Optical Scanning Technology and the Possibility of Packaged Perfection

Manufacturers want to know that their customers will receive exactly what they paid for: a defect-free, accurately dosed product, whether it was batched by weight, volume, piece count or, as in newer technology, a combination of all three. Manufacturers that consistently deliver products that meet customer expectations can expect additional orders and a healthy bottom line. This is especially true when you consider all of the regulations associated with the pharmaceutical and medical industries. Manufacturers that fall short are often left wondering what happened to their business.

The Business of Package Filling

Traditional filling by weight, volume, or pocketed slats does not always deliver the best-manufactured product. Traditional electronic counting machines are susceptible to interpreting scraps and findings as good product, which are then delivered to the final package. The customer expects the product to be accurately dosed and free of scrap and cross-pollination. Broken tablets, findings and smashed capsules are far from the expected quality required for pharmaceutical and medical products. Although the filled package may be the proper weight or the correct volume, the customer or regulator will not be pleased with the finished product – and the customer will likely make their next purchase decision based on such a poor experience.

Manufacturers also want to ensure a high level in accuracy and confidence in a defect-free finished package. In most cases, manufacturers take numerous procedural steps throughout the entire manufacturing process to ensure that the product is free of breakage, damage and cross-pollination well before the final filling process. But the fact remains that the product needs to be checked even as it is delivered to the package.

The cost savings of delivering accurate and defect-free products can be measured in increased sales, less product giveaway, more accurate inventory control, less rework and verifiable process quality control. The more accurate the dosing, the better all these factors fit within predictable guidelines of the entire manufacturing process. Newer scanned product filling technology provides the ability to fill the package by count using a combination of volumetric readings resulting in a gross inspection never before available to manufacturers. Single and multi-channel scanned product filling technology now rivals and even exceeds the older technology of multi-channel fillers.

Single and multi-channel scanned product filling technology now rivals and even exceeds the older technology of multi-channel slat fillers and electronic counters. These slat counters typically fill the pocket with a tablet and index a number of pockets for the correct count. They are easily tricked by broken tablets or tablets stuck in the pockets. Multi-channel electronic counters

typically do not take into account broken tablets or "snowball" tablets stuck together as two or more.

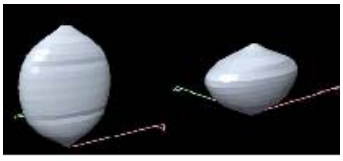
How Optical Scanning Technology Works

How does this technology work? Imagine viewing a tumbling piece of product from two or more directions *thousands of times per second* while only looking at a thin slice at a time. As the product freefalls, its volume is computed in real time and compared to predetermined acceptable minimum and maximum volume values that are stored in an industrial computer. Because the product is calculated by volume as it passes in mid-air, this opens a range of possibilities beyond counting only whole products to any of the following:

- Ignoring findings and small pieces of product;
- Rejecting batches of products with small pieces and findings;
- Rejecting products larger than one piece of product;
- Counting the larger piece of product as two pieces; or
- Adding up all the small pieces until they equal the volume of a single piece.

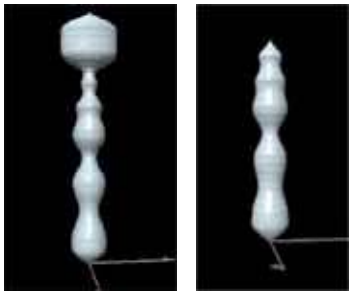
BSI has long excelled in optical part counting thanks to patented dual-view optical technology. Instead of breaking a beam or reflecting a beam, BSI counters look at every part in-flight, scanning each piece at 2,000 times a second, virtually creating a 3-D image of every part that is surprisingly representative of the product being counted.

The images below are of an aspirin tablet, whole and broken in half:



ACCEPT REJECT

The following images are actual images of a whole diabetic lancet with and without the protective cap over the needle:



Accept Reject

These images may be stored as documentation and/or tagged to each filled bottle/box/package for an accurate fill record. The result is that only product within the assigned volume ranges are counted, while out-of-tolerance parts are accounted for.

BSI counters provide technology customers can count on. They have proven a "huge" labor savings for medical device provider Owen Mumford, according to operations and production manager Keith Bryant.

At United Kingdom-based Owen Mumford's operations in Marietta, GA, the company receives lancets in bulk from its parent company and counts those into folding cartons using the BSI systems. The lancets (see image above) are used to draw blood. The counting was done manually until 2002 when four BSI Model Batchmaster II® optical counting systems were installed that replaced about 10 workers, Those pneumatic counters were upgraded last year with faster, quieter, servo-driven Batchmaster III® systems. The lancets are supplied by BSI vibratory bowl feeders.

One particular lancet style is especially challenging to count, according to Bryant. The lancet is one inch long and much thinner than a pencil width in diameter. These lancets are also counted by the BSI system with remarkable accuracy at a rate to 250/minute into the 25-count cartons, Bryant says. Other BSI systems at Owen Munford for less challenging lancets count even faster, up to 375 lancets/minute per Batchmaster III counter, Bryant points out.

"That BSI counter delivers 25 lancets into the carton every time, though we can select a count anywhere from one to 10,000 lancets," says Bryant.

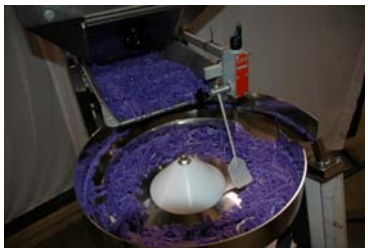
As the BSI unit counts, it also checks for the presence of a small cap that covers the lancet's needle tip to maintain sterility. Molded of clear plastic, the thin cap is about the size of a fingernail. The BSI system sees when a lancet is uncapped and sends it into a reject bin.

The counters are reliable workhorses, concludes Bryant: "Once the BSI systems start, they don't stop counting."

Two Questions to Consider

Two questions remain: Do I need this technology, and for what products can it be used?

Virtually anything that needs to be counted, batched, or weighed prior to packaging will work with optical scanning technology. Some examples include hardware, toys, jewelry, pills and tablets, twist-wrap candy, pipe and brass fittings, sporting goods, catheters and food products of all shapes and sizes.



Manufacturers that work with high-value foods such as chicken nuggets, fish sticks, buffalo wings, shrimp, bagels, meatballs and even frozen whole foods are prime candidates for this technology. That's because scanned portion filling can analyze shape, content, and size of each piece prior to packaging. For the fish stick example, scanned portion filling determines that each stick is whole and that the package contains a minimum set quantity of whole pieces, with ice chips and crumbs ignored. Broken pieces may even be totaled up by volume to equal a whole stick, thus helping to ensure satisfied customers.

Frozen meats are another prime candidate for this technology since the portions of all ingredients can be reliably delivered to the package. For example, if three meatballs are required and presented on the package picture, it can now be assured that three whole meatballs *will* be in the container. The same goes for baby carrots, potatoes and other ingredients.

Normally, scanned products are rejected before ever getting into the package, though some industries require that erroneous products not be recycled. In this case, the bottle or package may be flagged and sent to an inspection station downstream for further analysis. In the

pharmaceutical industry in particular, tablet counting and dosing accuracy is of paramount importance. Validation is the ultimate goal so that when 100 tablets are needed in a bottle, that quantity can be guaranteed in every single bottle, every time.

Three-dimensional scanning allows for scanning and analysis of half and quarter tablets as well, adding to the manufacturer's ability to maintain strict quality control standards. As in the 3-D images and examples shown above, the technology is here and serving pharmaceutical and medical product manufacturers now.

For more information, contact:

Batching Systems, Inc.
50 Jibsail Drive
Prince Frederick, MD 20678
Phone: 410.414.8111
E-mail: info@batchingsystems.com or
sales@batchingsystems.com

Or visit online at www.batchingsystems.com

For your pharmaceutical/nutraceutical automation or tablet counting project, call Diamond Machine Werks at 847.437.0665, e-mail sales@dmwautomation.com or visit online at www.dmwautomation.com.