Bottles are one of the most common packaging forms for over-the-counter solid oral dosage medications and nutritional supplements. Tablets, capsules, and softgels are all commonly sold as bottled products, and pharmaceutical manufacturers ship bulk bottles to pharmacies for dispensing prescription medications. Typically, bottled solid oral dosage forms are sold with a known product count inside them—a hundred-count bottle should contain exactly one hundred tablets or capsules. To ensure bottle-filling accuracy, pharmaceutical packagers generally use either slat fillers or electronic counters. Each technology has advantages and disadvantages depending on the application, so before specifying a new bottle filling line, it's important to consider which option will best fit your production needs.

A slat filler uses plastic bars, called slats, to count tablets or capsules into the bottle. The slats have cavities designed specifically for the shape of the product, and proper operation depends on each cavity containing exactly one tablet or capsule with no empty or double-filled cavities. Because they use product-specific parts, slat fillers can run at very fast operating speeds, commonly filling 100-count bottles at 300 bottles per minute. This makes slat fillers ideal for packaging lines dedicated to bottling one or two high-volume products. However, since the cavities are sized specifically for each product, the slats are change parts, so if you package fifty products in your facility, you probably need fifty sets of slats. If you have small runs and hundreds of products, the cost of the change parts can often exceed the cost of the slat filler itself.

The most common alternative to a slat filler is an electronic counter. Electronic counters are a newer technology than slat fillers but are very well-established in the pharmaceutical industry. The counters typically use a vibrating tray or bowl to arrange the tablets or capsules into a single-file line along one or more channels that lead to the empty bottles. An electronic sensor (usually infrared) near the end of each channel detects the tablets or capsules as they pass, and when the bottle's fill count has been reached, a gating system directs the product flow to a new bottle.

The biggest advantage of electronic counters is that they use very few change parts—typically just a funnel that varies depending on the size of the bottle opening—so counters excel in low- or medium-throughput applications with frequent product changeovers. In such applications, an electronic counter will probably cost less than a slat filler because you won't need to purchase and manage an inventory of slats.

However, arranging the products in a single-file line with spaces in between so the sensor can differentiate one product from the next takes time, and electronic counters operate more slowly than slat fillers. A typical single-head electronic counter can fill 50 to 60 100-count bottles per minute. Higher fill rates require a counter with more counting heads that can fill multiple bottles simultaneously. Most counter manufacturers offer dual- and quad-head units that fill 100 to 200 bottles per minute, but this adds to the machine's cost and footprint. For high-throughput applications, an electronic counter will cost more than a slat filler with the same fill rate. Also, electronic counters can have problems when used with dusty products such as uncoated tablets because the dust can blind the sensors, which is not a problem with slat fillers.

Another difference between slat fillers and electronic counters is how they verify the correct bottle count. Slat fillers rely on the proper design of the slat to accurately fill the bottle. A slat filler can't detect an empty cavity or a defect such as a broken tablet, which will cause a discount. For critical applications, manufacturers often must install a secondary inspection system with an infrared sensor or camera on the slat filler to catch empty cavities or defects.

Electronic counters already use sensors to look at each product, and some sophisticated counters can measure how long the product blocks the sensor (usually called dark time) to determine whether the product was intact or broken. This works for some product geometries but not for others, however, so electronic counters still generally require a secondary camera inspection system for critical applications.

The best filler type for your packaging operation typically comes down to the number of products you're bottling and the size of your product runs. Slat fillers generally work better for high-throughput packaging lines dedicated to just one or two products, while electronic counters are likely a better solution for facilities that package many different products in short runs.

Wesley Mancoff is the president at Thomas Packaging (847 392 1652, www.thomaspackaging.com). He has 25 years of experience as a pharmaceutical industry supplier of solid oral dosage production and packaging equipment including different types of bottle-filling lines. He can be reached at wmancoff@thomaspackaging.com.