DISTRIBUTION TECHNOLOGY IN THE POSTAL SERVICE

PAST, PRESENT, AND FUTURE

Introduction

Collecting, sorting, transporting, and delivering the nation's mail to every household and business across the country—from Alaska to Puerto Rico—is an enormous task. To accomplish this task, the Postal Service uses a physical infrastructure that includes more than 38,000 post offices and contract units, 282 automated processing centers, 63 airport mail facilities, 21 bulk mail centers and a number of other facilities.

The Postal Service handles three basic shapes of postal items: letters and cards, larger size pieces called flats, and packages. Letters—generally First-Class Mail and Standard Mail letters and cards—account for 71.3% of total mail volume. Flats consist of large First-Class Mail, Priority Mail, and Standard Mail envelopes, magazines, or large advertising circulars and account for 27.3% of volume. The remaining 1.4% primarily contains Priority Mail and Package Services.

Postal Service Technology History

At the turn of the 20th century, in spite of a rapidly increasing mail volume and limited work space, the Postal Service relied entirely on antiquated distribution operations, such as the 'pigeonhole' method of letter sorting, a holdover from colonial times. The first attempt at adapting technology was with crude sorting machines proposed by inventors of canceling machines in the early 1900s and tested in the 1920s. The Great Depression and World War II postponed widespread development of mechanization until the mid-1950s.

In the 1950's, the Postal Service took major steps toward mechanization by initiating projects and awarding contracts for the development of a number of machines and technologies, including letter sorters, facer-cancellers, automatic address readers, parcel sorters, advanced tray conveyors, flat sorters, and letter mail coding and stamp tagging techniques.

As a result of this research, the first semi-automatic parcel sorting machine was introduced in Baltimore in 1956. A year later, a foreign-built Multi-Position Letter Sorting Machine (MPLSM) was installed and tested for the first time in an American post office. The first American-built letter sorter was successfully tested in 1959 and became the backbone of letter sorting operations during the 1960s and 70s. The operation of the MPLSM was largely manual; it required 17 operators who had to look at, read, and then key in ZIP code information.

The Postal Service's accelerated mechanization program began in the late 1960's and consisted of semi-automatic equipment such as the MPLSM and the facer-canceller. These mechanization efforts produced significant increases in productivity. However, by the mid-1970s, postal mechanization had reached a point of diminishing returns and it was clear that more efficient methods and equipment were needed if the Postal Service was to offset the rising costs associated with the growing mail volume.

The Postal Service entered the age of automation in 1982 with the installation of the first Single Line Optical Character Reader (SLOCR) and Bar Code Sorter (BCS). The single line referred to in the SLOCR is the City, State and ZIP Code line. The SLOCR required a letter to be read only once by the OCR; it then printed a barcode on the envelope. In all downstream operations, a less expensive BCS would then read the barcode and sort the mail to the proper location.

By the end of 1984, 252 OCRs were installed in 118 major mail processing centers across the country and were processing 24,000 pieces of mail per hour -- at nearly four times the productivity of the MPLSMs. However, most handwritten letter mail still had to be processed on the MPLSMs. OCR technology was not yet capable of reading most handwriting.

The Age of Automation – 1988 through today

Since the mid-1970s, the Postal Service has continued to use the latest technology to improve service and productivity in all facets of its processing and distribution operations. Like other large businesses, the Postal Service relies heavily on modern technology to improve efficiency and to control costs. Automation equipment has been central in this respect.

During the 1990s, capital investments for equipment focused on development and installation of high-speed letter sorting equipment. Our strategy has been to invest capital to reduce labor requirements. Today the Postal Service has a world-class letter distribution system with over 15,000 pieces of automation equipment in service. Letter mail productivity in processing plants improved nearly 50 percent from 1993 to 2001. Reductions in time devoted to sorting allowed the Postal Service to reduce the number of city delivery routes by 4,100 from 1995 to 2001 while simultaneously absorbing about a 4% increase in the number of delivery points.

There are three key components supporting the Postal Service's automation program; an extremely accurate nationwide address database, a barcode format that is both easily applied as well as easily read, and finally an efficient and effective system that places barcodes on the mail.

The nationwide Address Management System (AMS) provides unique ZIP code identification for all addresses. The original ZIP code format called for 5 digits to identify a unique delivery zone. In order to distinguish between the various delivery routes in a given zone as well as the specific segments of each route, ZIP+4 was created. Finally, to enable mail to be sorted in the specific order to be delivered two more digits were added. The last two digits are simply the last two numbers in the actual address. Thus a nationwide delivery point specific coding system is enabled through the 11-digit barcode. Postal Service equipment and large volume mailers began applying 11-digit barcodes that allow barcode sorters to sort mail into delivery point sequence (DPS) -- the order in which carriers deliver it -- in 1993.

The barcode format itself has been essential to the success of the automation program. Developed by Postal Service engineers, the Postal Numeric Encoding Technique (POSTNET) code is a simple, yet very functional barcode. POSTNET uses a “two in five” technique. This means that there are five bars used to represent each digit. Of the five bars, two are always “on” and three are always “off”, or in binary terms “1” and “0”; “on” is represented by a high bar and “off” is represented by a low bar. The simplicity of this format allows an individual to look and translate the barcode simply by looking at it with naked eye. This is not typical for most barcode formats.

POSTNET is a one-dimensional or linear barcode. This allows for the ease of both high-speed application, as well as high-speed read. POSTNET has certainly met the Postal Service's needs for the automated distribution of mail. However, it is also limited by the data it can contain. As such, the concept of Intelligent Mail has required examination of more robust one-dimensional formats. Further, there will very likely be the need to utilize more data-rich two-dimensional formats.

The final aspect of the successful automation strategy was the means by which barcodes would be placed on mail. The Postal Service developed a strategy that involved both internal and external creation of barcodes. Given that the majority of mail is mass-produced in bulk quantities, it made sense to encourage large-volume customers to place barcodes on mail as it was created. The encouragement took the form of rate discounts for various levels of automation preparation.

Despite this incentive system to create barcodes, there still was a significant portion of the mail that required internal barcode technology. The Postal Service barcode technology relies upon very sophisticated Optical Character Recognition (OCR) systems. The combination of OCR hardware and software in use in the Postal Service is truly at the leading edge of this technology. Advances in OCR technology are discussed in more depth later in paper.

If a piece of mail cannot be read by the OCR, its image is captured and sent to a Remote Encoding Center (REC). In addition to the image capture, a unique ID Tag is applied to the back of each piece of mail to allow matching in subsequent automated operations. The image appears on a computer monitor at the REC, where a keyer inputs the required information to create the correct barcode. The results are then sent back to the processing center and automatically matched with the specific piece of mail through the use of the ID Tag.

With ever-increasing improvements in OCR technology, the volume of images sent to REC's has diminished significantly. There are currently 20 REC's as compared to the original 55. The peak operation of the REC system processed 24 billion images annually, with 32,000 employees. Today in the 20 REC sites there are 11,000 employees (mostly part-time employees) that process 6 billion images annually. There are plans for even further reductions. The centralized REC concept, with a REC serving multiple processing centers was driven by volume efficiency. Since no one site had enough images to create an efficient local keying operation, the images are digitally transmitted to these centralized locations.

Beyond these three key components to the automation strategy, was the development of the automated distribution equipment itself. The research and development (R&D) required followed two guiding principles. First, R&D efforts were moved out of the Postal Service and to the companies that would ultimately become the original equipment manufacturers. Second, the equipment design needed to incorporate the widest possible spectrum of mail.

Much of the technology development that pre-dated the 1980's automation programs took place within the Postal Service. With the full commitment to a comprehensive automation program in 1988, there was a need to change the R&D approach. The new approach sought out multiple suppliers in a competitive environment. These companies brought forth the latest technologies and a variety of creative solutions. As a result, the Postal Service was able to select the "best in class" systems for use. Without question, the Postal Service has the most sophisticated fleet of automated equipment of any postal administration in the world.

With the outsourcing of R&D to these suppliers, the Postal Engineering staff focused on matching operational needs with possible technology solutions. Fundamental concepts were developed followed by extensive interaction with key suppliers to work towards these concepts. The Postal Service's Engineering department has evolved to become a program management organization whose ongoing activity is to interact with suppliers to develop, validate, and ultimately implement distribution technology.

In order to encourage the greatest possible range of solutions we also have encouraged our supplier base to bring forward unsolicited proposals. The supplier's ongoing interaction with the Postal Service allows them to recognize possible technology solutions we may not have envisioned. This encouragement for new solutions, beyond our own concepts, allows for a greater level of creativity.

A basic premise of the Postal Service is that distribution technology must incorporate the greatest possible range of mail characteristics. It is quite common in other postal administrations to severely limit and restrict the characteristics of mail, especially various dimensional requirements (length, width, height, thickness, and weight).

From an engineering design standpoint, a uniform product does make development and design less complex. However, this approach is internally focused and ignores the value of mail in the marketplace. The success of direct mail marketing in the United States, as compared to European countries for example, is at least in part attributed to the Postal Service's allowance for greater tolerance in the design of mail.

While we attempt to incorporate the greatest possible variations in mail characteristics, there is a point of diminishing returns. The incremental cost to enhance a machine's design eventually outweighs the incremental portion of the mail that can be included. It is not feasible or practical to design distribution technology to handle all mail on every piece of equipment. Ultimately, a cost-effective machine design must be chosen, and in turn, the machine's capability will determine the dimensional requirements for that type of automated mail.

In the age of automation, the Postal Service made a conscious decision to outsource the research and development necessary for this next generation of technology. We did so with a solid basis for automated distribution; a nationwide address management system, a functional barcode format and strategy for both internal and external application of barcodes. The system development took place with an approach that was not just internally focused. The value of mail was fully understood and system concepts attempted to incorporate customer needs to the maximum extent possible.

Letters:

Letter mail represents about 70% of the Postal Service's total mail volume. As such, the first major effort to automate distribution operations was focused on this product. By the late 1990s, letter mail automation was fully implemented and the Postal Service was already moving forward with automation of flats, parcels, mail forwarding, and material handling operations.

The Postal Service's letter automation goals and strategies were first defined in the 1988 Corporate Automation Plan (CAP). CAP was a formal document, implemented via a formal management structure created at both Headquarters and the five Regional offices of the Postal Service. At each field operating unit, defined as one of 88 Divisions, there were managers tasked with implementing the plan. At the Division level, the CAP was translated into a site-specific plan called the Division Corporate Automation Plan (DCAP).

CAP envisioned a national network of equipment that would allow the automated sorting of virtually all letter mail through the use of barcodes. Most importantly, the strategy for barcode creation was a mix of internal technology, through the use of Optical Character Readers combined with customer applied barcodes that were encouraged through rate incentives.

Barcoded letter mail can now be sorted at speeds of up to 34,650 letters per hour on Delivery Bar Code Sorters (DBCS). The DBCS requires two mail processors to operate the machine, a loader and a sweeper. As a point of reference, the DBCS replaced the MPLSM which sorted about 30,000 letters per hour with a staff of 17.

The decade long effort to automate the distribution of letters has proven very successful. At the close of Fiscal Year 2002, 94.5% of letters were distributed using automation equipment. The remaining 5.5% were processed manually.

Flats:

The Postal Service receives over 50 billion flat mail pieces each year in a wide variety of sizes and packaging materials. This mail includes large envelopes, newspapers, catalogues, advertising circulars, and magazines. Over 40 percent of this mail is presorted to individual carrier routes by mailers and can be sent directly to the carrier for delivery; the remaining percentage requires some level of distribution by the Postal Service.

Lessons learned from letter mail automation experiences have been applied to flats. The experience has streamlined the time required to implement the flat automation program. Unlike the Corporate Automation Plan of the late 1980's and early 1990's, there was no need to create a separate management structure and tracking systems for flat automation.

The letter automation experience created the knowledge within the established operations structure to successfully implement the program. Flat automation is not viewed as an ancillary activity; it is part of the day-to-day business of operations management. This has lead to a faster and more effective implementation of the program.

The flats automation program relies upon two systems to process the full range of products within this category. The first is the Automated Flat Sorting System (AFSM) 100; it can handle flats up to 20 ounces in weight. The second is the Upgraded Flat Sorting Machine (UFSM) 1000; it can handle flats that exceed the 20 ounce limit of the AFSM 100.

The first AFSM 100 was installed in the Spring of 1999 and full-scale nationwide deployment of 537 AFSM 100's was completed in 2002 at 240 mail processing plants. With the AFSM 100, the overwhelming majority of flat mail (90%) was automated. In 2 ½ years, the Postal Service accomplished what had taken nearly a decade to complete with letters.

Each machine processes about 300,000 flats a day, at speeds of up to 18,000 flats per hour, with almost three times the productivity of the older mechanized flat sorter it replaced. Software enhancements have increased the OCR read rate to nearly 90%. Recent advancements in technology have made it possible to encode flat images off-site, in near-real-time. So during 2002, the flat video coding operation was moved from Video Coding Systems (VCS) located in individual processing centers, to the RECs, where images are now processed more efficiently.

The UFSM 1000 processes flat mail beyond the capability of the AFSM 100, such as newspapers and heavier magazines and catalogs, that was previously sorted manually. The UFSM 1000 was developed in response to customer requests to expand the characteristics of flat mail that can be processed via automation and thus receive a discount. These enhancements have resulted in lower staffing requirements and higher machine throughputs.

Parcels:

Parcels are the latest product line to which we are addressing automated solutions. The increase in barcoded package volume is similarly driving efforts to improve processing efficiency in parcel sorting operations. New parcel sorting equipment, such as the Singulate, Scan, Induction Unit (SSIU) and the Automated Package Processing System (APPS), are reducing the labor required to process parcels.

Bulk Mail Centers (BMCs) handle a variety of mail products including bundles, packages, sacks, and trays. The BMC network came into operation during the early 1970's to mechanize both parcel and bulk mail processing. As the BMC's were originally designed, packages and bundles were sent to individual keyers. The keyers first "faced" the package, or in other words, turned the package to find the side with the address. Once "faced", they key in ZIP Code information, which in turn allows the system to sort.

The SSIU eliminates the need to both face and key the package or bundle. The singulate portion of the system automatically places packages and bundles, presented in bulk loads, into single file. The packages no longer need to be "faced" because they pass through a six-sided OCR tunnel that reads the address on any side of the package or bundle. Packages and bundles are then automatically inducted onto the sorter. This is greatly reducing the labor needed to process parcels by improving productivity and sort accuracy. When deployment ends later this year, 19 BMCs will be using SSIUs in their daily processing operations.

Development of a next-generation sorter that takes advantage of the latest technology to distribute small parcels and bundles was completed this year. This new equipment, known as the Automated Package Processing System (APPS), will automate the existing package and bundle processing network.

Borrowing from some of the concepts used in SSIU, APPS first puts the packages and bundles in single file and then they pass through an OCR scanning tunnel. Images that cannot be read by the OCR will be processed at the RECs where letter and flat images are also handled. The APPS features automated container unloading to support the high throughput requirements.

Optical Character Recognition (OCR) Systems:

The description of the letter, flat, and parcel automation programs quickly establishes a common thread – the use of state-of-the-art Optical Character Recognition (OCR) systems. The effective design and development of automated distribution technologies, in large part, relies upon effective integration of OCR technology.

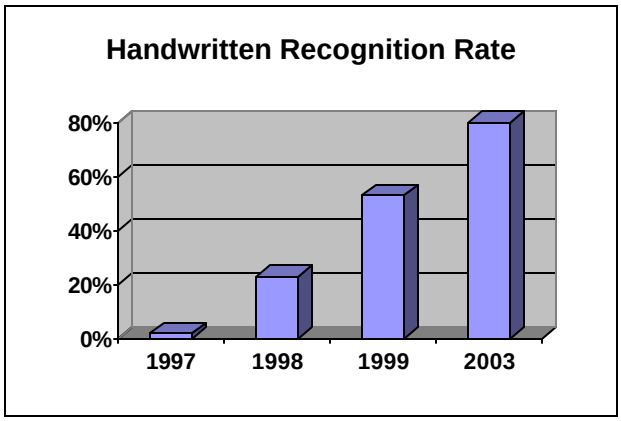
There are two very basic algorithms used in OCR technology for mail. The first set of algorithms are used to determine "address block location". In simple terms, the purpose of address block location is to look at all the things written on the face of a piece of mail and determine which one is the intended destination address. For example, if done incorrectly, the letter is returned to the sender. Once the address block is determined, the second set of algorithms deciphers the handwriting and/or print that makes up the address.

The first set of algorithms differs between letters, flats, and parcels. The differences are related to the unique characteristics of these products. However, once the address block is determined, there is a great deal of similarity in the algorithms used to decipher the address

itself. This commonality has allowed the Postal Service and its suppliers to leverage the OCR improvements made in one product and apply them to the others.

Letter and flat mail recognition rates continued to rise in 2002 as hardware and software upgrades were deployed for existing equipment. Additional improvements will continue to be pursued on a pay-for-performance basis. This incentive-based contract arrangement has yielded great benefits to the Postal Service. The Postal Service's Engineering department determines the dollar value of both read rate improvement and error rate reduction. In addition, USPS defines the manner in which the supplier must demonstrate enhanced performance. The supplier is paid at the agreed upon amount as improvements are demonstrated, validated, and implemented.

As the Postal Service's ability to resolve addresses improves, so will productivity because mail can be sorted without manual keying of addresses at RECs. In 1997, letter automation OCR's resolved primarily machine-printed addresses with handwritten address recognition being less than 2%. Since that time, improvements have resulted in the current recognition rate of about 80% for handwritten addresses, and over 87% for all addresses. These remarkable improvements have allowed the Postal Service to close 35 of the original 55 Remote Encoding Centers over the last three years.



The Postal Service has also successfully applied recognition technology to flat mail processing operations. All flat automation equipment is now equipped with optical character and bar code readers. The primary flat sorter, the AFSM 100, is achieving read rates near 90% today with expectations of reaching about 95% by the end of 2005. In addition, OCRs were recently added to the UFSM 1000 machines and improvements for them are also being pursued.

Material Handling:

Beyond the distribution technology in the three products (letters, flats, and parcels) is the need for technology improvements in material handling operations. Material handling spans all three products. It involves the movement of not just mail, but the containers mail is placed into for movement around facilities, and ultimately, on to transportation.

Through the mid-1990s, most trayed mail, parcels, sacks, and other containers were transported internally either manually or via basic conveyors. Since then, the Postal Service has implemented technologies that have improved transport systems, expanded tracking and control, and provided processing information to facilitate operations management.

Material Handling continues to be a significant target of opportunity for technology investments to reduce operating costs and improve productivity and efficiency. Recent development and deployment activities have included equipment for flats, receipt, dispatch, and material transport operations within processing plants.

The Universal Transport System (UTS) is a prototype of a more robust material handling system for use in larger processing centers. The UTS expands the processing of product lines beyond that of traditional tray management systems by being able to handle sacks, parcels, and bundles as well as letter trays and flat tubs. Featuring state-of-the-art material handling technologies and information systems, UTS enhances the Postal Service's ability to contain work hour growth while providing improved work processes and information flow within processing plants.

The Low Cost Tray Sorter (LCTS) supports field initiatives for breakthrough productivity and cost reduction of allied material handling labor. It sorts letter trays and flat tubs in a variety of inbound and outbound operations in processing centers, Bulk Mail Centers, and Air Mail Centers. So far, over 50 systems have been deployed with each one configured to meet the unique needs of each processing facility. Deployment of additional LCTS equipment is expected to continue over the next year.

Technology has been applied to improve dispatch operation efficiency. Trays of letters and tubs of flats are automatically scanned and assigned to airline flights and trays of mail are robotically sorted and loaded into containers or pallets for transportation.

Development of prototype flat-tub unlidding and mail tray unsleeving technologies have been completed and field-tested for operational reliability. When mail is ready for dispatch from a processing facility, trays of mail must have sleeves, and flat tubs must have lids with strapping applied to both, to secure the mail during transport. The Postal Service can now automate this process. Conversely, when mail arrives at a processing facility, the strapping must be cut so the sleeves and lids can be removed for access to the mail for processing.

A major accomplishment of the past year has been the successful transition from moving mail using common carriers for air transport to using the USPS-FedEx agreement. This required updating some of the material handling equipment in order to produce identification and tracking codes that could be used by the new carrier. The reduced reliance on common carriers for air transport has reduced costs, improved service, and a provided more predictable outcome.

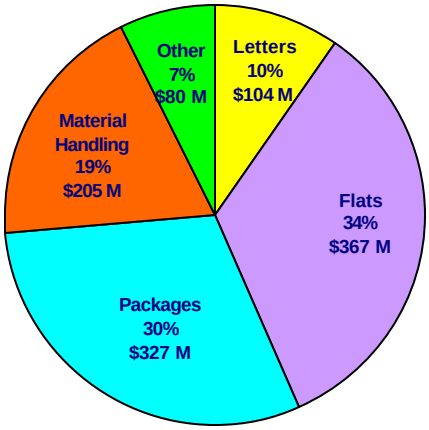
Consequently, there has been a greater awareness of the value of the information generated by the new coding strategies, with benefits in the improved manifesting and work-in-process tracking than previously available. This has implications for use in transportation modes other than air transport.

Mail Acceptance:

Automation is now used in mail acceptance operations with the Mail Evaluation, Readability and Lookup INstrument (MERLIN). This system automates the labor-intensive process of evaluating bulk mailing eligibility for work-sharing discounts. MERLIN verifies nearly all mail preparation requirements for both letters and flats, produces reports necessary for mailing acceptance, and identifies preparation problems to support process improvements. These systems automate the mail acceptance process using uniform methodologies that eliminate the variability that results from human factors.

Future Plans

The long-term capital plan calls for aggressive cost management by developing and deploying new automation and mechanization equipment that will increase the Postal Service's operating efficiency. Under this plan, investments will be made in programs that reduce work hours in distribution, processing, and delivery operations. Current efforts are concentrated on flat and parcel sorting operations where substantial opportunities have been identified. During this year, Fiscal Year 2003, the Postal Service expects to invest about $1.08 billion in new technology and equipment:



The Postal Service is currently implementing strategies that will enhance already efficient letter processing, improve flats automation capabilities, expand mechanization of material handling operations, improve delivery efficiency, and deploy next generation package sorting equipment. These efforts will improve the efficiency and effectiveness of the postal network and processes.

The five-year Engineering Plan (FY2004 - 2008) calls for investments of about $6.9 billion over the next several years. The investments will be concentrated in those areas where increasing costs are of the greatest concern. This investment strategy will achieve continuous, year-to-year performance improvements while emphasizing high-return programs to try to optimize return on capital dollars. Successful implementation of this Plan faces two major challenges.

The first challenge is that our current business model, including our break-even requirement and rate setting process, could force difficult choices should we find that we must substantially increase debt to fund our capital program.

In addition, we expect to invest extensively in projects that will enhance the safety of the mail and our employees. After the anthrax attack in October 2001, the Postal Service began exploring new ways to protect our employees from future bio-hazard threats. A strategy was developed which combines bio-hazard detection and a filtration system for mail processing equipment. Congress passed two appropriation bills which have funded the Postal Service to begin these procurements. However, this funding only partially covers the effort. Therefore in fiscal 2004 and beyond, the Postal Service will require additional funding if we are to implement this strategy without impacting our current capital plan.

Letters:

The handling of letter mail will improve as a timelier, cost-effective system for processing Undeliverable-as-Addressed (UAA) mail is implemented. The Postal Service will continue to improve the quality of automated letter operations and will work to reduce and/or eliminate the non-automated letter mail stream through equipment modifications and customer incentives. Aging letter automation equipment will be replaced with newer, more efficient technologies. Increased recognition rates will also be pursued with a goal of reaching a 93% or higher recognition rate over the next few years.

The Postal Service will invest in additional equipment and software technology to automate the forwarding of letters, an investment that will produce significant savings in 2004 and 2005. About 17 percent of the nation's population moves each year, resulting in about 43 million change-of-address cards and over 5 billion pieces of mail that must be forwarded, returned to sender, or alternatively handled. The total cost attributed to this activity exceeds $1 billion annually.

The Postal Automated Redirection System (PARS) will handle the forwarding of UAA letter mail more efficiently than today's manual or mechanized processes, with the UAA mail intercepted earlier in the sorting process. Letters that should be forwarded will be identified and intercepted during the initial handling and automatically redirected to the new address, resulting in a reduction in total handlings and processing costs. PARS Phase I will automate the handling of UAA letter mail at 53 processing plants and 86 computerized forwarding system sites, covering nearly one-fourth of all forwarded letters. A second phase is planned that will complete PARS implementation nationwide.

Flats:

New automation programs are now being developed for the flat mail stream. Additional technology upgrades for flat automation equipment will improve address recognition, enhance feeder systems, and add tray handling systems. The Postal Service will expand flats processing initiatives to include walk sequencing and explore changes to customer preparation requirements.

The efficiency of the remote flat keying operation will improve as enhancements that manage and balance the keying workload are implemented. Consolidation and streamlining of the flat mail video coding operation will result in increased productivity and improved service. It will also provide an infrastructure that supports remote keying activities associated with future programs that may be used with other types of mail.

Other potential future enhancements are improved tray handling and sorting capabilities. Automatic and semi-automatic tray handling systems are being investigated as enhancements to existing flat automation equipment. Their use would increase flat automation capabilities while reducing the labor required to operate this equipment.

The Postal Service has been successful in automating letter mail distribution for carriers, but has not yet been able to extend the benefits of automation to carrier flats operations. The long-term vision for delivery operations is a seamless operation that culminates in one bundle of mixed letters and flats for each delivery point. All flats and letters for a delivery point would be provided to a carrier in packages they can take onto the street and deliver, as is. All of the

manual sorting and removal from the case (pull-down) that each carrier currently does will no longer be needed. This vision is dependent on having high-speed mail sorting and packaging equipment that will efficiently sort and merge the letter and flat mail streams in delivery sequence for the carrier with the addresses on all of the pieces properly oriented. If the processing equipment can be designed, the labor-intensive manual preparation of mail in sequence for street delivery would be reduced using state-of-the-art technology.

Success with these concepts could mean that the definition of a flat may need to be narrowed or standardized in the future. The Postal Service is working with customers and the mailing industry to determine if product redesign changes can be incorporated into the mailing regulations for flats that would enable greater processing efficiencies in the future.

Parcels:

To improve the Postal Service's ability to handle packages, equipment projects are planned to improve productivity, sort accuracy, the singulation process, and automatic induction of barcoded parcels. The next generation of parcel sorting machines for small parcels and bundles of mail will replace older labor-intensive machines in larger offices. Bulk Mail Center technology will also be upgraded.

Deployment of next generation parcel sorters as replacements for a portion of the small parcel and bundle sorters that have been in operation since the late 1980s is expected to begin in 2004. This new equipment will provide automatic container unloading as well as automatic package singulation and address reading through an optical character reader/barcode reader/ video coding system.

Material Handling:

Material handling improvements will focus on identifying and developing new material handling equipment that mechanizes or automates allied labor functions. The new equipment will primarily target cost reductions in incoming and outgoing dock operations, and receipt and dispatch operations inside processing facilities. Equipment that will likely be deployed over the next several years to improve the efficiency of material handling operations includes flat tub lidders, flat tub unlidders, and mail tray unsleevers. Deployment of the unlidding and unsleeving technology will target opportunities for cost reduction and avoidance in receipt operations and provide ergonomic benefits.

Also in the future, there will be a physical integration of the handling of trays, bundles, packages, and sacks. The Postal Service will continue to work with customers and the mailing industry to explore product redesign and work sharing opportunities that could reduce the number of tray and piece handlings and improve efficiency in postal operations.

To improve the movement of the nearly 86 million pounds of mail processed daily, the Postal Service will continue to invest in tray sorting machines, such as the Low Cost Tray Sorter (LCTS). This equipment reduces manual sorting of letter and flat trays as they enter and exit operations for processing and dispatch.

Summary

Over the last 20 years, the Postal Service has invested over $13 billion deploying automation equipment in support of the collection, sorting, and delivery of the nation's mail. This equipment

has drastically increased the Postal Service's operating efficiency and reduced operating costs by automating what was once an entirely manual process. In developing these technologies, the Postal Service will continue to work closely with suppliers and customers to not only select the best technologies, but to increase the amount of mail that can be processed by automation equipment.

Last year, nearly 203 billion pieces of mail were collected, processed, and delivered. That's 675 million pieces on an average day. Laid end-to-end, this would circle the globe four times. The Postal Service could not have handled this volume without substantial investments in automation and technology.