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Rolling Precision Round Stars

Introduction:
Rolling round stars is probably the last star making technique most beginning pyros learn to master. The need for the rolling machine combined with the difficulty in rolling small batches of stars and the little nuances necessary to roll stars quickly and effectively create a barrier to entry for the beginner. However, round stars are the most versatile and precise type of star that can be made, and they are the only option for making color changing effects and round shells.

Some pyros will recommend that you learn to roll stars by hand in a metal bowl before using a machine. I disagree with this viewpoint, as the technique for rolling stars in a machine is much different than using a bowl. Swishing stars around in a bowl is labor intensive, difficult and limited to small batches. The beginner who approaches star rolling through this route is likely to lose all interest!

This article is intended for those already familiar with basic star rolling techniques as explained here. In this installment we look at one specific process for efficiently making a range of star sizes of the same color, also referred to as "rolling cores." We also look at how to size these cores to very precise dimensions in order to achieve commercial quality effect changes that occur in precise sequences.

When working with larger batches of stars, star rolling becomes the fastest method of making stars available. This is because it takes just as long to roll a one pound batch as it does a ten pound batch. Not only that, but rolling becomes much easier with larger batches. This is because the extra weight of the star pile helps the stars pick up composition easier, keeps the sides of the roller clean, reduces spiking and is just an easier task all around.

The down side to working with large batches of course is that when you mess things up you can waste a lot of material! The technique shown here is only recommended for compositions with which you are very familiar and have rolled successfully in smaller batches.


Figure 1: A typical star rolling station.

Rolling Star Cores:
Since it is easier to roll larger batches of stars, it makes sense to roll a year or two's worth of color cores in all the basic colors that you commonly use. These typically include red, green, blue, yellow, white, white flitter and strobes. I use the term "core" to refer to round stars between 1/4" and 1/2" that are a solid color with nothing rolled over them. Making a few pounds of cores in the 1/4", 3/8" and 1/2" sizes of the common effects mentioned above will give you a nice palette to choose from when building out the stars to completion.

Rather then starting from scratch each time you want to make a new batch of stars, having a good supply of cores on hand will allow you to skip the most time consuming step, which is bringing the star up from a small seed to the inner core size. You simply throw a few handfuls of your pre-made cores into the roller and start adding effects from there. A one gallon bag of 1/4" cores will make an

Figure 2: 2/3 cups of husked millet cores ready for rolling.

Figure 3: Initial buildup on the cores rapidly expands pile size.

Figure 4: Rolling is stopped at about 3/16" diameter.

amazing number of 1/2" stars, and will likely last you several years!

My starting core of choice is a seed known as husked millet, which is smaller than normal millet because the shiny outer shell has been removed. The smaller core you start with, the better micro stars you will be able to produce for use in gerbs and small shells. Using a large core such as lead shot or micro sieves will consume a high percentage of volume in stars smaller than 3/16", which will reduce their burn time. Husked millet is not as small as sand grains, but it is smaller than most other types of cores yet still cheap and easy to work with. I purchased a 25 lb bag of husked millet from Whole Foods for only $20, which will probably last a lifetime if the bugs don't get it. Transferring the seed from the paper bag into a sealed container is important to prevent the bug problem. If you do get a bug infestation, flooding the millet with water and drying it out will kill the bugs. Just make sure it is good and dry before sealing it up again!

Figure 1 shows a star rolling station ready for action. I use a 15" diameter roller that spins at 28 RPM for stars ranging between cores up to 1/2" in diameter. The drum sits about 3 feet off the ground, which is a comfortable level when sitting on a small stool for hours on end. A table next to the roller allows easy access to the powder bucket, sprayer, a scraper and a waste bin. It is a good practice to do your rolling out doors, especially when rolling dusty comps like aluminum and charcoal.

Figure 2 shows 2/3 cup of husked millet ready to be rolled. You will need about 15 pounds of composition to work this millet up to the various sizes. This seemingly small pile of cores will make quite a large number of stars, even if you only roll them up to 1/4". Figure 3 shows how much the pile grows before even all the cores are fully coated.

The key to starting composition on small cores like this is to put on a pair of latex gloves and work the cores with your hands in between spraying and powder application. This helps break up the inevitable clumping that will occur, and also allows you to mop up caked powder that will adhere to areas of the drum dampened by your sprayer. Roll the stars between your hands or drag them across the bottom of the roller to help break up any clumps. For dextrin bound stars, using a higher percentage of alcohol at this stage will help reduce clumping. The exact amount of alcohol varies greatly depending on the rolling characteristics of the composition. Formulas containing a high percentage of parlon and magnalium can be started with almost 100% water, while formulas high in aluminum or charcoal content might need up to 50% alcohol to get them started and reduce spiking problems.

Figure 4 shows the original pile of millet rolled up to 3/16" diameter. Size consistency between stars will be very poor at this early stage, and there's nothing you can do about it. New stars are continuously forming from clumps of wet comp that break off, so there is generally a wide range of star sizes at this point. But that's ok, because these tiny round stars make great micro stars for your gerbs!

At this point the stars are placed on a screen lined with a sheet of newspaper and allowed to dry, as seen in Figure 5. Because star

Figure 5: Stars placed on a screen lined with newspaper for drying.

rolling is an inherently boring activity and dust masks make you hot and sweaty, I only spend a small amount of time rolling at each stage. The true addict with a lot of screens and a high tolerance for monotony would clean the roller and begin to bring up the next set of cores, continuing the process until all the base effects were rolled up to 3/16".

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Figure 7: Screen box with interchangable screens.

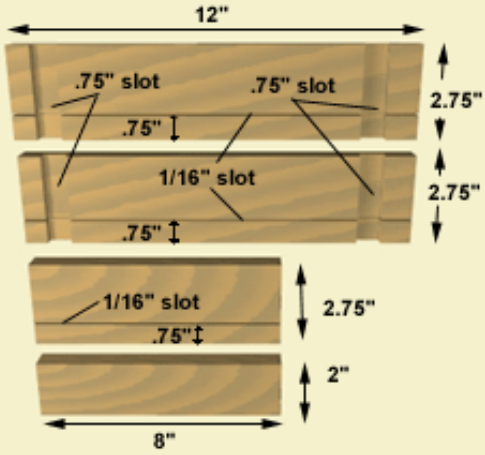

Figure 8: Screen box frame dimensions.

Screening Round Stars:

The key to any good round shell is good round stars, and good round stars can only result from good sizing technique. Poor size consistency will result in sloppy effect transitions. Anyone wishing to make a color changing ball shell that blinks from one color to the next with unified precision needs to start with a good set of sizing screens to achieve this.

Some people think I'm obsessive, but I actually screen my stars up to 3/8" dia. with 1/32" accuracy. While this may seem like a high tolerance, 1/32" of a 1/4" star is actually only a 12% tolerance. Screening to 1/16" simply results in too much size variance for precision color changing timing, but will work fine for simple solid color stars.

With a 1/32" tolerance, you find yourself needing more screen sizes of course. The screens listed in the process diagram on the next page call for 3/16", 1/4", 9/32", 3/8" and 13/32" screens. Since ordering such wide variety of odd sized perforated metal to use for screening would get expensive, I prefer to make my own. Because you are not going to be processing 100s of pounds of stars each day, a small 12" screen box will work just fine. Smaller screens are easier to handle and will be easier to build screens for.

Figure 7 shows a screen box with interchangeable screens that are made from sheets of Formica with holes drilled in them. The Formica drills easily without gumming up the bit and the thin sheets allow stars to drop through easily without getting stuck in the holes. Drilling the holes is of course a rather tedious task, but a drill press will help to make it easier. You only have to make the screens once and they will last a long time, so just think of it as a meditative exercise!

Figure 8 shows the dimensions for the screen box, which will require a table saw or radial arm saw to make due to the slotted groove and dado joints. Note the non slotted piece that leaves an opening for the sheets to slide into at one end.

Of course you can simply find some cheap plastic bins and drill a bunch of holes in the bottom as well. Some hobbyists drill holes in the bottoms of 5 gallon buckets and stack them up in order of largest to smallest, then dump their stars in the top and shake this "screen tower" such that the stars settle out at the various levels.

Figure 9 shows a screening operation in progress. You really need three bins: one to hold the initial star batch, one to catch the stars that fall through the screen and one to store the stars that stay on the

Figure 9: Screening setup.

Figure 10: Well sized stars will align into a tight fitting pattern.

screen. A scoop made by cutting the bottom off a 1/2 gallon juice or milk jug makes an excellent star scoop. However, scoops such as this will sheer pieces of damp stars off, so only use it on dry stars.

The basic process is to roll a whole lot of 3/16" cores, screen out the sub 3/16" for use as micro stars and then roll the rest on to 1/4" stars. I prefer to dry the stars at 1/8" increments, which allows them to dry in only one day. Trying to roll too much comp onto stars in one sitting not only makes them take longer to dry, it requires you to screen them more frequently while still wet, which can be a source of chipping and other damage.

Figure 10 shows how a good batch of accurately sized stars will align themselves into a very snug and symmetrical pattern when laid flat. You should see hexagon outlines as each star aligns perfectly with those around it. You then know you have achieved the Zen of star rolling!

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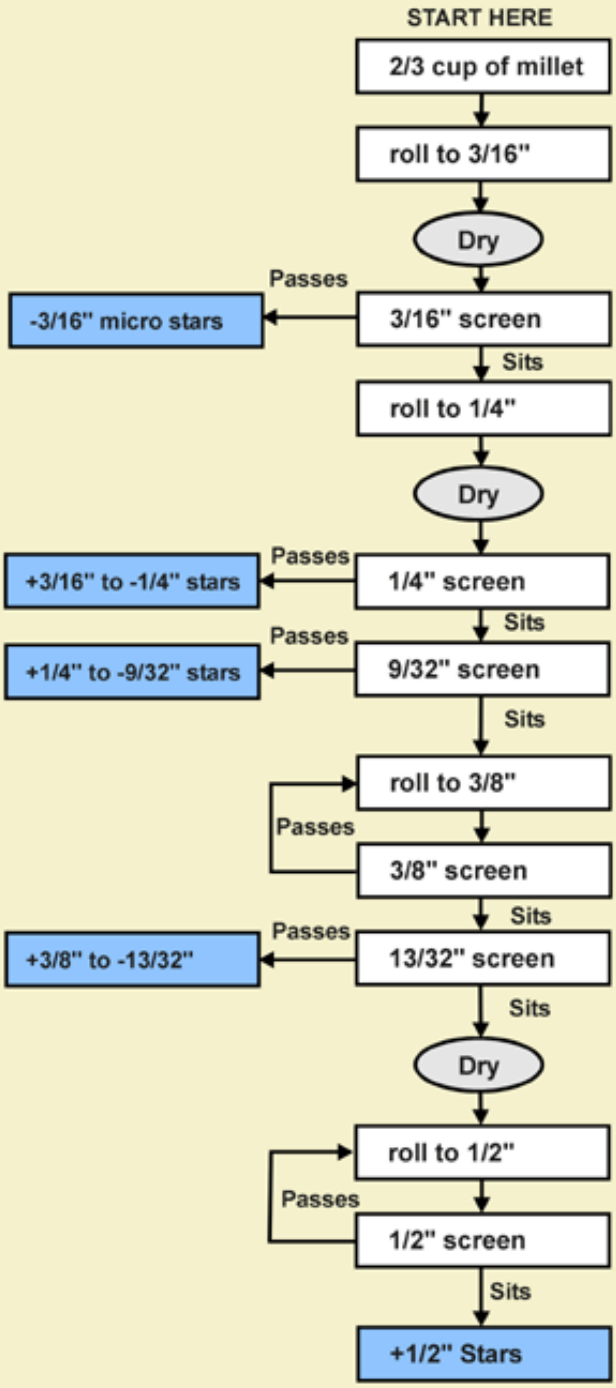

When rolling your stars and they start to look big enough, throw a handful on the next size screen you are rolling up to and see how many are retained. When about 50% sit on the screen, it's time to stop and screen again. Of course the more frequently you screen the better your batch size will be, meaning that you will get more of the size you are screening for and less of the oversized stars that must be rolled up to the next size. If you will be making another set of stars up one size from the current batch, you will need the oversized stars anyway so you might as well just screen less frequently.

The process diagram to the right shows the drying points, screen sizes and sort-to sizes that are your final products along the way. You will want to turn each 15 lb bucket of comp into the following bags of stars:

-3/16" a mixture of various sized micro stars for use in gerbs and small shells. These may also be rolled up later instead of starting from seeds again.

+3/16" to -1/4" these are fall-through from the first 1/4" screening and make good stars for small insert shells and matrix comets.

+1/4" to -9/32" these are your bread and butter cores for color changing stars. You will want a lot of these.

+3/8" to -13/32" these are good for smaller peony shells, pistil stars for double petal shells or cores for larger stars.

+1/2" to 9/16" these are used for mid sized ring pattern or peony shells.