

Image 6 – Square samples are prone to rotation in mail transport systems

Image 6 shows the undesirable tendency of the square samples to rotate in the leveling section that is common to the mail transport section of many different types of mail processing equipment. The resultant skew of the samples prior to scanning stations often adversely affects the image, character recognition and address interpretation processes that follow.



Image 7 – Square samples that are over-height are rejected to prevent damage to the mail

This image shows the automatic rejection of over-height mail done to prevent jams and damage. This is done prior to the inversion section of the AFCS where clearances are particularly critical. The green samples shown are 1/8 of an inch over legal height at 6 1/4 inches.

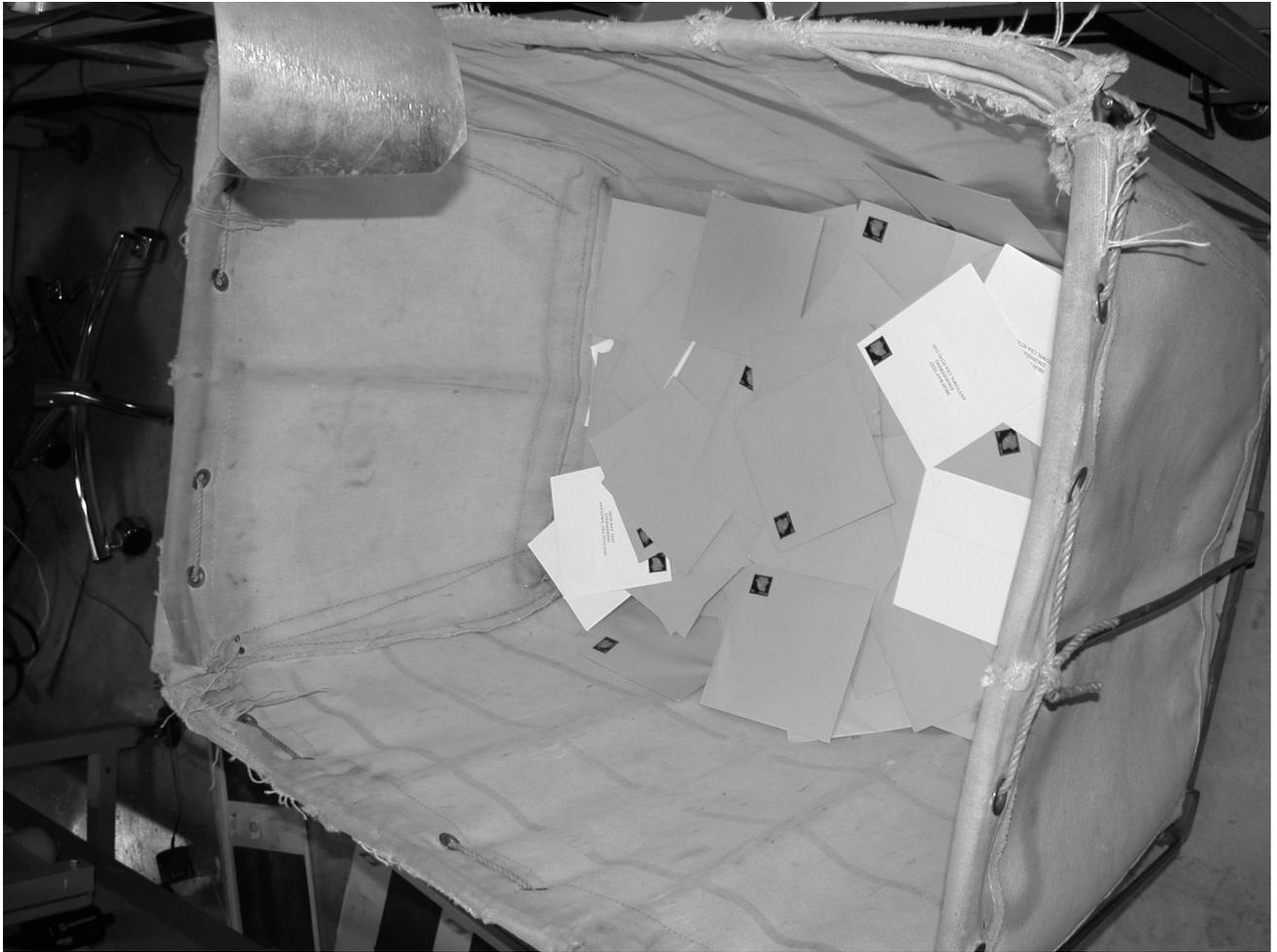


Image 8 – All of the over height pieces are a few legal height samples are culled

Image 8 shows all of the over-height samples and a few legal height samples that were also rejected. Due to earlier rotation, some of the square samples have not been fully leveled and are also rejected because they ride so high in the transport that they trigger the over height detection used to prevent jams. While this can happen with all mail, it is more pronounced with the square samples that fail to level more frequently than mail meeting the aspect ratio requirements.

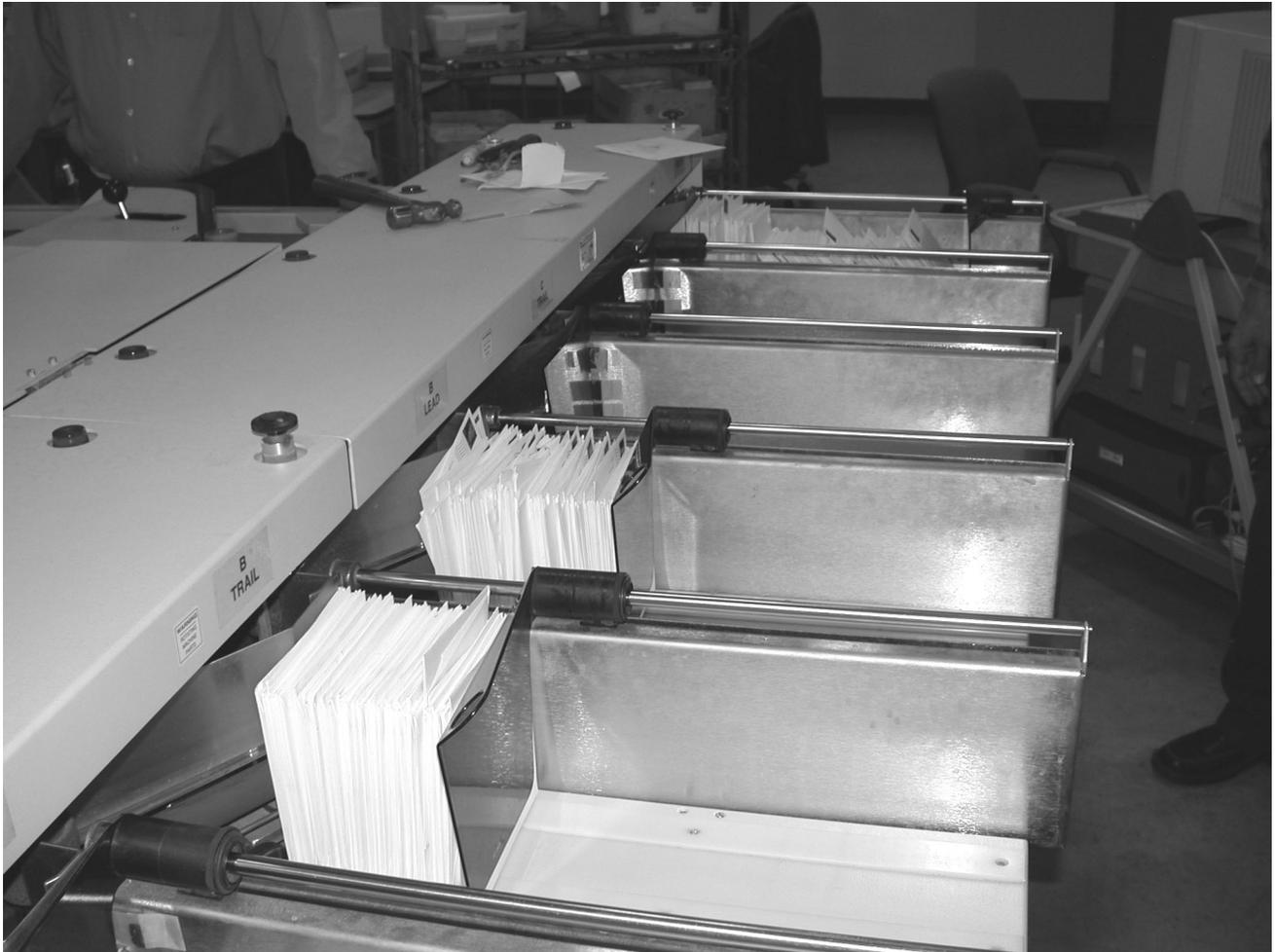


Image 9 – Canceled pieces (bottom two stackers), and not-cancelled samples (top stacker)

Image 9 shows all of the three square samples in the output stackers of the AFCS after they were processed. Note that all of the over-height (green) samples have been culled.

The samples in the two foreground stackers have been correctly canceled. Those in the closest stacker found indicia in the “stamp trailing” position. The next stacker back contains the samples where the indicia was found in the “stamp leading” position. The AFCS can only properly face and cancel the mail that is inducted in one of the four orientations possible with address in a horizontal position.

The last stacker has all the samples that were not cancelled because the indicia could not be detected where it was expected. Specifically, these samples were inducted from the feed stacker on either the left or right edge rather than the top or bottom edge. These samples are removed from the automation mail-stream, thereby incurring significant additional costs.



Image 10 – The not-cancelled stacker has samples with the address positioned vertically

This image shows the samples that were not cancelled – slightly separated for viewing. Some of the samples have the stamp and the address visible and facing outwards. The remaining samples had the stamp and address facing in toward the machine. In all cases, the address was positioned vertically indicating the reason these pieces were not cancelled was improper orientation.



Image 11 – Successful cancellation of “stamp leading” orientation

Image 11 shows all the samples where the indicia was found in the “stamp leading” position. Note that the first sample has managed to rotate after being cancelled.



Image 12 – Successful cancellation of “stamp trailing” orientation

Image 12 shows all the samples where the indicia was found in the “stamp trailing” position.

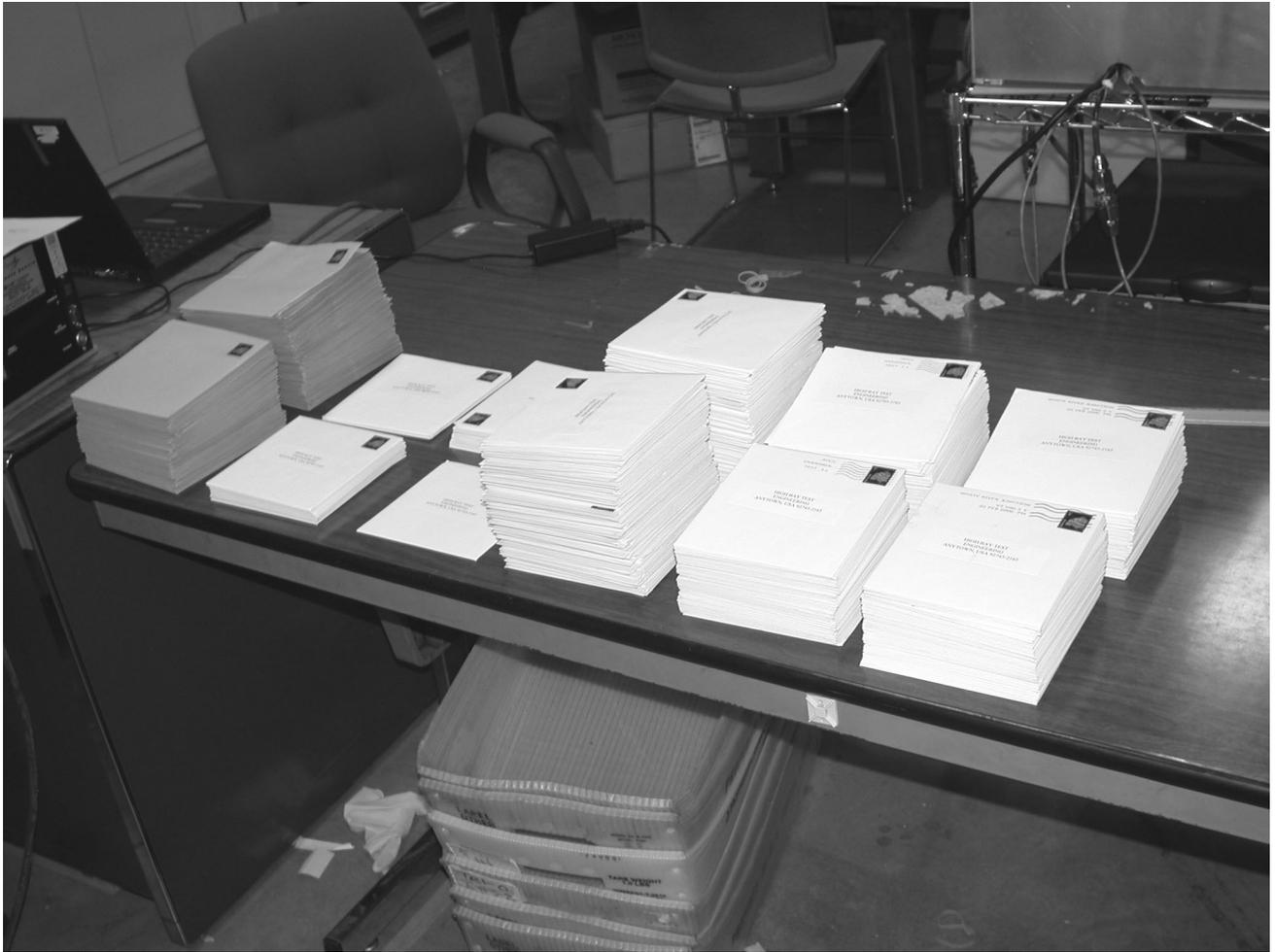


Image 13 – For all the samples, only the four stacks on the right were correctly processed

Image 13 shows all the square samples in this subset after processing by the AFCS. Only the four groups of envelopes on the right were correctly processed. The four groups of envelopes on the left were mechanical rejects (over-height). The four groups of envelopes in the middle were cancellation rejects (improper orientation).



Image 14 – The four groups of envelopes on the right were correctly cancelled

This image shows the square samples that were correctly processed by the AFCS. As might be expected by the random nature of orientation of the square samples, about half of the cancelled samples were “stamp trailing” (the rightmost column of envelopes). About half of the canceled samples were “stamp leading” (the next to rightmost column of envelopes). Approximately one half of each sample type shown in the leftmost column (type #22 in the front row, type #23 in the back row) was not cancelled due to improper orientation.



Image 15 - Second View, only the four groups on the right were correctly processed

Image 16 is a second view of how the square samples were processed on the AFCS. The leftmost four groups of envelopes were mechanical rejects (over-height). The middle four groups of envelopes were cancellation rejects (indicia could not be found due to improper orientation). The rightmost four groups of envelopes were cancelled without problems. For more detailed results, see the Table 1 at the end of this report.

| Greeting Item No. | Card Test Envelope Size | Verified Size | Aspect Ratio | Legal Size | Legal Ratio | Color | Performance Acceptable | Quantity | Reject Mechanical | Reject Cancellation | Weak Ink | Cancelled | Percent Cancelled |
|-----------------------------|-------------------------|---------------|--------------|------------|-------------|-------|------------------------|----------|-------------------|---------------------|----------|-----------|-------------------|
| Aspect Ratio Samples | | | | | | | | | | | | | |
| 1 | 3 X 4 | | 1.33 | NO | YES | | NO | 200 | 200 | 0 | 0 | 0 | 0.00 |
| 2 | 3-1/16 X 3-1/16 | | 1.00 | NO | NO | | NO | 224 | 224 | 0 | 0 | 0 | 0.00 |
| 3 | 3-5/8 X 6-1/2 | | 1.79 | YES | YES | | YES | 200 | 3 | 0 | 0 | 197 | 98.50 |
| 4 | 3-3/4 X 6-3/4 | | 1.80 | YES | YES | | YES | 200 | 0 | 0 | 0 | 200 | 100.00 |
| 5 | 3-3/4 X 9-3/4 | | 2.60 | YES | NO | | YES | 196 | 0 | 0 | 196 | 0 | 100.00 |
| 6 | 3-7/8 X 5 | | 1.29 | YES | NO | | YES | 200 | 0 | 0 | 0 | 200 | 100.00 |
| 7 | 4 X 5-3/8 | | 1.34 | YES | YES | | YES | 199 | 0 | 0 | 0 | 199 | 100.00 |
| 8 | 4 X 8 | | 2.00 | YES | YES | | YES | 228 | 0 | 0 | 0 | 228 | 100.00 |
| 9 | 4 X 9-3/8 | | 2.34 | YES | YES | | YES | 198 | 0 | 0 | 0 | 198 | 100.00 |
| 10 | 4-1/8 X 6-1/4 | | 1.52 | YES | YES | | YES | 200 | 0 | 0 | 0 | 200 | 100.00 |
| 11 | 4-1/4 X 6-1/8 | | 1.44 | YES | YES | | YES | 202 | 0 | 0 | 0 | 202 | 100.00 |
| 12 | 4-1/4 X 9-1/4 | | 2.18 | YES | YES | | YES | 199 | 0 | 0 | 0 | 199 | 100.00 |
| 13 | 4-1/4 X 9-1/2 | | 2.24 | YES | YES | | YES | 195 | 0 | 0 | 0 | 195 | 100.00 |
| 14 | 4-3/8 X 6-3/4 | | 1.54 | YES | YES | | YES | 196 | 0 | 0 | 0 | 196 | 100.00 |
| 15 | 4-1/2 X 8 | 4 x 8 | 2.00 | YES | YES | | YES | 330 | 0 | 0 | 0 | 330 | 100.00 |
| 16 | 5 X 5 | | 1.00 | YES | NO | | NO | 250 | 8 | 145 | 0 | 97 | 38.80 |
| 17 | 5 x 7-1/2 | | 1.50 | YES | YES | | YES | 194 | 0 | 0 | 0 | 194 | 100.00 |
| 18 | 5-3/8 X 6-7/8 | | 1.28 | YES | NO | | YES | 198 | 0 | 0 | 0 | 198 | 100.00 |
| 19 | 5-3/8 X 8 | | 1.49 | YES | YES | | YES | 197 | 0 | 0 | 0 | 197 | 100.00 |
| 20 | 5-1/2 X 5-1/2 | | 1.00 | YES | NO | | NO | 199 | 0 | 102 | 10 | 87 | 48.74 |
| 21 | 5-5/8 X 5-5/8 | 5-1/2 x 5-1/2 | 1.00 | YES | NO | | NO | 250 | 3 | 121 | 0 | 126 | 50.40 |
| 22 | 5-3/4 X 5-3/4 | | 1.00 | YES | NO | Beige | NO | 250 | 14 | 113 | 1 | 122 | 49.20 |
| 23 | 6 X 6 | | 1.00 | YES | NO | White | NO | 250 | 4 | 109 | 18 | 119 | 54.80 |
| 24 | 6-1/4 X 6-1/4 | | 1.00 | NO | NO | Green | NO | 200 | 200 | 0 | 0 | 0 | 0.00 |
| 25 | 6-1/4 X 8-3/4 | | 1.40 | NO | YES | | NO | 203 | 203 | 0 | 0 | 0 | 0.00 |
| 26 | 6-1/8 X 9-1/4 | | 1.51 | YES | YES | | YES | 198 | 2 | 0 | 0 | 196 | 98.99 |
| 27 | 6-1/2 X 6-1/2 | | 1.00 | NO | NO | | NO | 250 | 250 | 0 | 0 | 0 | 0.00 |
| 28 | 6-1/2 X 10 | | 1.54 | NO | YES | | NO | 200 | 200 | 0 | 0 | 0 | 0.00 |
| 29 | 6-3/4 X 6-3/4 | | 1.00 | NO | NO | | NO | 262 | 262 | 0 | 0 | 0 | 0.00 |
| 30 | 7 X 7 | | 1.00 | NO | NO | | NO | 249 | 249 | 0 | 0 | 0 | 0.00 |
| 31 | 7-1/4 X 7-1/4 | | 1.00 | NO | NO | | NO | 225 | 225 | 0 | 0 | 0 | 0.00 |
| 32 | 7-1/2 X 7-1/2 | | 1.00 | NO | NO | | NO | 250 | 250 | 0 | 0 | 0 | 0.00 |
| 33 | 8-1/4 X 8-1/4 | | 1.00 | NO | NO | | NO | 250 | 250 | 0 | 0 | 0 | 0.00 |
| 34 | 8-1/2 X 15-1/2 | | 1.82 | NO | YES | | NO | 200 | 200 | 0 | 0 | 0 | 0.00 |
| 35 | 8-7/8 X 12-1/2 | | 1.41 | NO | YES | | NO | 198 | 198 | 0 | 0 | 0 | 0.00 |

Table 1 – Cancellation Rates for GCA Aspect Ratio Samples on AFCS

The green highlighting indicates samples that were processed at an acceptable level of performance, but also had an aspect ratio that is not within the current acceptable range.

| Greeting Item No. | Card Test Envelope Size | Verified Size | Aspect Ratio | Legal Size | Legal Ratio | Color | Performance Acceptable | Quantity | Reject Mechanical | Reject Cancellation | Weak Ink | Cancelled | Percent Cancelled |
|------------------------|-------------------------|---------------|--------------|------------|-------------|--------|------------------------|----------|-------------------|---------------------|----------|-----------|-------------------|
| Colored Samples | | | | | | | | | | | | | |
| 36 | 5-3/4 X 8-1/4 | | 1.43 | YES | YES | Green | NO | 251 | 0 | 251 | 0 | 0 | 0.00 |
| 37 | 5-3/4 X 8-1/4 | | 1.43 | YES | YES | Green | NO | 278 | 0 | 278 | 0 | 0 | 0.00 |
| 38 | 5-3/4 X 8-1/4 | | 1.43 | YES | YES | Green | NO | 261 | 0 | 261 | 0 | 0 | 0.00 |
| 39 | 5-1/4 X 7-1/8 | | 1.36 | YES | YES | Green | NO | 261 | 0 | 261 | 0 | 0 | 0.00 |
| 40 | 5-3/4 X 8-1/4 | | 1.43 | YES | YES | Green | NO | 245 | 0 | 245 | 0 | 0 | 0.00 |
| 41 | 5-3/4 X 8-1/8 | | 1.41 | YES | YES | Red | NO | 259 | 0 | 252 | 0 | 7 | 2.70 |
| 42 | 5-1/4 X 7-1/4 | | 1.38 | YES | YES | Red | YES | 301 | 0 | 1 | 0 | 300 | 99.67 |
| 43 | 5-1/8 X 7-1/4 | | 1.41 | YES | YES | Red | NO | 267 | 0 | 265 | 0 | 2 | 0.75 |
| 44 | 5-3/4 X 8-1/4 | | 1.43 | YES | YES | Blue | YES | 270 | 0 | 0 | 0 | 270 | 100.00 |
| 45 | 5-3/4 X 8-1/4 | | 1.43 | YES | YES | Blue | YES | 265 | 0 | 0 | 0 | 265 | 100.00 |
| 46 | 5-1/8 X 7-1/8 | | 1.39 | YES | YES | Blue | YES | 201 | 0 | 0 | 0 | 201 | 100.00 |
| 47 | 5-1/4 X 7-1/4 | | 1.38 | YES | YES | Blue | NO | 257 | 0 | 254 | 0 | 3 | 1.17 |
| 48 | 5-1/2 X 8-3/4 | | 1.59 | YES | YES | Blue | YES | 200 | 0 | 0 | 0 | 200 | 100.00 |
| 49 | 5-1/8 X 7-1/4 | | 1.41 | YES | YES | Blue | YES | 288 | 0 | 0 | 0 | 288 | 100.00 |
| 50 | 5-1/4 X 7-1/4 | | 1.38 | YES | YES | Purple | YES | 250 | 0 | 0 | 0 | 250 | 100.00 |
| 51 | 5-1/4 X 7-1/4 | | 1.38 | YES | YES | Orange | YES | 253 | 0 | 0 | 0 | 253 | 100.00 |
| 52 | 4-1/8 X 9-1/2 | | 2.30 | YES | YES | White | YES | 400 | 0 | 0 | 0 | 400 | 100.00 |

Table 2 - Cancellation Rates for GCA Colored Samples on AFCS

Note that most of the darker color envelopes failed to achieve an acceptable level of cancellation.



Preliminary Test Report

Greeting Card Association (GCA) Samples

Effects of Envelope Size and Color

On the Automated Facer Cancellor System (AFCS)

Image Recognition & Processing

USPS Engineering

March 22, 2006

Draft

| Revision History | | |
|----------------------------|---------------|--------------------|
| Revision # and Date | Person | Description |
| (draft) 3/22/2006 | D. Milligan | Initial version |

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