Pharmaceutical packaging manufacturers have become the trailblazers of the packaging world when it comes to ensuring carton quality. In every pharma packaging plant, multiple checks are carried out right through the production process from sales, through design and print, to die-cutting, gluing, and beyond. Yet even this is not enough to ensure the ‘zero fault’ supply that brand owners increasingly require. So where do carton-makers go from here?

Only a few years ago, supply contracts for pharmaceutical packaging were much less onerous than they are today and brand owners would have a raft of their own QA staff checking the packaging products they received from suppliers days or even weeks before the cartons were needed on the packing line. Any problems not identified by the supplier would be picked up by the brand staff and sent back for re-working before the job was needed.

Now, of course, just-in-time production is the king of manufacturing methods and time-to-market has been shortened dramatically for both new products and promotions. Brand owners therefore need packaging suppliers to deliver their products during a very narrow window, usually only hours before packing starts. But this change has meant that the packaging supplied must now be faultless, both mechanically and in terms of print and Braille, or the filling line will be stopped because the packer cannot know if any fault encountered is a one-off or the first of hundreds in the batch. Stopping a packing line not only means lost time, but also means that drugs and leaflets will have to be put into storage until the packaging is re-worked. But the implications of not stopping the line are considerably more serious, with the specter of the wrong drug/packaging combination reaching the consumer never far from the mind of those involved. Not surprisingly, brand owners are increasingly inclined to claw the cost of line stoppages caused by incorrect cartons back from the packaging manufacturer.

So how can the carton-maker ensure that every carton they deliver meets their client’s specifications, especially with so many processes to go through from virgin board to finished box? The process starts with raw materials, where incoming product is subject to the same level of scrutiny that the carton-maker expects their products to go through. For this, and for production, random sampling is a mainstay of the checking process, with most packaging makers ensuring that samples are taken, and retained, at every stage of production. These samples form a major part of the audit trail should there be a problem later on, and the ability to trace each job through the company’s production processes means that non-conforming product can be tracked through individual printing and converting machines. Packaging manufacturers report that sometimes, this traceability enables them to prove that packaging faults encountered on packing lines were not caused at source, as some unscrupulous fillers have been known to claim.

Alongside the random sampling of products at every stage of the production process, carton-makers already use a range of automated in-line systems including detection devices to ensure that adhesive has been correctly applied, film windows are present and correctly positioned if the design requires them, pharma and EAN/UPC codes are correct, Braille dots are present and say the right thing, and folding has been correctly carried out.

But until recently it has not been possible to check the print on every finished carton except manually, which is clearly impractical with modern production outputs, or by running the finished cartons through a separate off-line unit, incurring additional setting and running times and so lengthening turnaround. Granted, systems do exist for checking the print as it exits the printing press, but there are plenty of opportunities downstream for damage to occur, notably when the carton is in transit between processes, during die-cutting or embossing, during window-patching, or during folding and gluing.

In the last year, however, developments in high speed cameras and image processing from the web-fed printing arena have been applied to sheet-fed carton manufacture, where systems such as ACCUCHECK mounted into a folder-gluer are able to check the print on every single carton, in-line, during the last process before the boxes are packed and dispatched to the filler.

Using a high definition Registron® camera, the system scans each carton as it enters the folder-gluer, comparing the image against a reference supplied by the brand owner. Systems such as ACCUCHECK have to be designed for the extremely high rate of data flow received from the camera during production and have to interface perfectly with the host folder-gluer to ensure that any non-conforming carton is marked out or ejected.

Systems such as this are able to detect a range of print and print-related defects. Hickeys and spots, whether from print or from oil or water splashes can be detected. Defects on codes such as EAN/UPC, colour bars or pharma codes can be identified, as can missing or defective text. Of increasing importance as brand owners aim to standardise colours across various print media is the control of colour variance, and this system can ensure colour to a level of 1 Delta E*. Physical defects of the carton such as scratches or rubs, and inaccurate die-
cutting, are also detectable.

Depending on the settings defined for the run (i.e., which areas of the carton are high priority, what size and type of defects are permissible), the defective carton can be allowed to continue, or automatically ejected, without affecting production. Whether ejected or not, defects are recorded for later analysis. A zone masking function allows the operator to choose which part of the box he would like to check or not. The setting of the zone masking function is saved with each job.

At Bobst we recently held an ACCUCHECK customer focus group where pharmaceutical packaging manufacturers from around the world expressed a huge amount of interest in this type of solution, especially in the ability to copy-check the carton running through the folder-gluer against a reference as supplied by the brand owner. Along with the QA implications, manufacturers believe that systems such as this will help them work with brand owners to ensure tighter and tighter colour control, which in turn will help in the fight against counterfeiting.

Such systems completely modify the quality control process for packaging manufacturers and also bring about the possibility of making changes in the production process that until now brand owners would not have found acceptable. At present carton-makers are obliged to produce just one type of packaging at a time, but with run lengths decreasing across the industry they would benefit from being able to place two or more variants on a sheet – perhaps of different languages or dosages. With 100% checking and verification of cartons it would now be possible to ensure that no mixed product reached the packer-filler even if the printed sheet consisted of multiple pack types. While it is yet to be seen if brand owners would accept such a change, the prospect would certainly be attractive to carton-makers.

Carton-makers could expect a range of other advantages by installing such in-line systems. Clearly customer satisfaction and loyalty may be improved by the consistent delivery of ‘zero fault’ packaging, with the packaging manufacturer avoiding quality claims and penalties. The need for certain other QC systems or procedures may be reduced, saving costs and time.

The application of this technology could easily spread beyond the pharma packaging field, with carton-makers potentially able to charge a premium for using this technology on packaging for other markets such as food. Carton-makers see it as entirely logical to have this sort of quality control system located on the folder-gluer because of its location at the end of the carton production process. Who knows what other faults such systems could be able to detect in future?