

What really counts is separation

THE WAY THAT PRODUCTS ARE SEPARATED, GIVING A GAP FOR AN ACCURATE COUNT, IS WHAT REALLY DETERMINES THE DESIGN OF A **COUNTING MACHINE**. BY ANDREW SMITH.

The unusual aspect of product counting is that the counting itself is not a principal problem or has the most impact on design. By and large, mechanical or electronic counters involve relatively simple technologies, but will only provide accurate counts if the product is delivered to the counting device correctly – that is, in single units to avoid miscounting of groups as one count.

This general tenet applies across many product sectors, but is exemplified in the pharmaceutical sector where the tablets and capsules being counted are invariably small and mobile and often fragile. In some instances there may also be a tendency for the products to adhere to each other, a common problem with soft gel capsules.

A further complication is that in this industry miscounts are not just undesirable, they are unforgivable. Consistent over-counting of high margin proprietary drugs can have a serious effect on the books while under-counting may have adverse consequences for patients, which will tarnish the reputation of the supplier.

Traditionally, the most common methods of counting solid dose drugs has been via mechanical slat counters, where the product is separated by being fed into channels on the slats, or electronic multi-channel vibratory counters which separate the product by vibration and then channel them in single file past an electronic scanner. However, in recent years alternatives have become available.

First to challenge these traditional methods in the UK was Bosspak, a member of the Romaco Group, with the launch of its RTC range. These machines are claimed to be the first to tackle the problem of achieving the required degree of separation between products, by allowing positive control of the product from the hopper through to the bottle.

The operational principle of the machine is based on rotating sorting disks, in which each tablet is positively located.

The disks are set around a central turret, which also rotates and which is mounted within the main hopper. The sorting disks are formatted for specific products and, as they rotate, they collect tablets or capsules in niches around the rim of the disk on the upward stroke.

Products are then held in place until they reach the lowest point of the rotation, where they are released into the counting head on demand. Changeover of format parts is via tool-free, quick-release connections.

Bosspak says positive control is also evident in the container handling technique employed on the machine. Containers are transferred from the infeed conveyor onto a central bottle starwheel set below the rotary counting turret.

Counting while rotating

Each bottle is located beneath a count head, which counts and fills while the bottles and turret are rotating to “maximise speed and stability”. Once the correct count has been reached the filled container is transferred to the outfeed conveyor and an empty container allowed in to take its place.

Another innovation claimed for the machine is in the counting system itself, a so-called “quad count” consisting of an optical matrix which detects tablets or capsules around four sides of the counting head. This is said to increase the count zone by 100 per cent compared with conventional systems – which typically incorporate a dual array of scanners – and improve the capacity to detect broken tablets or capsules.

Bosspak says the method of collecting product from the hopper and feeding it into the container individually also makes the system par-



Baby Bosspak: New RTC single station model

ticularly effective for handling products traditionally regarded as difficult, such as soft gelatin capsules and irregular-shaped tablets. Large products too – up to 22mm diameter – can also be readily handled.

The system is also said to be vibration-free, so that damage to fragile products and the generation of dust are minimised. An integral dust extraction system also contributes to a clean operation and ensures that tablets are dedusted prior to filling.

Control on the machine is via an integrated touch screen panel which allows straightforward programming, storage of set-up parameters and collection of statistics for batch reconciliation. Entering the dimensions of the tablet or capsule into the program automatically optimises all settings for accurate counting.

The original 12 station RTC 200 offers an output up to 200 x 100-count bottles a minute, but for less demanding applications, Bosspak has now introduced two lower throughput models, the RTC 15 and 30, both of which operate on the same principles as the 200.

The RTC 15 single station standalone model, which is available in either semi or fully-automatic execution, gives speeds up to 15 bottles a



Separation by disks: *Bosspak RTC 200 provides speeds up to 200 x 100-count containers a minute*



Rotary feeding: *Aylward counters can be built with up to 30 wheels, each giving 1000 a minute*

minute and additional stations can be added to increase output as required. The company says this model is ideal for small batch production, operator training and benchtop applications, such as in the laboratory.

It can also be employed to complement high throughput in-line counters: for QC purposes it can be used off-line to verify count accuracy and for existing RTC 200 users it can improve productivity by allowing new formats to be optimised off-line.

The dual station RTC 30 has a throughput of 30 x 100-count bottles a minute and recently had its first UK installation, at Regent-GM in London.

According to Bosspak, the RTC range combines speeds previously achieved only by slat counters with the flexibility and control of an electronic system.

Similar claims are made for the next innovator in this field, US-based Aylward Enterprises, for its BF range of tablet counter and bottle fillers which have just been introduced to the UK and Ireland by Ultracpac.

The BF machines also incorporate a rotary feeding motion and are described as GMP designed, multi-wheeled feed units of balcony

construction. Product is fed into a 1-5 cubic foot hopper and then directed to the wheel cavities by low frequency hopper vibration. A rotary brush sweeps excess product back into the hopper to eliminate product build-up in the wheel cavities.

Pneumatically actuated drives index to rotate the feed wheels in a clockwise direction, controlled by the operator via the touch screen control. Product travels on the wheel and is released into a bottle through a counting sensor.

Stepper motor drives

To maintain full control of the feeding operation, each wheel is independently driven via stepper motors and all parameters can be adjusted via the screen. With this continuous communication and single or dual product detection sensors, Aylward says it can guarantee bottle fill rate and a 100 per cent accurate product count. The "safe, on the fly" adjustments are also said to increase productivity by reducing downtime.

The tool-less changeover machines are built in aluminium and stainless steel for ease of cleaning and feature vacuum dust elimination and separate drives, sealed off from risk of contamination by dust.

The BF range is currently available in four variations with the model number indicating the number of feed wheels. There are two large scale models, the BF30 and BF15, the BF5, which is said to be specifically designed for the European market, and the BF1, a single wheel, bench model for laboratory and demonstration purposes.

Depending on the size of the product, the machines can count up to 1000 tablets a minute, per wheel, which would enable the 30 wheel model to count and fill 1.8 million tablets an hour. Performance can be adjusted to demand, however, by selecting the number of wheels required to be operational for each task.

"We are especially excited by the potential of the BF5 which is a direct alternative to traditional electronic counters," says Ultracpac sales manager Paul Cadec. "It has a tiny footprint of just 910mm by 750mm, low power consumption and almost silent operation. Maximum filling performance is up to 80 bottles a minute with 100 tablets. Prices start at around 30 per cent less than electronic counters offering similar performances."

More conventional electronic counters are available from DT King in the form of the upgraded TC8 and TC12 Kingtronic models,

COUNTING

which respectively have 8 and 12 filling lanes and speeds up to 4000 and 6000 tablets a minute. These now incorporate "advanced control features" via a touch panel interface linked to the infra-red counting sensors, plus enhanced GMP capabilities.

The Kingtronic controllers feature pre-set parameters for a range of products as well as the ability to input customer-defined settings. Adjustments between pre-set levels of the vibrator tray can also be made during running to maximise output. GMP is enhanced through tool-less strip down for ease of cleaning and inspection while all contact parts are either stainless steel or approved polymer materials.

Sister company, DT Swiftpack, adds further value to its pharmaceutical counting technology by including an accurate measure of product quality. Infra-red technology is perfectly adequate for checking product shape, but it allows, for example, empty gelatin capsules to escape detection.

Monitoring size and shape

So, for highly accurate assessment, Swiftpack's latest models have the capability to monitor a number of parameters, including size, shape and weight.

The SV2 Intellisense works by producing and measuring an electrostatic field. Product is then measured against this field and any variance results in rejection.

Developments made in the system since its introduction have seen higher GMP specification with improved dust control, and enclosed pipework and cabling. Quick release fasteners also ease cleaning and maintenance – a complete strip down and rebuild of the counthead and chute can be undertaken in less than 10 minutes – while a larger counthead enables more product to be held in the pre-count, so improving productivity.

Following discussions with a customer which could not find a satisfactory solution for its requirement to count and fill tablets into tubes, Italian manufacturer Vasquali, represented in the UK and Ireland by Skerman Promac, has developed a small, high speed, fully-automated counting, filling and lidding line for just such a purpose.

The line consists of a VB series disc tablet counter that mechanically counts the tablets while maintaining them in a flat orientation. A security system checks the pockets of the disc just prior to discharge into the tube and, if any pockets are empty, the stack can be rejected.



More than a counter: SV2 Intellisense from DT Swiftpack can monitor size, shape and weight as well

The option of a twin-head disc doubles output.

Empty tubes are first fed into an indexing starwheel from a large magazine that allows loading direct from the tube manufacturer's delivery trays. Once in place, they are indexed under the filling head and mechanically tilted to the same angle and height as the tablets, before being rotated at high speed to allow a smooth tablet loading sequence.

The next index takes the filled tube to a second checking station which uses a plunger to check fill height before moving on to the capping station where a third station checks the cap has been applied to the tube.

Component counting

Tablets and capsules are not, of course, the only problematical products when it comes to separation and counting. For example, Counting Technology Systems (CTS) has now developed a new product feed system which it says allows a much wider range of products to be handled – from hardware through to frozen foods and confectionary – on its existing multi-lane and bowl feeder linear counters.

The counters are available in any number of tracks from two to 32, depending on the application, with standard or custom-built feed systems. Computer control is via LCD displays and touch panels which use symbols and simple menus to make product changeover easy using the product recall system. The screen also alerts

the operator to any problems while fault finding is carried out through simple step-by-step tests.

US-based Palace Packaging Machines has approached the problem of sorting by utilising an oscillating tray to separate product. Available in the UK through Burge Equipment, the



Counter-feeder: The BFW range of bowl feeder/weighers from Comcount combine both optical and weigh count technology

machine consists of a series of oscillating v-shaped channels which sort the items from bulk into single file.

The items then drop down tubes where they are counted electronically using a light beam and accumulated in containers. The company says the parameters of the oscillation are adjustable in terms of speed and magnitude, thereby allowing the system to be optimised for the product.

The counter is said to be very versatile in that different items can be counted without the need for change parts, which in any case consist of

COUNTING

"easily replaceable" stainless steel trays and counter components.

Burge says it is ideal for batch counting most small items ranging from pouches – up to 150mm long and 75mm wide – sachets, individual plastic cartons, desiccant pellets, to nuts, bolts and electrical components. Only items that become entangled with one another are considered unsuitable.

Very high speeds are said to be achievable by the addition of extra channels to the basic machine.

"The relatively low cost of the basic counter combined with its versatility make it an excellent pilot or laboratory unit," says Burge, "whereas adding more channels using similar parameters give a reliable and efficient production machine." A GMP standard machine for use in the pharmaceutical industry will be introduced by Palace in the next few months.

High volume industries

Counting prior to bagging is a common requirement in high volume industries, such as the hardware trade, and a productivity level to match the volume of production is required. Utilising a vibratory bowl feeder for separating, counting and dispensing components into pre-opened, reel-fed bags, the Autobag Accu-Count Advantage from Automated Packaging Systems has been developed for just such tasks.

A field eye detects components as small as 1.5mm while separating the parts from dirt or small scraps of material at speeds up to 50 bags a minute, which is claimed to be "double the rates of traditional counters".

Elsewhere in the Autobag range, the Accu-Scale now comes with touch screen technology for ease of use. The company says this is an ideal entry level unit and has been developed to weigh-count and bag products including plastic or metal parts, electronic components and medical consumables. Designed for use with an Autobag Excel bagger-sealer, the system is said to be compact and simple to operate.

A sample product is weighed and the data stored. As more products are added the weight is instantly calculated and the piece count shown on screen. Once the correct batch size is reached a pedal-operated flip tray feeds the parts into a pre-opened bag, which is then sealed and the next bag indexed and opened.

High speed counting and bagging systems based on vibratory bowl feeders are also available from Riley Automation, which has a range of multi-station machines capable of feeding,



Multi-station: Triple counter and bagging line from Riley Automation

counting and dispensing a broad range of products. The company says the modular systems can comprise any number of counting modules with an accumulation conveyor, bagging machine, controller and integrated printer.

Each module consists of a bulk storage supply hopper which meters the product into a vibratory bowl feeder through a counting ring into a collection area. On completion of the count, the product is released into a drop pan and any over-count is contained in the collection area to become part of the next count.

A counter controller provides a completed count signal to an auxiliary controller and, when this has received the "count complete" signal from all active bowl feeders, it instructs all the drop pans to open and discharge their contents into the pockets of the accumulation conveyor.

The conveyor then runs into a pre-programmed number of pockets and discharges the contents into the bagging machine. The bag is then sealed and another prepared. Riley Automation says the systems are "ideal for sorting millions of small, sharp-side or difficult shaped components into a very specific package and when speed and accuracy are vital."

Technologies combined

Meanwhile, Comcount points out that two principal technologies are generally used for counting engineering components. For smaller counts up to around 25 components, optical counting is generally used, while for larger counts, and certainly from 50 upwards, weigh counting is generally preferred.

Now, the company has brought these technologies together with the introduction of its

BFW range of combined bowl feeders, counters and weighers.

The machine is based on a vibratory bowl feeder which supplies a steady stream of product, which can either be pared down to a single file suitable for optical counting, or fed in bulk for the weigh counting modes. There is also the option of an automatic reject facility which allows the weigh pan to be used as an integral checkweigher.

Pacmatec has recently installed and commis-

Moulder injects

Leicester-based injection moulder, Abaloid Plastics says it has achieved low-cost counting accuracy as the result of installing 20 Mettler-Toledo Viper Monobloc counting scales.

The company produces a wide range of injection moulded products, including automotive, electronic and houseware components as well as components for security and fire protection equipment.

The new scales are used to count these components as they come off the line. Mettler says as a reference scale, the Viper Monobloc delivers highly accurate piece counting through an integrated draught shield and "extremely high weighing accuracy". Available in a number of models, it has a diecast aluminium housing and a stainless steel weighing pan. Readability is enhanced with a backlit display and the data interface enables connection to a computer, printer or second scale.

Abaloid production manager Phil Hammond says: "The Vipers offered us excellent value for money. They are ideal for an indus-

sioned its first batch counting machine for a large UK manufacturer of wound dressings. The machine counts up to ten individually wrapped dressings and a leaflet into the infeed of an IWKA cartoner at speeds up to 60 cartons a minute. In the event of a miscount, the cartoner is informed of the error and the incorrect batch



Handling small items: Palace vibratory oscillating tray counter from Burge Equipment

is ejected without interruption to production.

Turning to pure weighing-based systems, the latest from Mettler-Toledo are two industrial counting scales, the Spider Basic Count and Spider Fast Count, which are said to be ideal for counting mass-produced parts in goods received, production, packaging and despatch departments.

On both models the reference piece count can be selected from a range of default values and the resolution can be "increased at a key-stroke" during weighing. The advantage of the Fast Count is said to be substantially increased efficiency as the machine allows filling to a target piece count or weight, keying in of ID numbers, numerical tare pre-setting and totalling and storage of average piece weights as well as tare values.

Protected to IP65

A diecast aluminium terminal, chrome-nickel steel load plates, powder-coated steel weighing platforms and IP65 protection against dust and splashing water are said to ensure robustness. The terminal is available desk or wall mounted and can be connected to a range of platform sizes up to a weighing capacity of 3000kg. Portable operation is also an option through a battery power supply.

new accuracy with scales



Counting at each machine: Abaloid Plastics has bought 20 Viper scales from Mettler-Toledo

trial environment and extremely accurate. They have speeded up the counting process and made life much simpler...we no longer have to switch scales from one line to another, so we

get better consistency. We have actually found they have helped us to release labour to other areas of production."

More information - enter 114

COUNTING

Another global player, Avery Berkel, has bench-top counting systems offering capacities up to 50kg. High sensitivity models have been developed with speed and accuracy in mind and can count up to a million parts.

Each machine can link up to two remote bases, such as high capacity floor weighing platforms for stillages or for counting boxes onto pallets, and a higher sensitivity scale for counting higher value components.

Up to 1000 product records can be stored with touch key recall of tare values for frequently used containers. Selected models also feature alpha-numeric keypads to enable product names and descriptions to be entered and to allow label formatting with both text and bar code options.

For shipping and receiving applications, the machines interface with a variety of peripheral equipment such as bar code scanners and offer management totalising facilities as well as real-time data output to both printers and computers.

For total control and traceability, the company says its Weighcount PC-based system provides a comprehensive range of control, monitoring and report routines, including stored

product/location details, batch number, bar code data input and labelling facilities.

The system provides information on operators, batches, products and throughput to ensure traceability and compliance with quality standards. Avery Berkel also says the system is easy and fast to use through the use of on-screen help and browse windows.

Euroweigh has recently installed a multi-head weigh count machine to pack confectionery assortments into a variety of containers including tins, cartons and bags.

Dedicated control module

Each weigh head has a dedicated control module which can be set to "count" equal piece weight products in whatever quantities are required. When all heads have achieved the target count set, the pans discharge simultaneously down a common discharge chute into the container.

As an option, the discharged products can be collected in a checkweigh pan prior to filling the container. This ensures that the total weight is also within preset limits, particularly where the piece weight of each product may vary a little. If the total 'count' is under a pre-set weight

limit, the checkweigh pan is topped up from a separate vibratory feeder.

Euroweigh says the Series 300c weigh-counter is a compact, low cost method of achieving assortment packs and can be mounted over any type of packaging line. Speeds on 500g packs start at 10-12 a minute. ■

For further information:

Automated Packaging Systems	enter 101
Avery Berkel	enter 102
Burge Equipment	enter 103
Comcount	enter 104
Counting Technology Systems	enter 105
DT Swiftpack-King	enter 106
Euroweigh	enter 107
Mettler-Toledo	enter 108
Pacmatec	enter 109
Riley Automation	enter 110
Romaco UK	enter 111
Skerman Promac	enter 112
Ultrapac	enter 113

For full details of all PPMA members able to supply counting equipment, enter **401** on the free reader service card in this issue, or visit the PPMA web site: www.ppma.co.uk