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Bar Coding Overview

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Note: This paper, synthesized from several sources, is to be considered a foundation document upon which additional analyses, conclusions, recommendations and solutions will be based. Generally, this document defines and summarizes bar coding – what it is, what its benefits can be, and suggests how a bar coding project may be justified and undertaken and why. It is not an exhaustive look at the subject; and, as a general overview may contain both more and less relevant (to your organization) information and conclusions.

Introduction

Bar coding, simply put, is a form of automatic data capture that enables automatic identification and data collection (sometimes called ID scanning.) The uses of bar coding have spread from the early adoption by retail grocers to nearly all facets of commerce. Bar code applications are turning up in new places such as companies' offices, architect's and attorney's firms, governments' offices, virtually all retail stores, banks, and recently security applications – to scratch the surface.

Indeed, bar coding, scanning and printing have been used in distribution and manufacturing companies for ordering, shipping, tracking and receiving operations for well over 30 years. Moreover, even in these more traditional settings, bar code applications have made their way throughout the entire enterprise – now including warehousing, financial reporting, customer service, employee time tracking, and many supply chain functions. In manufacturing, bar coding is being adopted at the assembly line itself.

Like many technologies that employ the adoption of specialized technology and know how, the motivation to begin bar coding is to gain efficiencies, improve accuracy and accessibility and cut costs. Simply put, bar coding has been adopted and continues to be applied by enterprises who wish to improve both their effectiveness and efficiency. New technologies and the realities of a just-in-time business climate have and continue to hasten the adoption – and value – of bar coding applications. By the 1990's, bar coding had made the transformation from a critical component in the search for greater efficiency to a technology required to gain and retain competitive advantage.

Now, due to outsourcing and growing global competition, bar coding has become virtually a "must have" weapon for beleaguered companies who can no longer entertain hiring additional data entry professionals tasked with keying vast quantities of information into computer applications. Today, companies that do not consider bar coding across virtually all departments and functions within the enterprise are literally endangering their long-term ability to remain competitive and grow.

The widespread acceptance of bar coding within industry over the past three decades has lead to the development of numerous industry standards by now formidable industry groups, such as AIAG (Automotive), EIA (Electronics), HIBCC (Healthcare), and HAZMAT (Chemical) to name but four. Standards set by these groups and adopted by their member companies, ensure compliance and facilitate identification of shipments among and between trading partners in the supply chain as well as make certain that products (such as hazardous chemicals) are handled properly to prevent injury or loss of life.

Benefits

✓ Data Accuracy (Effectivity)

Improved data accuracy is the first reason typically cited as the motivation for implementing a bar code system. Often the foundation of operations, data entry enables a company to produce accurate reports and forecasts about upcoming needs and actions. With data entry playing a vital role in a company's operations, it is important to identify the impact attributed to data entry errors.

Companies with integrated bar coding systems that enable users to scan bar codes rather than type numbers are commonly achieving ~ 99% data accuracy. For companies in which data errors are a mere nuisance, the difference between 90% and 99% may not, at first blush, seem that extreme. Yet, for organizations where data entry errors can be financially damaging such as distribution and manufacturing companies, the goal is actually a minimum of 99.999% accuracy (it is 100% where security and safety are the prime considerations, of course.) Bar coding is perhaps the best tool that these organizations have to ensure data accuracy and integrity and greatly reduce or eliminate the impact of human error.

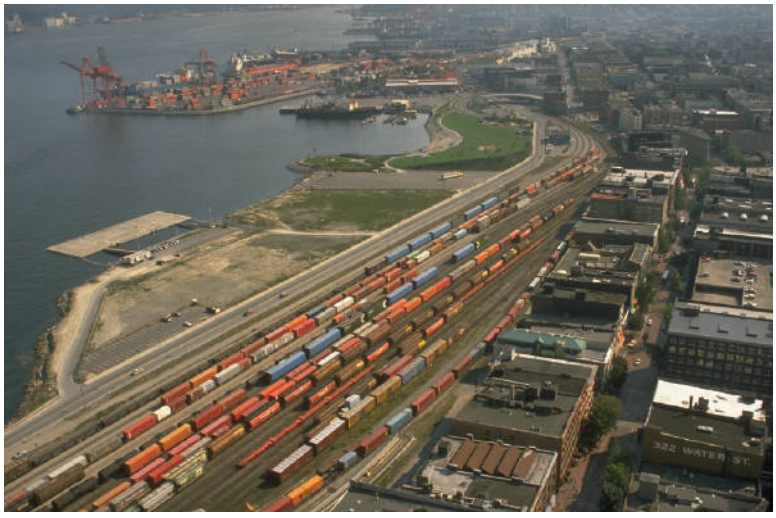
✓ Efficiency (Increased Throughput)

Besides providing virtually perfect accuracy, bar coding also enables users to do more, without sacrificing accuracy (bar coding is often said to be one of the ways companies can utilize to compress time.) Considering the time it takes to correct data integrity errors, it is easy to appreciate the improved efficiency that accompanies bar coding. Moreover, by providing computer systems the capability to accurately capture and analyze exactly what is happening within an organization, bar codes facilitate the transformation from the physical realm into the digital domain. This conversion from manual tasks to digital *e*-processes occurs in "real time," further increasing efficiency and enabling management to make decisions based on current rather than historical information and direct personnel to be employed in other, more productive areas.

Although the time saved in data capture operations is easily recognized, even greater efficiency improvements emerge when bar coding capabilities are extended to other areas of the organization, resulting in functional automation. Functional automation simplifies data collection, processing, tracking and information generation.

✓ Reliability (Predictability)

Bar coding, particularly in distribution and manufacturing environments, creates and maintains both consistent and predictable operations for improved operational quality by combining data management functions and maintaining workflow at data input points. Bar code scanning systems typically operate at a set pace, either self-determined by the printer's maximum speed or triggered by the action of associated devices. For example, in a Distribution Center, operations (locating, picking, packing and shipping, etc.) that were previously slowed by congestion at one or more points of data entry can now progress smoothly through a system of automated print-and-stick labeling machines and/or fixed scanners. Moreover, employing standardized bar code schemes (for both creating and recording) ensures critical bar code information is captured and relayed in a manner that is universally understood and accepted by all links in the [manufacturing or supply] chain.



✓ Asset Management (Inventory Improvements)

Bar coding can help any company better manage its resources. Enterprises are routinely bar coding assets such as manufacturing and distribution equipment, information technology (IT) hardware, office furniture, and tools of the trade in order to record the number of each item, as well as other characteristics including the owner or department name, state of repair, color, and other attributes. Rental agencies of all sorts are putting bar codes on their products to track rental history and similarly, vehicle fleet owners, public transportation agencies, and rental companies of all kinds have begun utilizing bar codes to track detailed maintenance records for each of the products they offer for hire. Distribution and manufacturing companies likewise employ similar bar code applications to track both resources and finished or picked products inventories.

Many companies complete their processes by affixing a label to the finished item, tote or pallet. This label often contains very specific and extensive information about the product in both bar-coded format and human readable text. By scanning the label in the shipping department, the exact inventory, can be identified and its status stored in real time. Then, when the product is shipped, the precise date and time of its departure can trigger the tracking process.

<u>Note</u>: We continue to raise the bar regarding item, container or pallet tracking. Increasingly companies in addition to adopting bar coding at virtually all levels are adopting or evaluating the use of an additional technology, Radio Frequency Identification (RFID.) As of early 2006, major retailers such as Wal-Mart have stated their intention and timetable for at least a partial implementation of this technology. At this time, RFID is for many companies a technology they are aware of and considering. Bar coding and RFID can be seen, today, as complimentary technologies. However, the benefits associated with the adoption of bar coding provide a proven ROI that currently cannot rapidly be duplicated with RFID.

Cost – Benefit and Project Considerations Summary

Current opinion is that most bar coding projects will pay for themselves between six months to two years. But such assertion is **primarily dependent on the enterprise's commitment** to the process and **organizational acceptance** of bar coding (in all its various aspects of applying, printing, scanning, etc.)

Bar coding begins "payback" and subsequently generates a profit when supported by widespread (universal) improved enterprise processes. When evaluating a bar code implementation project, all feasible processes (those that would benefit from bar code implementation, i.e.) should be reviewed. Typically, there are obvious improvements that can be achieved by implementing bar coding systems, such as placing bar codes on finished goods or components to spare workers from the tedium and error prone activities of entering each item's price or serial number. Moreover, new capabilities, efficiencies and controls will appear from the improved data management achieved by implementing a bar coding system. For example, improved speed and accuracy will benefit incumbent systems such as Supply Chain Management (SCM), Enterprise Resource Planning (ERP), wireless networking options, and RFID "smart tags" (i.e., a human-readable label embedded with a computer chip that acts like a portable data file for the product at hand.)

The initial drivers companies discover after implementing a bar code and scanning system typically include: some to significant labor cost reductions, often greatly improved customer service, improved vendor/partner response times, improved asset and inventory management, space management, and potentially lower equipment costs (and delays in adding equipment.)

Accompanying the "hard" cost reductions, are several "soft" savings that must be considered during the cost – benefit analysis. It should be noted, however, some of these savings may not surface until the implementation is complete. For example, when the data capture on the production line or in the warehouse is fully automated, can warehouse or manufacturing production speed be increased? Are we able to create bar codes for every item, can the company now more easily and profitably undertake customized products and solutions in response to customer requests? Now that all inventory will be monitored in real time, can warehousing costs but cut or can we add capacity with a lower than expected run up of associated costs? These are several examples of the unforeseen cost reductions or gains in efficiencies that often result from bar coding. Typically other opportunities will emerge as your use of bar coding and scanning technologies gains momentum with operations.