Improving Parcel & Postal Operations with Bar Code Printing
Executive Summary

The postal and parcel industry is changing everywhere in the world. National postal operators, express parcel couriers, franchise mailers and other service providers must change their service offerings—and technology infrastructures—or they will lose in newly competitive, deregulated markets. The world’s leading post and parcel service providers have always been the most innovative and enthusiastic adopters of automatic identification technologies. Deregulated national postal services and other competitors now must match and even surpass the industry leaders in exploiting technology to control operating costs and enable new services.

This white paper will:

- Discuss specific opportunities to gain efficiency or new revenue in retail post office, express parcel, depot and delivery operations;
- Describe how to improve asset management and security with bar code and radio frequency identification (RFID) technology;
- Show how mobile printing technology can be used to create new sales and service offerings;
- Explain how distributed bar code printing operations can create significant time and labor savings for depot and distribution operations;
- Explain the key performance criteria for label printing systems in postal and parcel applications.

Introduction

Postal and parcel operators face the conflicting challenges of improving service while reducing cost. The pressure is especially strong in Europe, where deregulation is expected to reduce the price of letters 30 to 35 percent, and eliminate 25 percent of postal jobs according to estimates by the European Union. National postal authorities who have had little or no competition for hundreds of years are now faced with new competitors for the most profitable segments of their business while still being required to serve the mass market, including unprofitable routes and service areas.

Market success will depend on maximizing efficiency throughout all operations and creating new revenue-producing services to offset losses from new competition and falling prices. The key to doing both is exploiting automatic identification technology. Basic pick up and delivery operations have not fundamentally changed in hundreds of years. The mark of modern postal and parcel carrier is the amount of information they are able to collect and provide their customers.
The most effective way to improve efficiency and keep labor costs under control is to minimize the amount of manual handling required to process packages and letters. Most mail processing expenses are derived from piece handling, so any improvements to the handling process will result in significant cost savings. Manual handling of pieces that were rejected by automated processing systems contributes greatly to this expense. Bar code is by far the fastest and most accurate method to identify and sort individual mail pieces, so it should be used as much as possible to prevent mis-sorts and manual processing. Bar codes are much more accurate than handwriting- and character- recognition systems and can be read with inexpensive equipment at any point from pick-up to final delivery. The accuracy, convenience and low-cost readability make it the perfect technology on which to base tracking systems and related services offered to customers.

In 1985, FedEx became the first parcel courier to apply bar codes to every item it processed, which helped set a new standard for efficiency and tracking. FedEx and its competitors have continued to innovate and aggressively exploit new technologies, and in the process have become some of the most efficient businesses in the world. Tracking services that were so innovative and provided a competitive advantage just a few years ago are now routinely offered by postal services, catalog merchants and other retailers.

There are still many opportunities to innovate, and emerging technologies create exciting possibilities. Two-dimensional bar codes have been a staple for automated parcel sortation and are increasingly being used to carry delivery, handling and other information on all types of mail and packages. The concept of “intelligent mail” refers to putting a machine-readable, unique identification mark on each individual piece of mail. This encoded “birth certificate” could drive many new tracking, reporting, accounting and planning applications for service providers and their customers.

**Applications**

**Post Office Counter Operations**

The retail industry can provide valuable lessons on how to profitably manage post office counter operations. Retailers and post offices both operate in a high-volume, low margin environment with demanding customers and strong competitive pressure. Each sector must aggressively practice cost control without sacrificing customer service. Bar codes have become an indispensable tool that retailers rely on for efficient store operations. Post offices can also take advantage of the technology to reduce labor and improve efficiency throughout their operations.

Post offices can use compact printers to create delivery labels, counter receipts, postage marks, tracking labels and more. Mobile printers can be used with bar code scanners in portable and temporary point-of-sale systems to manage lines during peak busy times.

Postal services gain two important benefits by using bar code technology at post office counters. First, bar coding saves time and reduces the amount of labor needed to serve customers. Second, bar code-based automation systems improve quality. Ensuring that mail is identified accurately when it enters the system improves quality throughout the sorting and delivery processes, which reduces the need for inefficient, expensive manual handling.
Replacing paper-based record keeping with computers and printers is the first step to realizing productivity and quality improvements. Entering transaction data into a computer and automatically printing receipts saves clerks time on each transaction compared to preparing handwritten receipts and other manual procedures. Saving only a few seconds per transaction leads to significant productivity gains over time because of the volume of customers served at the counter. Automated data entry also produces more timely and accurate volume information for logistics planning.

Computer data entry at the counter also eliminates the need for manual records to be entered later, so there is no chance for transcription errors or need for data entry personnel. Printed receipts are legible and professional looking, which is important in resolving future customer inquiries.

One of the best opportunities to improve counter operations is to use bar code printers to create parcel shipping labels. Operators save time by entering shipment data into a computer at the counter and automatically generating an address label. The label can feature a clear, readable address to aid carriers, plus a bar code. The bar code enables the use of automated sortation equipment throughout the sorting and delivery process, thus avoiding the need for much more expensive manual handling. It also ensures that the parcel is identified correctly as it enters the system, ensuring maximum processing efficiency. Compact desktop label printers can also print special handling notes, security symbols and other special marks, so that manual stamping or handwriting is not necessary.

Printers can also be used to create postage marks and other indicia used in place of stamps. These printed alternatives to stamps are more secure and functional. The printed symbols can include information in a bar code that can form the basis for many intelligent mail applications that are being developed.

It is also an excellent idea to use printers to create postage on demand in other places where stamps are traditionally sold. Stamps are a popular item with thieves because they are small, easily resold and have relatively high value for their size. Removing stamp inventories in favor of postage-on-demand printers is a powerful deterrent to theft and fraud.

Speed and ease of use are among the most important performance criteria to consider when selecting countertop bar code printers. Speed is best measured as “first label out,” which refers to the amount of time required to print a label after receiving the print command. The printer must be fast enough to print labels without causing clerks and customers to wait for the output. The printer must also be able to produce all the different bar code symbologies, fonts and symbols used by the carrier. Other desirable qualities are small size to conserve space on crowded counters and easy loading of ribbons and media to save operator time.
Mobile Commerce

Mobile point-of-sale (POS) stations are an excellent method for managing variable customer demand. Workers with handheld computers and mobile printers can be assigned to the lobby or even outside the post office facility to service customers and prevent congestion during peak busy times. On busy mailing days, workers can use mobile printers to create postmarks, collect payments and issue receipts. Parcel collection points can be set up at convenient locations so that customers with bulky boxes won’t block traffic in counter lines. Mobile POS systems can also be used to sell stamps, accept special handling mail and perform many other transactions. The systems are much less expensive than the cost of constructing new counters and offer more customer convenience.

Mobile printers should be easy to use and ergonomic for comfortable operation all day long. Wireless models are especially desirable because they have no cables that interfere with worker safety and productivity. Mobile printers may have a Bluetooth® wireless interface to a portable computer or cash register or a wireless network connection. Zebra offers a complete range of mobile and wireless printers including models with built-in magnetic stripe and/or smart-card readers for accepting card payments.

The applications described above may seem futuristic for the common post office, but variations of these procedures have been put in practice by franchise mail service centers and other retailers who are angling to gain their share of the postal business.

Express Parcel Customer Automation

Competition has made express parcel delivery one of the most efficient industries in the world. Industry leaders have a long history of innovating and commercializing technology like bar codes, wireless computers and electronic commerce. Express parcel services continually seek to automate new business processes so they can leverage their information infrastructure investments. One of their most powerful practices, which can be readily emulated by other service providers, is to extend automation into their customers’ businesses through self-service shipping and tracking applications.

The most common practice is for the parcel carrier to issue its regular customers software and printers to generate shipping documentation and labels. Small, light-duty-cycle printers designed specifically to produce bar code shipping labels are a sufficient and inexpensive option for carriers to issue their customers. Customers print and apply bar coded shipping labels to each parcel prior to pick up by the courier. This arrangement shifts the effort for preparing documentation and labels from the carrier to the customer. This shift has minimal effect on individual customers but has a tremendous aggregate impact on the carrier.

Accepting pre-labeled, ready-to-ship parcels can save couriers several minutes per package. When the savings are multiplied by the typical number of parcels serviced each day, the labor benefits can be better appreciated. If pre-labeling saves only one minute per parcel (a conservative estimate), the carrier realizes an aggregate savings 16.7 hours per 1,000 parcels processed. The time saved enables couriers to reduce handling and distribution costs, which provides competitive advantage by reducing the total time required for delivery.

Pre-labeling also enables tracking and customer service operations to take effect sooner. Once a parcel is scanned, either by the driver at pickup or upon processing at the distribution center, the parcel has a record in the carrier’s tracking system. Scanning at each subsequent movement or change of status can update the record. Tracking records can be made accessible to customers through a Web-based interface, which enables to track their own shipments and perform other self-service operations without involving the carrier’s customer service personnel.
Distribution operations also become more efficient when parcels are pre-labeled. When labeled items are unloaded from courier trucks they are immediately available for scanning and redistribution. This eliminates a potential bottleneck caused by processing large batches of parcels as they arrive at the distribution center. Overall dwell time is reduced and there are labor savings owing to the reduced volume of items that must be manually processed. Because pre-labeled parcels require no additional data entry at the depot, a potential source of errors is avoided.

**Depot Operations**

Distribution centers are often the most automated facilities of any business and the post and parcel industry is no exception. In recent years, bar code and wireless technology have helped businesses reach record levels of quality and efficiency in shipping, receiving and material handling operations. In the parcel and post industry, where distribution is the main expense and timesavings are extremely valuable, investments in automatic identification systems earn a very strong return on investment.

Parcels and mail that do not arrive pre-labeled should be bar coded as soon as possible to take full advantage of automated sorting and material handling equipment. Fast, high-duty-cycle, networked printers are required for this operation. Zebra offers a full line of rugged industrial printers to create bar codes wherever mail and parcels are received. Receiving personnel can carry wireless label printers into trucks to label items as they are being unloaded. Forklift-mounted printers can create carton, mailbag and container labels anywhere. Stationary printers can be placed at receiving areas and be monitored and controlled through either a cabled or wireless network interface. Special cameras and recognition software can be used to identify handwritten addresses and convert them into bar code format for automated processing. A printer/applicator integrated with the camera can automatically generate and apply the bar code to each identified piece of mail. For other high-volume marking and sortation, high-speed printer applicators can be integrated with material handling equipment to label items without slowing line speeds. All these Zebra solutions are available with advanced control and management tools that can issue status reports and alerts to maximize productivity and uptime.

Bar code, RFID and related technologies improve depot operations by reducing fixed asset expenses and by helping control variable expenses such as labor and item-handling costs. Auto ID technology can also provide immediate benefits in sorting, routing and material handling. The same technologies form the basis of research and pilot projects currently underway to develop future intelligent mail applications.

Parcel and post operators can obtain immediate and ongoing benefits by tracking mail trays, totes, pallets, roll cages and other returnable containers with bar codes or RFID tags as the assets are issued to and received from customers. By actively managing these assets and creating processes for customer accountability, operators will increase asset utilization, reduce dwell time and recover assets previously considered lost in the supply chain. Implementing a simple tracking and return management program enable operators to reduce their required amount of returnable containers. By improving control and tracking, businesses will ultimately be able reduce their inventories and new purchases. The result is a higher return-on-assets for existing materials and lower overall capital spending.

RFID tags can also be used for asset, parcel and letter security in a manner similar to anti-shoplifting systems commonly used in retail stores. RFID readers can be placed at all entry and exit portals within a facility and programmed to sound an alarm or perform other action if a tagged object nears the reader. RFID security systems can be programmed to only seek and protect specific objects, or to turn off the alarm feature if items are processed properly.
Zebra offers a variety of printers to print smart labels while simultaneously encoding the RFID chips within them. The product line includes industrial and desktop models to meet a wide range of volume and application needs. Multiple RFID protocols for tracking and sorting applications are supported and the printers offer all Zebra’s traditional network and management features.

**Automated Sorting**

Bar code and RFID technologies probably provide their greatest value to sorting and distribution operations. In 2005 the U.S. Postal Service (USPS) was delivering 21 billion more pieces of mail annually, to 12 million more addresses, than it did in 1995 with the same size workforce. The USPS made these huge productivity gains in large part because it has aggressively implemented additional bar code and other sorting systems.

Bar code readers are much more accurate than character recognition systems and can process more pieces per hour. RFID can be processed even faster and enables identification of multiple items simultaneously, such as all the individual mail trays or bags contained within a roll cage. Operators can take advantage to build sorting systems that can process more volume than previously was possible.

RFID is also advantageous because it can be read from any orientation. Bar code systems require the symbol to be placed on the side of the container that passes in front of the reader. This practice may be inefficient, as it often requires a human operator to align the container, or placement of multiple, redundant bar codes on multiples sides of the container. Using RFID for container identification avoids these labor and materials costs. RFID systems cost more to implement than bar code, but often have a lower total cost of ownership (TCO) because tags can be reprogrammed and reused multiple times, which provides a savings over one-use, disposable bar codes.

While RFID can be used for any postal and parcel sorting application, it is most cost effective for identifying returnable assets, because tags can be reused many times. Bar coding still provides excellent, cost-effective performance for identifying individual letters and parcels. Bar coding is proven as the critical foundation technology for mass sorting and can also be used to create many other new services.

Simple linear bar codes work exceptionally well for identifying and sorting letters, periodicals and other flat materials. Parcels and other variable-size items are often tracked with two-dimensional (2-D) bar codes with greater reading tolerances, including MaxiCode, which was created specifically for parcel sortation.

Parcel delivery companies have traditionally used 2-D symbols to encode detailed shipping information on individual parcels. The information is used to drive a variety of sophisticated track-and-trace services, which parcel carriers use to set themselves apart from their competitors. Gradually, mail-order retailers, e-commerce Web sites and other businesses began offering their customers tracking services, which are now widespread. What was once a competitive advantage is now a basic market requirement. The result is that parcel and post services must continually innovate and offer new services or risk losing business.

Once again, bar coding can serve as the foundation for new tracking-based services. Intelligent mail programs provide some of the best examples of bar code-based service innovation. Intelligent mail programs apply parcel tracking principles to individual pieces of mail. Intelligent mail items receive a bar code or other mark that uniquely identifies the piece, its mailer and destination. The mark is read at points throughout the distribution, building a tracking record. Postal authorities can use the tracking information to improve their facility, labor and asset planning and may offer it to customers in a variety of services.
In the U.S., retailers and direct marketers have taken advantage of intelligent mail tracking to coordinate phone calls, e-mails and advertising placements with the arrival of promotional mailings. Because mailings can be tracked to final delivery, marketers can contact consumers the same day information is received in the mail. Along with tracking, the U.S. Postal Service (USPS) also offers customers delivery confirmation, which was previously only available for higher classes of service. Companies who have used intelligent mail tracking services to execute integrated marketing campaigns have reported more sales per campaign and higher revenue per customer. By giving customers the ability to cost effectively track individual mail pieces, USPS has a powerful new competitive offering.

Many beneficial tracking and confirmation services can be developed using simple linear bar codes. Two-dimensional symbols and RFID labels, which offer more security, data capacity and read-write capability, will make future innovations possible.

**Carrier Operations**

The benefits of printing are not limited to retail and depot operations and may be extended all the way to the customer's door. Letter carriers and delivery couriers can use mobile printers to issue receipts, label pick-ups, sell postage and collect payment anywhere.

Mobile printers for use on the route must be highly functional to create receipts, labels and postage, yet must remain lightweight and easy to use. Printers with built-in card readers can facilitate mobile payment processing. Battery performance is one of the most important features in mobile printers, because the devices must be able to operate the entire shift without needing to be recharged. As with mobile printers used for retail postal applications, convenience and ease of use are very important considerations for carrier operations.

With mobile printing, postal operators can put quality control practices in place in the field to match procedures followed in facilities. One of the most important functions mobile printers provide is to create receipts for delivery confirmation, parcel pick up or monetary transactions for sales or fees collected. Printers can automatically include the date and time on the receipt. If a mobile computer is used with the printer, all transaction information can be stored electronically and uploaded later to host computer systems, completely avoiding manual record keeping and data entry. Receipts can improve service by providing a clear record of activity and a reference for efficiently handling customer service calls. These capabilities are especially valuable for managing deliveries of cash or high-value items.

Using mobile printers to label items that are picked up for delivery can lead to strong productivity gains at the depot by labeling. Route workers can use mobile printers to give customers a pick-up receipt and also to create bar coded shipping labels for the parcels they collect. Creating and applying the label in the field takes only a few seconds, but can save hours of processing time. When route workers return to the depot, their pick-up parcels are ready immediately for redistribution. There is no bottleneck that would result if hundreds of drivers had to put all their picks ups in a queue for labeling prior to redistribution. Operators can use the timesavings to offer their customers later pick-up times without delaying delivery.

In situations where carriers could not complete the delivery or the customer is required to visit the post office for pick up, notification and instructions can be printed.
Mobile printers can also create new sources of revenue. Route personnel can become mobile postal sales agents by printing secure postage labels on demand. The system is secure because no stamps can be stolen, and is convenient because customers can order the exact postage they desire and carriers do not have to maintain inventories of different stamp denominations and package quantities. A card reader built into the printer can keep transactions cashless to further improve security and convenience.

Deregulation offers other revenue-enhancing possibilities. In Sweden, a utility company has contracted for letter carriers to read meters on their routes. Carriers could also sell lottery tickets, money orders and other goods and services. In each scenario, documentation is needed to complete the transaction. Mobile printers are the most efficient and professional tools to support these new business practices.

**Conclusion**

Automatic identification technology has become indispensable to the postal and parcel industry over the years. Newer innovations, including mobile printing, wireless connectivity, 2-D coding and RFID, are now proving their value and will play a leading role in industry modernization. These technologies are an excellent investment for postal and parcel operators because of their unusual ability to simultaneously reduce costs and increase revenue opportunities.

Zebra Technologies is a world leader in providing on-demand bar code labeling solutions which deliver information in forms that enable organizations to improve productivity, quality and customer service. Zebra is a leading manufacturer of all the innovative print systems referenced in this paper, including mobile and wireless printers, RFID label printers plus a full range of bar code printers for use in retail and industrial environments. Contact Zebra to see how your organization can gain a competitive advantage by using bar coding and smart labels.