# Implementing a Supply Chain Traceability Solution for a Supplier of Food Products to a Major Restaurant Chain

## Background

The Food Safety Modernization Act (FSMA) was passed by Congress and signed into law in 2011. One of the requirements of this act is to be able to rapidly trace back from defective food products to the source of the defects, which may be contamination of the ingredients or the packaging materials in immediate contact with the food. Another is to be able to rapidly trace forward from a source of contamination to all the effected food products in the supply chain, so that they can be quickly recalled.

Originally, the FDA and USDA expected to be given the additional resources to be able to inspect all the food production and growing facilities in the USA and overseas. Unfortunately, partially as a result of sequestration, Congress once again did not provide the funds for the actions that it mandated. As a result, the FDA turned to big box retailers and major restaurant chains and insisted that they enforce the FSMA requirements on their suppliers.

The FDA and USDA then translated the mandate of "rapid" recall of products into a 4 hour requirements for the retail organizations and restaurant chains to be able to assemble the needed traceability information for their supply chains.

Most food products manufacturers, who convert ingredients into processed food, and manufacturers of food packaging materials have done an excellent job in maintaining paper records that help ensure food safety. Unfortunately by the time that the 4 hour traceability time is parceled out amongst the supply chain participants, each participant only gets about an hour to assemble their materials traceability data.

This is impossible to do with the use of paper records alone. As a result, there is a need for each supplier to electronically assemble the necessary supply chain information and then to forward this up the supply chain. This can be done manually by entering the paper-records data into a computer and then manually collating and forwarding the data in the required form up the chain.

This need to convert paper records into electronic records can impose a large overhead labor cost burden on each supplier. It is also prone to mistakes, which unfortunately are only discovered at the worst possible time, namely when a major recall is required due to a source of contamination in the ingredients or, even worse, due to an act of bioterrorism.

The FDA's response to errors in traceability records, or the inability to produce these records within the requisite time, can be to order the recall of all food products that could possibly have been effected made in the last 3 years, which can easily drive a smaller food or packaging materials processer into bankruptcy and can cost larger processors or participants in the supply chain millions of dollars.

The FSMA regulations are also part of the "strict constructionist" Code of Federal Regulations, which means that owners and senior managers of manufacturers of food and food packaging materials can be held criminally liable for outcomes of failures in the food supply chain for which they are responsible, irrespective of whether or not they had criminal intent.

In addition, big box retailers do not want the legal liability and cost of a major product recall. Instead they want to be able to minimize the scope and cost of the recall by requiring their suppliers to have electronic traceability records.

## Specific Requirements

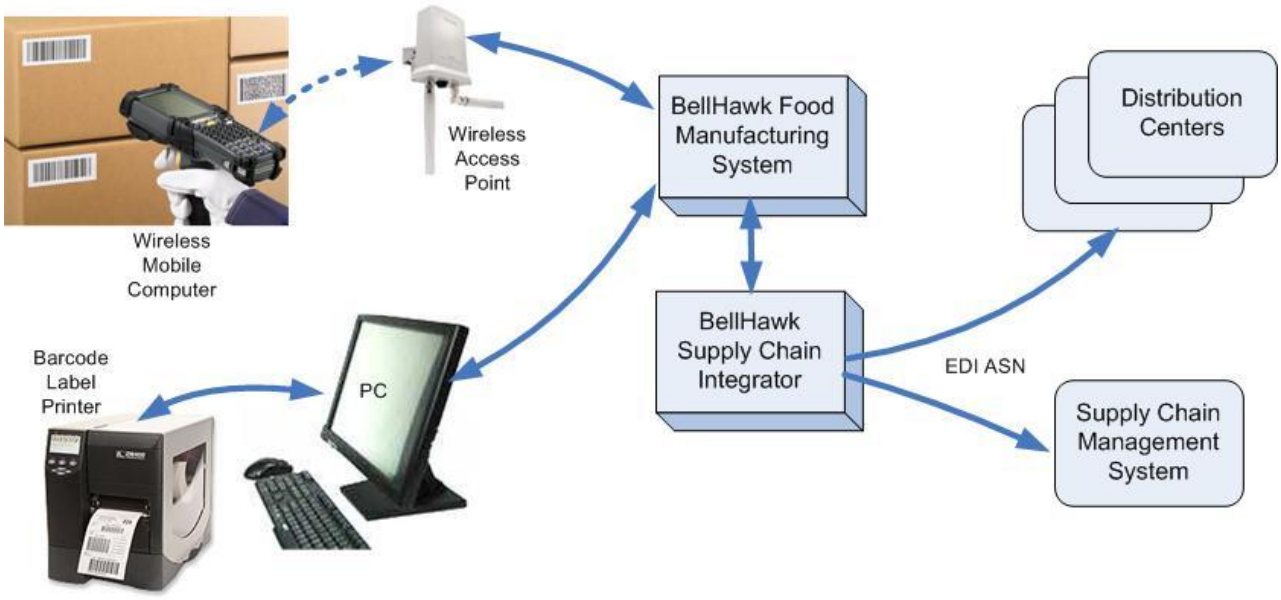
As a first step in this, the major restaurant chain required that all their suppliers of food and food packaging products place GS1 (Global Supply Chain One) standard "license-plate" Serialized Shipping Container Code (SSCC) barcode labels on each carton and pallet of products. They also required each supplier to forward an ASN (Advanced Shipment Notice) by EDI (Electronic Data Interchange) containing 36 separate data items for each case and each pallet, as well as information about the shipper and the truck/trailer used for delivery.

The ASN has to describe the make-up of each pallet as a "nested container" listing the SSCC codes for each carton packed on each pallet. Each ASN then has to be delivered electronically, to the third party logistics organization (3PL) running any one of 50 distribution centers (DCs) to which the products are shipped and also to the supply chain manager for the restaurant chain.

These ASNs have to be sent out essentially as soon as the truck leaves the dock door. The reason for this is that the pallet barcodes will be scanned and correlated with the ASN data at the time of delivery to the DC, to record the receipt of products into the DC. As, in the specific case we were dealing with, the nearest DC was less than an hour's drive away, the ASN for the shipment had to be sent right away.

As a result of all these requirements, it was decided to implement a system which, as much as possible, automated the data collection process and the generation and sending of the ASNs.

## System Solution



The solution was implemented using the BellHawk Food Manufacturing System (FMS), which is a special version of the BellHawk Manufacturing Execution and Warehouse Management System designed specifically for food processors and manufacturers of food packaging materials. This system provides end-to-end materials tracking and traceability capabilities that meet the FDA, USDA and HACCP requirements. It tracks raw materials from receiving through processing, packaging, picking packing and shipping in an electronic database, facilitating one-step forward and on-step backward traceability recall at the press of a button.


In this specific application, the data collection process starts with the preparation of the SSCC barcode labels to go on each carton of finished product, as they came off the processing lines. These labels are preprinted in the office and associated in the BellHawk FMS database with the product, quantity, batch number and other product related data.

After these SSCC barcode labels are attached to the cartons, the labels are scanned using ruggedized wireless mobile computers (with integral barcode scanners) to record each container into inventory. As part of this activity, the Bellhawk FMS automatically associates the data that was previously associated with the label (when it was printed) to the container to which it is now attached.

An SSCC barcode is also printed out for each pallet and attached to the pallet after it is shrink wrapped. This SSCC barcode is scanned as the destination of each of the cartons on the pallet, thus automatically forming the nested container record needed for the ASN.

The SSCC barcodes on the pallets are then scanned along with rack and floor location barcodes to record the put-away locations of the pallets in the finished goods warehouse.

Customer orders are used to generate barcoded picking sheets for each line item on the order. These are used to record the picking and staging of each order, ready for shipment.

If complete pallets are being picked, the SSCC barcodes on each pallet are scanned to record which pallet, and therefore which cases of which products from which batch, are being shipped to the designated DC for the customer.

If a mixed product or lot number pallet is being made up, then the SSCC codes of the cartons are scanned as they are picked onto a shipping pallet and an SSCC barcode is printed to go on the outside of the pallet after it is shrink-wrapped.

In this way each pallet is tracked as it is moved to the staging area. Once a truck or trailer arrives at the loading dock then the needed data about the truck is recorded and the picked orders are recorded as being loaded onto the truck by scanning a barcode on the picking sheet. Then, after a final check that everything is loaded, the dock door is closed in the BellHawk FMS.

At this point the BellHawk Supply Chain Integrator (SCI) takes over. This software is designed to monitor changes in the databases of multiple suply chain systems and automatically move relevent data to other systems.

In this case the SCI waits until the shipping supervisor has indicated that the electronic shipment record is correct. Then it gathers up all the information about the shipment and automatically

sends the ASN data to the destination DC as well as to the supply-chain manager in the designated EDI format.

In doing this, the SCI does a lot of data checking to make sure that all the required information is present and correctly formatted. If there are any errors, the system administrator is notified by Email so they can make any needed corrections, on-line, to the ASNs before they are submitted.

Much of the ancilliary data needed to be sent as part of the ASN, such as the Global Location Numbers for the manufacturer and each of the DCs, is captured using the BellHawk FMS' user defined parameter data capture. This enables users of BellHawk to specify additional data items to be captured on each screen without the need to customize the software.

It should be noted that the SSCC barcodes were not only used to identify the pallets shipped to the customer, which could have been done by manual "slap-and-ship" methods, but were also used as the "license-plate" barcodes to track pallets and cartons within the plant, thus ensuring consistency of data capture.

## Commentary

As a result of using the BellHawk software it was possible to complete the deployment of this solution in a few short months. The biggest technical challenge was developing the VB.Net code within the BellHawk Supply Chain Integrator (SCI) to gather all the data from the BellHawk FMS database and generate the EDI ASN submissions in the required format.

Fortunately the SCI has excellent built-in capability for automatically converting multiple levels of indirection in the FMS database into high level business objects and for automatically handling issues with missing or incomplete data. As a result, we were able to focus on getting the data into the correct format for the SCI to deliver to the specific destinations required for each order.

As a result of this project, all the needed traceability data from the producer to the DC and from the DC to each restaurant is captured electronically to facilitate rapid and accurate recall should problems arise. Furthermore, this was done without needing to add people to capture or process data, as all the data collection is done by material-handlers as part of their regular job.

Mistakes are also prevented, as the BellHawk FMS provides real-time point-of-action warnings to material handlers if they attempt to pick the wrong pallets or cartons for an order or pick pallets or cartons that have passed their expiration dates.

In future, it is planned to expand the system to make use of the full materials tracking and traceability capabilities of the BellHawk FMS. It is planned to track the receipt of ingredients and food packaging materials and their incoming quality control inspection. Then these ingredients will be tracked into mix batches, through cooking, and packaging, to join up with the above system as the products are packed into cartons.

This will then provide complete end-to-end traceability within the manufacturing plant and the delivery of the products through the distribution centers to the restaurants. It will include, where appropriate, capturing data about the harvester of ingedients and where and when they were harvested. This will then give complete "farm-to-fork" traceability through the supply chain,

including tracking what ingredients and packaging materials went into which products and where they went in the electronic supply chain.

## Author

The author of this white paper is Dr. Peter Green who has been implementing industrial operations tracking and management solutions for over two decades. Dr. Green is a domain expert in industrial automated data collection as well as in materials tracking and traceability. His team at BellHawk Systems has implemented nearly 100 systems for clients including manufacturers, food and pharmaceutical processors, biotech labs, and defense contractors, as well as systems for the US Navy and Air Force.

Dr. Green earned a BSEE and a Ph.D. in Computer Science from Leeds University in England. He was a Senior Member of the Research Staff at MIT and a full Professor at WPI. He is also a member of APICS and gives professional development talks about materials tracking and traceability.

Today, Dr. Green spends most of his time coaching, training and assisting implementation teams to enable them to successfully deploy operational tracking and materials traceability solutions.