the cavity. Most commercial crossette pumps have a pin at the end of the plunger, as seen in Figure 3, which is designed specifically for this purpose. The flame front will reach the small hole first, allowing ignition of the cavity while there is still some composition left at the bottom to help create containment. The passfire fuse, which runs the full length of the cavity, also helps eliminate the end-burner problem by providing a fire gap through any comp that may otherwise get compacted from setback.

Thermolite is the most common choice of passfire for the small inner fuse, probably because it is one of the few types of fuse that is thin enough to actually fit into the hole. However, Thermolite is quite expensive and is increasingly hard to find. I have not had much luck with thin diameter visco fuse as an alternative, as the burn rate is too slow.

My personal secret is the use of hand rolled Chinese paper fuse made from corning dust. This type of fuse is ideal since it is thin, takes fire easily and is very fast burning. For those of you who don't make black powder, corning dust is the fine grained dust leftover when granulating BP. It ranges in particle size from meal to 60 mesh and burns quite rapidly when made into tissue fuse. Corning dust could also be made from pulverizing commercial BP by hand, or screening dampened meal through a 40-50 mesh screen. The procedure for making Chinese paper fuses can be found here.

The other common crossette defect is an overly hard break that causes many small pieces instead of four large pieces. This is a simple matter of dialing in the strength and amount of break used in the crossette. The paste wrap around the crossette should also not be too thick. Two turns of a light weight 30-40 lb kraft paper is all that is required.

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