

The Contribution of Inspection Systems to Successful Track and Trace Programmes

Industries such as the pharmaceutical and parcel courier industry have been using track and trace systems for a few years now. During this time, they have learned a number of lessons that can be shared with other industries new to track and trace, including those involved with tax stamps.

One of these lessons is to ensure that critical data barcodes, such as the unique identifier on the tax stamp, are readable, accurate and unique, as they are the crucial components of any trace and trace system. If these barcodes are misprinted, missing or duplicated, or if the tax stamp is poorly applied to the product, then this can cause tracking and authentication issues downstream which can ultimately undermine the entire track and trace system.

In order to minimise the mis-application of these codes to tax stamps, the systems used to inspect the accuracy and print quality of stamps during production (as well as application to the product) need to be enhanced. Gone are the days when the only quality control a security printer needed to perform was that of checking static elements such as colour, print registration and security features. Today's printer is now expected to ensure the integrity and accuracy of all variable data – including unique identifier codes – on the printed item.

And when we say all, we mean all. It is no longer enough to inspect some tax stamps and not the entire batch. In order to meet today's stringent standards, each and every tax stamp – together with its accompanying unique identifier – needs to be inspected and verified, because just one defective stamp could undermine people's confidence in the entire system and open the door to counterfeiters. This need for 100% accuracy and integrity means that manual inspection systems – which are essentially based on using the human eye to detect errors – will not work, as they will never keep up with today's high-speed production methods.

In addition, it is crucial that inspection of the unique identifier code takes place right at the start of the process, during the production of the tax stamp itself.

Vision-based systems are the answer

A vision-based inspection system, such as Lake's *Discovery Multiscan*, can capture an image of every tax stamp, using the latest linescan cameras. The system checks that all key elements are present and in the

right place, simultaneously reads text and barcodes, and verifies each code against the central database for accuracy. This is done in real time and at press speeds exceeding 100 metres per minute.

Any stamps that fail the quality inspection process by being, for instance, unreadable or having mismatched data issues, are entered into a log. The log includes information on the precise location of the offending stamps, so that they can be removed, replaced or reprinted at a later QC stage. This guarantees 100% print quality inspection and variable data validation of all tax stamps before they are applied to the product.

Applying the tax stamp onto a product – be it a cigarette pack, liquor bottle or other items using high-speed application machines – can also be prone to errors. Mechanical or human errors can cause the stamps to be applied in the wrong location or miss the product altogether. Therefore the inspection system needs to ensure all stamps are applied correctly, as well as read the unique identifier from each pack, associate it with other product data (eg. EPC) and verify it before uploading the data to the central track and trace database.

Best practice case study – Michigan tax stamp project

The state of Michigan required an integrated tax stamp and track and trace system to be put in place to increase and automate its tax collections, increase supply chain visibility and provide mobile and online enforcement tools. In terms of scope, there were 54 application centres producing 450 million packs each year, with line speeds of up to 1,000 packs per minute.

The solution developed for Michigan was a track and trace tax stamp system where the digital stamp was created by OpSec Security, and the physical stamping was performed by two providers: Red Stamp and United Silicone. Lake Image Systems provided the cameras, scanners and software systems, and Xerox the eTRACS track and trace central database system.

A tax stamp inspection requirement was an integral part of the project from the outset, as opposed to being an afterthought – which is unfortunately so often the case with such projects.

The stamp production inspection took place at OpSec's label production facility, where a Lake Image Discovery Multiscan was installed on each label press, with multiple linescan cameras per system (the linescan cameras build an image line by line as the press travels forward).

Thousands of images were captured per minute and analysed at production speeds of greater than 200 feet (60 metres) per minute.



The system checked millions of tax stamps as they were produced, and verified the label stock before variable data was added. Once this was done, the QR code containing the unique identifier was checked for readability and the unique identifier was cross-matched against the database to identify defects such as duplicated, missing, damaged or out-of-sequence codes.

Any defects were then mapped onto what is called a 'roll map': a digital mapping of the printed roll with indications of problem areas.

The tax stamp application inspection was implemented at all 54 application centres across the state. The Discovery Multiscan was installed on each stamping machine and ensured tax stamps were placed on the correct cigarette pack, by comparing the packs to a daily 'approved brands' list from Michigan State. Any packs not meeting the requirements were rejected and not stamped. All 'good' packs were then stamped, captured and archived, along with associated order information, in Xerox's eTRACS system.

The project implementation took place between September 2014 and March 2015. By September 2015, over half a billion tax stamps had been produced and shipped to Michigan, of which 465 million had been stamped on products. At \$2 per pack in tax revenue, that equates to around \$930 million in collected revenue using this system. We believe that a robust and open tax stamp inspection system continues to make a significant contribution to the ongoing success of this project.

Lake Image Systems specialises in label integrity, data verification and print quality inspection. It has over 3,500 systems installed around the world, covering a wide range of market segments, with a heritage in transactional documents, and a strong presence in the labelling and tax stamp world.