ESCORT MEMORY SYSTEMS
A Datalogic Group Company

Reducing Health Care Costs with Automated Prescription Filling

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Executive Summary

No one is wondering about ROI for this one. With health care costs front and center in the national consciousness; KNAPP Automation and EMS are providing relief one prescription at a time.

Automated pharmacies come in many shaped and sizes ranging from small stand alone dispensers serving hospitals and small pharmacies up to pharmacies the size of a football field that deliver 80,000 prescriptions per day. All have two things in common – all rely on automated product identification and all save the consumer money on their prescriptions.

The largest and most recent depend on a blend of RFID-enabled identification and barcode identification to process orders.

Problem Statement

Prescription drugs have grown at a phenomenal rate with brand name and generic drugs rapidly becoming the primary method of reducing hospital visits and shortening hospital stays. The industry stands at $261B and 8.5 billion prescriptions in 2005 in the US alone. The task of safely handling this huge flow of prescription drugs is rapidly being turned over to automated pharmacies that have lower error rates and dramatically lower operating costs. According to Doug Long of IMS Health, mail service prescriptions continue to grow at twice the rate of retail chain prescription outlets (8.9% for mail service vs. 4.3% for chain drugstores, 2006 data)

Centralized automated mail order pharmacies reduce the cost of filling prescriptions by 60% (Note: this only addresses the prescription filling process and not the cost of the prescription drugs). Capable of filling 20,000 to 80,000 prescriptions per day, the central mail order pharmacy is a miracle of automation working hand-in-glove with people. With over 100 centralized mail order pharmacies operating today and a long track record of success, these automated facilities address both issues facing US healthcare, cost and supply security.

The Players

Several types of players own these large automated pharmacies including the Veterans Administration (CMOP's/TMOP's consolidated mail order pharmacies), Non-profits (i.e. Sutter, HCA) and For profit insurers (ie. UnitedHealth Group, Humana). The automated pharmacies are set up to deliver mail order prescriptions of all types (pills, blister packs, creams).

The History

Dating back several years, the centralized mail order pharmacy has always featured some level of automation. Whether pick-to-light, A-frame delivery or pill dispensing; each area of the automated pharmacy has used automated identification originally in the form of barcode. Since 2000 however, all automated pharmacies are converting to durable RFID tagging in combination with barcodes for product identification.

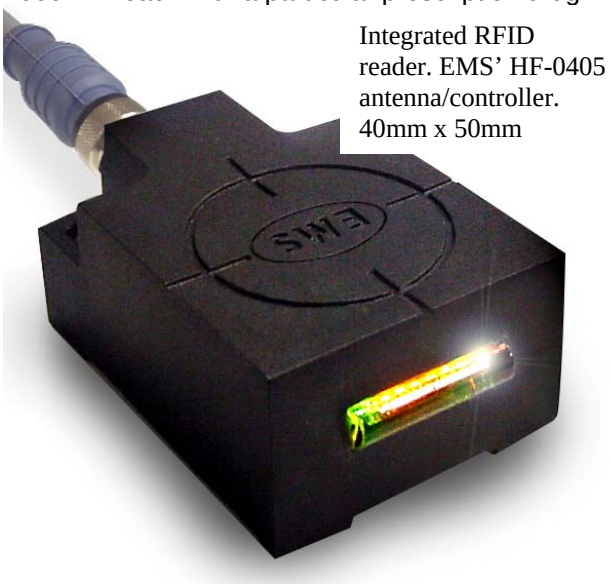
This conversion is part of the never ending struggle at an automated pharmacy to improve efficiencies and reduce error rates. It has been found that RFID read rates are typically above 99.99 -99.999% (1 read failure in 10,000 or 100,000 attempts) on the tote bin and puck lines compared to barcode with read failures in the 99% (1 failures per 100 attempts). Converting from barcode identification to RFID identification provides immediate ROI due to reduced installed cost and error handling requirements.

How They Work

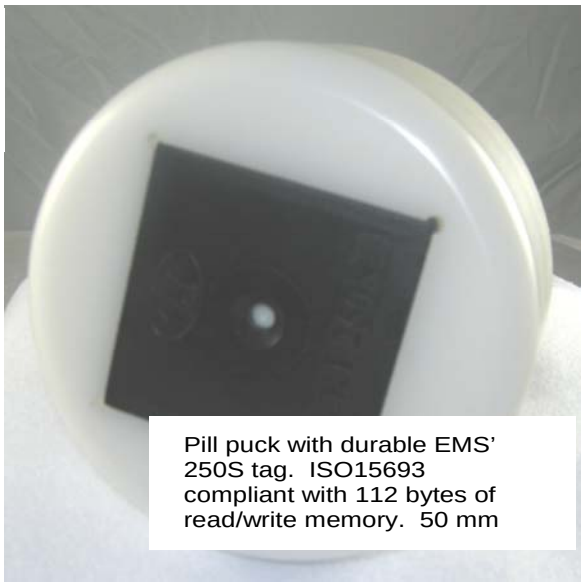
Each automated mail order pharmacy is broken into several sections connected by conveyors. Each section is suited to the particular function that is performed in that area. All areas are connected by conveyors using both

totes and pill pucks to move products between areas. These areas are:

Bottle label and fill – Prescription bottles are labeled with barcode and customer labeling. These bottles are dropped into a plastic 'puck' that holds the empty bottle while it travels along a series of conveyors. These pucks have RFID tags in them and the tag ID is associated with the barcode label on the bottles. The prescription information is also written to the tag in the puck associating it with a particular order, customer, etc. The control system guides the puck and bottle along a conveyor to an IPD, individual pill dispenser. The IPD automatically fills the bottle with the correct prescription. An automated mail order pharmacy may have 500 - 1000 IPD each with a particular prescription drug in it.



Integrated RFID reader. EMS' HF-0405 antenna/controller. 40mm x 50mm



Pill puck with durable EMS' 250S tag. ISO15693 compliant with 112 bytes of read/write memory. 50 mm

Pharmacist Checking – The host control guides the newly filled prescription bottle to a review station where a pharmacist checks that each order is correctly filled.

Tote Line – The newly filled and checked prescription now heads for the tote line. Here it will be dropped into an order tote along with other prescriptions that make up a complete order. Each tote bin has an RFID tag. Data will be written to this RFID tag associating it with the order. The tote collects all pill bottles associated with the order before being conveyed to the next area

Pharma tote with EMS' LRP125S durable tag. 25mm diameter with 112 bytes of read/write memory

A-Frame - Boxes, crèmes, blister packs and other assorted shapes are stored in what is called an A-frame. This long machine looks most like an A-frame house with vertical slots filled with the prescription medicines. When the host has requirement for a particular medicine for an order, it will drop from the A-frame onto a conveyor running the length of the A-frame. The conveyor drops the package into the waiting tote bin. The RFID tag on the tote bin is read and the data on the tag updated to reflect the addition of prescriptions from the A-frame. Next stop is the pick-to-light area.

Pick-to-light – Low volume products are held in the pick-to-light area. An order tote arrives in this area and the RFID reader communicates to the host that it is ready for the pick-to-light portion of the order to be filled. In the pick-to-light area bins contain various prescription materials and when the host has an order to fill from this area, a light goes on that signals the location of that particular item. People place these items in the order tote and when complete release the bin for further processing.

Order Checking – A completed order is carried by conveyor to an area for manual checking of an order against a host generated prescription. When this is complete, the order is released for pack out.

Why Not Barcode?

At this point let's stop for a moment and look carefully into why barcode labels are being replaced everywhere possible within the automated pharmacy. The reasons are simple but key to the success of this application:

reliability – cost – function.

EMS's RFID readers and tags provide much higher reliability of data in automation environments than can be achieved by barcode techniques. The EMS readers and tags achieve as many as a million read cycles with only a few failures. This means a bullet-proof method of identifying each prescription order. This level of reliability is not possible for barcode reader systems in the automated environment.

Optical systems are subject to failure in automated environments due to optics degradation, condensation and barcode damage.

Barcode data cannot be changed once created.

RFID readers and tags are environmentally sealed and can be read in any orientation.
Tags support multiple read/write operations for continued use.

Second**,** EMS' RFID tags can be used thousands of times meaning the cost of a durable tag can be spread over thousands of cycles. This makes them cheaper to use than a barcode label that must be re-applied after every production cycle (i.e. new job number). The 10,000 totes within an automated pharmacy cycle through the facility 5-10 times per day. This is a typical example of re-useable production line carriers or shipping containers such as the pucks and totes.

Reliability – Getting specific
There are many ways to measure and predict reliability of complex systems, tools, etc. including mean time to fail, mean time to repair and other 'mean times', Another way of analyzing reliability is to analyze error rates. There is a certain error rate associated with every process. A process step is any necessary activity that occurs while moving a product through a production facility.

An RFID reader is present at many of these process steps to insure that the product is moving along the correct path to the next process step. RFID readers are used at each fill step to insure that each product goes into the correct prescription order.

Each day, an automated pharmacy handles as many as 80,000 prescriptions; each prescription may have several different items within it. Consider the results of using different identification methods within these pharmacies. Remember that each prescription may see 100 identification steps in its journey through the facility.

<u>Using human identification</u> – 50,000 prescriptions x 100 steps x 1 error/100 steps = 50,000 identification errors per day

Using barcode identification – 50,000 prescriptions x 100 steps x 1/1,000 = 5,000 identification errors per day

Using RFID identification – 50,000 prescriptions x 100 steps x 1/50,000 = 100 identification errors per day

All pharmacies have exceptional records of prescription accuracy however to achieve this, multiple error checks must occur. Each of these error checks is expensive to put into place and operate. Image the effect of reducing the number of errors a system must handle daily from 50,000 to 100!

Problem Solved

Of course, no problem is ever really 'solved' but the RFID-enabled identification reduces identification errors by 10-100X within these large automated facilities providing immediate ROI from reduced installation costs, maintenance and error handling.

With the national attention turned to reducing healthcare costs, it's good to know that some of the largest health care organizations in the country are turning to RFID technology to cut the costs on delivering prescription drugs.