

## KEEPING AN EYE ON TABLET COUNTERS



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From discs, wheels, slats, and channels to electrostatic field sensing and camera-based inspection, tablet counters count and inspect tablets in a variety of ways. In this article, vendors discuss mechanical counting and some methods that incorporate optics for counting and inspection.

Some of the earliest tablet counters, such as slat fillers, used a purely mechanical method of counting products. Still popular today, slat counters use slats—each containing a number of product-sized cavities—that move along a track and pass under a tablet hopper that feeds a tablet into each cavity. The slat then carries the tablets to a discharge, and they drop into a bottle. Slat counters run at high speeds with precision. “Slat fillers are incredibly accurate when the slats are designed for that particular tablet,”

said Mike Tousey, technical services director and owner of Techceuticals, Bluffton, SC. “On the other hand, if you had 30 different products, you’d probably need 30 different sets of slats. You can imagine the cost if you had many different products and a set of slats for each one.”

#### Infrared sensors

In lieu of mechanical counting, companies can use sensors and add camera-based inspection to their tablet counters. In fact, electronic counters rely solely on sensor-based counting. Infrared sensors consist of two parts: an emitter, which generates an infrared beam, and a receiver. “Any object passing through the beam can be detected,” said Johan Jung, West Coast area manager of Key International, Englishtown, NJ. To some degree, the sensors can also inspect for defects, according to Stephen Bozer, area manager of Key International. “It’s called light-and-dark shadowing. Infrared



Courtesy of Optal Vision, Orléans, QC, Canada

helps detect tablet fractions as well as double counts, where there are two tablets simultaneously breaking the beam and ultimately causing miscounts,” Bozer said.

There are many advantages to infrared sensors: They’re easy to set up, inexpensive, and robust. On the other hand, dust can build up on the sensor windows and hamper inspection, Bozer said. “Dusty products have a tendency to coat and confuse infrared sensors. That’s why dedusting tablets immediately following compression is very important—it mitigates dust on the counter’s sensors.”

Today’s counters also have their own methods to reduce dust buildup. “Our machine monitors itself for dust

and alerts the customer once the dust becomes a problem," said Mark LaRoche, vice president of sales at NJM/CLI, Lebanon, NH. Other counters use air nozzles that blow dust out of the way of the sensors or cameras.

Integrating a checkweigher with a counter is another way to achieve counting accuracy. "Most pharmaceutical companies use an independent checkweigher to verify small variations in tablet count," Jung said. "But most have never been 100 percent accurate because the empty container weight varies far more than the tablet weight." Key's counter-checkweigher [1] accounts for each bottle's tare and gross weights before and after filling. "It's especially suited for customers who have a very valuable product," Jung said.

#### Camera-based inspection

The most recent development in tablet counting relies on cameras to verify tablet count as well as to detect tablet color, shape, and size and to detect broken, chipped, and incorrect products. In one such slat counter, a camera captures an image of the tablet in the slat. (Both the slat filler [2] and camera [3] are shown on page 16.) "It compares that image to a reference image, and if it doesn't match the reference image, then the system tracks the error and rejects the individual bottle off the line," said Andrew Smith, sales engineer at Modular Packaging Systems, Fairfield, NJ. "Our system is able to tell users, 'Yes, there is something there and it is exactly what you want it to be.'" Camera-based systems can replace operators and eliminate human error. "The camera doesn't get tired, look away, or have those types of hiccups that an operator might have. It's 100 percent validatable, and we've had a lot of interest from the QA standpoint," Smith said.

But two potential drawbacks of the camera-based technology are expense and extensive setup. Furthermore, it may have difficulties distinguishing the correct product from a similar-looking rogue product, said Tousey, whose company does not offer slat fillers with camera inspection. "As long as the two products aren't the exact same size and color, it could dif-



An electronic counter that uses infrared sensors [4]

ferentiate," Tousey said. "But if the products were a coated aspirin and an uncoated aspirin and they were the same size, the camera couldn't tell the difference." LaRoche, whose company also does not offer such equipment, highlighted some concerns about camera-based inspection that he's heard from customers. "These are still in the industry-acceptance phase," he said. "Ideally, what customers would like to see is a sensor or camera on a counting machine that can pick up any kind of defect in the tablet. But when you use a sensor that's able to detect a half a tablet or a broken tablet, then you have to start to define what is acceptable. If 10 percent of the tablet is missing, is it OK? Or 20 percent? Or 30 percent?" LaRoche asked. Smith acknowledged that there are limitations for inspection, but "broken tablets are determined with very high accuracy because they appear different from the reference in brightness and shape."

The inspection system Modular Packaging uses was adapted from a blister inspection system, Smith said, and blisters have been inspected in this manner for more than a decade. But according to LaRoche, applying it to tablet counters complicates the issue. "In a blister format, inspection is very easy because the tablets are laid out nice and flat in their own individual pockets, separated for you. When you present them to a camera, it's very simple," he said. "But in a bottling operation, you're packaging a much larger volume of product, and the tablets are always in motion, never

stopping, so it's very difficult to pick up defects."

#### Counting on the future

Which counting method is best depends on your application, but the vendors agreed that inspection is important for tablet counters, especially when it comes to consumer safety. "A rogue tablet is a major catastrophe and could cause a recall," LaRoche said. "You can imagine if they're running a 10-milligram and a 100-milligram gets thrown in there, somebody could die." Quality is also a priority. "Customers, especially those who have stringent quality standards in pharmaceutical production, are interested in finding high-end counting systems," Jung said. LaRoche agreed. "All manufacturers are pushing toward 100 percent inspection," he said. "When the technology's available, everybody's going to jump on the bandwagon. But because there are so many different variations and products out there, we need to make sure that the technology is bulletproof."

T&C

#### References

1. Countec counter-checkweighing system, Key International, Englishtown, NJ.
2. Optel Vision slat filler inspection system, Modular Packaging Systems, Fairfield, NJ.
3. Camera, Optel Vision, Quebec City, QC, Canada.
4. Cremer double tablet counter, NJM/CLI, Lebanon, NH.