Transactional Identification

I have six honest serving men
They taught me all I knew
There names are What, and Where and When;
and Why and How and Who.

- Rudyard Kipling (1865-1936)

With apologies to the celebrated English poet and author, the supply chain submits that a seventh honest man is missing whose name is "Which". And as in Macbeth there are three "Whiches": "Which one", "Which group", and "Which container". For these seven "questions" underpin the very heart of the supply chain, traceability, tracking, and chain of custody.

WHO	Individual	ID Card symbol
WHAT	Product code	Product Symbols
WHICH (Item)	Unique item	Serial Number
WHICH (Group)	Specific group	Lot / Batch Number
WHICH (Container)	Package ID	License Plate
WHERE	Location (Storage/ Postal/Lat Long Alt)	Location code
WHEN	At what time	Time Stamp
HOW	Method	Menu or Traveler
WHY	Authority	Purchase Order/ Work Order

Where

Under "Where", above, Latitude / Longitude / Altitude are suggested. Such a designation of location can be ascertained, without a database, and with equipment that is widely available commercially (GPS).

1 degree of latitude and longitude is equivalent to approximately 110 000 meters, depending upon one's location on the earth where, because of its spheroid shape, a degree is of greater distance at the

equator than at the poles. Degrees can be reduced to minutes (1/60th of a degree) and then seconds (1/60th of a minute) to where a second of latitude or longitude is approximately 30.56 meters. Resolution below 30.56 meters requires positions to the right of a decimal point for seconds. Likewise, we can decimally represent all portions of a degree where six significant digits one can achieve a resolution of 0.11 meters. Secondly, many representations of latitude and longitude include either a North / South designation for latitude and an East / West designation for longitude. Alternately, some designations of South latitude and West longitude are differentiated from their North and Eat counterparts by a "-" (minus) prefix. Finally, the tallest building in 2010 is 828 meters, though plans do exist for structures greater that 1 000 meters in height. Consequently, the format recommended by this standard for Latitude / Longitude / Altitude is xnnn.nnnnnn/xnnn.nnnnnn/nnnn is in a range of 17 (intersection of the Prime Meridian with the Equator) to 30 characters. The "x" value is to permit the inclusion of a "-" (minus) prefix for South latitudes and West longitudes. The "-" (minus) prefix, "." (decimal point), and "/" (solidus) are explicitly encoded.

Data Identifiers

However, in order to associate which field of data belongs to which "honest man" a need exists to somehow flag that specific field of information.

In 1981 the United States Department of Defense issued The Final Report of the Joint Steering Group for Logistics Applications of Automated Marking and Reading Symbols (LOGMARS). This report concluded a four-year study of the use of bar code technology in a wide range of defense logistics operations. Immediately following this report came military standard MIL-STD-1189, defining the official Standard Defense Symbology (Code 39). The department also revised MIL-STD-129 which required all suppliers of defense logistics material (more than 25,000 of them) to commence marking all individual containers, inner packs, and shipping containers with a bar code representation of the National Stock Number (NSN) assigned to

the product. Additionally, MIL-STD-129 also required that each shipping container contain the code, in the standard defense symbology, of the Contract Number under which the material was procured. Shortly thereafter, the General Services Administration (GSA) followed suit with the issuance of a revision of FED-STD-123 requiring that all products being shipped to GSA also follow the marking requirements detailed in MIL-STD-1189 and MIL-STD-129. Both the NSN and the Contract Number were 13 characters in length. They were differentiated by their location on the label, data area title, and the contextual data content.

Also, in 1981 the Distribution Symbology Study Group issued its report, *Recommended Practices for Uniform Container Symbol "UCS/Transport Case Symbol/TCS",* following a similar four-year effort regarding the direct printing of bar codes on corrugated containers. This UCS/TCS report recommended that two bar code symbologies were strong candidates for direct printing on corrugated. These were Interleaved 2 of 5 and Code 39. The Interleaved 2 of 5 section of the UCS/TCS report ultimately became the U.P.C. shipping container symbol (ITF-14) adopted by the retail industry, and Code 39 became the favorite of many other industries, primarily due to its variable-length and alphanumeric capabilities.

At the same time as the LOGMARS and UCS/TCS reports were being published, a non-profit trade association group of North American automobile manufacturers and suppliers was being formed with the stated objective of increasing industry-wide productivity and competitiveness through a cooperative effort between manufacturers and suppliers. Named the Automotive Industry Action Group (AIAG), this group has published numerous standards relating to communications between trading partners.

The Automotive Industry Action Group is the organization responsible for administering trading partner communication standards within the automotive industry.

When the Automotive Industry Action Group adopted the AIAG Shipping/Parts Identification Label Standard (AIAG-B-3). AIAG

recognized the need to identify a wide range of "things" for a wide range of applications, and consequently AIAG-B-3 not only specified label format, location, and protection but also introduced the concept of "Data Identifiers." A data identifier defines the general category or intended use of the data that follows. In the AIAG standards and subsequent standards that were issued by other organizations, data identifiers are positioned as the first character(s) immediately following the start code of the Code 39 symbol.

When AIAG B-3 was first published, 12 data identifiers were defined. By 1987, with the prior issuance of AIAG-B-2 Vehicle Identification Number Label Standard (1985), AIAG-B-4 Individual Part Identification Label Standard (1986), AIAG-B-5 Primary Metals Identification Tag Application Standard (1986), and internal applications identified by AIAG, this list had extended to 32 data identifiers as published in AIAG-B-6 Data Identifier Dictionary Standard.

Three problems faced the automotive industry and its suppliers:

- There was no industry-wide common method of identifying suppliers. This led to the second problem.
- In the absence of a common supplier identity, each customer specified that the shipping labels and individual parts encode the customer's part number (not the supplier's). Even within the same company, different plants had different part numbers for the same product from the same supplier. In one example, a supplier to one of the major automotive companies shipped the same product to 13 different plants, each requiring that the items being shipped be labeled with the part numbers unique to that plant.
- The automotive industry standards were designed by and for the automotive manufacturers. Companies that considered themselves part of other industries, e.g., the electrical and chemical industries, adopted their own standards independent and sometimes different from those of some of their customers (the automotive industry). The Automotive Industry Action Group had no interest in administering the standards of all of

their suppliers' industries. Nor was it likely that these other industries would want AIAG to administer their standards.

A specific case in point was that of the electrical industry. The 1987 standard of the National Electrical Manufacturers Association (NEMA) permitted the use of Code 39 with data identifiers for product labeling, which conflicted with most of those assigned by AIAG. Then it came time for an electrical manufacturer to ship product to the automotive industry. Since the automotive company was the customer, it might appear straightforward to those wearing sales/marketing hats that the manufacturer simply mark the product the way the customer wants to receive it. This denies two important considerations of communications between trading partners.

- The concept of trading partners presumes that both parties, customer and supplier, will benefit from adopted standards - not simply that the supplier benefits from securing the customer's business. Shipping labels are obviously applied after the order is picked and the customer is known. But individual parts are most cost-effectively marked on the packaging line before the customer is known. If the supplier is to benefit from bar code marking, bar code structure on individual parts needs to encode the supplier's product-specific data.

- Software designed for the supplier's shipping area will likely utilize the Data iIdentifiers for edit checking to ensure that the correct symbol is being read. Scanning an AIAG customer assigned product ID symbol may be interpreted by the shipping software as a NEMA purchase order. Scanning an AIAG master label symbol may be interpreted by the shipping software as a NEMA manufacturer ID.

In November 1987, the Federation of Automated Coding Technologies (FACT) invited individuals representing various standards-making activities to attend a January 1988 meeting to discuss issues related to cross-industry commonalty of data identifiers used in automatic identification technologies.

The increasing popularity of data identifiers (also called "field identifiers") in industry-wide bar code standards had begun to create conflicts between data identifiers in various industries. This situation carried the potential of adversely impacting the further development of industry-wide standards and threatened the integrity of existing ones.

Prior to this meeting, the major burden of coordinating data identifiers (DIs) had been borne by the Automotive Industry Action Group. Working with industries that had contacted them for advice, the AIAG managed to guide the development of a number of standards that could coexist with established AIAG DI assignments. The Automotive Industry Action Group was not, however, a national DI clearing house and requested that the Federation of Automated Coding Technologies (FACT) assume this responsibility.

FACT recognized the importance of the work done by the AIAG and the appropriateness of FACT's assuming this responsibility. A Data Identifier Work Group was formed to examine existing standards and to produce materials that would provide guidance to standards-writing industries in order to permit coexistence of standards from all industries.

The Data Identifiers recommended within the FACT DI Standard were developed to provide guidance to organizations considering the development of standardized data element identifiers within a specific firm, organization, or industry. The FACT DI Standard was intended to provide guidelines for the development of application standards. In 1991, the American National Standards Institute (ANSI) formally approved ANSI FACT-1-1991 Data Identifier Standard as an American National Standard. Data Identifiers were specified by FACT as a specified character (or string of characters) that defines the general category or intended use of the data that follows. Data Identifiers can be either a single alphabetic character, e.g., "S" for serial number, or an alphabetic character preceded by one, two, or three numeric characters. In early 1990 FACT submitted the *FACT Data Identifier Standard* dated 2 October 1989 to the American National Standards Institute (ANSI). This standard was approved in

1991 and was published as *ANSI/FACT-1-1991.* In 1993 the AIAG concluded that since *ANSI/FACT-1-1991* was an accepted American National Standard and since the AIAG Data Identifiers were included in the FACT-1 standard, the maintenance of a separate list for the automotive industry was unnecessary. Consequently AIAG withdrew its B-6 standard in 1993.

Prior to the approval of *ANSI/FACT-1-1991*, the Uniform Code Council (UCC) appealed the issuance of this standard to ANSI. The UCC claimed that since FACT-1 did not include the UCC/EAN Application Identifiers, it should not be a national standard. The UCC lost its appeal. So as to preclude further UCC objections to the FACT-1 standard, the officers of FACT and the UCC agreed in April 1992 to develop a standard to replace FACT-1. This standard would address the Data Identifiers (DIs), Application Identifiers (AIs), and the mapping of DIs to AIs.

In May, 1992, the theretofore sponsor of FACT, AIM USA, decided to no longer fund administrative support for the FACT organization effective December, 1992. The ANSI MH10/SC 8 subcommittee agreed to undertake the stewardship of the FACT-1 document and its revisions.

The revision of FACT-1, including the Data Identifiers, Application Identifiers, and the mapping of DIs to AIs was published in 1995 as ANSI MH10.8.2 *Data Application Identifier Standard*. In 1995, the Application Identifiers achieved ANSI standardization in their own right as ANSI/UCC 4 *Application Identifier Standard.* In August 1996, as ANSI MH10.8.2 was in the process of being proposed as an international standard, UCC's international counterpart, EAN International, proposed that the Data Identifier and Application Identifier standards be separated as individual entities. Since many considered the mapping of Data Identifiers to Application Identifiers and vice versa was an important feature of the MH10.8.2 standard, it was decided to retain the current GS1 Application Identifiers and Mapping within the MH10.8.2 standard but that GS1 would issue the definitive document on Application Identifiers within their yearly published *GS1 General Specifications*.

The MH10.8.2 standard can be found at the following URL:

http://www.autoid.org/ANSI_MH10/ansi_mh10sc8_wg2.htm

Product Coding

Why Would a Supplier Not Wish to Use the Customer's Part Number?

The most cost effective point at which to mark a product is on the production line. At any other point in the distribution of the product, containers must be opened and labeling then applied to the individual items as well as the shipping container. The point at which the customer is known is at order fulfillment, not at the packaging line. Some, though very few organizations manufacturer items to order, but most in this century will continue to build to stock. To use the customer's part number when marking product, concludes that marking will occur only when the customer is known. To wait until the customer is known, in most cases, denies the supplier the opportunity to take advantage of machine-readable markings between the packaging line and order fulfillment. Marking product at order fulfillment means a post-production process that is far more costly than marking product on the packaging line.

Why Would a Customer Not Wish to Use the Supplier's Part Number?

As explained below, supplier part numbers have historically been variable length, alphanumeric, with embedded significant special characters. Customers know what they call an inbound product; they ordered it. However, they may not know how the supplier identifies this product. Regrettably most EDI conventions first implement the Purchase Order (850) not the Catalog (832); therefore the customer orders based on their stock keeping unit (SKU) code, not the supplier's. To employ supplier part numbers may mean that the product database to support incoming product must support a product code length equal to the longest part number of any supplier. Therefore, all product code fields would need to be equal in length to the longest part number; and while memory may be cheap, memory management is not cheap. Additionally, supplier A may have one part number and supplier B the same part number. Without some way to uniquely identify the manufacturer, confusion may develop between

the part number of supplier A and that of supplier B. If customers were going to use supplier part numbers the suppliers' part numbers would need to uniquely identify the supplier as well as the product.

Trading partners should consider a supplier assigned, fixed-length, numeric or alphanumeric, check-digit protected product codes, which includes the identity of the manufacturer. That system already exists in GS1 and HIBCC.

Supplier vs. Customer Product Codes

Two types of product coding structures are typical. The first product code is one that is for general trade. General trade products are those where multiple customers receive the same product. The second variety of product code is one that is unique to a specific customer, i.e., a custom product.

Manufacturers with product destined for the general trade should mark their products with the manufacturer's product code. Either the manufacturer's product code or the customer's product code could appear on custom product. Mutual agreement between the trading partners should dictate which product code to use for custom product.

Some customers may request unique marking of product shipped to that customer. If the product is unique to that customer, such requests are reasonable. Suppliers should endeavor to provide bar code markings consistent with reasonable industry standards. Suppliers should communicate their part numbers and supplier identification to their customers. ANS X12 EDI Transaction Set 832 (Price/Sales Catalog) or UN/EDIFACT Message PRICAT (Price-Sales Catalog) may best serve this trading partner communication. Likewise, to most electronic purchase orders the supplier returns a purchase order acknowledgment (X12 Transaction 855 or UN/EDIFACT Message ORDRSP). Each of these has numerous ways to identify a product. Suppliers may wish to consider including within a Purchase Order Acknowledgement the customer's part number and the supplier's product code. Customers requesting customer-specific marking of general trade should be made aware

and asked to defray the supplier's cost of marking product specifically for that customer. These costs include the additional cost for handling, labels, ribbon, amortizing equipment, label application, and profit margin. Since in all likelihood the customer is not known for general trade product at the point of packaging, supplier product codes are the only cost effective method of bar code marking.

An example of the costs associated with uniquely marking products for customers is the experience of a major electrical manufacturer. One of their large customers, an industrial distributor, insisted that the manufacturer mark each product with the customer's part number, even though the products were already marked with U.P.C. The manufacturer's finished goods inventory was on pallets. So to comply with this customer's request the manufacturer had to break the pallets, open the cases, open the inner-packs, re-label the products, re-label the inner-packs, re-assemble and re-label the cases, and re-build and re-label the pallets. An analysis of this activity based cost disclosed that the manufacturer spent in excess of $100,000.00 per year, in labor alone, to re-label for this single customer. These costs did not include the dedication of a separate packaging line within the warehouse for this customer, labels, ribbons, software, and hardware.

Figure 1 shows an example of the problems associated with customer-specific marking. Each of the four suppliers sells one product to each of the four customers. If the trading channel uses supplier product codes, there are four codes. If the trading channel uses customer product codes, there are 16 codes. Customers who have an internal number to identify the product may establish an alias to identify that product. The database can have two indices, supplier code and internal code (alias). The input of either number can access and update the status of the physical product. The use of supplier product codes, internally and within the trade channel, limits the number of codes to the number of products in the channel. Establishing customer aliases doubles the number of codes. The use of customer product codes arithmetically raises the number of codes used within the channel linearly by the number of customers within the channel.

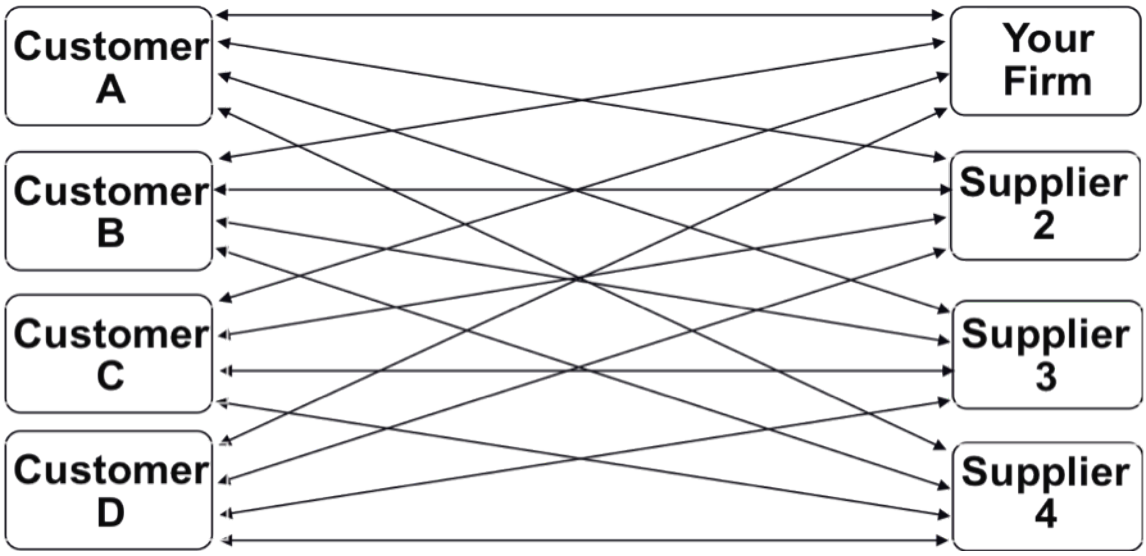

Figure 1 - Customer vs. Supplier Part Numbers

If four products are traded between buyers and sellers, the use of customer part numbers realizes 16 codes whereby with supplier part numbers, only 4 part numbers are needed.

Alphanumeric vs. Numeric Product Codes

Coding structures can be either numeric or alphanumeric. The rationale for most alphanumeric structures is to establish some form of intelligence within the coding structure (Significant Coding). This intelligence may provide a specific meaning for a character string in given positions. Alternately, the intelligence may require more than the 10 possibilities for any given character position available with numeric coding. Oftentimes, the claim is that this intelligence provides human understanding of the elements of the code. However, if human recognition is desired, it makes more sense to include a product description on the label as opposed to expecting the person to decipher the code. Most alphanumeric systems have good intentions. As time passes, the needs of the enterprise violate these "coding systems." Invariably, instead of violating the coding system, the enterprise increases the length of the field by one or more positions. It is such practices that give rise to product codes of such a length as to be unreasonable. Such modification requires all persons within the enterprise, working with product codes, to re-learn the

structure.

To be fair, however, if systems are in place to receive alphanumeric product codes, more permutations are possible with alphanumeric codes (Base 36) that with numeric ones (Base 10). In Table 1 we can see the number of possible permutations up to 5 character positions.

Number of Character Positions	Numeric Permutations	Alphanumeric Permutations
1	10	36
2	100	1,296
3	1,000	46,656
4	10,000	1,679,616
5	100,000	60,466,176

Table 1 – Numeric vs. Alphanumeric Permutations

The coding structures designed for the 21st Century will be codes that reference a computer database. Companies using alphanumeric part numbers may not need to abandon them. People may still care to use them. Many contemporary systems now employ codes that reference a computer database. The intelligence of the code exists within the computer system. Computer databases can contain alternate part numbers, or "aliases." A numeric code "key" can provide the benefits of numeric coding without requiring any change to information exchanged between humans. Coding therefore may be non-significant. A common form of non-significant coding is that of sequential numbering. When manually entered, fewer errors occur with keying numeric structures than with alphanumeric structures. Keyboards for numeric entry are simpler, easier to use, and less costly. Processing of numeric strings of data is more efficient for computer systems than are alphanumeric strings of data.

Fixed Length vs. Variable Length Product Codes

Computer systems that utilize variable length product codes (product codes from numerous suppliers) must establish data field lengths that can support the longest code that may be input to the computer.

Oftentimes, the maximum field length supports only one or a few products. Efficiency in memory management suffers when a majority of the data fields must support unused character positions. Editing fixed length fields, to ensure the correct number of characters were entered, is easier than editing variable length fields. Data manipulation of fixed length fields by computer systems is more efficient than variable length fields. In 2010 we are seeing arguments that certain industries want up to 50 alphanumeric characters. The key-entry of such codes, for back-up purposes when the bar code is unable to be used, is so error-prone that it should not be considered.

Check Characters

Today, popular two-dimensional symbols have error correction in addition to error detection. Regrettably, popular linear symbols and RFID have only error detection. However, it is possible to implement certain symbologies without error detection — that is a mistake. Linear symbols and their back-up human readable data should have a check cipher to ensure that the data that was entered was correct.

Determining When Product Codes Should Change

Product code changes should occur only when the change in a product is significant. If a change involves minor differences, and the new product is a replacement of the old, and the production of the old product ceases, the product code does not change. However, if the customer expects to be able to distinguish the new product from the old (such as a new version of software) and order accordingly, the enterprise should assign a new product code to the product.

Duplicate Product Codes Within Multiple Suppliers

Product codes may not be unique. Several suppliers may use the same code for different product. This can create major problems for distribution and end-user systems. To ensure uniqueness, the product code should include the identification of the supplier. Each industry conceivably could establish an agency to administer supplier identification schemes for their industry. This would presume that vertical industries truly exist and that there would be no crossover of

product between industries. At this point in time, there are few, if any, vertical industries. Electronics suppliers ship to health care product manufacturers, automotive industry manufacturers, computer system manufacturers, and to other electronic industry manufacturers. The same multi-industry shipments also exist in chemical, primary metals, office products, computer products, media/supplies, sanitary products, furniture/furnishings, taping, adhesives, institutional foods, telecommunications, and graphics. Unique identification is provided in the ISO/IEC 15459 suite of standards. Part of this unique identification is an Issuing Agency Code (IAC) and a Company Identification Number (CIN). This IAC/CIN combination can be associated with products & product packaging, transport units, and returnable transport items. In using Data Identifiers, this IAC/CIN combination can be found in 25B (for containers), 25S (for items), and J (for transport units). The use of these structures is highly recommended and provide the base of many supply chain application standards.

Product Code Recommendations for the 21st Century

- Unique Product Code,
- Supplier Product Code,
- Non-significant Product Code,
- Fixed Length Product Code, and
- Product Code Includes Unique Identity of Manufacturer

The GS1 Standards - For Identification of General Trade Products

GS1 is a nonprofit organization responsible for the administration of the Universal Product Code (U.P.C.) initially designed to serve the retail and distribution environments. The GS1 system enables unique identification on a global basis for industries providing products for general distribution. Based on the requirements of its global constituency, GS1 released expanded sets of Application Identifiers

(AIs) in 1990 and 1991 thereby permitting encodation of a wider range of secondary information within GS1-128 applications.

The GS1 system is the identification standard for general trade products where the same product in the same packaging is sold to multiple trading partners in multiple industries. ANSI MH 10 Data Identifiers are analogous to the GS1 AIs and have been implemented by the automotive, electronic, telelcommunications, and other industries.

UCC Primary Product Identification

Primary identification is a coding structure that identifies the supplier of the product and a code for item identification. Primary identification at the item level has been achieved in industries that support the GS1 standards through a 14-digit Global Trade Item Number (GTIN-14) when represented either in a 12-digit U.P.C. symbol or a 13-digit EAN symbol, when stored in a 14-digit field, zero filled to the left. Primary identification at the multi-pack level has been achieved in these industries through the GTIN-14 coding structure for standard count multi-packs of the same product. This is often encoded in a 14-digit (including check character) Interleaved 2 of 5 (ITF-14) symbol.

The fixed length, numeric U.P.C., EAN, and GTIN-14 structures have become bar code standards in many industries where the same product is shipped to many customers in multiple industry sectors. If the manufacturer ships product in grocery, mass merchant, general merchandise, home improvement, or any other retail distribution channel the GS1 standards may be used for both primary identification and secondary identification. Increasingly, some industrial and commercial (non-retail) channels are adopting GS1 standards.

The GS1 standards for item and shipping container identification emphasize the supplier's product number, so product ID may be consistent and independent of the receiving trading partner and the industry or industries in which they participate. With very few exceptions, such as "Ship To: " and "Purchase Order Number" AIs,

customer-specific information is looked up or cross referenced at the receiving end. This enables the supplier to mark one way for all trading partners.

GS1 Attribute Identification

GS1 developed a Code 128-based serialized shipping container standard and supplementary identification coding architecture. This standard and associated architecture includes all-numeric qualifiers - Application Identifiers (AIs) — analogous to the alphanumeric MH 10 DI approach. The Application Identifiers (AIs) are an integral part of the GS1 structure. The GS1 Application Identifier standard provides for both numeric and alphanumeric fields, where required (such as, batch number, serial number, customer purchaser order number).

GS1 attribute identification is a coding format that identifies additional product or order information. Secondary identification information can be printed in GS1-128 (a subset of Code 128) containing all numeric Application Identifiers (AIs), which define the structure, format, and intended use of the data that follows. Product specific information is information known at the time of manufacturer and includes serial number, lot/batch number, and expiration date. Order specific information is information known at the time of order fulfillment and includes purchase order number, ship to location, carrier-assigned PRO number, and Serialized Shipping Container Code. Likewise, product (GS1 key) and attribute data can be carried in other data carriers as well, e.g. Data Matrix, Databar, and EPC.

Since their introduction in 1990, UCC/EAN-128 AIs for secondary identification have become the standard for a number of industries currently using U.P.C. and EAN for primary product identification.

FACT DIs for Custom- or Custom Engineered Product

Variable-length, alphanumeric product and shipment coding structures in the linear bar code symbology Code 39 or Code 128 have become standard in situations where a unique product is manufactured for and shipped to a specific customer. In this environment, the MH 10 DIs serve the customer specific identification

needs very well.

FACT DIs for Serial Numbers

Many industries serialize their product and include bar code markings that encode the product serial number. Historically, these serial numbers have been variable length, alphanumeric, and encoded in Code 39. It is anticipated that many manufacturers may migrate their serial number encodation to the Code 128 symbology over time. When Code 39 is used, it is recommended that the MH 10 Data Identifier "25S" be used to identify a serial number (“25S” includes both the serial number and the Company Identification Number). When GS1-128 is used, the Application Identifier "21" is recommended for the same purpose. Retailers and non-retail distributors of serialized product should be able to scan both symbologies and make use of both the DI and AI options for product serial numbering.

Industrial Raw Materials

For raw materials used in a single industry, particularly where process information is important to the customer, industries may develop their own specifications for identifying items produced, shipped, stored, or consumed. Industries should collaboratively take requirements of each stage in the distribution chain, particularly the end-user, into account in developing these specifications. They may result in a structure or approach different from the product coding recommendations listed above, but the principles of supplier rather than customer identification still apply. Where industrial raw materials may also be offered in the general trade or retail marketplaces, industries should consider the GS1 structures described above.

ANSI MH 10 DIs for Internal Applications

There are many more identification schemes than the simple identification of product, which must also be addressed. There are structures for returnable containers, storage locations, employee identification, and many of the other identification formats, which have been addressed in the MH 10 Data Identifier Standards (ANS

MH10.8.2). It is for the benefit of lower cost software products to aid in the data collection process that these internal structures must be addressed.

Customer Databases That Require Customer Part Numbers

It is recognized that many existing databases and application programs require that the data presented must reference the customer's part number. One possibility would be to provide the product with the supplier's part number. On the master carton label or shipping label a label could exist which would contain the customer's part number(s) for the product contained within the carton as well as the associated supplier part number. Customer part numbers are supported in both MH 10 DIs (DI "P") and GS1 AIs (AI "241"). One could distinguish one part from another by either MH 10 Data Identifiers or Product ID Qualifiers in ANSI X12 (DE 235) or UN/EDIFACT (UNTDED DE EN 27372 7020) formats. Substantial label space could be eliminated if this associated information was encoded in PDF417.

Which Structures should a Manufacturer Use – GS1 or MH 10 DIs?

Some manufacturers sell product only to industries embracing MH 10 DIs. Other industries sell product only to industries embracing the standard of GS1. Such product should be appropriately marked. Manufacturers selling specific products to both industries should consider migration toward the GS1 standards.

Those implementing data collection standards should seriously consider what information is known when the various coding structures are assigned, e.g., a batch number is known at the packaging line where a purchase order number is not known until order fulfillment. Further, a supplier's part number is known at the packaging line while a customer's part number is not known until order fulfillment, except where the product is manufactured in a unit-level-specific build-to-order environment. Customer receiving areas would like each product received to have the customer's part number

on the product. This may, in effect, either deny the supplier the opportunity to use the machine-readable coding within their own pre-order fulfillment operations or increase the cost for labeling product with the customer's part number. Information cross-referencing supplier and customer part numbers may be best served through the use of an electronic data interchange purchase order or price/sales catalog process.

A case in point is a truck engine manufacturer who, like others in the automotive industry, required their part number (customer part number) on all items and shipping documents. They were the customer and believed that the supplier should mark items in a manner to facilitate the customer's receiving operation. This process continued until this engine manufacturer began receiving orders for filters from automotive aftermarket distributors, each requiring the distributors part number. Suddenly, the engine manufacturer understood the benefit of supplier part numbering.

The principal downside to adoption of the GS1 data structures is the need for a GS1 Company Prefix, which would cost most automotive suppliers over $20,000.00 per year. This may be hard to justify when the use of a government CAGE code or Dun & Bradstreet number (DUNS) cost nothing.

All industries may wish to carefully consider the efficiencies and data format simplicity of the GS1 coding structures and their associated cost. The exchange of customer part numbers via electronic data interchange and machine-readable data encoded with the supplier's part number should be carefully considered by any standards development work anticipating a recommendation for customer part numbers on individual products. New standards for products, which are supplied to multiple customers in multiple industries, should carefully weigh the benefit of the GS1 AIs for product attribute coding against the cost of GS1 membership. Existing standards for products, which are supplied to multiple customers in multiple industries, should seriously consider a migration to GS1 AIs for product attribute coding against the cost of GS1 membership.

A complete list of AIs (current as of February of each year) are maintained in the MH10.8.2 standard, which can be found at the following URL:

http://www.autoid.org/ANSI_MH10/ansi_mh10sc8_wg2.htm

Corporate Standards and Compliance Labeling

The only real "mandatory" application standards are those imposed by customers as a condition of doing business with them. The good news is that most customers who want bar codes and two-dimensional symbols follow industry standards that are based on national standards. These national standards have been harmonized into international standards. The bad news is that most international, regional, national, and industry shipping label standards simply provide a framework for compliance labeling. Variations are permitted within industry standards to support "the needs of the trading partners". Even those complying with GS1 standards find that each customer wants something "a little different" on the shipping label. While the compliance shipping labels of Wal-Mart, Sears, and Target are all based on GS1 standards; they are all different. The AIAG has a set of standards for automotive suppliers, but General Motors, Chrysler, Ford, John Deere, and Caterpillar all issue corporate compliance labeling standards that are different. The electronics and telecommunications industries are moving closer to a common label; but the compliance shipping labels for suppliers to IBM, HP, Lucent, Motorola, Apple, and Texas Instruments still face significant differences, many still requiring customer part numbers on the product packaging.

Applications Review

Today, bar codes are used in a variety of manufacturing, distribution, reseller, and end-user functions. For trading partners, bar codes have a wide range of potential uses including receiving, put-away, order picking, product re-ordering, cycle counting, shipping, transportation, labor reporting, point-of-sale, warranty tracking, and inventory control. All these applications offer significant productivity improvement opportunities throughout all channels of distribution. A review of these applications follows:

Automated Receiving

Problem

Each product received typically requires manual recording or verifying and manual lookup of the appropriate warehouse storage location, with all transactions typically key-entered into a computer. Receiving usually occurs once or twice within manufacturer warehousing activities, again for distributors, and again for end users. At each stage there are more transactions, multiplying the benefits of standardized coding and bar code symbols.

- The adoption of Quick Response and associated inventory procedures within many resellers facilities requires timely, product specific data;
- Need to identify supplier, product, serial number, purchase order, and date;
- Need a means to quickly and positively identify product;
- Need to have the correct product on hand;
- Need to move the product to the correct location at the right time;
- Bottlenecks occur within stored goods;
- Lost sales due to out of stock conditions.

Solution

- Bar code symbols identifying
  - Unique License Plate (DI “J” or AI “00”)
  - Supplier Code
  - Product Code
  - Serial Number
  - Lot / Batch Number
  - Reference Number
  - Employee ID
  - Quantity
- Download open P.O. file from host to work center, scan incoming product, upload receipt to host;
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT “ORDERS”);
- EDI Advance Ship Notice/Manifest (ASC X12 “856” / UN/EDIFACT “DESADV”);
- EDI Inventory Advice (ASC X12 “846” / UN/EDIFACT “INVRPT”);
- EDI Price Sales Catalog (ASC X12 “832” / UN/EDIFACT “PRICAT”);
- EDI Warranty Claim (ASC X12 “142”).

Possible Data Elements Employed

- MH10 Data Identifier “J”; GS1-128 SSCC-18 (AI “00”);
- MH10 Data Identifier “25P”; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier “25S”; GS1-128 GTIN-14 (AI “01”) (Packaging Identifier/Supplier/ Product ID);
- Quantity with Unit of Measure Bar Code Symbol (AI “30” or “3nnn”), Data Identifier “7Q”;
- Lot/Batch Code Bar Code Symbol (AI “10”), Data Identifier “1T”;
- Serial Number Bar Code Symbol (AI “21”), Data Identifier “25S”;
- Storage Location Bar Code Symbol (Data Identifier “L”);
- Purchase Order Bar Code Symbol (AI “400”), Data Identifier “K”;
- Small Carrier Bar Code Symbol (AI “43”);

- Carrier PRO# Bar Code Symbol (AI “95”), SCAC plus PRO# (DI “12K”);
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- RMA Code Bar Code Symbol (AI “DI1R”);
- ISO/IEC 15394 formats
- ISO/IEC 22742 formats
- System Date/Time Stamp.

Benefits

- Savings per transaction with bar code scanning;
- Reduction in inventory;
- Receiving usually occurs multiple times within the distribution channel. At each stage there are more transactions, multiplying the benefits of standardized coding and bar code symbols;
- Products moved in a timely, cost-effective manner;
- Sales Order/Pay Cycle time decreased due to the correct product delivered in a timely manner;
- Generation of daily reports showing real time data pertaining to day’s activities.

Product Inventory

Problem

- Computer inventory does not match shelf inventory creating turmoil in shipping and inventory control;
- Bottlenecks develop, shrinkage occurs, and filling orders becomes a real challenge;
- Physical inventory is inaccurate;
- Location of inventory unknown;
- Shrinkage level through pilferage or damage is unknown;
- Lack of perpetual inventory information;
- More frequent inventory taking required;
- Increased overhead for maintaining inventory;
- Manual logging of data with interpretation errors.

Solution

- Bar code symbols identifying
  - Unique License Plate (DI “J” or AI “00”)
  - Supplier Code
  - Product Code
  - Serial Number
  - Reference Number
  - Employee ID
  - Quantity
- Implementation of bar code scanning of all inventory;
- EDI Inventory Advice (ASC X12 “846” / UN/EDIFACT “INVRPT”);
- EDI Price Sales Catalog (ASC X12 “832” / UN/EDIFACT “PRICAT”).

Possible Data Elements Employed

- MH10 Data Identifier “J”; GS1-128 SSCC-18 (AI “00”);
- MH10 Data Identifier “25P”; U.P.C./EAN (Supplier/Product ID);

- MH10 Data Identifier “25S”; GS1-128 GTIN-14 (AI “01”) (Packaging Identifier/Supplier/ Product ID);
- Quantity with Unit of Measure Bar Code Symbol (AI “30” or “3nnn”), Data Identifier “7Q”;
- Lot/Batch Code Bar Code Symbol (AI “10”), Data Identifier “1T”;
- Serial Number Bar Code Symbol (AI “21”), Data Identifier “25S”;
- Storage Location Bar Code Symbol (Data Identifier “L”);
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- ISO/IEC 15394 formats
- ISO/IEC 22742 formats
- System Date/Time Stamp.
- Inventory logging is much easier and not manual;
- New products can be quickly uploaded to inventory;
- Elimination of human interpretation errors;
- Annual inventory counts are often reduced to a small fraction of the time spent without bar code scanning.
- An even greater opportunity is the elimination of the annual inventory. Accuracy attainable with good scanning systems will typically allow annual physical counts to be eliminated and replaced with periodic sampling or cycle counts of a small number of items. Auditors permit this based on proven levels of inventory accuracy;
- Elimination of human interpretation errors;
- Portable units can be used to track perpetual inventory;
- Put away & pick data is used to update inventory levels creating shipping and invoicing data;
- Real time report generation

Product Verification

Problem

- Customers and suppliers need positive verification of what is put into containers. The need exists to verify products, packages, and the distribution of the package contents;
- Products packaged in wrong containers;
- Orders get mixed;
- Customers become dissatisfied;
- Additional time required in shipping (checking);
- Excessive use of floor space for inventory;
- Real time data is not available.

Solution

- Implementation of bar codes on all packages and cartons for verification purposes provide substantial security in getting a product to market. Bar codes keep track of what products are shipped, the contents of cartons, and whether parts are available for assembly.
- Bar code symbols identifying
  - Unique License Plate (DI “J” or AI “00”)
  - Supplier Code
  - Product Code
  - Serial Number
  - Lot / Batch Number
  - Reference Number
  - Employee ID
  - Quantity
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT “ORDERS”);

Possible Data Elements Employed

- MH10 Data Identifier “J”; GS1-128 SSCC-18 (AI “00”);

- MH10 Data Identifier “25P”; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier “25S”; GS1-128 GTIN-14 (AI “01”) (Packaging Identifier/Supplier/ Product ID);
- Purchase Order Bar Code Symbol (AI “400”), Data Identifier “K”;
- Quantity with Unit of Measure Bar Code Symbol (AI “30” or “3nnn”), Data Identifier “7Q”;
- Lot/Batch Code Bar Code Symbol (AI “10”), Data Identifier “1T”;
- Serial Number Bar Code Symbol (AI “21”), Data Identifier “25S”;
- Storage Location Bar Code Symbol (Data Identifier “L”);
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- ISO/IEC 15394 formats
- ISO/IEC 22742 formats
- System Date/Time Stamp

Benefits

- Real time information available;
- Less space required for inventory;
- Greater productivity with wireless scanning;
- Wrong parts or products quickly identified;
- Product recall streamlined.

W-I-P Tracking

Problem

Tracking product is a significant factor in an automated material handling environment. The need to know an item's location within workstations and other areas of plant becomes a prerequisite to shop floor data collection and computer integrated manufacturing

- Customer is unsure of delivery date;
- 75% W-I-P sits idly on plant floor, out of production;
- Parts, sub-assemblies, and products are not routed to the proper areas;
- Decreased productivity;
- Projects fall behind schedule;
- No integrity of statistics for report generation;
- Over production of inventory goods (on-hand).

Solution

Use of bar code based data collection systems results in timely movement and tracking of products. Database is updated so products can be monitored during routing;

- Download open orders file from host to work center, scan container at each work station, upload to host;
- Bar code symbols identifying
  - Container license plate
  - Employee ID
  - Operation number
  - Sequence number
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT “ORDERS”);

Possible Data Elements Employed

- MH10 Data Identifier “J”; GS1-128 SSCC-18 (AI “00”);
- MH10 Data Identifier “25P”; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier “25S”; GS1-128 GTIN-14 (AI “01”) (Packaging Identifier/Supplier/ Product ID);
- Quantity with Unit of Measure Bar Code Symbol (AI “30” or “3nnn”), Data Identifier “7Q”;
- Lot/Batch Code Bar Code Symbol (AI “10”), Data Identifier “1T”;
- Serial Number Bar Code Symbol (AI “21”), Data Identifier “25S”;
- Combined Supplier ID/Serial Number (MH10 DI “17S”)
- Location Code (MH10 DI “L”)
- Work Order Number (MH10 DI “W”)
- Combined Work Order/Operation Sequence Number (MH10 DI “3W”)
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- Internal License Plate (Data Identifier “9S”);
- KANBAN Number (Data Identifier “15K”);
- System Date/Time Stamp

Benefits

- Unfinished goods can be tracked throughout the plant;
- Similar parts from different vendors can be tracked;
- Customer service can monitor items from start to finish.

Item Sorting

Problem

With high-speed inspection and conveyor lines, the need to identify a product, sort and divert it to other lines is a critical, time-related problem. Products of unlike types and wrong quantities (along with the mixing of wrong products) create confusion in material handling environments.

- Increased order turnaround time;
- Wrong product placement for forklift pickup or delivery to production line;
- Delayed shipments due to manual sorting;
- Lost tags which render products unusable;
- Manual sorting too slow for high speed applications and mistakes in sorting;
- High employee turnover due to mundane tasks;
- Decreased production.

Solution

Most feeder lines convey a multitude of items to be sorted and packaged. Systems must be capable of identifying an item and routing it properly. Bar code based data collection system permit items to be identified and tracked through sorting to final packaging or assembly.

- Bar code symbols identifying
  - — Unique License Plate (DI “J” or AI “00”)
  - — Supplier Code
  - — Product Code
  - — Serial Number
  - — Reference Number
  - — Quantity
- Sortation / tracking symbol — MaxiCode
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT

"ORDERS");
- EDI Advance Ship Notice/Manifest (ASC X12 "856" / UN/EDIFACT "DESADV");
- EDI Inventory Advice (ASC X12 "846" / UN/EDIFACT "INVRPT");

Possible Data Elements Employed

- MH10 Data Identifier "25P"; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier "25S"; GS1-128 GTIN-14 (AI "01") (Packaging Identifier/Supplier/ Product ID);
- Quantity with Unit of Measure Bar Code Symbol (AI "30" or "3nnn"), Data Identifier "7Q";
- Lot/Batch Code Bar Code Symbol (AI "10"), Data Identifier "1T";
- Serial Number Bar Code Symbol (AI "21"), Data Identifier "25S";
- Combined Supplier ID/Serial Number (MH10 DI "17S")
- Location Code (MH10 DI "L")
- Internal License Plate (Data Identifier "9S");
- ISO/IEC 15394 formats
- ISO/IEC 22742 formats
- System Date/Time Stamp

Benefits

- Minimized inventory space due to proper staging and routing;
- Sorting may be done by weight, quantity, destination, order, etc.;
- Bar code symbols permit specific product to be properly diverted to various staging areas.

Item Sorting

Problem

Tool cribs are most often run with a paper-based tracking system of "who has which tool". Tools are kept in places that the attendant thinks appropriate. Most requested items are kept close, other times they are stored alphabetically, and yet other times by size or type. Tool cribs become quickly disorganized.

- Misplaced tools;
- Lost paperwork;
- Unreturned tools;
- No periodic calibration;
- Tools returned to incorrect locations within crib.

Solution

Bar code symbol attached to each tool. Database created on work center listing tool number, description, crib location, and calibration data. Each time a tool is checked out or in employee identity is entered along with tool ID. System has clock to record time checked out and to report tools remaining out for extended periods of time.

- Bar code symbols identifying
  - Serial Number
  - Employee ID
  - Tool Crib Location
  - Reference Number

Possible Data Elements Employed

- Serial Number Bar Code Symbol (AI "21"), Data Identifier "25S";
- Combined Supplier ID/Serial Number (MH10 DI "17S")
- Location Code (MH10 DI "L")
- Work Order Number (MH10 DI "W")

- Combined Work Order/Operation Sequence Number (MH10 DI "3W")
- Tool ID Code (MH10 DI "10S")
- Employee ID Bar Code Symbol (Data Identifier "1H");
- Internal License Plate (Data Identifier "9S");
- System Date/Time Stamp

Benefits

- Report generation of all tools signed out;
- Reporting of those tools out for an extended period of time;
- Reporting of all tools needing periodic maintenance;
- Stock locator system within tool crib identifies location of all tools;
- Duplicate tools in other cribs are able to be cross-referenced.

Quality Control

Problem

Recording of quality control data is labor intensive and error prone. Delays in getting information entered may result in lost production time due to product not being released as available or rework of product that does not meet quality control requirements.

- 60% of Quality Engineer's time spent as clerk;
- Delays in releasing received material can slow down production by not having material at the right location in a timely manner;
- Delays in releasing finished goods can slow down customer billing;
- Statistical process control needs real time data collection from source.

Solution

Bar code symbols on all product or batches of product (containers, etc.). Quality control reporting employs on-line terminal (possibly wireless), bar code menus to denote test conducted, and bar code menus to denote recorded attribute of product as tested. Upload of QC data from work center to host allows quicker product release. On-line reporting to work center allows SPC data to be immediately available.

- EDI Report of Test Results (ASC X12 “863” / UN/EDIFACT “QUALITY”);
- Bar code symbols identifying
  - Product Code
  - Serial Number
  - Employee ID
  - Reference Number
  - Quantity
  - Test Procedures

— Test Observation

Possible Data Elements Employed

- MH10 Data Identifier “J”; GS1-128 SSCC-18 (AI “00”);
- MH10 Data Identifier “25P”; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier “25S”; GS1-128 GTIN-14 (AI “01”) (Packaging Identifier/Supplier/ Product ID);
- Quantity with Unit of Measure Bar Code Symbol (AI “30” or “3nnn”), Data Identifier “7Q”;
- Lot/Batch Code Bar Code Symbol (AI “10”), Data Identifier “1T”;
- Serial Number Bar Code Symbol (AI “21”), Data Identifier “25S”;
- Combined Supplier ID/Serial Number (MH10 DI “17S”)
- Location Code (MH10 DI “L”)
- Work Order Number (MH10 DI “W”)
- Operation Sequence Number (MH10 DI “1W”)
- Operation Code / Work Code (MH10 DI “2W”)
- Combined Work Order/Operation Sequence Number (MH10 DI “3W”)
- Status Code (MH10 DI “W”)
- Internal Applications Bar Code Symbol (AI “94”), Data Identifier “Y”;
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- Internal License Plate (Data Identifier “9S”);
- KANBAN Number (Data Identifier “15K”);
- System Date/Time Stamp

Benefits

- Earlier release of received product to production;
- Earlier release of finished goods for shipping;
- Less time required for Quality Engineer entry of Quality Control data;
- Uniformity of Quality Control reporting;
- SPC data immediately available from check point to SPC processor and back.

Work Order/Traveler Tracking

Problem

Recording of production data is labor intensive and error prone. Delays in getting information entered may result in lost production time due to arrival of sub-assemblies without production operation or wrong operation performed on sub-assemblies requiring rework.

- Production delay to get production procedure;
- Rework of product due to incorrect or incomplete production procedures;
- Lack of reporting relating to status of work order at each workstation;
- Lack of timely data for shop floor data collection.

Solution

Bar code symbols on all product or batches of product, containers, etc. Bar code marked work orders to match product with operation, sequencing of operations, and identity of operation for shop floor data collection;

- Bar code symbols identifying
  - Unique License Plate (Data Identifier “25S” or AI “00”)
  - Supplier Code
  - Product Code
  - Serial Number
  - Lot / Batch Number
  - Employee ID
  - Work Order Number
  - Quantity
  - Operation Number
  - Sequence Number
  - Reference Number
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT

"ORDERS");

Possible Data Elements Employed

- MH10 Data Identifier "25P"; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier "25S"; GS1-128 GTIN-14 (AI "01") (Packaging Identifier/Supplier/ Product ID);
- Quantity with Unit of Measure Bar Code Symbol (AI "30" or "3nnn"), Data Identifier "7Q";
- Lot/Batch Code Bar Code Symbol (AI "10"), Data Identifier "1T";
- Serial Number Bar Code Symbol (AI "21"), Data Identifier "25S";
- Combined Supplier ID/Serial Number (MH10 DI "17S")
- Location Code (MH10 DI "L")
- Work Order Number (MH10 DI "W")
- Combined Work Order/Operation Sequence Number (MH10 DI "3W")
- Employee ID Bar Code Symbol (Data Identifier "1H");
- Internal License Plate (Data Identifier "9S");
- Internal Applications Bar Code Symbol (AI "DIxx"), Data Identifier "Y";
- System Date/Time Stamp

Benefits

- Improved flow of production;
- Less rework;
- Better sequence control of production operations;
- More timely and more accurate data from the shop floor;
- Less labor required for production data entry.

Labor Reporting/Time & Attendance

Problem

- Time & attendance and labor reporting is a manual, error prone, and labor-intensive process. Compliance with labor standards is difficult to measure.
- T&A time cards mechanically generated and subsequently key-entered;
- Labor standards' data is often specious.

Solution

Bar code marked employee badges at clock-in, clock-out, interrupt, and materials management/ point-of-sale data collection steps. Time stamp of data entry at work center provides accurate labor reporting data.

- Bar code symbols identifying
  - Work Order Number
  - Operation Number
  - Sequence Number
  - Reference Number
  - Quantity
  - Employee ID

Possible Data Elements Employed

- Work Order Number (MH10 DI “W”)
- Operation Sequence Number (MH10 DI “1W”)
- Operation Code / Work Code (MH10 DI “2W”)
- Combined Work Order/Operation Sequence Number (MH10 DI “3W”)
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- System Date/Time Stamp.

Benefits

- Lower cost for payroll data entry;
- Better identity of employee/procedure;
- Better management reporting of labor.

Shipping

Problem

- Each order line item shipped must typically be verified, with key entry of all shipment quantities or exceptions to the quantity ordered. Each shipment transaction is costly, in terms of labor hours and paperwork on the floor and in the office. High costs are incurred with shipping errors, including the cost of returning goods, shipping correct goods, and correcting inventory and financial records. Bottlenecks occur in shipping area. Lack of sufficient storage space can slow production.
- Delays;
- Lost products;
- Delayed billing;
- Overstocking;
- Shortages;
- Wrong products shipped;
- Manual inspections & checking;
- Extra space required for staging products.

Solution

- Bar code symbols identifying
  - Unique License Plate (Data Identifier “J” or AI “00”)
  - Supplier Code
  - Product Code
  - Serial Number
  - Lot / Batch Number
  - Reference Number
  - Employee ID
  - Quantity
- Products scanned in and out of shipping area;
- Host download of data to shipping for last minute changes;
- Scanned data compared to open purchase order file to ensure correct shipment;
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT

"ORDERS");
- EDI Advance Ship Notice/Manifest (ASC X12 "856" / UN/EDIFACT "DESADV");
- EDI Invoice (not needed with Evaluated Receipts Settlement) (ASC X12 "810" / UN/EDIFACT "INVOIC").

Possible Data Elements Employed

- MH10 Data Identifier "J"; GS1-128 SSCC-18 (AI "00");
- MH10 Data Identifier "25P"; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier "25S"; GS1-128 GTIN-14 (AI "01") (Packaging Identifier/Supplier/ Product ID);
- Purchase Order Bar Code Symbol (AI "400"), Data Identifier "K";
- Quantity with Unit of Measure Bar Code Symbol (AI "30" or "3nnn"), Data Identifier "7Q";
- Lot/Batch Code Bar Code Symbol (AI "10"), Data Identifier "1T";
- Serial Number Bar Code Symbol (AI "21"), Data Identifier "25S";
- Small Carrier Bar Code Symbol (AI "43");
- Carrier PRO# Bar Code Symbol (AI "95"), SCAC plus PRO# (DI "12K");
- Storage Location Bar Code Symbol (Data Identifier "L");
- Employee ID Bar Code Symbol (Data Identifier "1H");
- ISO/IEC 15394 formats
- ISO/IEC 22742 formats
- System Date/Time Stamp.

Benefit

- Fewer errors and error costs;
- Increased throughput and customer satisfaction;
- Real time data for invoicing;
- Elimination of manual inspection;
- Less inventory storage space required for staging products.

Customer Service

Problem

- Product ordering, availability, shipment, and receipt requires timely, product/order specific data.
- Need to quickly process customer orders;
- Data-entry is slow, costly, and error prone;
- Delivery dates subject to knowing product availability;
- Customers receive wrong product/quantity;
- Customers looking for J-I-T and Quick Response.

Solution

- Bar code symbols identifying
  - — Supplier/Product ID
  - — Scannable sales order entry books for salesmen and customers combined with order entry device Product Code
  - — Identity of customer
  - — Product Code
  - — Economic Order Quantity (EOQ);
- Transmit order telephonically in computer-readable format; or,
- EDI Purchase Order (ASC X12 “850” / UN/EDIFACT “ORDERS”);
- EDI Advance Ship Notice/Manifest (ASC X12 “856” / UN/EDIFACT “DESADV”);
- EDI Invoice (not needed with Evaluated Receipts Settlement) (ASC X12 “810” / UN/EDIFACT “INVOIC”);
- EDI Inventory Advice (ASC X12 “846” / UN/EDIFACT “INVRPT”);
- EDI Price Sales Catalog (ASC X12 “832” / UN/EDIFACT “PRICAT”);
- EDI Warranty Claim (ASC X12 “142”);
- EDI Order Status (ASC X12 870 / UN/EDIFACT “ORDRSP”.

Possible Data Elements Employed

- MH10 Data Identifier “25P”; U.P.C./EAN (Supplier/Product ID);
- MH10 Data Identifier “25S”; GS1-128 GTIN-14 (AI “01”) (Packaging Identifier/Supplier/ Product ID);
- Employee ID Bar Code Symbol (Data Identifier “1H”);
- Internal Applications Bar Code Symbol (AI “DIxx”), Data Identifier “Y”;
- System Date/Time Stamp.

Benefits

- Lower cost for order entry;
- Reduced errors in order taking and shipment;
- Just-in-Time and Quick Response product;
- Better inter-departmental communication;
- Improved customer service.