Improving the multihead

HIGHER SPEEDS FROM PACKAGING MACHINERY ARE AMONG FORCES DRIVING THE FURTHER DEVELOPMENT OF MULTIHEAD COMBINATION WEIGHERS, WRITES MARTIN KEAY.

The constant dilemma for both automatic weighing machine manufacturers and users is the trade off between speed and accuracy. Accurate weighing is desirable to minimise product giveaway and to maintain product quality but, typically, high accuracy weighing comes at the expense of reduced speed, with its financial penalties of reduced output and efficiency.

The trade off point between accuracy and speed is of course substantially influenced by legal requirements, such as average weight legislation. However, once these are satisfied, higher accuracy will of course usually be desirable for a high value product, to minimise giveaway, while for low value products accuracy may be considered less important than maximising output.

Another trade off is between the accuracy of the weigher and its price. Here too, once the minimum legal requirements have been met, there will be a greater justification to pay for higher accuracy with a high value product such as coffee than with a low value material such as building sand.

Naturally, the Holy Grail for weighing machine manufacturers is the weigher that can combine high speed with high accuracy, which to a large extent was discovered in the 1980s with the invention of the multihead weigher, or selective combination weigher as it is known in legal metrology circles.

When multihead weighers were first introduced they were so much faster and more accurate than their linear weigher predecessors that, instead of the weigher always being the factor limiting output, it suddenly became the packaging machine being fed by the weigher.

However, during the intervening years packaging machine speeds have caught up and now the pressure is again being turned on weighing machine manufacturers to increase their equipment's speeds.

It is a similar story with accuracy. When the multihead weigher was introduced 20 years ago accuracy was so much better than linear weighers, for a given speed, that only recently has there been any incentive to increase the multihead's accuracy.

For example, Ishida, the original inventor of the multihead weigher, has made a fundamental re-evaluation of the design and at Interpack in April launched a new model which is both faster and more accurate than its previous machines.

The new R Series is said virtually to eliminate product giveaway while speeds up to 200 weighings a minute are achievable with a 14-head single discharge model. Other enhancements include additional easy clean features, an improved drive unit design and a new automatic feeder driver system and self-tuning feeders to enhance smooth handling of difficult products. Energy consumption is also reckoned to be half that of previous models.

Calculate combinations

A major innovation is Ishida's development of a new algorithm to calculate weighing combinations which can make calculations up to five times faster than before. This enables the weigher to fine tune its selection of weigh hoppers in establising the optimum combination of weights. As a result, the new R Series is said to improve weighing accuracy by 0.5 per cent compared with the current best multihead technology. A new high speed filter has also increased top speeds over previous models by around 20 per cent.

The new weighers employ a Windows XP operating system, which gives more advanced networking capabilities and makes it easy to integrate the machines with other packaging equipment. There is also an enhanced remote control unit with intuitive 3D graphic screen and start-up assistant to help the operator.

But the challenges for multihead weighers are not just confined to speed and accuracy. Multihead weighers, which were initially developed for dry piece goods, are being used increasingly for wet products and in environments where the weighers need to be washed down on a regular basis to maintain good hygiene levels.

Most manufacturers approach this problem using the same basic machine architecture used for dry goods, however Danish manufacturer Bilwinco has chosen to develop a radically different architecture for its wet environment machine, which effectively separates the load cells from the product contact areas that need regular cleaning.

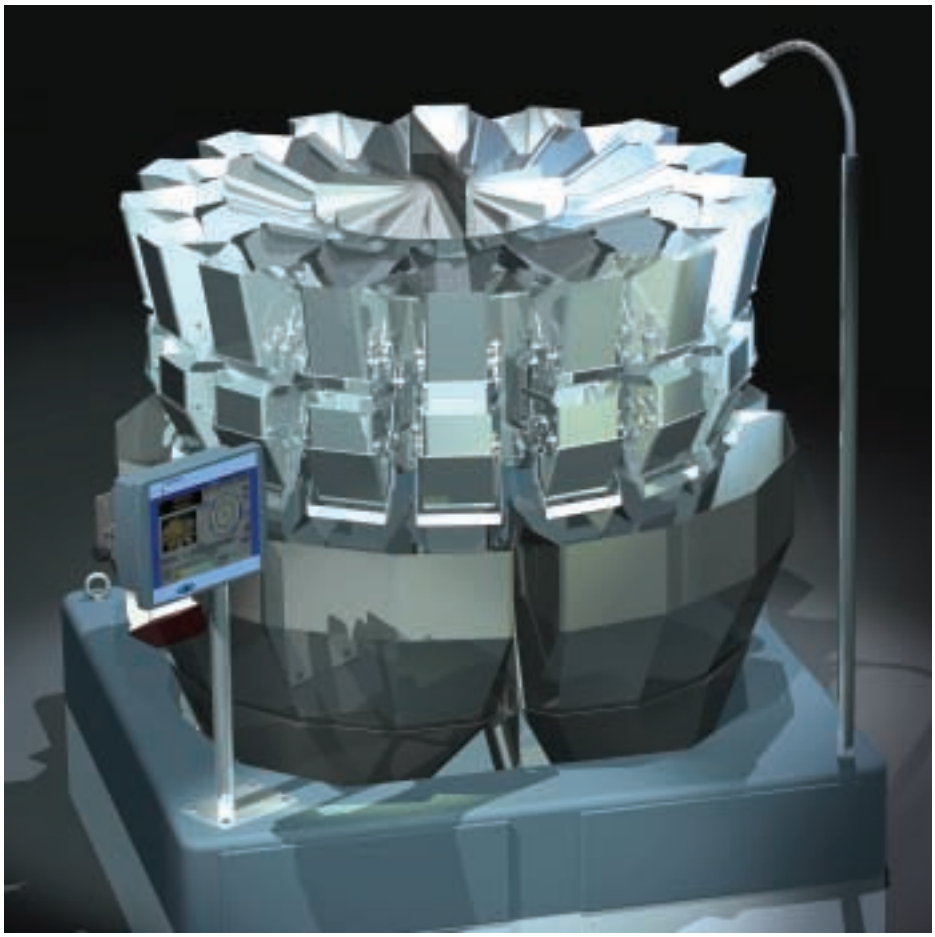
The new Bilwinco BW128W multihead is capable of speeds up to 260 drops a minute and has been developed specifically for the wet food industry to give flexible integration between weigher and horizontal packaging machines such as thermoformers and tray sealers. It has 28 heads with a bucket volume of 500ml.

The machine uses the direct weighing principle, which means that load cells and activation mechanisms are located outside the weigher body. Components are rated to IP67 and therefore able to withstand high-pressure hosedown.

Avoiding gaskets

"One of the great advantages of outside location is the avoidance of gaskets in the 'body' that houses all electronics," says Bilwinco, represented in the UK by Ancholme Machinery. "To make cleaning even easier, the vibratory coil is located inside the body and magnetism between coil and armature works through the stainless steel wall."

In addition, says the company, mounting the weighing buckets directly on the load cells improves accuracy quite considerably. For cleaning, the vibratory chutes and the springs are dismantled as one unit, and the body of the machine is left bare for high-pressure washdown.



Higher speed and accuracy: *Ishida has launched its new R Series of multihead weighers*

Easier cleaning: *Bilwinco's new BW128 multihead*

The BW128W is a compact machine and can be supplied on a mobile height-adjustable support frame for use on different packaging lines and with several packaging machines.

Reducing the physical size of the machinery has been a further objective for multihead weigher manufacturers and, indeed, was a significant factor that influenced West Yorkshire based Scott Packaging's decision to buy two Yamato ADW510a multiheads, followed by a further two Yamato ADW-214SD Sigma Compact machines for running small target weights at high speeds.

The ten-head ADW-510a Alpha multiheads consistently achieve speeds of 60 weighings a

minute on 300g packs of wrapped and unwrapped confectionery products, while still attaining up to 45-55wpm on the larger 500g packs.

"With its small footprint and utilisation of many of the advanced features of the Yamato Sigma range of multiheads, the ADW-510a Alpha is ideal for upgrading packing operations converting to multihead weighing for the first time," says Yamato. The 14-head Compact weighers are running small target weights at speeds of up to 140 weighings a minute to accuracies of 0.2-0.5g.

Meanwhile Verti-Pack, part of the GSH group which also includes Easiweigh, has introduced the new Sorma P14 in-line multihead weigher able to handle a wide range of fresh fruit and vegetables at speeds up to 85 packs a minute.

Equipped with 14 heads, the machine has a touch screen control and can feed up to four separate packaging systems as well as produce two different pack weights simultaneously and also count products if required.

Two multihead combination weighers – one a mobile fully automatic radial unit, the other a semi-automatic in-line machine – were launched at Interpack in April by Multipond. The mobile machine, the LW1201-B, is mounted on castors for relocation from line to line, in applications such as ready meals production. It can be lowered and raised on its support frame to accommodate different height lines and to provide easy access from ground level for cleaning.

New multihead weighers: *Above: Multipond's ten-head linear machine. Left: Multipond LW1201-B mobile machine. Below: Sorma P14 linear system from Verti-Pack can feed up to four packaging machines*

Self-calibrating system

One of the key features, points out Multipond, is that the LW1201-B employs the same self-calibrating system used in other Multipond weighers, which means the machine can be moved around with no need to recalibrate each weigh station manually on each occasion.

Instead, the system employs an internal weight against which all stations are automatically calibrated on start up in a matter of seconds. The LW1201-B is equipped with 12 heads and can handle portion weights of 0.5-1600g at speeds up to 100 weighings a minute.

The new semi-automatic machine is a hand-fed ten-head unit and has been introduced by Multipond to provide fixed weight portions of meat and poultry. Another application is weighing unprepared 'stew packs' of vegetables in which, for example, there is one swede, one leek, and three onions, with the overall weight made up with whole carrots.

A further linear multihead weigher, suitable for confectionery, dry fruits, biscuits and short pasta was launched by the Italian manufacturer Ricciarelli.

The FCBS4+4 has four weighing heads and four memory buckets and is driven by stepper motors. Available in standard finish and stainless steel versions – for handling fresh and frozen food products – it can reach speeds of 45 weighments a minute. Each head is controlled by an independent microprocessor with the connection between the heads and the central unit made via a CAN-bus.

As it can be placed directly onto a bagger, without the use of frames or supports, a considerable reduction both in space and cost can be made, claims the company.

UK agent Oniki Packaging says the machine offers packers an opportunity to benefit from multihead weighing technology at a price more comparable with twin or triple sets of linear weighers.

Also shown at Interpack was Ishida's recently introduced Fresh Food Weigher, an in-line machine aimed at sticky products – such as cooked vegetables, poultry, fish, meat and pasta that cannot usually be handled on automatic weighers – as well as short run work where extra-quick cleaning is required for fast changeover. Payback periods are said to be as low as three months when replacing manual weighing.

The machine is available with up to 12 heads to give speeds up to 70 drops a minute.

Bulk product is accepted onto the feed table where an operator or automatic system loads manageable lots into the linear feeders – vibratory or belt – that supply the hoppers. Computer controls then select the optimum combination of hoppers to give target weight, keeping giveaway on most products to 0.5g or less than 1 per cent, says Ishida.

Micro ingredients

In most factories it is now usual for raw materials to be supplied in bulk and for them to be handled and weighed automatically. However, it is still commonplace for minor ingredients to be handled, weighed out and added to batch mixes by hand.

Manual weighing and handling is typically viewed as both a cost effective and accurate

way of dealing with minor ingredients, but this practice is not without its problems.

The first problem is manual handling, because a minor ingredient for one company may be a bulk ingredient for others and so the size of pack in which the product is supplied will typically bear little relationship to the amount of product used at any one time. This will often mean that products will have to be dispensed into intermediate containers which are more suitable for use at the manual weighing station.

Manual handling of these packs and the double handling of intermediate containers is both labour intensive and potentially hazardous for operators.

Hazardous products

Another issue is the containment of hazardous products which are used as minor ingredients. For instance, powdered alpha-amylase, which is used in small quantities in the bread industry as an 'improver', has recently been identified as a possible source of occupational asthma and this is prompting bakeries to review their manual ingredient weighing practices.

One solution which is being investigated by the bakery ingredients industry is to supply alpha-amylase in granular or liquid form, which reduces the risk of operators inhaling dust from the product while it is manually weighed. This would allow it to continue to be weighed out by hand, although there are concerns that these products may be more difficult to handle and may not be as effective.

But another solution to this problem is to automatically dispense this and other minor ingredients, which will eliminate both manual handling and containment problems at the same time.

For example, following an approach from one of the UK's largest animal feed milling groups, Game Engineering has designed and built an automatic system to add small quantities of ingredients to batches of bulk product within a mixing system, rather than hand weighing and tipping.

The new system employs ten stainless steel bins, four to hold about 1000kg of ingredients and six to hold about 250-300kg of ingredients.

Each of the micro-ingredients to be included in a batch mix is automatically weighed and discharged into a central weigh hopper – mounted on load cells – which is then discharged and blown into the designated mixer. On completion, the system shuts down and proceeds to make up the next batch.

Free-standing weigher for Eurobins

This free-standing 200-litre Eurobin weighscale from Syspal eliminates the need for floor pits and ramps. Built in stainless steel and said to be simple to use, the unit has a crevice free design with no bug or vermin traps and will handle loads up to 250kg.

T: 01952 883188 E: sales@syspal.co.uk

Weigh-price labellers

The tradition in fresh produce packing has been to offer a fixed weight pack, however the major retailers are increasingly asking for products to be packed in fixed quantities regardless of weight. This means that fresh produce packers need to invest in weigh-price labelling equipment.

For example, fresh produce supplier Stubbins, based at Waltham Cross, North London, has recently bought eight Delford 8100 weigh-price labellers for labelling variable weight peppers and tomato packs at speeds up to 100 items a minute

The machines have full colour screen and keyboard display for programming and running information, 12 dot/mm resolution printing, and are able to accommodate a large variety of label sizes.

Two labelling heads

Each of the machines – which can operate on a minimum or average weight basis according to individual product requirements – has been fitted with two labelling heads, allowing replacement or new reels to be set up in advance for automatic changeover. Promotional flash labels can also be added.

The Delford units are networked on a wireless basis using the Delford Deltalink Ethernet system, which provides data for production control purposes to a remote PC and also allows the machines to be moved around the site without affecting data transfer. The machines can also be programmed from the PC for changes in variable information to be made quickly.

Stubbins also uses the Delford 8100 units for checkweighing fixed weight packs, maximising the flexibility of the system. They can operate on a minimum or average weight basis according to customer specification.

Meanwhile Digi Europe has announced its HI-700 weigh-price labeller, which uses Windows XP as the core operating system and a 300dpi thermal print head to handle Truetype fonts. Maximum speed is 150 packs a minute, and capacity is up to 12kg.

The machine uses a 12in colour touch screen display and, being PC based, is readily connected to a network using industry standard protocols as well as being able to store training videos, service manuals and so forth. A top and bottom labelling version is the first to be installed in the UK. ■

For further information:

Ancholme Machinery
T: 01652 657521
E: ancholme1@aol.com

Delford Sortaweigh
T: 01255 241000
E: harwich@aewdelford.com

Digi Europe
T: 01440 712175
E: sales@digi.co.uk

Game Engineering
T: 01522 868021
E: sales@game-engineering.com

Ishida Europe
T: 0121 607 7700
E: info@ishidaeurope.com

Multipond
T: 01494 816644
E: info@multipond.co.uk

Oniki Packaging Systems
T: 01789 414977
E: sales@oniki.co.uk

Verti-Pack
T: 01733 202088
E: gsh@btconnect.com

Yamato Scale Dataweigh (UK)
T: 0113 271 7999
E: sales@yamatoscale.co.uk

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