



Tracking Products: An Industry Imperative

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Automotive and aerospace companies have a critical need to track and trace products. Serialization technology can help.

With products that must perform reliably in mission-critical applications, automotive and aerospace companies have a particular need to maintain complete control over their end-to-end supply chains. In the event of a quality issue with a specific batch of products, they need to quickly and accurately identify these products and execute a recall flawlessly. Product serialization technology, which enables the tracking and identification of items down to the item level, provides the answer. Learn why the world's leading automotive and aerospace companies leverage this innovative tool, and discover how you can begin to explore the use of product serialization in your own supply chain.

In terms of exacting supply chain management and uncompromising quality control, few industries face more significant challenges than the automotive and aerospace industries. Companies in these industries design and manufacture products that operate in mission-critical environments, where human safety is at stake. Not only do they need to carefully engineer and control product quality, but they also need to identify and recall products with quality issues quickly and accurately.

Consider the automotive industry, where recalls unfortunately occur with greater and greater frequency. In fact, according to the US National Highway Traffic Safety Administration (NHTSA), several of the biggest original equipment manufacturers (OEMs) recall more cars per year than they sell today¹. By August 2018, 50 models had been recalled in the USA during 2018². The number of affected vehicles and users for that eight-month period exceeded 200,000. The risk of liability and reputational damage posed to OEMs,

as well as the associated safety risk for consumers, demonstrates the critical importance of being able to track, trace and recall parts from across the entire value chain.

It's worth noting that OEMs are particularly sensitive to reputational damage. The Customer Satisfaction Index (CSI), a market measure of aftermarket service performance, is a big deal for original equipment manufacturers. The CSI determines the OEM's market rating, and it can influence both market share and growth. Product recalls significantly affect revenue and market loyalty.

Tracking and tracing parts are also essential activities in order to manage and control inventory. On average, a vehicle is made of 1800 parts³, yet auto dealerships want to reduce the number of stock keeping units (SKUs) held in inventory. Parts and accessories (P&A) support network partners also want to decrease their inventories. The high costs associated with space, the working capital tied up in inventory, the

obsolescence of parts and the frequent changeovers in models necessitate the need to limit spare parts inventories. This makes it important to have visibility into both historical and predicted demand, stock the correct inventory and optimize the number of SKUs carried. Tracking and tracing individual parts represent critical capabilities for precise inventory management and control.

In addition, OEM warranty programs require the replacement of parts in vehicles with OEM-certified parts. The market has seen a proliferation of “gray” parts (counterfeits or substitutes that may be substandard). Across the global automotive industry, the drive is on to eliminate gray parts from the supply chain, as they not only expose the consumer to product failure but also cannibalize OEMs’ after-market sales of parts and accessories.

In the worldwide aerospace industry, manufacturers need to manage both standard components and serialized components (or rotables) for aircraft maintenance. Serialized components have a serial number that helps keep track of these parts, which are usually rebuilt when they wear out. Serialized components are generally major parts that are life-limited in some way, whether by time, airframe/engine hours or airframe/engine cycles. Some examples are engines, hydraulic pumps, brake assemblies and spoiler actuators. Because of their critical nature, these are controlled parts that must have a paper trail that follows their movement, showing who worked on them and other important details.

Non-serialized or standard components are generally simple, cheap or single-use parts which do not require a serial number. Some examples are windows, structural fittings and floorboards. There are also “consumables” which only require traceability for each package or set, because they are generally one-use items. Examples include rivets, screws, bolts, O-rings, gaskets and cotter pins.

However, all aircraft parts, both serialized and standard, still must be traceable to the manufacturer by a lot or batch number. All parts are subject to recall, which means tracking and tracing processes must be optimized to better manage this process. Speed, agility and accuracy are essential in order to protect the brand reputation and human safety.

The tracking and tracing of parts also enable greater inventory visibility, which can speed up production time, support the processing of warranty claims, help manage customer repair orders and reduce inventory levels.

Effectively tracking products also helps address issues such as counterfeiting, diversion, product authentication, industry regulations and mandates. Globalization, outsourcing, the need to link disparate supplier processes and other sources of supply chain complexity only complicate the problem. As a result, automotive and aerospace companies need to better collect, track and trace the products and information that traverse their supply chains.

The solution: Product serialization technology

The clear solution is the implementation of product serialization technology. This capability enables manufacturers to uniquely identify products in the supply chain down to the item level, beyond the lot/batch level. It is implemented with tags, using either barcode or RFID (radio frequency identification) technology. Devices along the supply chain read these serialized tags and send information into manufacturers’ back-end systems. These systems feed data to a serialized management system, an integrated event management platform that tracks uniquely identified objects, as well as events relevant to those objects. By using this data to compare expected and actual events, companies can develop track-and-trace applications, identify exceptions and trigger alerts.





Serialization technology supports more accurate pinpointing of products and all their components, so manufacturers can accurately target the right products for recall.

As an example, imagine that, shortly after the launch of a top-selling car model, an automotive manufacturer realizes that the fuel tank design and the composite used in its welding, which originated in a specific plant, make the tank prone to explode in the case of a left-side vehicle impact. Obviously the company must recall all vehicles with expediency to protect consumer safety, while also avoiding a potentially devastating public relations impact. By leveraging serialization, the company could quickly and accurately recall only the units in question and ensure the installation of safe replacement parts. Executives could manage the resupply of the market within seven days, with virtually no back orders. This prompt and effective response would greatly reduce bad publicity and protect general safety. This type of efficiency and responsiveness saves lives and protects the company's bottom line. But it is only possible if the company is committed to supply chain optimization and having detailed data about all products, including their history and current location.

Conversely, across most industries today, companies typically manage their product materials at the batch level. They have limited visibility at the pallet, case or item level. While this seems to keep costs low and streamline data management, it simply does not provide the level of information granularity required to track products through the supply chain and reduce risks. For example, if a defect is discovered and the manufacturer uses a batch-level tracking approach, the only prudent way to recall the right items is to take back everything that was shipped within a specific timeframe. This means essentially clearing the entire supply chain of the product and making the recall wider in scope than necessary.

In today's international supply chains, products originate in one location, but then are shipped to multiple locations for finishing. This expansive geographic footprint exacerbates the problem of recall and containment in the event of product failure. In the auto and aerospace industries, this could mean recalling an entire fleet of cars or planes, rather than just those manufactured at a specific site. These extensive recalls add costs for the manufacturer and retailer in lost inventory and sales, while also damaging brand image and consumer confidence.

Along with its support for recall management, serialization also enables track-and-trace applications. Companies use these applications to automatically track the intra- and inter-enterprise movement and storage of finished goods, using barcodes or RFID tags. Products can be traced from receipt into inventory, and throughout the picking, packing and shipping processes.

Minimizing risk exposure via serialization

Equally important in today’s complex business environment, product serialization helps automotive and aerospace companies protect themselves against the risks of product tampering and product obsolescence.

These industries have complicated supply chains, involving multiple partners and suppliers, in which products constantly move. Unfortunately, the more a product changes hands, the easier it is to introduce tampering and other problems. This means that enterprises need the ability to trace the movement of goods in production at each stage in the process, including all activities carried out by contract manufacturers or third-party packaging sites.

In addition, manufacturers in the automotive and aircraft industries need to manage product obsolescence and monitor product life. It is especially critical to trace the maintenance and condition of parts that are subject to high levels

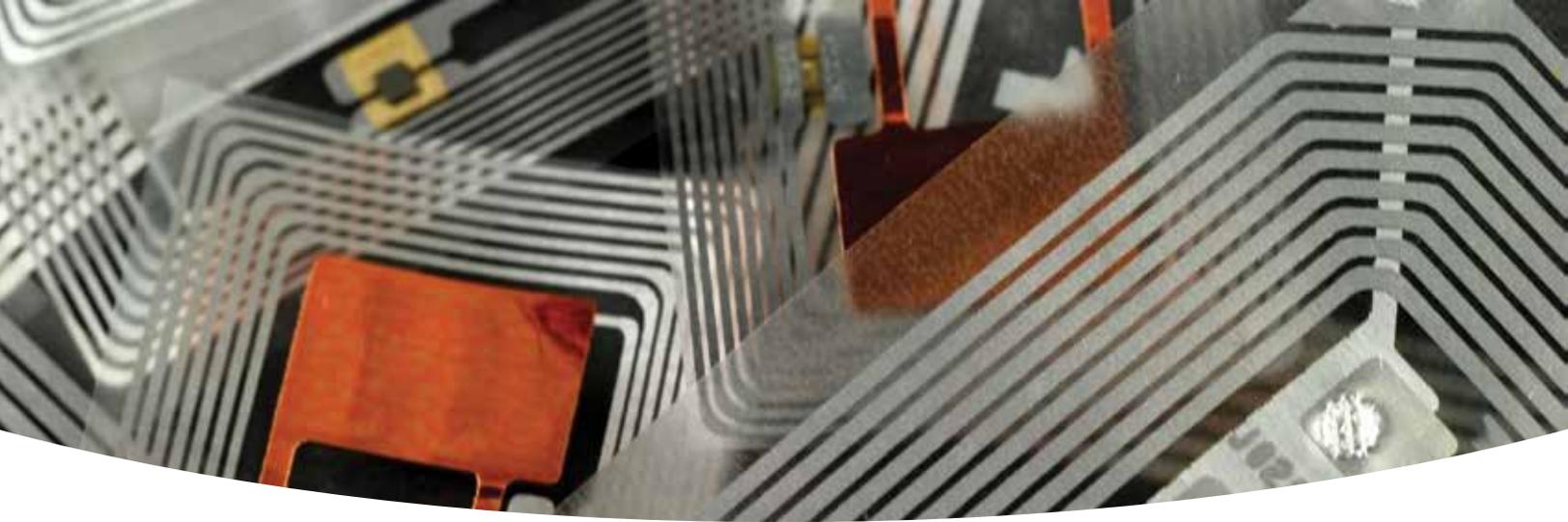
of stress and, especially in the aircraft industry, replace certain parts after a pre-defined number of service hours. By preventing wear-and-tear and fatigue-related damage, this practice ensures that parts are working effectively and supporting the plane’s safe operation.

With the introduction of 3D-printed parts, yet another element of risk has been added. These parts are generally produced outside the normal bounds of the supply chain, making them special targets for tracking, serialization and quality scrutiny. Parts distributors, as well as parts producers (or 3D printers), need to verify all the compounds used in the production of these parts.

Table 1 is a graphical demonstration of the many risks and opportunities inherent in automotive and aerospace manufacturing today. It also illustrates how product serialization can combat these threats and capture these opportunities, by supporting necessary capabilities such as product recall management.

Table 1: Required Capability vs. Benefits of Serialization in the Automotive and Aerospace Industries

Capability	Why You Need It	Benefit
Recall management	Recalling tainted or defective products is a challenge common to many manufacturing industries. If the distribution of batches or lots is not tracked through distribution and retail channels, the recall is potentially inaccurate, incomplete and costly, requiring a general recall of all products.	<ul style="list-style-type: none"> • Reduces impact of recall • Reduces time to complete recall • Improves or even saves the brand
Alerting	By alerting appropriate parties when things are not going according to plan, manufacturers can support early intervention. This relies on effective data collection and analysis. The sooner manufacturers realize something went wrong, the broader their options for mitigation and containment.	<ul style="list-style-type: none"> • Reduces costs/errors • Predicts problems before they happen
Process improvements	By analyzing auto-captured data, pharmaceutical manufacturers can continuously improve their end-to-end processes and identify issues such as excess dwell times, unnecessary handling and poor execution. The rise of RFID has enabled and encouraged the development of these types of analytic tools.	<ul style="list-style-type: none"> • Reduces overall cycle times • Improves quality • Increases productivity • Improves handling
Expiration management	For limited shelf-life products, the batch number can be used to determine product end-of-life (EOL) and help enforce management disciplines across the supply chain including: first expired, first out (FEFO); first in, first out (FIFO); or “no sell after sale date.” This may require various supply chain partners (e.g., third-party distributors and retailers) to capture, monitor, communicate and act on expiration data.	<ul style="list-style-type: none"> • Reduces obsolescence • Reduces returns • Improves replenishment planning and accuracy
Supply chain planning	Inventory visibility allows firms to better predict when and where to replenish products. It allows them to assess all types of merchandising issues, from displays to distribution patterns.	<ul style="list-style-type: none"> • Produces accurate and timely source data



RFID and serialization: A winning combination

Increasingly, serialization is being combined with RFID technology to increase the ease and accuracy of tracking products. Via RFID and serialization, companies can facilitate the authentication of serialized products by distributors or retailers, which provides manufacturers with real-time visibility into where a specific product physically resides at a certain time in the downstream supply chain.

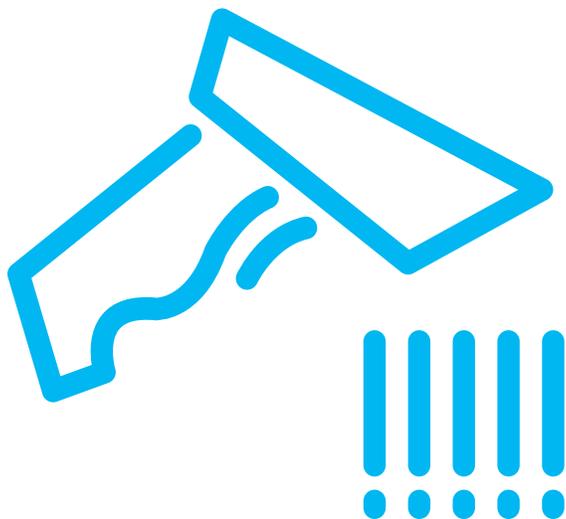
This visibility of data helps manufacturers recognize counterfeiting situations, identify obsolete products and perform targeted recalls. With regulations calling for a unique serial number on each saleable unit, companies can easily identify products at the unit level.

In addition, manufacturers not only have visibility into where the product physically resides, but they also have a record of the specific path it took to get there through the supply chain. This data is invaluable to automotive and aerospace manufacturers.

Serialization: A strategic capability

Creating item identification and then tracking those items through the supply chain can lead to incredible business benefits. Changing foundational processes to uniquely identify items down to the individual item level helps automotive and aerospace companies ensure a secure, traceable and auditable supply chain that meets all regulatory requirements and ensures product integrity, but is also highly efficient. Mass serialization has the potential to change the way companies do business by leveraging highly granular data to gain better insight into performance and results at all levels of the business.

Track-and-trace technologies deliver a positive return on investment (ROI) across the entire supply chain. The tighter the grasp manufacturers have on their supply chains, the better they'll be able to identify with pinpoint accuracy exactly which items are affected when problems arise reducing any negative impacts on the bottom line. Comprehensive track-and-trace solutions that integrate across the entire supply chain may be initiated by regulators, but businesses are seeing a significant return on investment because they are able to recoup the costs of these systems by reducing product recalls, enhancing consumer confidence in product quality and ensuring consumers' continued brand loyalty.



Getting started: Explore serialization for your business

For those companies new to the concept of serialization, the process of identifying and implementing the needed technology may seem overwhelming.

The good news is that Blue Yonder, the industry leader in supply chain management solutions, offers best-in-class serialization capabilities as part of its warehouse management solution.

Warehouse management offers two types of serial capture capabilities. The first is the ability to capture one or more serial numbers on a specific unit of measure (UOM) for an item number. The second is capturing three levels of unique inventory tracking at the license plate (barcoded) number (LPN), sub-LPN and detail-LPN levels. These levels typically equate to pallet, case and item:

- The LPN is typically linked to the pallet, and Blue Yonder also enables the tracking of the serial shipping container code (SSCC). This allows the pallet to move within the warehouse, while carrying all underlying serial numbers of the aggregation.

- The sub-LPN is typically linked to the case and carries a unique case identifier. This supports the ability to inherit all underlying serial numbers when the case is picked or replenished.
- The detail-LPN is typically linked to each item (a single SKU), where the serial number is the unique identifier for the individual unit.

The two generally accepted approaches to managing serial number tracking are **Cradle to Grave** and **Outbound Capture Only**. Both are supported by Blue Yonder's serialization technology. Blue Yonder technology supports serialization with tracking and tracing of SKU at the level of pallets, cases and eaches (single SKUs).

Through a strategic partnership, Blue Yonder also supports the processing of large volumes of aggregated serial numbers. The serialization capabilities in the warehouse management solution allow for integration and data exchange with other platforms that support data analytics, as well as tracking and tracing capabilities.

1 <https://livingsafelyrecalls.wordpress.com/2018/08/16/nhtsa-august-2018-vehicle-recalls-59-us/>

2 <https://livingsafelyrecalls.wordpress.com/2018/07/20/nhtsa-july-2018-vehicle-recalls-50-us/>

3 <https://www.reference.com/vehicles/many-parts-average-car-84981ee597c85b91>