

# Weigh into more data

AS WELL AS CARRYING OUT THEIR PRIMARY FUNCTION, CHECKWEIGHERS CAN NOW PROVIDE A WEALTH OF PRODUCTION INFORMATION. ANDREW SMITH REPORTS.

Taken at face value, **checkweighing** is a modest concept, but the word often belies the reality and a more accurate, albeit clumsier, description might be "Multifunctional Data Collection Port and QA/QC Inspection and Rejection System" – MDCPQIRS for short, well shorter.

As John Craig, global marketing manager at Thermo Electron Corporation's weighing and inspection business unit points out, in addition to fulfilling their mandatory checkweighing role, the units can provide a wide variety of local statistical information for display, both numerically and graphically on a colour screen.

For example, the company's Goring Kerr AC900 Plus controller "can indicate valuable information such as trends, yields and the range of filler that can be extrapolated to provide an important insight into the filling and packaging process," says Craig. "The system will also provide historical data for use in performance comparisons between various periods under different circumstances.

"This means that a checkweigher is not only a major source of process quality assurance information, but also capable of looking at and recording changes and improvements to the process. This elevates the system to the status of a powerful process instrumentation device."

One result of this elevation is the increasing networking of checkweighers into the office environment via an Ethernet or web-based connection. This removes data collection from the shop floor and allows more rapid and sophisticated use of the resulting statistical analyses.

"These 'seamless' systems," says Craig, "provide a new level of transparency throughout companies in terms of the overlapping of production, accounting, distribution and marketing functions."

This is a theme echoed by Andrew Hallitt, Boekels brand manager at Sartorius, who says that it is essential for both production and management purposes that the checkweigher is able to feed back into an automated system.

"Portion control via the checkweigher is a critical feature as this helps to control giveaway automatically on volumetric filling lines and dividers. Linking the checkweigher into data capture systems makes it possible to take this level of control one step further. Capturing all the data from a machine helps to examine how the factory is performing over longer periods, including, for example, comparisons of shift performance."

## Windows-based applications

Linked to the growth in access and analysis of checkweigher generated data is the requirement for ease of use combined with security. On the units themselves, this has resulted in the increased specification of simple, touch screen control to avoid operator error and simplify set-up and, in the back office, the growth of Windows-based applications for data analysis. At all points of access, multi-level password protection is becoming the norm.

A key attribute in general is flexibility to ensure compatibility with the wide variety of products and line configurations checkweighers will be expected to work with. As Lock Inspection Systems points out, certain types of packaging present particular challenges to the checkweigher.

It cites bottles and jars, for example, as being difficult to handle at high speeds, and also flexible packs, particularly if they are coming off the bagger at irregular orientations.

However, a number of manufacturers are able to deliver systems to overcome these prob-



**Range of transport:** Lock WeighChek is available with a range of product handling systems

lems, with Lock for instance able to supply machines configured with belt or chain transports, or even with screw-feeders or side-belt transfer mechanisms which are able to handle even the most challenging packs.

The requirement for speed will naturally vary depending on the application, but as with most production equipment, the trend is towards more rapid throughput. Similarly, the mantra of reduced downtime is as applicable to checkweighers as it is with any equipment and rapid set-up and tool-free "easy clean" machines are readily available.



**Lifting to weigh:** Checkweigh UK's Pakweigh has a "toast rack" to raise cases off a roller conveyor



**Easier cleaning:** New drive system and belt layout eases cleaning on Bizerba's CWM system

Despite the importance of "correct weight" both to the manufacturer and consumer, there is currently no Europe-wide legislative standard, although the OIML R51 standard is the certificate of conformity recognised across much of Europe. As Loma Systems points out, only the UK and Greece recognise R51 as an optional standard, which means that manufacturers based in these countries without approval cannot trade elsewhere in Europe unless they gain R51 or go through the process of obtaining national approvals.

The European Commission has drafted The

Measuring Instruments Directive, but when, if ever, it will see the light of day is as yet unclear. However, Loma product manager for checkweighers, Alan Johnson, believes the "overriding trend in Europe is to harmonise metrological standards" and to back that belief the company applied for, and has now been awarded, R51 approval from the National Weights and Measures Laboratory (NWML).

### Twice as sensitive as normal

The NWML classified Loma's equipment in terms of accuracy, readability of display, technical functionality, electronics, controls and test methods. The assessment process also ensures the machines cannot be used fraudulently.

The company achieved an accuracy level of X (0.5) and  $e=0.5g$ , which in layman's terms means it is twice as sensitive as the normal standard and can measure very small levels of difference in weight, thus guaranteeing a high standard of accuracy.

Because of the rising expense of product recalls due to underweight or component-short packs and the realisation that overweight packs can seriously affect long-term profitability, very accurate weighing is obviously of great importance in many circumstances. As such, the

trend towards increasing accuracy can be added to those mentioned above – versatility, speed, ease of use and cleaning, sophisticated data collection and better security.

Working along these lines, Yamato UK has introduced its CSG Series, which it claims sets a "completely new standard in checkweighing" with new technology building on the "excellence of earlier models while complying with all current and anticipated global quality and hygiene standards, including HACCP regulations."

### Intelligent settings

Combining high accuracy with high speed, the checkweighers are said to be easy to operate, with 10.4in touch screen displays, while all data captured can be transferred to a Windows environment. Auto-timing also provides intelligent automatic settings and there is a filter system to eliminate the effects of vibration from the floor.

The company says the sealed load cell CSG Series will integrate easily with a wide range of plant and equipment on almost any production line and incorporates a tubular support frame in stainless steel that minimises flat surfaces, to eliminate most potential dirt traps and contamination areas.

Tool-free strip down and interchangeable weigh and infeed conveyors ease maintenance and increase flexibility. Waterproof models are also available.

Similar attributes can be found with the CWM system from Bizerba which it claims provides "perfect weight measurement" alongside reliable process control in a variety of packaging and logistics applications. Again it is easy to use and maintain, featuring a touch screen control panel, easy to read display and quick belt-release technology.

Downtime is reduced by the design of the new drive system and belt-unit layout which features closed motors and an open support structure ensuring belts and belt units are accessible for washdown. Maintenance and monitoring are also supported by online servicing and e-learning capabilities which facilitate troubleshooting, tutorials and process monitoring from anywhere in the world.

Of stainless steel construction, the unit runs at speeds up to 150 packs a minute and is able to operate in temperatures of 0-40deg C with a maximum load of either 6kg or 10kg, depending on the model.

Suitable for integration with a number of applications, it incorporates a 32-bit processor

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that can be interfaced via standard Ethernet and Profibus networks and RS232 connections.

According to Checkweigh UK, the recently established brand of integrated control equipment from Sparc Systems, the design of its new TS300 Pakweigh enables it to be one of the most accurate checkweighers available, with an accuracy of  $\pm 0.05$  per cent.

This level of precision is achieved by dispensing with the usual continuous conveyor belt system and utilising what Checkweigh UK calls a "toast rack" of support fingers that rise between the rollers of a roller conveyor to lift cases for weighing. This enables the cases to be stationary when checkweighed, so providing the high accuracy.

Checkweigh UK points out that this approach also avoids the usual need to cut into existing conveyor systems and allows the machine to be readily transferred from one line to another. Random weight cases up to 50kg can be handled, with speed depending on pack size.

Again controlled by touch screen technology, it has simple, menu-driven set-up and operation with 500 product codes available. The unit also has comprehensive management information capabilities and is Ethernet compatible and web enabled to support remote status checks via a standard browser.

Commenting on the capabilities of the Pakweigh, Alan Ross, commercial director at Checkweigh UK, says: "Not only will our customers be able to measure, for example, such things as whether a box contains 20 cartons, they will also be able to tell electronically whether there is an instruction sheet in each box."

### Portable memory module

Driver Southall's recently introduced P2000 is now considered the centrepiece of the company's checkweigher range, with features such as a user-friendly TFT display touch panel screen, re-configurable input/output and "unlimited data storage". It also has what is claimed to be a unique portable memory module which can be transferred between machines to enable them to become instantly operational. Other features include RS232 and RS485 links and multiple password access levels.

Also new to the range is the compact P1000 static checkweigher which is intended for small, lightweight pharmaceuticals and cosmetics such as inhalers, lipsticks and contact lenses and delivers accuracy to 0.05g.

Meanwhile the P1000 eye level control in-



**Recent upgrade:** The Wolf KWD checkweigher from Engelmann & Buckham

line dynamic checkweigher has been upgraded with the Mk II featuring improved electronics, a new weighing system for faster response and brushless DC motors on the conveyors for quieter operation and minimal maintenance.

The Wolf KWD checkweigher, available in the UK through Engelmann & Buckham, has also had an upgrade and is now capable of storing 100 production programmes with production data and operating parameters available via a user-friendly, interactive display. The KWD 2 also features manual and automatic tare functions as well as automatic calibration. Suitable for static or continuous operation, the machine is said to offer maximum accuracy by means of a force compensated load cell.

Further features include its temperature stability when operating between 0 and 50deg C, allowing a temperature drift of less than 0.03 per cent. The free-standing unit incorporates its own conveyor and is said to be easily installed on any line for checking bags, boxes, cans, bottles or blister packs of food, chemical, cosmetics or pharmaceutical products.

According to Collischan, accuracy, user-friendliness and security were the primary considerations when developing its TC 840 series of checkweighers, which are available in the UK and Ireland through Ultrapac.

### Password protection

Four levels of password protection are provided, with each level being user definable with as much, or as little, access available at each level as required. Control is via a touch panel screen and the company says setting up for new products can be "done in seconds with very few keying inputs" since, once the weight and the

rate of product throughput is entered, the machine carries out the timing and speed calculations.

The graphic display is used for fine tuning since, with speeds up to 400 packs a minute this would be impossible to adjust by eye alone.

Production statistics and weighing information can be relayed to the customer's host computers via various interfaces while feedback information can be used to control various filling machines if required.

Maintenance requirements are said to be minimal, with a complete drive unit "changed in seconds" if necessary. A full validation package is also available.

"A versatile, cost-effective checkweighing system for a wide range of general packaging applications" is how Delford Sortaweigh describes its Guardian 1000 system. Offering a choice of average weight or minimum weight operation, the machine is built from stainless steel, is IP65-rated for dust and water exclusion and has food quality belts throughout. It is also said to be easy to clean and operate and has a 500 programme memory.

### Speeds up to 180 a minute

Delford says the system is ideal for wrapped products such as ready meals and can be adapted to handle a variety of items at speeds up to 180 packs a minute. A number of reject devices are available and the optional features include integral metal detection.

For central programming and production control, up to 31 Guardian 1000 weighers can be linked to a host PC by the Remote Monitoring System (RMS). Developed in-house, RMS is a Windows-based application which can create and edit production programs, obtain and process production reports and provide real-time data on any PC connected to the company's intranet.

Delford Sortaweigh says RMS allows production and average weight records to be stored and retrieved manually or automatically 24 hours a day. Performance can be compared and analysed and, if a problem occurs, the operator is alerted via an alarm or messaging system.

Versatility was also one of the primary considerations behind the development of Garvens' S2 dynamic checkweigher with its modular design ensuring it is suitable for integration into almost any production line. Capable of weighing products up to 600g, the standard design includes height adjustment, reversible direction of transport and a variable speed belt drive

system which provides full torque over the entire speed range. The modular design and tool-free belt change also aid cleaning and maintenance.

Other features include weight classification up to seven zones, manual or automatic re-zero, 100 programme memory and a touch screen display with operator prompts.

The latest development for the S2 is a software package allowing remote access via a PC. The Garvens Remote Access Tool – ReAct – allows single or multiple checkweighers to be linked to any PC fitted with an Ethernet card or through an Ethernet network.

Legislative and regulatory requirements are simplified, says Garvens, by uploading data direct to the QA office. Data can also be inserted into spreadsheets using the Windows platform for further analysis.

Moreover, the product database can be uploaded and modified or added to on the PC and downloaded back to the checkweigher using the same screen layouts and entry procedures as on the checkweigher, removing the need for further training. Unauthorised access is prevented by a system of multi-level password protection.

Romaco is the agent for Garvens dynamic checkweighers in the UK and Irish healthcare sectors while the complete range of Garvens products is available through Mettler-Toledo for all other industry sectors.

### Combined with a metal detector

For example, food manufacturer Loxtons has installed a Garvens checkweighing system at its site in Stockport, Cheshire. Supplied by Mettler Toledo, the CombiChecker combines a checkweigher and metal detector in one unit for checking handmade ready meals.

The unit enables central article data editing at the weighing terminal, plus quick and easy article changeover. Its compact design also ensures it integrates into most production lines.

Up to 200 product settings can be stored and items can be classified in three weight zones on the Garvens, while the Safeline metal detector is said to have optimum sensitivity for many different products.

"We use the equipment for checking and weighing individual portion dishes in the assembly area so it is vital that the instruments we use are highly accurate and reliable," says Paul Durbin, managing director. "The checkweigher is easy to use, easy to clean and it has been successfully integrated into the existing production



**Closer to target:** Anritsu SVh machines have been installed by Monaghan Middlebrook Mushrooms

lines without any problems, minimising downtime and inconvenience."

Specifically aimed at the pharmaceutical industry is BOC Edwards NCCW non-contact checkweigher. Launched earlier this year, the machine is designed to weigh vials, ampoules and pre-filled syringes with fills of 0.5ml to 1 litre at speeds up to 600 units per minute with a typical accuracy of 5mg on 1g, or some 0.5 per cent.

The key attribute of the NCCW is that being non-contact, it is not sensitive to airflow or pressure and can therefore be employed in clean rooms with no need for a protective cabinet.

It operates on the principle of magnetic resonance in which the containers are first subjected to a strong magnetic field which, broadly speaking, aligns the atoms of the liquid contents with the field.

Radio waves are then applied for a brief interval during which the alignment is pulled into a new orientation. When the radio waves stop, the atoms return to the alignment with the magnetic field, giving off energy in the form of radio waves.

### Proportional to mass

The amplitude of those radio waves is proportional to the mass of the substance and can therefore be interpreted, via calibration from a known mass, to give the weight. Moreover, the decay signal that comes from the re-alignment

also provides information which can be used to measure qualitative criteria such as oxidation and concentration.

Subject to further development work, BOC Edwards says the NCCW technology is also capable of being applied to powders and solid dosage forms.

Meanwhile, one of the UK's leading producers of sauces, dips, dressings and marinades, Bakkavor Birmingham, has invested in a Boekels EWK 2000 in-line checkweigher. Previously the products were weighed off-line, but as Bakkavor's QA manager James Blackband, explains, "switching to the Boekels checkweigher has enabled us to achieve a greater level of consistency in terms of fill weight."

### Variable output from the filler

The IP65-rated unit is currently weighing pots at a rate of 110 a minute. While this is well within the machine's rated capacity, Boekels says a significant handling challenge was presented by the variable output from the filling system.

"Pots arrive at varying levels of pitch from the filler, presenting a tricky handling problem", explains Boekels brand manager at Sartorius, Andy Hallitt. "We met this challenge by inserting a second accelerator conveyor between the filler out-feed and the checkweigher's in-feed conveyor to provide a smooth and consistent pitch."

Greater consistency of weight is not the only benefit derived. "The checkweigher provides our production team with a continuous stream of real-time data, enabling them to achieve greater process precision", comments James Blackband. "This has enabled us to improve profitability by reducing both product giveaway and headcount.

"Looking to the future we are planning to link the checkweigher to the filler via an SPC system to achieve even greater control of fill levels."

Following the success of previous installations, Monaghan Middlebrook Mushrooms has ordered another Anritsu SVh series checkweigher from Skerman Promac.

Packaging manager Allun Evans says: "Since we introduced the Anritsu checkweighers into our packing areas, whether they are on our pre-weighed manual lines or the automated roundabout system, they have proved to be reliable and efficient in operation over a long period."

One of the main justifications for using the

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Anritsu models from the in-line range of checkweighers instead of the existing static scales is that they automatically calculate EC weights as a standard function allowing operators to fill closer to the target figure. The result has been less product giveaway and faster line speeds as the onus to ensure accuracy is no longer on the operators.

The machines withstand a harsh environment, operating with sticky products and high pressure washing regimes. The conveyors are powered by water resistant motors featuring a positive direct drive which obviates the need for sprockets and timing belts, so reducing maintenance, increasing the working life of the motors and providing a stable environment to ensure accurate weighing.

Since their introduction three years ago, Ward Bekker's Apex checkweighers have been employed to handle a wide variety of products, but one of the most demanding applications has been the requirement to handle fresh garlic bread sticks in varying lengths at speeds up to 120 a minute.

Due to the large difference between the shortest and the longest pieces, it was necessary to design an interchangeable conveyor system



*Interchangeable conveyor: Apex checkweigher was equipped for different length bread sticks*

which enabled the weigh conveyor and outfeed conveyor to be easily swapped around. The two conveyors are of differing lengths, allowing the most appropriate to be used for the length of stick monitored.

This enables the company to maintain close accuracy at the high speeds required and re-calibration is unnecessary as the settings are programmed into the machine and can be quickly

selected from a keypad.

So successful has the installation been that the complaint levels due to incorrect fill quantities is said to have dropped by 83 per cent. ■

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