



TRIVISION
Vision beyond imagination



SmartInspector®

Danish Crown case story

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Promising project pushes the boundaries of vision-based quality control in Danish Crown

TriVision has worked with vision inspection for quality management since 1999, with numerous examples of installations that have had a positive effect on the quality and output of its customers' production processes. But when they met with Steffen Jørgensen from Danish Crown Factory Solutions, what resulted was an opportunity to utilise their technology in a unique way.

When you think of China, some of the first things to pop into your head would probably be the Middle Kingdom, an ancient culture, authoritarian rule and strange foods. The fact is, however, that China is a well-developed, industrialised country with a large and growing middle class and a big market for many Danish companies. One of the top Danish exporters to China is Danish Crown, which accounts for no less than 21% of Denmark's exports to China.

"The challenges of exporting to China are connected to the long transport time, so any faults in our products which are only discovered after a very long and costly transport end up becoming very expensive," said Steffen Jørgensen, who works for the department in Danish Crown called Factory Solutions. Factory Solutions is a shared service that all of Danish Crown can make use of when trying to optimise operations at a factory. The department has now increasingly begun to focus on vision technology to ensure optimal quality control.

Danish Crown in Blans tests new solution

Danish Crown is known for producing an extensive range of food products across many factories around the world. The factory in Blans, South Jutland produces various meat products, which are shipped directly to China by sea in containers. Roughly one container gets shipped off to China every hour, and the containers are packed to the last cubic centimetre with boxes in varying sizes. All the products are packaged and labelled to ensure they are correctly distributed upon arrival. What makes the Blans factory's products for the Chinese market special is that they are labelled in Chinese characters, which are difficult - if not impossible - to verify manually or semi-manually. Even the smallest printing error can result in one character resembling another character which means something completely different. Jørgensen therefore saw a need to use vision technology to verify the labels for various basic information, bar code quality and, above all, errors in the Chinese characters.

"Our customers continue to raise their requirements, which are also becoming increasingly individualised. Some customers have now gone so far as to fine us if the labels cannot be scanned by any given barcode scanner worldwide," said Jørgensen.

All the labels are placed on the front side of the boxes as they move down the conveyor belt, which is why they are more difficult to photograph than at installations where the cameras can be positioned perpendicular to the labels. The photos are taken at a roughly 30 degree

angle, which results in a completely different perspective than is typical, meaning that TriVision's image recognition software had its work cut out for it.

"What we have developed for Danish Crown through this project may sound trivial, but it's far more than simply checking a label and ensure it matches the shipment," said Ole K. Neckelmann from TriVision, the Odense-based company behind the technical solution for Danish Crown.

The system inspects boxes that range significantly in size and runs a check of the visual data through a central product database at the headquarters. The database contains data from a number of IT systems. It's a complex data structure, and the vision inspection system continuously receives new information which makes it possible to run inspections in real-time and collect information about errors such as misprints or incorrect packaging, which could result in the customer refusing the delivery.

SmartInspector creates new possibilities for optimising production

"We have developed the product **SmartInspector**, which now contains all our advanced functions. At the same time, we have achieved a lower cost of production and a more compact solution, both of which are benefits the customers value," said Neckelmann from TriVision.

The camera is linked up to Danish Crown's headquarters and is essentially a cloud solution that makes it possible to remotely operate the camera in connection with support or software updates.

Due to its price and compact size, SmartInspector can be installed at several points of the production cycle, creating opportunities to implement general optimisations of the production cycle. The solution validates text with OCR, while at the same time making it possible to see the label as an image and use image analysis for quality control. By taking a photo of the entire box, Danish Crown can see whether the box is disfigured and thereby monitor packaging operations.

"We can see whether the top of the box reaches the bottom, which it ideally should in order to make it easy to pack into a container. We can see which products have issues and make specific changes to them. We can also see packaging errors, giving a fact-based opportunity to instruct individual packagers to be more careful. Finally, we can identify structural differences, such as differences between day and night shifts, which make it possible to achieve best practice. When we use data in that way, we improve our quality as well as our output," Jørgensen explained enthusiastically.

The new system stores images of every product, thereby giving Danish Crown extremely detailed quality control documentation that can be used in the event of any complaints. By providing evidence of the quality with photos of every single product prior to shipping and requesting the same form of documentation from Danish Crown's Chinese customers, the company is able to handle complaints correctly, and accurately identify who is responsible for the error, such as the shipping agent.

Expected to be implemented at more production sites

The project has had a focus on discrepancies that can help Danish Crown improve its processes. An automated system can detect a lot of errors, but it's not all errors that necessarily matter or require action. With the data collected through the project in Blans, Danish Crown will learn more about which measures make a difference.

TriVision's focus has constantly been on ensuring that the solution is competitive and easy to implement, which is why the technical side has been developed in a way that requires no adjustments to the conveyor belt. Due to the massive integration with data from Danish Crown, and because it is a server-based system, the solution requires entering into a security agreement that ensures the software is regularly updated and that the latest features are always available. The agreement also ensures that the system data is backed up daily on an external and encrypted server, minimising production losses in the event of a system breakdown.

“The system is still in an early proof-of-concept phase, but we've begun to pull statistics from it which will allow us to carry out the production-related checks on the products and attribute any discrepancies to printing errors for instance, which are often caused by issues relating to the start-stop adjustment preciseness. We're able to immediately pinpoint if there's something that needs to be adjusted. This doesn't only benefit the factories; it's also an important sales argument Danish Crown can make to its customers, namely that it's not just a limited number of products that undergo quality control, but every single one,” said Jørgensen.

A solution with financial benefits

The SmartInspector project has been bought by Danish Crown as a proof-of-concept project, and is nearing its end as of the end of June 2018. The next step is to implement the SmartInspector system into the rest of the production cycle at Blans and build up the associated processes at Danish Crown that will allow its implementation at other factories via Danish Crown Factory Solutions. In connection with that process, and in general when implementing new and innovative projects, the management always asks whether the initiative will be worth it, which has also been a central question in this project.

“Imagine if we were to send a full container to China with erroneous labelling on the boxes, which would result in them refusing the delivery and fining us! If we only avoid a single incident like that, the investment will have paid itself off,” said Jørgensen.

For further information, please contact Managing Director Jesper Bach at bach@trivision.dk or on +45 41104282.

About Danish Crown

- Danish Crown is owned by 7,166 cooperative members
- The company has a total turnover of DKK 62 billion
- 25,000 members of staff worldwide
- Among the global top 50 FMCG companies
- World's biggest exporter of pork products

- Uses state-of-the-art machines
- Website www.danishcrown.dk

About TriVision

- Founded in 1999 in Odense
- Currently employs 10 staff and is in growth
- TriVision's systems check more than 10 million products every single day
- Website www.trivision.dk

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Steffen Jørgensen from Danish Crown (right) and Ole K. Neckelmann from TriVision, testing SmartInspector



Steffen Jørgensen (left) and Ole K. Neckelmann shake hands on a promising project