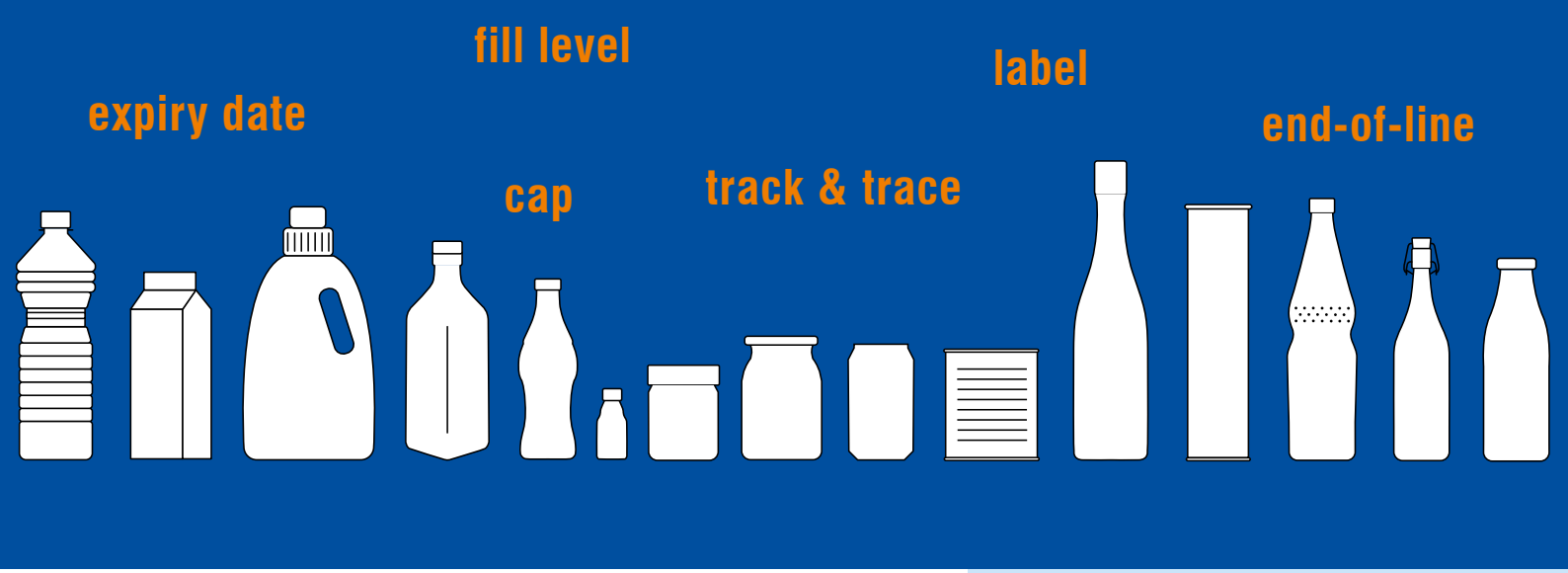
COMMUNICATION FROM SPECIALIST TO SPECIALIST

Smart Cam vs Integrated Systems

HOW TO IMPLEMENT EFFICIENT QUALITY CONTROL POINTS (QCP)



About the Author

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Camera inspection is becoming increasingly important in all areas of industry.
So-called Smart Cameras can, in principle, be used at many places on the production line where product conformity needs to be verified, thanks to their modularity and universal nature. These camera units also look like economically attractive solutions. However, Smart Cameras quickly reach their limits when things get ‚serious'.

In conjunction with specific examples from beverage filling, the following article is intended to show that integrated systems are a better alternative.

Judging by our experience over the years, we see an increase in the number of customers who initially purchased a Smart Camera solution, which quickly reached its limits, forcing them to put it aside and look for a standard, fully integrated inspection system.

IN THIS ISSUE:

It is tempting to use a Smart Camera. Their apparent limitless possibilities give the impression that they answer every inspection application. In beverage bottling, for example, you could think to use them to check the cap presence, the label, or the best-before date.

Smart Camera Characteristics

- Image acquisition and evaluation in one small device. Visualization and operation via a separate PC.
- Can be useful for execution of single tasks.
- Preferred for presence control or position detection.

It is often forgotten that it is not just the inspection unit that defines the efficiency of a QCP but that many additional aspects need to be considered to implement a modern quality management system.

More than “just” camera technology.

The efficiency of an in-line quality control system goes far beyond the simple combination of a Smart Camera with its lighting. A simple Smart Camera / LED light combination can often not provide the ideal performance.

Designing an efficient inspection system requires detailed hard- and software engineering to ensure system accuracy, reliability and durability. The end-user should have access to a well-conceived HMI providing real-time production statistics and a user-friendly graphical interface to manage the system and grant access to inspection data acquisition and analysis. Only an Integrated Inspection System presents these features and offers user management, convenient inspection program management, remote maintenance and system manufacturer support for more than ten years.

The advantages of an Integrated Inspection System can be clearly illustrated using the example of the bottle inspection after filler:

First, it involves checking properties like the fill level, closure presence and position or presence of a filling nozzle inside the bottle (Figure 1).

Secondly, it ensures the close monitoring of the upstream filler and closer, with regards to, for example, bottle breakage, filling valve and closer element performance.

Underfilling detection is required to guarantee the product quantity to the customer. Overfilling is very important for the bottler who does not want to “give away” products for free. It also poses another danger for the consumer; in the case of carbonated beverages in connection with high temperatures (exposure to the sun), the bottle can, in extreme cases, burst if there is not enough head volume available to buffer the internal pressure.

The miho Carefree package

Classification of new glass defects according to the risks involved, according to American Glass Research2

- Critical defects, which primarily lead to a risk to the consumer.
- Functional defects that can lead to failures in the subsequent process, e.g. bottle breakage
- Impairment of stability
- Increase in internal stress
- Cosmetic defects that do not affect the function of the product

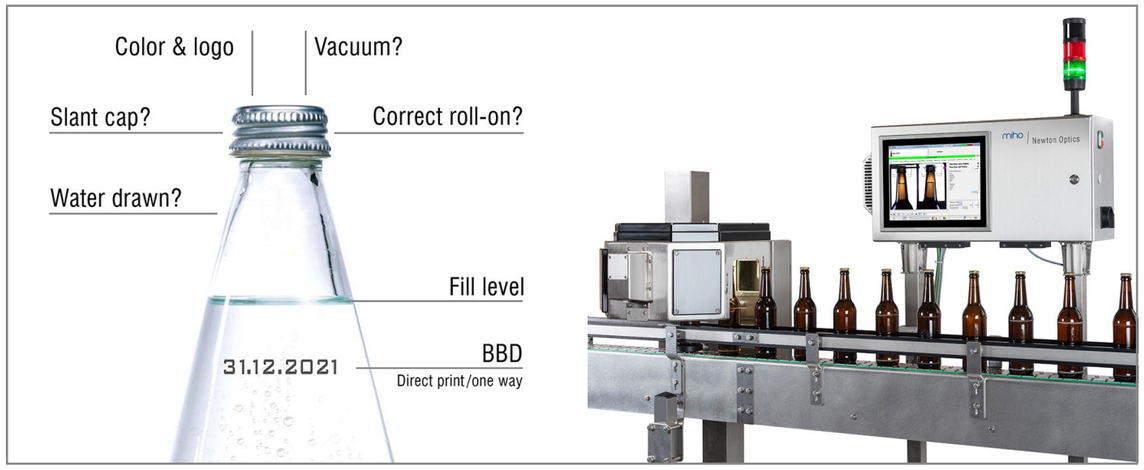

Figure 1: An integrated level and closure inspection with optional modules covers all necessary checks.

The Filler Management, a smart extension of an Integrated Inspection System.

A fill level inspection system installed after the filler can be combined with a filler management system (filling valve and capping device monitoring). It offers the bottler a tool with which he can precisely track which filling valve is permanently under or overfilling and which capping device is producing excessive errors (preventive maintenance). The so-called bottle burst monitoring, part of filler management, also has a crucial function to ensure consumer protection. It recognizes whether and at which filling element a bottle has burst during the pre-tensioning or filling process and can activate specific mechanisms and safety steps in connection with the fill level control:

It detects whether a bottle has burst during the pre-tensioning or filling process and, in conjunction with a fill level check, is able to initiate certain mechanisms and safety steps:

- forced underfilling,
- forced rejection of X of neighbouring bottles before and after the filling element on which the bottle burst,
- X empty laps with the bottle shower switched on,
- X filling rounds with forced rejection.

All inspection and management information is documented in a dedicated corresponding operating data acquisition system.

The closure, whether it is a screw or a crown cap, whether it is made of metal or plastic, also has the potential for errors and must therefore be checked. Typical defects are misplaced crown cork (“bull-nose”), incorrectly screwed closure, retracted or damaged safety rings, wrong colour or closure logo - see Figure 2.

Integrated Inspection Systems offer the bottler the enormous advantage that they are modular. The bottler can combine different inspection functions and choose between several technologies depending on the application requirements. For the fill level inspection, Miho offers High Frequency, IR, X-Ray and camera-based systems and helps you define the most adapted solution for your application.

In contrast, the Smart Camera solution is limited to simple tasks. It is generally not part of an integrated and specifically engineered standard inspection system portfolio and is consequently less adapted to high demanding industrial processes.

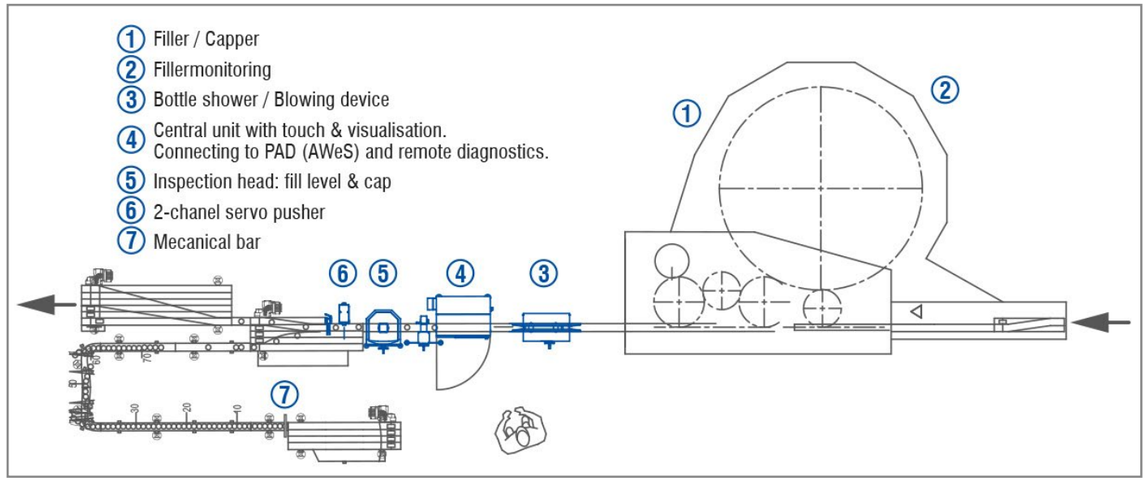

Figure 2 : Behind the filler and capper, there can be an integrated control of the fill level, the capper together with the monitor of the filler and capper itself.

In the example layout, the miho HSPM 2-channel servo pusher discharges a complete round of filler into the single discharge within the time frame specified by the quality assurance system. The line-up of bottles is clearly assigned to the individual filling valve.

Reject systems

Each QCP must be connected to a reject device and an associated rejection monitoring system. The digital link between the inspection system and the production data acquisition or Manufacturing Execution System (MES) is an integral part of the Integrated Inspection Systems.

In contrast, the Smart Camera solution requires the addition of external systems. Product tracking from the point of inspection to the reject, reject monitoring and system parameterization require an additional PC and PLC, which typically leads to a heterogeneous non-integrated solution.

Complete bottle verification after labeller

Customer expectations for error-free, uniform and flawless products at the point of sale (POS) are very high today. The creative marketing of the beverage manufacturers and the continuously increasing consumer expectations fuel each other. In addition, there is a trend towards ever-stricter consumer protection, which requires the error-free labelling of allergens, alcohol-free products, dietetic foods and organic products. In the worst case, an incorrectly labelled package can endanger the consumer‘s health.

The labelling quality criteria also include compliance with a large number of guidelines and regulations such as:

- the food labelling ordinance (LMKV),
- the EU food information regulation,
- the US Food and Drug Administration (FDA) guidelines,
- the guidelines of the British Retail Consortium (BRC).

The labels must be checked for presence, logical correctness, integrity, EAN barcode, best-before date, language variants and country code.

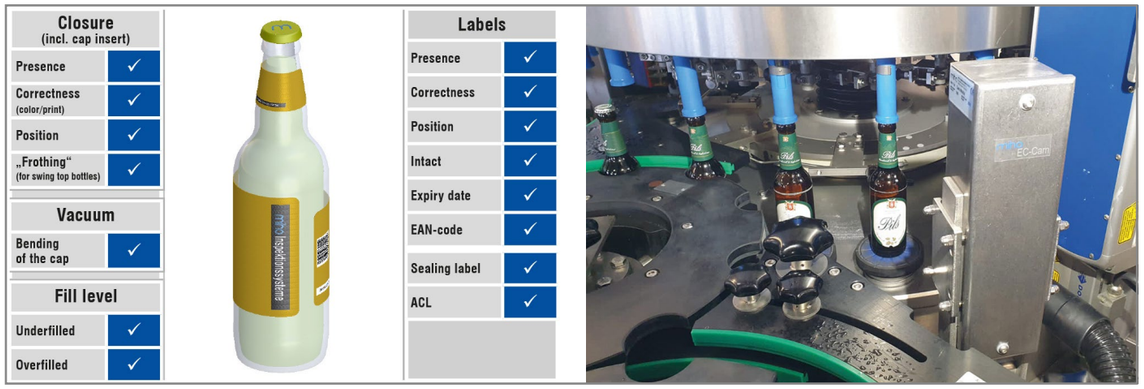

Figure 3: The full-bottle inspection can be integrated inside or after the labeller

The complete verification of the bottle labelling conformity (Figure 3) can be executed with the miho EC-Cam modular smart camera package. The building blocks of the package include:

- at least one robust IP67 inspection head with camera and adapted lighting ,
- a control cabinet with HMI, image processing platform, reject system and reject monitoring,
- operating and evaluation software Vidios SC running on Windows 10 (Figure 5).

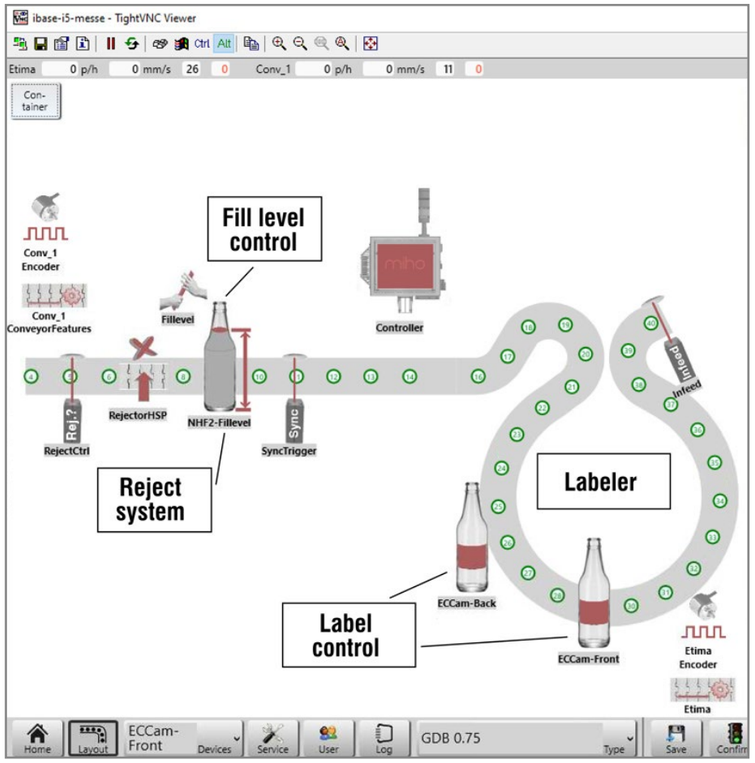

Figure 5: Representation of the HMI of an EC-Cam label inspector mounted inside labeller and combined with fill level verification.

adjustment is required, the whole change process takes only a few minutes.

If a new inspection recipe has to be created, it can be set up in 30 minutes, either by the trained staff of the bottler or together with the miho support team via remote maintenance.

Vidos_SC, the new software platform from miho, visualizes in real-time, on the HMI (Figure 5, the complete inspection system configuration, including the peripherals such as motor encoder, infeed control, trigger light barriers, reject systems and reject monitoring. The bottle flow is simulated schematically, errors are highlighted directly via colours. All modules output their status after clicking.

The camera can also be combined with other inspection heads, as for example vacuum or fill level control.

The example hereunder shows an EC Cam inside a labeller, using two camera modules to inspect two labels and an MHD imprint. Alternatively, the device with its camera modules can be mounted directly on the conveyor belt to check bottles in free flow. (Figure 4)

Mastering a wide variety of bottle formats is easy with an integrated system. When changing from one format to another, the new inspection recipe is simply selected on the HMI system. Even if a camera height

Figure 4: Full bottle inspection of non-cylindrical containers.

Conclusion

Suppose you decide to retrofit an inspection system in a QCP of the filling line. In that case, you will quickly realise that the fully integrated inspection system from a specialist system constructor is the best alternative. In addition, added value is created through professional and personalised support, spare part supply and durability thanks to the robust design and future upgrade options..

Send us your bottle samples, come to miho and see the inspection system.
Let us customize it for optimum results.

For more information we invite you to visit our website www.miho.de or to contact us directly by mail at info@miho.de