Technical requirements for an Automated Direct-Mail process combining the Printing- Process and Envelope-Inserting for Inline Direct-Mail Production

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Abstract

More than 25 different post-processes have been added inline with digital printers. Direct-mail produced directly off the end of a digital printer by using a mail-inserter to collate several previously printed pieces and stuff into a traditional envelope has been an elusive process. In recent years office speed desktop printer-inserters have become common, but their solutions are not scalable to high speed. For direct-mail production of speeds over 15,000 stuffed envelopes per hour, much more is needed. At the current digital printing speeds of 500 to 1000 feet per minute and paper web-width that allow multiple wide pieces to be printed, it is generally considered improbable to automate inserting- inline-with printing for the average printing / mailing company.

Mail-Inserters collate typically 4 to 7 pieces and stuff this bundle in a traditional envelope. The broad technology problems that had to be solved will be discussed in this paper. The reason it has taken so many years to achieve the production of collated and enveloped mail directly off press were investigated and the research findings are published here. The results are that rather than taking hours or days to print, insert and tray addressed mail in another department, mail is produced in-line with digital press and in the mail trucks within the hour. Labor costs are dramatically reduced. Integrity is increased and waste is decreased. Print-Insert-Tray inline mail processing is not just connected machines but an entirely new way of automatically producing traditional enveloped mail in minutes.

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Introduction

Had the opportunity to work with one of the great pioneers of post-print, inline-finishing on web presses, Robert (Bob) Fokus. I saw printing presses in the early 70's being transformed from a system component into an automated solution with the addition of a paper roll splicer on the front and direct-mail inline finishing on the back. The industry had the Mead-Imager (Kodak Proper's forerunner) for personalization and addressing and high-volume print-on- demand was born.

We discovered the 15,000 digital-printers being fed from boxes of fan-folded or cut-sheets and founded Roll-Systems™ (Lasermax-Roll, now Technau™) to produce roll-fed inline solutions. Twenty-five years later, with $100's of millions having been sold and more than 40 inline-patents to my name, we still didn't have a main-stream inline solution for enveloped-mail-inserting. There are 25+ different inline digital-printer solutions, for virtually every other paper based products such as books, newspapers and labels. Yet products that go-in- the-mail are the largest single class of paper-based products, with more than 150 billion delivered by the USPS (United-States-Postal-Service) every year. (1)

The attempts to hook envelope-inserters to printers for a complete enveloping solution had two main technical problems that needed solving: 1) Envelope inserters are too slow, complicated and a poor paper handling machine due to paper jams, and 2) There has been no viable automatic traying system to USPS - DMM (Domestic-Mail-Manual) standards that is fast enough. Valpac's™ successful direct-mail plant is limited in scope and cost $400+ million.

Today the urgency of this inline envelope mail production solution is to provide Direct-Mail Advertising a solution to compete against electronic based communications. Without postal preparation automation, mail will decline.

This paper reviews the requirements needed to entice media-buyers to invest more of their advertising budget in paper based solutions and the technical requirements needed for a complete automated-direct-mail-factory, where envelopes are on the truck in minutes after printing.

Increasing Print Market

Any improvement in processing of paper based communications or advertising must consider their Electronic-Media competition. After extensive discussions with media buyers, it became clear that there are three requirements they desire but rarely achieve, for their next big mail advertising campaign.

Three benefits print-media advertising-buyer wants, but can't get!

1) 100% accuracy: Every name on the list goes in the mail.
2) Reduced cycle-time (turn-time or turn-around): the time from when the content and format changes are frozen and the direct-mail pieces are in the hands of the addressees.
3) 100% mail piece integrity: No misuse of the piece or the information

"Direct-Mail process combining the Printing and Envelope-Inserting for Inline Direct-Mail Production" answers the media-buyer's needs because: 1) Insert, trayed and addressed mail produced in-line with a digital press is in the mail trucks within minutes. 2) Labor is removed from the process. 3) Integrity is increased and waste is decreased.

Mail that can arrive to coincide with other forms of advertising or communications greatly increases the value of the overall program. Mail is the only method that can ensure that everyone in a specific geographical area or neighborhood, physically interacted with the intended message.

Traditional Direct-Mail Process

Economics – Return-On-Investment, (ROI)

- Every printer-hour requires 10 to 30 man-hours of mail preparation.
- Typically, there 1/3 the number of people needed, and
- It often takes hours to get the job out the door after the printer is finished.

Lots of possibilities for delays and mistakes.

Example: If a printer runs for 10 hours, with only 1/3 the labor needed, then there may be an additional 20 hours of required post printing, to finish the job.

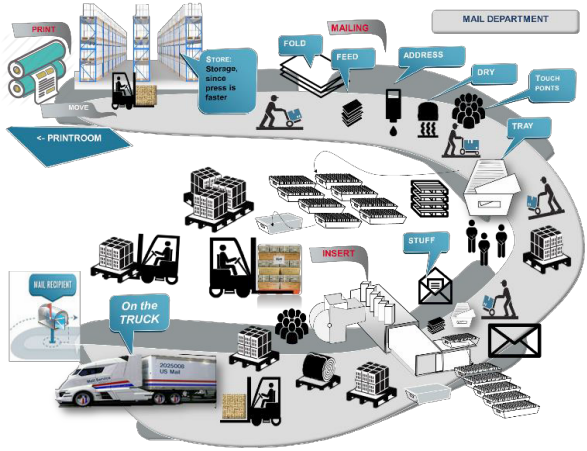
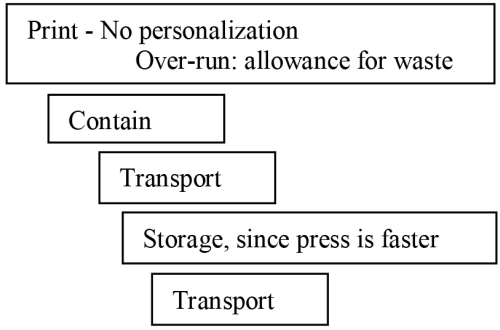


Figure 1: *Traditional Direct-Mail Process.*

TRADITIONAL DIRECT-MAIL WORKFLOW

Envelope Inserting, Personalized - press and mail in separate areas, separate buildings or separate companies.

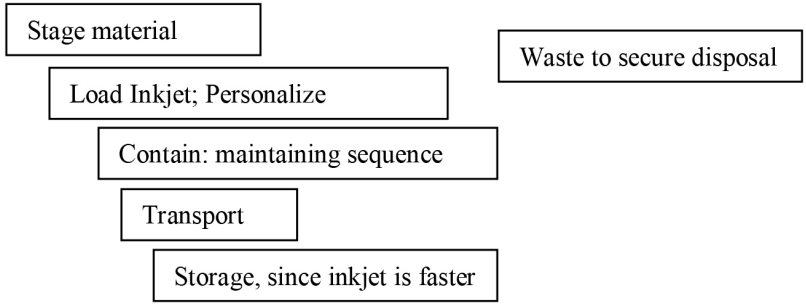
PRINTING AREA



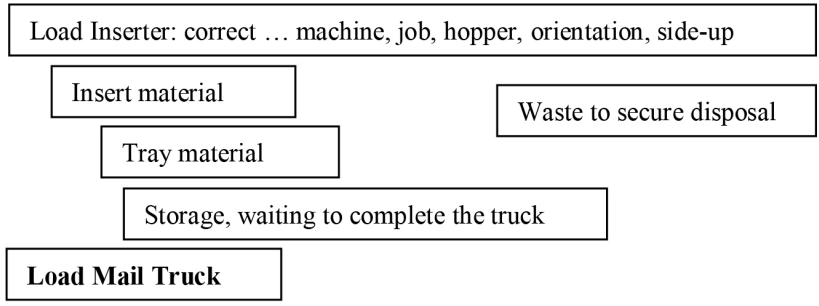
MAIL PROCESSING AREA

- 10 to 30 people/hour to keep up with each press. DELAYS, MISTAKES, MISUSE (touch-points)

Personalize (inkjet) - **window envelopes**



Insert



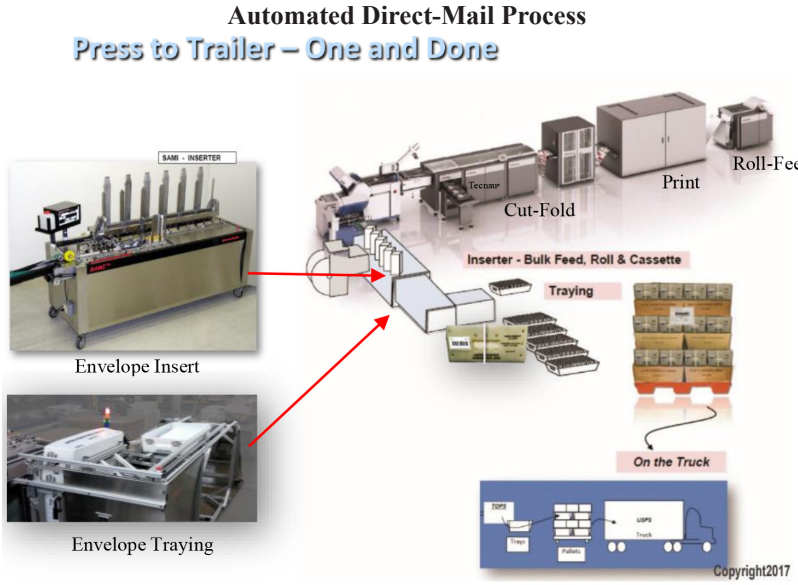


Figure 2: *Automated Direct-Mail Process.*

Automated Envelope Inserting inline, Personalized: print and mail inline.
PRINTING / INSE RT ING inl in e … **in same AREA**

Inline: Print, Personalize, Insert and Tray NO Over-run, NO touch points

Load directly to Mail Truck, within the hour.

The 6M's of a successful Automation project

It has become clear that a machine in one location may be unsuccessful, and yet that same machine moved to a different plant, will be wildly successful. We started out attributing it to the quality of the Materials. As the old adage says: garbage in, garbage out, GIGO. You can't make first-class mail out of class-less printing and paper. Over time our list of considerations and requirements necessary for a successful automation project has grown to include the following six importance areas in an automated process plant:

1) **M**achine
2) **M**aterials
3) **M**anpower
4) **M**aintenance
5) **M**ethods
6) **M**anagement

All are Necessary for Success!

1) A successful **Machine** needs:
2) Raw **Materials** that are in specification,
3) Available operator **Manpower** that is conscientious,
4) Competition **Maintenance** department that is conscientious,
5) Procedures and **Methods** that make sense, and
6) At all levels, **Management** that is engaged and cares about the process.

TEN Criteria necessary for successful inline process

After having produced over 15 different successful inline processes, covered by more than 40 patents, it became clear that there are reasons why some inline processes cannot work. Conversely what are the criteria that must be required to have a successful inline processes.

Each process in line must be:

1) … faster than previous process.
2) … more reliable than the previous process (lower jam rate, less moving parts).
3) … operator skill level must be comparable.
4) … service skill level and frequencies must be comparable, or less.
5) … must be forgiving for substrate treatment of all previous processes.
6) … material feeding (replenishing and preparation) must be comparable, or less.
7) … material removal must be fast.
8) … quality-control built in, and verifiable.
9) … exceptions allowed for. (mistakes will happen)
10) … handling the requirements of many small details

To elaborate on 5) above, all of the torturous treatment of the printed media by each of the previous process steps are handed to the next process step. In this case of envelope inserting and Traying, that's the end of the line. This is particularly important since arguably Direct-Mail encompasses the widest possible array of different types of printing and many forms of processing of any other type of printed material processing.

INSERTER:

With these inline processes criteria firmly established, it became clear what was needed in order to complete the automation of envelope inserted Direct-Mail. Collating individual inserts and stuffing them into an envelope is arguably the most difficult and most important aspect of the print industry. Envelope mail inserting in-line with printing, required many improvements, in many areas such as:

1) Faster: If the printer prints at 500 or 750 feet-per-minute (fpm) and is two, 8-1/2 or 11 inch-cutoff documents wide; then the post-printer components must be able to process >100,000 envelopes per hour.
2) Reliable: for our envelope inserter, we eliminated 100 traditional sources of jams.
3) Skill: We eliminated 40 operator adjustments, the operator adjustments of just length/width/thickness and they are very forgiving.
4) Service: We only have 15 moving parts, less than 1 part for each of the 6 insert hoppers.
5) Substrate: Our design is very tolerant to typical material defects.
6) Feeding: We have bulk feed and barcode validation of correct material.
7) Removal: The envelope-inserter feeds an automatic traying system.
8) Quality-Control: tracking and cameras monitor material flow.
9) Exceptions: Procedures and checklists ensure predictable production.
10) … There are lots of details that need to be thought out and customized.

TRAYING SYSTEM:
Similarly, the inline process criteria applies to the next process inline. Automatic traying is complicated by the rules that were written for manual processing at a time when post-office automation was not as advanced.

1) Must follow the USPS (United-States-Postal-System), DMM (Domestic-Mail-Manual) when traying mail.
    a. Working with the local postal entry point may find different DMM interpretations and opinions on process preparation and flow.
    b. The USPS postal savings for adding processing that save the USPS expense must be weighed against the production cost required to save postal cost. An extreme example: we don't want to put one envelope, in one tray, on one pallet.

2) Considering the previously described: TEN Criteria necessary for successful inline process:
    a. The traying system has only 7 moving parts and no operator adjustments.
    b. It is much faster than the previous inline components; able to process >500,000 envelopes per hour.
    c. All the workflow processes and material flow for the Traying system to the truck-loading is thought out. The material moment speed and the need for shrink-wrap, labeling, and manifesting needs to be considered with regards to the availability of people and machines needed during Inline Direct-Mail production.

Inventory management - loading truck

It is probably not obvious but the logistics of getting the material off the machinery and loaded on the truck is not trivial. Very often there are traffic management problems due to other incoming and outgoing material and machines that have to be maneuvered around. In addition, there is the hurry-up- and-wait phenomena as material comes off the end of the process line. The material needs to be cleared from the area so there's room to bring in raw material and to work around the machines. Fork-trucks, pallet-jacks, supplies and materials need to flow in and out of the area in a very deliberate manner.

Job specific procedures and checklists are a necessity. The activity can be so fast and with such volume that there is no time to figure out what and when inventory must be moved. The material moment procedures need to consider many dimensions in time material and space. Floor, loading-area, and rack space must be considered with the volume and deadlines of all the other current, future and past jobs in the area.

Clearly it would be best if the machinery and the workflow was laid out purposefully. This automated-direct-mail-inline problem also lends itself to further automation such as Automatic-Guided-Vehicles (AGV) and robots. (2)

Conclusions

The processing of 150 billion mail pieces annually with the current workflow, that requires material movement between many process-machines, is a serious detriment to Direct-Mail Advertising. Current mail processing waste, delays and mistakes do not provide what the market needs for their advertisers. There needed to be experience, focus, and will to solve this very important post- printing process problem inline. The experience of many successful inline processes provides the necessary knowledge to establish the criteria necessary for successful inline process. The experience of many successful automated process machines provides the necessary knowledge of the criteria required to have a successful inline process.

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