

Quick Tool for People Wanting to Know More about FSS

# Flats Sequencing System

for  
Inquiring Minds

A Helpful Handbook for  
Postal Employees  
and our Customers

I Need to  
Know More



USPS Technology Acquisition Management

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# FLATS SEQUENCING SYSTEM

## General

Flat mail is one of the most challenging categories of mail to process, sort, and deliver due to its variations in size, thickness, and address label placement. Flat mail pieces include large envelopes, catalogs, magazines, and newspapers. Currently, flat mail is sorted only to the carrier level on our existing AFSM 100 fleet of flat mail processing machines; however, this mail must be sorted manually by the postal carrier into delivery order before beginning deliveries for the day.

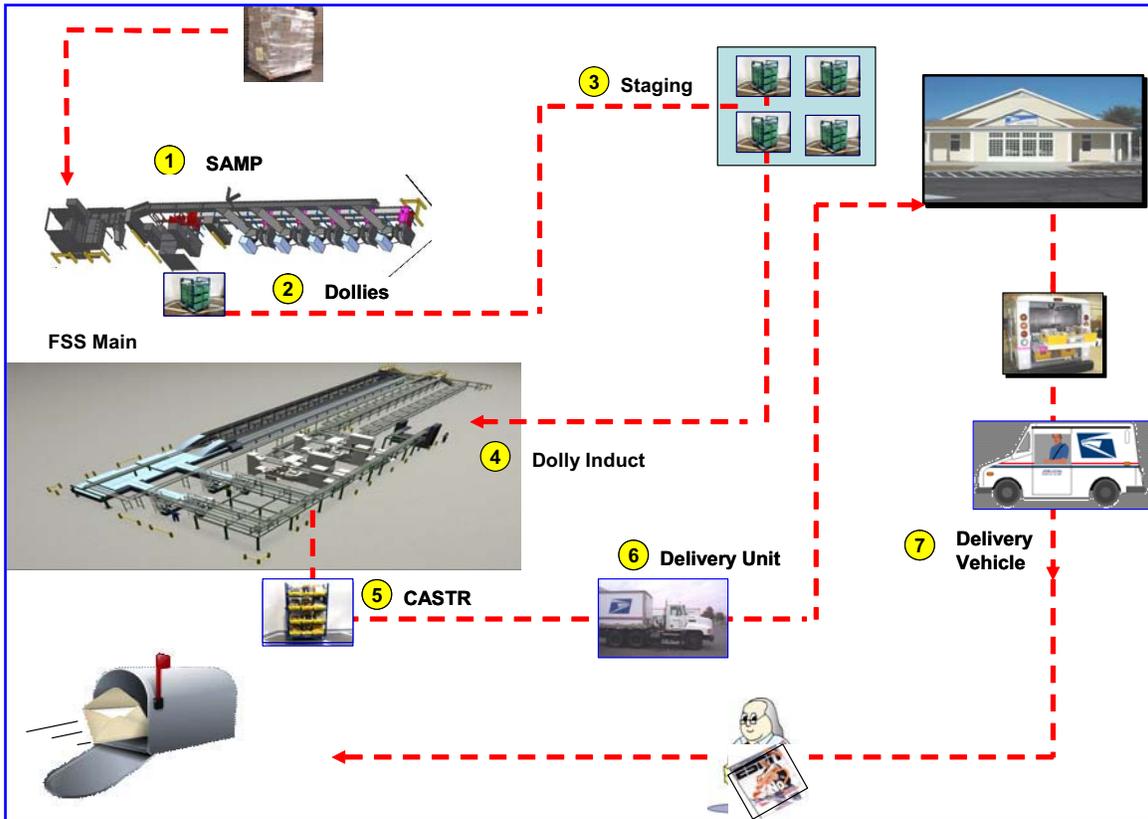


Automation through the use of the AFSM 100 Machines has revolutionized the way the United States Postal Service processes flat mail. The Flats Sequencing System (FSS) advances flat mail processing by sorting flat mail in the precise order that postal mail carriers walk their route eliminating the need for the carriers to manually sort the mail. This allows mail carriers to begin their deliveries earlier, increasing their available time to deliver the mail--which improves service to our customers.



The FSS is designed to automatically sequence flat mail at a rate of approximately 16,500 pieces per hour, and is capable of sorting and sequencing up to 75,000 pieces of flats in one sequencing session (run). Each FSS run consists of a two-pass operation. FSS is designed and scheduled to operate an average of 17 hours a day. Thus, each machine will be capable of sequencing an average of 280,500 pieces per day to more than 125,000 delivery addresses.

## New Mail Flow



- 1 Bundled and loose flats are inducted into Stand-Alone Mail Prep (SAMP).
- 2 SAMP outputs flat mail in green Automation Compatible Trays (ACTs) stacked on Dollies.
- 3 Dollies are temporarily staged for Flats Sequencing System sortation.
- 4 Dollies are transported to the Dolly Input section of the Flats Sequencing System. A two-pass sortation of mail is performed, and mail is output into yellow Carrier Street Trays (CSTs).
- 5 Street trays are automatically stacked in Carrier Automated Street Tray Racks (CASTRs) for dispatch.
- 6 CASTRs are transported by USPS trucks to delivery units.
- 7 Street trays are picked up by the carrier from the racks and loaded into vehicles for delivery to customer mailboxes.

## SYSTEM DESCRIPTION

The Flats Sequencing System consists of three major sub-systems: the **Site Manager Server (SMS)**, **Stand-Alone Mail Prep (SAMP)**, and **Flats Sequencing System (FSS) Main**.

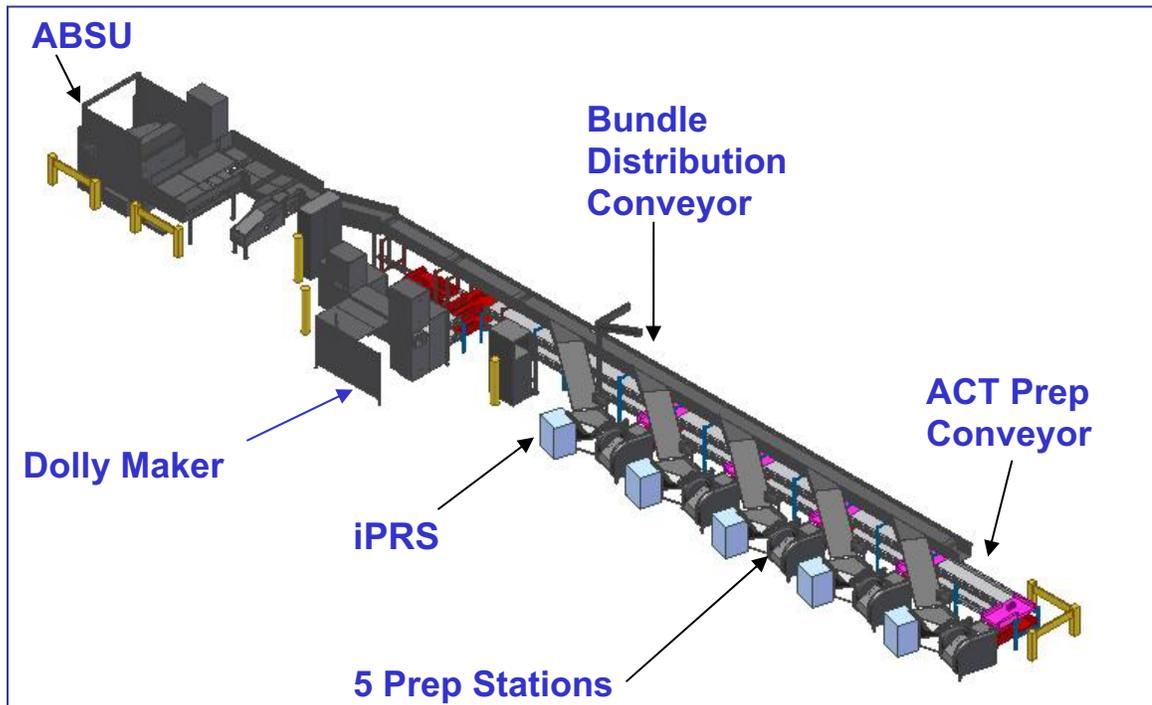
### **Site Manager Server (SMS)**

The Site Manager Server is a computer that contains two significant software applications; the *Process Control System (PCS)* and the *National Directory Support System (NDSS)*. The **Process Control System** is a management tool which tracks flat mail volumes for processing using historical and real time information. Using the site's volume information and specific dispatch schedules, PCS determines the order and schedule for each sort plan run on a daily basis. One Process Control System manages all Flats Sequencing Systems within each facility. The **National Directory Support System** is used to download sort data files and create sort plans for the FSS.



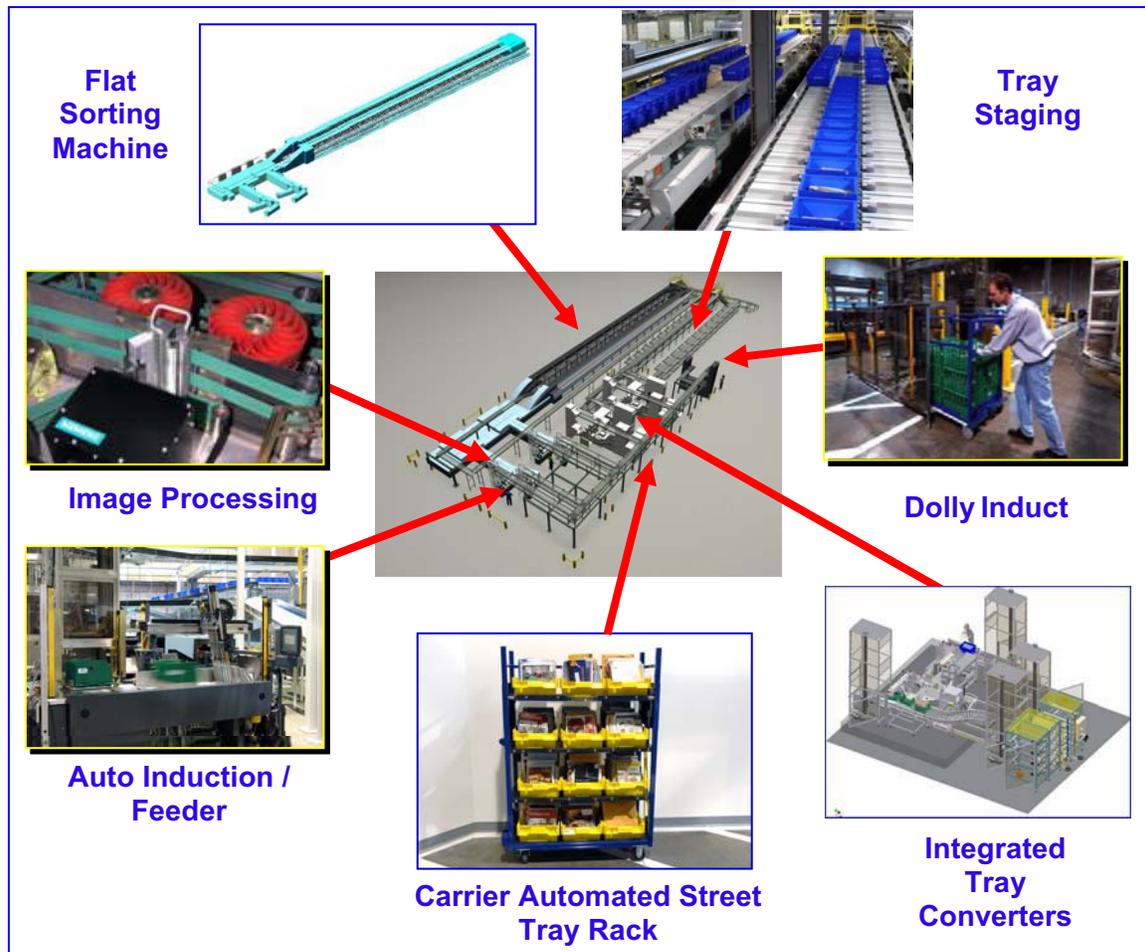
### **Stand-Alone Mail Preparation System (SAMP)**

The SAMP consists of the following sub-systems: Automatic Bundle Separation Unit (ABSU), Bundle Distribution Conveyor (BDC), ACT Prep Conveyor, Prep Stations, individual Packaging Recovery System (iPRS), and the Dolly Maker. The SAMP and its sub-systems are shown in the below layout.



## Flats Sequencing System (FSS) Main

FSS Main consists of several major sub-systems that prepare, sort, and dispatch the mail. They include the: *Dolly Induct*, *Flat Sorting Machine with Auto Induction*, *Image Lift/Processing*, *Tray Staging*, *Integrated Tray Converters*, and *Carrier Automated Street Track Racks*. Within these sub-systems are key components which are instrumental in automating the flat mail process. The FSS Main and its major sub-systems are shown in the below layout.



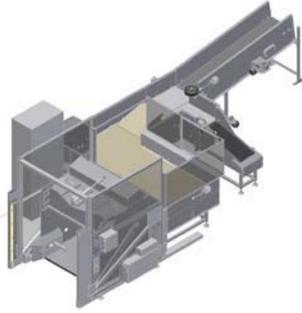
## Operational Mail Flow

Mailers and customers drop off bundled flat mail in USPS approved containers (pallets, tri-walls, wiretainers, hampers) or loose flat mail in tubs known as Flat Mail Trays at a Bulk Mail Center (BMC), Logistics & Distribution Center, Processing & Distribution Center (P&DC), or an associate office. All flat mail is trucked via USPS transportation to a designated FSS processing site for Delivery Point Sequence processing. Flat mail is staged at the FSS processing site as it is received and is scheduled for processing.



After initial bulk staging of the flat mail within the FSS site, the Process Control System identifies mail containers that are scheduled for processing. These containers are routed to the **Stand-Alone Mail Prep** (SAMP) area.

### Automated Bundle Separation Unit (ABSU)



The Automated Bundle Separation Unit of SAMP removes and inducts the bundled mail, while a separate tray input conveyor positioned next to the ABSU accepts and inducts the loose flat mail contained in postal Flat Mail Trays. Both methods of induction provide material to the Bundle Distribution Conveyor. The Bundle Distribution Conveyor transports the singulated bundles and Flat Mail Trays from the ABSU to five mail prep stations.

At the prep station, the mail prep operator removes polywrap and strapping materials and manually places the flats into green Automation Compatible Trays (ACTs). Wrapping and packaging removed by the mail prep operators are placed into trash compactors known as individual Package Recovery Systems (iPRSs). Full ACTs are inducted from the mail prep operator stations onto the ACT prep conveyor where they are transported to the Dolly Maker.

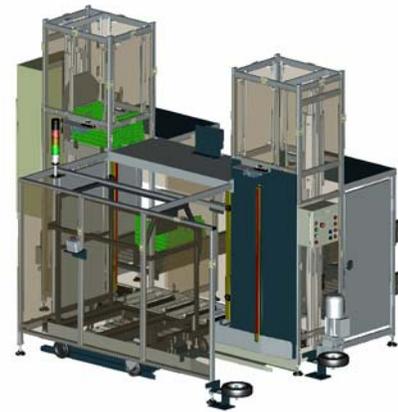
### iPRS and Mail Prep Station



*The iPRS uses stretch wrap to bundle the discarded strapping and packaging materials into a bale. When the system is full, the iPRS moves the completed bale to the top of the belts for easy handling and disposal.*

### Dolly Maker

The Dolly Maker automatically stacks and transfers full ACTs onto roll-around carts called dollies. Each dolly holds 12 ACTs. Dollies are removed from the Dolly Maker by an operator and are staged within the facility until the mail on the dolly is scheduled to be sorted.



When the FSS Main system is ready to begin the sort operation, the Process Control System identifies the dollies to be inducted and an operator transports the dollies from the staging area to the Dolly Induct system. At this point, the full green Automation Compatible Trays are automatically removed from the Dolly and empty ACTs are automatically placed back onto the Dolly. Dollies containing empty ACTs are removed from the Dolly Induct system and are returned to a staging area. Dollies containing empty ACTs are re-circulated through the SAMP. This step is repeated until all flat mail for the sort program is inducted.

### Automated Induction Feeders



The Full ACTs are transported from the dolly induction system to one of four Automatic Induction (AI) feeders for induction and first-pass sortation. *(Note: it requires two sortation passes to place flat mail in the order of the carrier's delivery sequence)*. Each feeder singulates the flat mail pieces and transports them to the recognition module where optical character readers and barcode readers scan each mail piece. If there is insufficient

information to sort the mail piece to the Delivery Point Sequence level, the image of the mail piece is captured and sent to a **Remote Encoding Center** to determine the delivery destination.

### Image Processing

The **Image Processing Sub-system** scans each mail piece and resolves the printed address if the bar code reader is unable to read an 11-digit bar code. If the flat is not previously bar coded with an 11-digit bar code, a labeler applies a blank label to the flat, and an ink jet printer sprays an identification bar code on the label. A verifier then scans the bar code for accuracy and clarity. This identification bar code is utilized in subsequent processing steps to relate sort information to the mail piece.

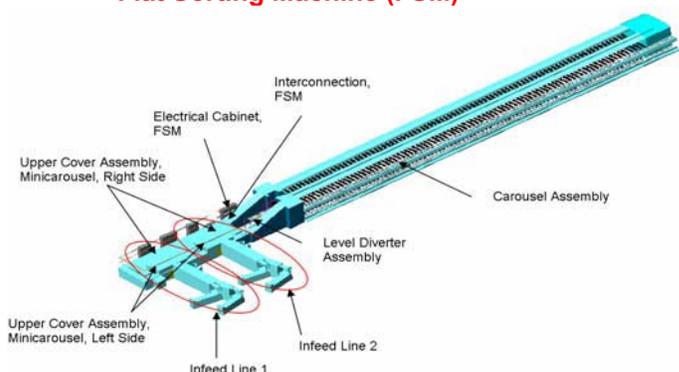


### Operators at REC Site

Data Conversion Operators located at Remote Encoding Centers process the images of flat mail that cannot be resolved by the Bar Code Reader or Optical Character Recognition (OCR). The operators view an image of the mail piece and other information gathered by the Bar Code Reader to determine the delivery destination. This information is sent back to the FSS to complete sortation of the relevant mail pieces.



### Flat Sorting Machine (FSM)



After the image is scanned and labeled (if necessary), each mail piece is injected into the mini-carousel section of the **Flat Sorting Machine (FSM)**. The mini-carousel transitions mail from the FSS in-feed line to the main carousel. Non-machineable mail is diverted from the mail stream into a hamper. Pieces that are too

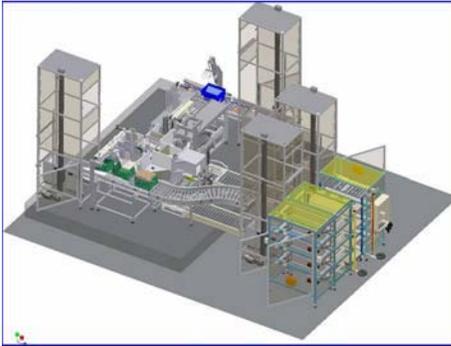
large, too small, or insufficiently gapped relative to neighboring flats are also rejected into the same hamper in order to reduce jams. The mini-carousel uses gravity to drop singulated mail pieces into synchronized, moving carousel buckets on the main sorter--which are similar to the sort buckets on the AFSM100.

### Rigid Captive Tray (RCT)

The main sorter discharges the singulated flat mail pieces into blue Rigid Captive Trays (RCTs) at the output bin designated for each mail piece. *(Note: there is a total of 360 output bins located on two levels and two sides of the FSM.)* Once an RCT becomes full, it is automatically ejected from the sorter bin location and is transported to the tray staging area where it is stored until the second pass of the sort process begins.



### Integrated Tray Converter (ITC)



When the first pass sort process is complete, all RCTs are arranged in the proper order within the tray staging area and then transported to the Integrated Tray Converter (ITC). The Integrated Tray Converter removes mail from the RCTs and places the mail back into green ACTs for the final (pass two) sort operation.

Once the mail is transferred from blue RCTs into green ACTs, the ACTs are transported to the feeders in the proper order for second pass sortation. At the conclusion of the second pass sort, blue trays containing the final sequenced mail pieces are again ordered in the tray staging sub-system and then transported to the Integrated Tray Converter. This time, the Integrated Tray Converter transfers mail from the blue Rigid Captive Trays and positions it vertically into yellow Carrier Street Trays with the address facing front and the bindings on the mail pieces to the right. An automatic labeler prints and applies a human-readable tray label to each yellow street tray and then the street trays are transported to the CASTR Maker.

### Labeler



### Carrier Automated Street Tray Rack (CASTR)



The sort operation is completed when an operator inserts a Carrier Automated Street Tray Rack, or CASTR, into the CASTR Maker for dispatch. Each CASTR holds 12 street trays. The CASTR Maker automatically removes empty trays from the CASTR and loads the labeled street trays containing sequenced mail. Once filled, CASTRs are towed to the dock and loaded onto trucks for transport to the delivery unit. CASTRs may also be towed to staging areas for later dispatch.

## Delivery

At the delivery unit, the CASTRs are offloaded from the truck and staged in sequential order in accordance with an accompanying manifest. The manifest also indicates to the postal carriers which CASTR contains their mail. Carriers then load their yellow street trays from the appropriate CASTR into their vehicles for delivery.

### CSTs Loaded in Vehicle



FSS-processed flat mail (along with associated letter mail and parcels for each address) is delivered to the customer's mailbox.

## GLOSSARY OF TERMS

TERM	MEANING
ABSU	Automated Bundle Separation Unit
ACT	Automation Compatible Tray
AFSM 100	Automated Flats Sorting Machine 100
AI	Automatic Induction
ATLAS	Automated Tray Label Assignment System
ATMS	Automated Tray Management System
BDC	Bundle Distribution Conveyor
CASTR	Carrier Automated Street Tray Rack
CST	Carrier Street Tray
DPS	Delivery Point Sequencing
FMT	Flats Mail Tray
FSS	Flats Sequencing System
FSM	Flat Sorting Machine
iPRS	individual Package Recovery System
ITC	Integrated Tray Converter
MDSS	Maintenance Diagnostics and Support System
NDSS	National Directory Support System
OCR / FRES	Optical Character Recognition / Flats Remote Encoding System
PCS	Process Control System
RCT	Rigid Captive Tray
SAMP	Stand-Alone Mail Prep
SMS	Site Manager Server
TSD	Tray Staging Device
VRL	Vertical Reciprocating Lift