

**Build This...****6" Double Petal Ball Shell****April, 2002 Issue****Build This:**[6" Double Petal Ball Shell](#)**Technique:**[Pasting Paper Ball Shells](#)**Design Notes:**[Strip Pasting Calculations](#)**Autopsy:**[Lidu 5" Crossette Canister Shell](#)**Summary:**

This classic round shell is the staple of many displays and gives the artist a wide variety of color combinations and effects. If done correctly, the effect is one round break nested inside of a larger round break. Common smaller inner petal stars include solid colors, streamers or even strobe stars. The larger outer petal stars should be designed to complement the inner effect so the two petals are visibly distinct.

Materials:

- ▶ (2) 5-3/8" OD hemispheres
- ▶ (2) 3-3/8" OD hemispheres (optional)
- ▶ (1) 2-1/2" long x 3/8" ID tube
- ▶ (1) 2" long piece of chinese time fuse
- ▶ 450 g KP rice hulls, 6:1

Tools:

- ▶ Hot glue gun
- ▶ 16" x 1" dia wooden dowel
- ▶ Scissors
- ▶ Cross match punch

Unmeasured Materials:

1/2 to 5/8" dia stars, 1/4 to 3/8" dia stars, cross match, tape, tissue paper





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Figure 1: A commercial double petal opens during a finale.



Figure 2: Distinctive inner petals visible inside outer petal.



Figure 3: These shells have an inner pistil, which is not the same as an inner petal.

Introduction:

The double petalled round shell, be it a peony or chrysanthemum, is an attractive effect in which one sphere of stars is nested within a larger sphere. The inner sphere is typically one half the diameter of the outer sphere, and the effects of both petals should be designed so that the inner petal is clearly visible.

The Japanese refer to the stars that make up the inner petal as pistil stars, but this can be misleading since a shell with inner pistils is a different effect than one with inner petals. An inner pistil is simply a cluster of stars located at the center of the shell, and the effect looks like Figure 3. Inner petals, however, are arranged in a sphere just like the stars at the outer edges of a normal round shell. If done right, this will result in a spherical inner break instead of a random cluster.

The most difficult thing to master with this type of shell is getting the inner petal to appear perfectly round. From Figure 1 and 2 it can be seen that even commercial shells have difficulty with this. The inner petal stars must be positioned in a good sphere, centered in the shell, and kept that way until the shell breaks. If a container is not used to hold them in place, then they are subject to shift during the closing phase of shell construction, or even during the violent lift and burst events.

It would seem that the larger the shell is, the easier it is to make the inner petal break round. Figure 1 is probably an eight inch shell, where Figure 2 looks like six inch shells. The six inch size is about the smallest diameter I would use for attempting this effect. Going any smaller leaves too little room for the burst charge and doesn't allow much space for an inner petal.

Due to the extra space consumed by the inner petal stars and any case that may be used to hold them, there is less space available for burst charge in a double petal shell. Thus, the strength of the burst that is used must be higher than that used for a single petal shell of the same diameter. For the six inch paper shell described in this article, the burst charge is [KP](#) on rice hulls in a ratio of 6:1. The hulls were coated using a star roller as described [here](#).

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Figure 4: Cross matched time fuse inserted through bottom of hemisphere.



Figure 5: Center tube hot glued over time fuse.



Figure 6: Stars loaded in place.

Construction:

Two hemispheres measuring 5-3/8" O.D. are required to hold the contents of the shell and provide a sturdy surface to paste over. The commercially available Chinese or Japanese paper hemispheres work well, with the Japanese type being the highest quality. Be aware that both types come in two different sizes for six inch shells.

The Chinese hemispheres come in a larger size for poka shells, which are too large to allow the necessary number of paste layers for this shell. The Japanese type are available in nested sets, with an inner set that fits snugly inside an outer set, thus reducing the number of paste layers required to finish the shell. Using the nested sets are a bit expensive, but should work with less time spent pasting. If you want to use the traditional method of pasting over a single set of hemispheres, make sure you order the inner size and not the outer size.

Plastic may also be used if they are pasted over at least six layers when closed. The type of hemispheres shown in the illustrations are made from recycled paper using the [vacu-form](#) method.

Prepare one hemi with a piece of time fuse measuring 1-1/2" between cross match holes (assumes a burn rate of 2.2 seconds per inch). The end of the time fuse that goes inside the shell should be cross matched with a 5" long piece of match before inserting the time fuse. A bead of hot glue is run around the time fuse joint both inside and outside the case. A 2-1/2" pipette made from a few turns of 70lb kraft is placed over the time fuse and cross match inside the shell, held into place by the bead of hot glue around the base of the time fuse. Extra sticks of black match may also be inserted into the pipette to help increase the jet of ignition fire.

The two hemispheres are next loaded with the outer petal stars until filled just below the rim, as seen in Figure 6. Occasionally jostling the shell helps the stars settle into place and fill the gaps.

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Figure 7: Tissue paper liner placed over stars.



Figure 8: Inner hemispheres punched with holes to help fire transfer.



Figure 9: Pouring break charge around inner hemis.

After the stars are loaded a tissue paper liner is placed over them, which helps prevent the stars from migrating into the burst charge during assembly and transportation. It may help to form the tissue over a 5" hemisphere prior to placing it in the shell so that it will lay down better. Using scissors to make four cuts around the edges of the tissue paper half way to the center also helps the paper lay down easier.

The hemispheres shown in Figure 8 are used to hold the inner petal stars in place. These were made using the [vacu-form](#) method, but another type can also be made by pasting half circles around a former and drying them out. Holes are punched in the paper in order to help transfer fire from the inner petal to the outer petal. The vacu-form hemispheres are very weak and easy to punch with an awl or screwdriver. In fact, these hemispheres are so easily torn during burst that the shell will still function properly with no holes at all, but it doesn't take but a minute to perforate them.

Plastic hemispheres can also be used, but the fire transfer holes must be drilled instead of punched, so they take slightly longer to prepare. The same is true of commercial paper hemispheres, although these are a bit thicker, more expensive and consume more space in the shell. Thin paper hemispheres are ideal.

Another method of creating the inner petal does not require hemispheres. The tissue is filled 2/3 full with burst, then a paper or plastic hemisphere is pushed into the burst charge and removed so that a spherical indentation is formed. The stars are then carefully placed into this cavity. However, I believe the use of rigid hemispheres results in a rounder inner petal that is not susceptible to becoming deformed as the shell is closed.

With the tissue in place, a handful of burst charge is placed into the bottom of each half. The inner petal hemispheres are now placed on top of this bedding of burst charge, rocking them into place so that the rim of the inner hemi is even with the rim of the outer hemi. The remaining space around the sides of the hemi is then filled with burst charge. Figure 9 shows how a paper hemi placed over the inner hemi can be used to prevent burst from falling inside when pouring around the outside.

After both inner hemispheres are shimmed into place with burst charge, they may then be filled with the smaller 1/4" or 3/8" stars as shown in Figure 10.

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Figure 10: Loading inner petal stars.



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Figure 11: Tissue paper liner placed over inner petal stars and filled with burst charge.



Figure 12: Tissue paper liners are trimmed and gathered up.



Figure 13: Sheet of tissue used to hold in contents when right hemi is inverted onto left hemi.

After loading the inner petal stars into both hemispheres, another tissue paper liner is added as before. The remainder of the space inside the liner is filled with burst charge until level with the edge of the casing.

The excess tissue paper is now trimmed with scissors and folded in as shown in Figure 12. The stars for both petals are inspected for gaps, and additional stars are wedged in place where needed. There will be some stars that stick up above the casing and other spots where the stars don't quite make it to the edge of the casing. Judging the placement of stars is somewhat of an art, since too many will prevent the shell from closing and too few will result in a visible "seam" when the shell breaks.

Position the two shell halves next to each other and try to align them so that stars sticking up above the hemi wall will be matched with stars that rest below top of the hemi when one half is flipped over onto the other. The stars will shift during the closing process, but it is good to try and get things to interlock as best as possible going into the process.

Extra burst charge is added around the top of the inner petal and wherever else needed to bring everything level. Since rice hull burst is slightly compressible, a slight excess of burst may be mounded up in the center of the shell. The purpose of this is to provide a solidly packed shell when it is forced closed.

Closing the shell is done by flipping one half of the shell over onto the half that contains the time fuse. In order to keep the contents from spilling out during this process, a sheet of tissue paper is placed over the half to be flipped as shown in Figure 13. This sheet is carefully held in place with both hands while turning the hemi over as shown in Figure 14.

There should be a gap of about 1/4" between the two halves when they are put together. This gap must be closed by lightly rapping the sides of the shell with a wooden dowel rod while pushing down on the shell from above. The rod is tapped above and below the seam for the entire circumference of the shell until the gap is closed. This action causes the stars to shift and fall into place. On occasion you may overfill the shell and not be able to close the gap. If this happens, you must grasp the tissue paper and remove the top half, making sure that nothing spills. The contents are adjusted by removing break charge and stars where necessary, then reassembled as before.

If there is no gap when the halves are put together, then you probably under filled the shell. This will result in a shell that is not packed as tightly as it should be and can allow stars to shift and migrate out of alignment. An under-filled shell can also result in less structural integrity, although it is not likely that a shell of this size would get damaged on lift if properly pasted in.



Figure 14: Closing the gap by tapping with wooden stick.

Once the gap is closed, the tissue paper is torn away and the halves are held together with pieces of masking tape running around the circumference of the seam. A small flag of tape is placed around the time fuse to protect it during pasting.

The shell is now loaded and ready for pasting. Several methods of pasting are described in this month's [pasting article](#). To determine how many paste layers are required for the type of paper you are using, check out the guidelines given in the [paste layer calculation](#) article. 🔥

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