"How critical is it to keep my powder measure’s reservoir full?"
By Dee Hester

Frankly, it depends on your personal quality standards and the intended use to which you’ll put your handcrafted ammo. It also depends on the kind of powder you’re using.

If you’re cranking out 500 rounds for a weekend of pistol plinking, 1/100th-of-a-grain accuracy is hardly necessary, even if you could achieve it. However, if you’re handcrafting 60 cartridges for an early-morning bout of long-distance rifling, you’ll be interested in keeping each step in the reloading process as accurate and consistent as possible. A predictable throw from your powder measure should be at the top of that list!

Without attempting to address each shooting application, let me share some of my experience with different powder types and how they flow through a powder measure. Our objective is, no matter your application, to achieve consistent output from the powder measure.

Almost all powders break down into five basic forms: extruded tubular kernels, cut round flakes, cut sheet flakes, round ball and flattened ball.¹ The density and shape of a powder effects how it will pack and flow from your powder measure’s reservoir to its delivery point.

For example, cut round flakes (they look like tiny, flat circles) such as Hercules Bullseye, Red Dot or Blue Dot powders, tend to pack loosely within the reservoir and in the finished cartridge or shell. To ensure a consistent charge in the ammo, a consistent "pack" in the reservoir and measure are required. Therefore, the weight of the column of powder in the measure’s reservoir should also be kept consistent. Hence, many reloading guides recommend refilling your powder measure’s reservoir when the powder column reaches the half-way point.

I agree with this recommendation, especially for extruded kernel, cut round and cut sheet flake powders. My experience with these powder types has been that my measured throw can and does vary as much as 3/10ths of a grain from a full reservoir to a near-empty reservoir. How critical is this variation? Again, it depends on the intended application of the ammo and the firearm in which it will be used. It also depends on how close you are to the ballistic limits for your cartridge type and load. Do not push the limits of the reloading tables. Use your head and stay safe!

In the case of ball powder, be it round ball (e.g., Hodgdon’s H380 or H870) or my favorite, flattened ball (e.g., W-W 231 or W-W 760), I find little or no difference in the measured throw from a full reservoir to a near-empty reservoir. Ball powders tend to pack the same from the weight of a full column down to a very short column of powder.

As you can see, depending on your powder type, there is some latitude as to how frequently one really needs to replenish the powder reservoir.

20 Tips for Powder Measure Accuracy
By Lee Love

The following information is based on my personal experience and the experiences of other shooters who reload their own ammunition. However, due to the vast number of powders available on the market, as well as the various powder measures and reloading presses, you may find that some of these tips don't agree with your personal experience. Also, some tips are specific to Dillon Precision reloading presses because this is where most of my personal experience has been. However, most of the basic principles can be applied to any powder measure. With that said, here are the tips.

Tip 1:
Make absolutely certain that your reloading press is mounted solidly to a sturdy table. If the press is wiggling around, it will not yield consistent results no matter how diligent you are with the other Tips. Anchor the table to the wall, preferably with lag screws directly into the wall studs. If possible, also anchor the front table legs to the floor. If the table wiggles, so will your press! When I mounted my XL-650 press, I ran lag screws into the wall studs and set expansion anchors into the concrete garage floor.

But I still wasn’t happy with the front two mounting bolts being supported by just the thin lip of the counter top. It still felt a little “mushy” when seating primers. So, instead of using the fender washers supplied with the press, I got a 24" long piece of 1" wide x 1/8" thick iron strap from a hardware store and drilled holes through it for the two front bolts. I put a slight bow in the strap, like a wagon spring, and placed it under the table edge with the bow down (like a smile when viewed from the side). The bow helps to spread the force outward toward the ends of the strap. You only need about 1/2" of bow. With the strap in place, the force is spread across that entire 24" wide section of table. I can actually feel difference, especially when seating primers.

Recently a customer suggested adding more bolts to my Dillon Strong Mount. The base normally has four bolts … one at each corner. So I added one additional bolt on each side, half way between the original bolts. If I hadn’t already added the iron strap under the lip of the bench, it might have made a perceptible difference. Regardless, I feel it was well worth the small amount of effort.

Tip 2:
Make certain that your press is set up correctly. In particular, make absolutely certain that powder die is set up correctly. If the powder bar does not travel fully to its limit in both directions, powder drops will be erratic. Refer to your operating manual for a detailed description and procedure for setting up the powder die and powder measure.

Tip 3:
After adding powder to a completely empty powder hopper, throw at least 10-15 “dummy” charges before you start weighing any. Cycling the press multiple times will allow the powder to settle uniformly in the hopper.

Tip 4:
Replenish the hopper before it drops below half full. If you have a Low Powder Sensor, don't just wait for the sensor to alarm. If the alarm does go off, add powder, then throw at least 5 dummy charges before weighing a charge to confirm that you are still throwing the charge weight you want. If you don't get the charge weight you expect, throw and weigh more charges until they have returned to a consistent weight. As mentioned in Tip #3, it may take quite a few cycles of the press before the powder “settles in” when filling a near empty hopper.

Depending on your powder measure, powder baffles may be available that will make a marked improvement in the powder charge repeatability and make the powder measure less sensitive to the powder level in the hopper.
Powder baffles are available for RCBS, Redding, MEC and Dillon powder measures. Some of them are available directly from the powder measure manufactures (e.g. RCBS and Redding). Others are available as aftermarket accessories (e.g. for Dillon and MEC). If you don’t have one, or if your powder measure came with one and it has been lost, definitely get one. It is probably the least expensive and most valuable upgrade you can do to your reloading press!

If you have a Dillon Low Powder Sensor installed, you can shorten the rod to make it alarm at the half full level … or any level you want (See UniqueTek Tips File #4, “Adjustable Low Powder Sensor”).

Tip 5:
Don't tap on the side of the powder hopper to level the powder. This is not needed and may cause the powder to settle differently than it does during normal cycling. If you do happen to bump against the hopper, weigh a few charges to confirm you are still throwing a consistent charge weight.

Tip 6:
Cycle the powder measure or press using consistent force. Changing the force can result in slightly more or less powder in the charge. A heavy-handed operator that slams the lever hard against the stops can cause the powder to settle a bit more, resulting in a slightly heavier charge weight compared to a operator with a lighter hand. A heavy-handed operator can also cause powder to bounce out of an already filled case (when the shellplate indexes on a progressive reloading press) when making loads at near full case capacity. Lubricating all brass (even when using carbide dies and loading straight-walled pistol cases) will make the press operate more smoothly, and can help with powder drop weight consistency.

Tip 7:
After making any adjustment of the powder bar, throw at least 3 dummy charges before weighting any. Obviously, the powder already in the powder bar is disturbed by the adjustment and will not be representative of the new setting. But the powder immediately above the powder bar can also be disturbed, especially if the adjustment is a large change, and will require several cycles of the powder measure to settle in to the new powder bar setting.

It is actually recommended to make powder measure adjustments with the press operating handle in the down position. With the handle down, the powder bar is empty and your adjustment is less likely to disturb the powder in the powder hopper. This is especially true when adjusting from a large charge to a small charge. If done with the handle up, the compressed powder will tend to push upward, disturbing the powder above the powder bar.

Either way, you are likely to disturb the powder any time you are rattling around with a wrench on the powder bar adjustment bolt and will need to throw at least 3 dummy charges before weighing any.

Tip 8:
Weight at least 3 charges to ensure you are throwing a consistent charge weight. With most powders, the charge weight should not differ by more than 0.1 to 0.2 grains across the three measurements. Any time I get a spread of 0.2 grains or more, I weigh more charges until I get a consistent reading. Certain powders (e.g. long grain extruded and stick powders) may not meter as uniformly due to their grain size. Experience and weighing a lot of charges will tell you just how repeatable charge weights can get with each powder you use.
Tip 9:
To keep powder from clinging to the inside of the powder hopper (some powders have a greater tendency to cling than others), empty and remove the powder hopper, wash it, then dip it in a soapy water solution (Liquid Joy seems to work the best) and let dry completely before re-assembly. The soap film will remove static cling and allow the powder to settle more evenly. You will need to repeat this treatment occasionally.

I’ve also heard that wrapping an anti-static drier sheet (e.g. ClingFree®) around the outside of the hopper helps, but I have not tried this myself. I have also not tried using anti-static laundry spray (e.g. STATIC GUARD®) but, if it works, would be a lot less unsightly than a drier sheet.

Grounding your powder measure will give static charge a clear pathway to ground. Just because the press is metal, still doesn’t guarantee an effective ground; as the press itself is not likely to be grounded. But grounding the powder measure is easy and inexpensive. Here is a list of parts you will need.

1 - #6 Ring Lug (This will go under one of the screws that attach the powder hopper to the powder measure.)
1 - #10 Ring Lug (This will go under one of the screws that clamp the powder Measure onto the powder die.)
1 - Banana Plug (This will insert into the ground hole of any handy electrical outlet.)
6’ – 20 gauge stranded copper wire. (This will connect the parts and provide a pathway to ground.)

Cut a 5.5" length of wire and strip the insulation from both ends. Insert one end into the #6 Ring Lug and crimp in place. Strip one end of the remaining wire and insert it, and the loose end of the 5.5" wire, into the #10 Ring Lug and crimp into place. Attach each of the ring lugs to the powder measure; the #6 Ring Lug under one of the screws attaching the powder hopper tube to the powder measure, and the #10 Ring Lug under one of the screws clamping the powder measure to the powder die. Use the screws on the side opposite the bellcrank, so the ground wire can’t get snagged. Next, route the remaining wire to an electrical outlet making certain that it doesn’t interfere with anything and allowing enough slack that it isn’t pulled tight. Cut the wire and strip the end. Insert the end into the Banana Jack and crimp in place. Now just plug the Banana Jack into the ground plug in the electrical outlet.

Tip 10:
Older model Dillon Powder Measures used springs (Powder Bar Spring, Part No. 14036) to return the powder bar. The powder measure on my XL 650 was delivered with only one spring and I was unhappy with the sluggish and jerky return to battery. If you have an older model powder measure that uses springs, always use two Powder Bar Springs for smoother operation and a more positive return.

The new style Dillon Auto Powder Measure has eliminated the need for return springs. Some users have found this to be “clunky” in operation and have modified their powder measure to use return springs.

Tip 11:
The Bowed Washer (Part No. 14041) on the Dillon Auto Powder Measure should be oriented on the Bellcrank Bolt (Part No. 13904) so that the high center of the washer is against the Bellcrank Bushing (Part No. 13848) and the low outer diameter of the washer is against the Bellcrank. Occasionally, the Auto Powder Measure is shipped with the Bowed Washer installed upside down. Correct orientation of the Bowed Washer will provide greater range of tension adjustment of the Bellcrank, which is critical to smooth movement of the Powder Bar.
The Dillon press instruction manuals say to “snug” the bellcrank screw. I find that the powder measure operates more smoothly with the bellcrank bolt adjusted just shy of being “snug”. I like to see just a little bit of bow remaining in the bowed washer rather than it being completely flattened. But leaving the bellcrank bolt too loose can cause in the powder bar to not reach its full travel, resulting irregular powder drop weights.

The Bellcrank Bolt threads into a Nylock Nut (Part No. 16340) in the current version of the powder measure. This is superior to the Kep Nut used in earlier powder measures, as it doesn’t loosen up easily. If you experience a problem with the Kep Nut loosening up during press operation, replace it with a Nylock Nut.

**Tip 12:**

Use the correct sized powder bar for the charge weight you are loading.

- **Extra Small** – Use for dropping less than 3 grains of powder. Generally used only for .25 ACP, .32 ACP and .32 S&W.
- **Small** – Use for dropping 3 to 10 grains of powder.
- **Large** – Use for dropping 10 to 45 or 50 grains of powder.
- **Magnum** – Use for dropping more than approximately 45-50 grains of powder.
  
  Throws up to: Approximately 72 grains of extruded powder
  Approximately 82 grains of ball/spherical powder.
- **Belted Magnum Powder System** – Use only for those really big powder drops!

It is never a good idea to use a powder bar at its extreme maximum or minimum powder drop limits. If you are using the Small powder bar at near its maximum charge limit, you will likely obtain better accuracy if you install the Large powder bar. Similarly, if you are using the Magnum powder bar and near its minimum charge weight, you should switch to the Large powder bar. As always, the proof is in charge weight consistency. If you are working near one of these limits, try both powder bars and see which one yields the most repeatable powder charge weights.

There can be quite a large overlap in powder drop weight ranges between powder bars. The overlap between the Small and Large powder bars covers a range from approximately 6 to 15 grains (depending on the powder). So, you are likely to run into many instances where the powder drop weight you want, can be achieved by either powder bar. So which one do you use? Again, test both powder bars and use the one that gives the best powder weight consistency.

**Tip 13:**

The powder bar adjusting bolt is steel and the powder bar insert is a soft metal casting (probably a zinc/aluminum/magnesium/copper alloy). The fit between the threads can be loose even in a new powder bar, plus the threads in the powder bar insert can wear with repeated use. A loose fit between the insert and adjusting bolt yields inconsistent powder weights and difficulty in making small powder weight adjustments. I have often heard handloaders say they always back off the adjustment bolt and approach the final adjustment from one direction. This may help for the initial adjustment but a loose fit between the bolt and insert will rattle loose during further press cycling resulting in powder weight changes.

You can cure a loose fitting adjustment bolt in one of two ways;

1) Add a spring to maintain tension between the adjustment bolt and powder bar insert. Any good hardware store should have a selection of springs. Choose a compression spring that has thin wire and just barely fits over the threads of the adjuster bolt without binding. I used a SERVALITE® #S-147 spring I found at an Ace Hardware. Install the spring so that the adjustment bolt passes through the spring and then threads into the powder bar insert (you will need to cut the spring to the proper length). Once installed, the spring applies pressure against the powder bar insert, removing any play or backlash in the threads.
2) Install a Micrometer Powder Bar Kit™. This kit has a 1/4"-28 threaded bushing that engages the powder bar insert. The bushing is held in place with Loctite®, eliminating any play due to worn threads in the powder bar insert. The micrometer also has 40 threads per inch instead of 28 so will give you a finer adjustment capability. The Micrometer Powder Bar Kit™ is available at http://www.uniquetek.com

**Tip 14:**
Clean the powder funnel regularly. Powder residue can build up on the inside diameter of the powder funnel of the Dillon Auto Powder Measure. This buildup can lead to powder sticking and, with certain powders, aggravate powder bridging. Remove the powder funnel and clean it periodically. I make it a point to inspect it every time I change toolheads and after about every 500 rounds. You will quickly learn just how often you need to clean it with each powder you use.

**Tip 15:**
Powder Funnel Bridging. Long grained stick powders can “bridge” inside the powder funnel of the Dillon Auto Powder Measure, especially with small caliber cartridges, resulting in grossly undercharged and/or grossly overcharged cartridges. You can reduce the bridging by reaming out the inside diameter of the powder funnel with a taper reamer (usually a 1/8" x 5/8" reamer) and then polish the metal. Do not over ream the powder funnel. You must stop before you ream off the shoulder that the case mouth meets. You may want to take your powder funnel to a machine shop and have them perform the reaming and polishing.

Here is what Dillon Precision has to say about using Hodgdon VARGET™.

“A couple of things to do to get Varget to meter better. Polish the upper part of the interior of the powder funnel, where the powder flows through it. Next, it should take at least one full second to move the powder bar through its' travel stroke. You want the powder to fall through the funnel, not be pushed through. Be sure to start with the hopper at least 2/3 full, throw 10-15 charges to settle the powder under the baffle before you start weighing powder charges. Doing this, your charges should be within ±.2-.3 grain.”

**Tip 16:**
Polish the interior of the powder measure body. This is easy to do yourself and the instructions and photos have been posted on several Internet forums by Tom Freeman. The polished surface helps powder flow more easily into the powder bar and can enhance the powder charge weight consistency of all powders, not just extruded powders like VARGET™.

**Tip 17:**
Increase the powder level over the powder bar. This places more pressure on the powder in the powder bar and can improve powder drop weight consistency, especially with “difficult” powders. This is easy to do on powder measures with a baffle that can be adjusted up or down in the powder hopper tube (e.g. Redding, RCBS). But to do this on the Dillon powder measure requires some minor surgery. First you must cut out the original plastic powder baffle that is molded into the Dillon powder hopper tube. Then install a UniqueTek Precision Powder Baffle™. Position the UniqueTek baffle higher in the hopper tube than where the original plastic baffle was located. Move it up in about 1/2" increments and test the powder drop consistency at each location until you find the optimum height. Don’t position the baffle any higher than is necessary as the higher you place the baffle, the less powder capacity the hopper will have. Powder must be added before the powder level drops below the baffle in order to maintain the constant pressure over the powder bar. To gain the maximum benefit, you should also take the time to polish the powder measure body as described in Tip #16.

If you don’t already have a UniqueTek Precision Powder Baffle™, you can go one step further by getting the UniqueTek 2X Powder Hopper Tube™. The advantages are;
1. You don’t need to do any surgery on the Dillon powder hopper.
2. It is easier to position the baffle.
3. You will still have plenty of powder capacity with the baffle positioned higher in the tube.

A Precision Powder Baffle™ is included with the 2X Powder Hopper Tube™, so you won’t need to buy one separately. Plus, the tube material will not stain from contact with most powders.*

* Hodgdon TITEGROUP™ will stain the 2X Powder Hopper Tube™ after extended contact time. It is recommended to drain this powder between reloading sessions.

Tip 18:
When loading new brass pistol cases, they can stick when disengaging from the case neck expanding die (the powder funnel on Dillon presses). On progressive presses, the lurch when the case pops free from the die can upset powder drop consistency and even result in powder being splashed out of the case mouth. If you inspect the case neck expander (or powder funnel), you will see brass residue smeared on the metal. Periodically cleaning off the brass residue will restore smooth operation. Dillon recommends cleaning off the brass residue using a Scotch-Brite™ pad (or similar product). Don’t use anything so abrasive that it may scratch the metal surface. After cleaning the expander, try applying some case lube directly to the expander. I recommend a wax type case lube (e.g. Imperial Sizing Die Wax or Hornady One Shot™) for this application. Applying the lube will make the neck expanding operation smoother and may reduce the frequency of cleaning needed.

Tip 19:
There are three plastic parts on the Dillon Auto Powder Measure that should be inspected regularly and replaced if worn or cracked. They are the Bellcrank Cube (Part No. 13871), Collar Sleeve (Part No. 13845), and Plastic Plug (Part No. 13921). A customer had two seemingly identical powder measures, but one just didn’t give powder weights as consistent as the other. After replacing these three parts, it dropped powder weights equivalent to the other powder measure.

The Bellcrank Cube is the most critical of the three parts. If it is cracked or the center hole is worn, it should be replaced. I consider this part a “consumable” and keep several replacements on hand.

The Collar Sleeve is also prone to wear or cracking. Inspect it periodically and simply replace it if there is any visible sign of wear. A worn or cracked Collar Sleeve will allow the powder measure to flop around, resulting in poor powder drop weight consistency.

The Plastic Plug doesn’t look very important, but does play a critical role. It must hold the Powder Bar Spacer securely in place. If the spacer shifts, it can create a ledge on which powder grains can hang up. If the tip is bent or partially broken off, or does not snap securely into position, replace it. When installing the plug, ensure that it is fully engaged into the powder bar spacer and fully seated into the hole on top of the powder measure body.

While you are inspecting these parts, take a few extra minutes to clean and lubricate the powder measure. Lubricate the bell crank pivot points (Roller #13793, Collar Roller Bushing #14808 and Bellcrank Bushing #13848) with wheel bearing grease. Also apply grease to the guides on the Body Collar (#13940) and Powder Measure body (#22273) to prevent wear where the casting surfaces meet. Use only a sparing amount of grease as any excess will just collect dirt faster.

Tip 20:
A customer gave me this tip on how to solidly anchor the Powder Bar Spacer. Rather than just replacing the Plastic Plug as described in Tip #19, tap the hole in the Powder Bar Spacer using an 8-32 thread tap, then use an 8-32x3/8" screw instead of the Plastic Plug. This holds the Powder Bar Spacer solidly in place, eliminating all motion. Make sure the tip of the screw does not protrude below the bottom of the Powder Bar Spacer as this will scratch the top of the powder bar and cause binding.
A Final Word

Above all else, the key to powder measure accuracy is consistent technique. How you operate the powder measure or reloading press doesn't matter nearly as much as it does that you do it the same way each and every time.

References:


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