



RedPrairie for Automation Integration

 RedPrairie®



Automation Integration Advantage

With over 30 years of experience supporting the world's best companies, RedPrairie has successfully integrated our E²e™ Supply Chain Execution solutions to virtually every type and major manufacturer of Automated Material Handling Equipment (AMHE). These integrations leverage the capabilities of the control systems, hardware connectivity, and communications protocols available to provide fast, secure information workflows, while decreasing the integration effort required and promoting ease of use.

This brochure provides a brief overview of RedPrairie's automation integration approach and technology, as well as lists of sample AMHE manufacturers we have integrated to (Figure 1) and customers for whom we have successfully completed AMHE integrations (Figure 2). It also provides a number of case studies highlighting our AMHE integration experience.

Interface Technologies

The majority of interfaces to AMHE today utilize Ethernet and TCP/IP. The principal reason for this approach is:

- Speed and flexibility of the Ethernet connection
- Decreasing cost of networking components
- Support for open systems by automation vendors
- Ease of long term software and hardware support

These implementations include communication via a number of mechanisms including:

- Near real time inter-process messages
- File transfers - rcp or ftp
- Shared data - NFT

In addition, RedPrairie has provided direct serial connections and other communication interfaces to devices such as:

- Allen-Bradley Pyramid Integrators
- Allen-Bradley KF2 modules
- In-line scanners
- In-line scales
- Sizers
- Label applicators



Integration Approach

RedPrairie's Integrator EAI framework has been designed to streamline the process of data mapping, and manage "events" and responses associated with transactional exchange between applications. It provides an intelligent, configurable interface tool that handles variable or fixed data formats. Integrator is an integral part of RedPrairie's services-oriented architecture (SOA). It enables customers to personalize workflows to address the specific data exchange nuances of their work processes and substantially reduces the cost and time associated with cross-application integration.

In systems implemented by RedPrairie involving AMHE, RedPrairie's Warehouse Management system (WMS) accounts for all inventory across the building or campus. For example, in a Pick-to-Light system, the WMS will retain responsibility for accounting of all inventories by location within the Pick-to-Light controlled locations. When product movement out of an automated subsystem is required, the WMS will pass to the automation controller the location from which inventory is to be picked and, if applicable, the quantity.

With Sortation systems, the WMS passes a divert list to the sortation controller containing, at a minimum, the carton license plate and the divert destination. The sortation controller then passes acknowledgment of successful divert back to the WMS. Where this is not possible, the WMS can be interfaced directly to in-line scanners on the conveyor system, and divert decisions

can be made dynamically. In this case there is more processing responsibility on the WMS, and response time could be an issue, especially in high-speed conveyor systems.

At the communications level, an ACK/NAK protocol is used to assure the arrival and processing of messages between the WMS and device controllers.

The WMS is generally isolated from the Level 2 controllers, which are responsible for the communication with PLCs, relays, or other devices. In the past, RedPrairie systems have had to interface with these low level devices. At present, it is more common for controllers to communicate with these devices. The transition has been made by most AMHE suppliers from PLC controlled devices to microprocessor based controllers.



AMHE Vendor Integrations

The following list of AMHE vendors and their associated equipment is not meant to be exhaustive of the equipment to which RedPrairie applications have been interfaced, but only to reflect the depth and breadth of our experience in this area.

Figure 1 – AMHE vendors and equipment to which RedPrairie has interfaces

Vendor	Equipment
ABB	Picking robots with Allen-Bradley PLCs
Alien	RFID readers, antennas and tags
Daifuku	AS/RS cranes, mini-loads, cart picking systems and robotic palletizers
Dasko	Labeling systems
DCS	Pick-to-light systems
Dematic	AS/RS cranes and routing conveyers
Dexion	Routing conveyors
Egemin	Routing conveyors and sortation systems
ELECTTRIC 80	Humanless and Trackless Laser Guided Forks LGV's
EOS	Pick to Light systems
FKI Logistex	Conveyors and sortation systems
Interlake	AS/RS cranes
Intermec	Radio frequency and RFID systems
Jungheinrich	Mini-loads and routing conveyors
Kardex	Vertical carousels
Knapp	A-Frame dispensers and conveyors
Labware	Pick to Light
LXE	Radio frequency and RFID systems
Motorola / Symbol	Radio frequency and RFID systems
Printronix	Labeling and printing systems
Psion Teklogix	Radio Frequency systems
Samovie	Conveyor controls systems
Savoye	Carton manipulation and label applicators
Siemens	Order picking and sortation conveyors
Sumitomo Heavy Industries	AS/RS cranes
Toledo	In-line scales
Van der lande	Order picking and sortation conveyors
Vocollect	Voice systems
Voxware	Voice systems
Wavetrends	RFID systems
Weber	Label and coding solutions
Zebra	Label, printing and RFID solutions

RedPrairie AMHE Customer Integrations

The following list of customers and their associated Automated Material Handling Equipment is not meant to be exhaustive, but only to reflect the depth and breadth of our experience in this area.

Figure 2 – Customers and AMHE equipment to which RedPrairie has interfaced

Account Name	Location	Automation Type
ADS	USA	Carousels; conveyors; Pick to Light
American Standard	UK	AS/RS; conveyors; automated pick stations
Amgen Europe BV	Netherlands	AS/RS; carousels; conveyors
Becton Dickinson	USA	Conveyors; In-line scales; palletizer; sorters
Bemusic NYC	USA	Conveyors; sorters
Bio-Rad Laboratories, Inc.	USA	Sorters
The Book People	UK	Conveyors; cartonization; label applicator
Bristol-Myers Squibb	USA	Conveyors; In-line scales; Pick to Light

RedPrairie AMHE Customer Integrations

Account Name	Location	Automation Type
California Cartage	USA	Sorters
Cambium Learning	USA	Conveyors
Cetraal Boekhuis	Netherlands	Vertical carousels
Cingular Wireless	USA	Carousels
Computer 2000	UK	Order picking and sortation conveyors
Coopervision	USA	A-frame; carousels; Pick to Light
Coty Astor	Spain	AS/RS; Pick to Light; conveyors
CSK Auto	USA	Put to Light
Despec Logistics	Netherlands	Conveyors; sorters
Dick Blick Company	USA	Pick to Light; sorters
Electronic Arts	Belgium	Conveyors; In-line scales
Ford Motor Company	Germany	AGVs; conveyors; sorters
Fosters	Australia	Single Pallet Humanless Laser Guided Fork and double pallet variants, Voice Picking, ASRS, Pallet Stackers
Friesland Madibic Food Service	Belgium	Sorters
GlaxoSmithKline	USA	Conveyors
GSI Commerce, Inc.	USA	Conveyors; shipping diverts
Hatfield Quality Meats, Inc.	USA	AS/RS; conveyors
J. C. Penney Company	USA	AGVs; conveyors; GOH (Garments on Hangers); Pick to Light; shipping diverts; sorters
JéWéRET	Netherlands	AS/RS; shuttles
Johnson & Johnson	USA	Auto label applicators; conveyors; In-line scales; sorters
Jusco – AEON	Japan	Cart picking systems
Kaplan Dearborn Logistics	USA	Conveyors; sorters
Keystone Automotive Industries, Inc.	USA	Conveyors; sorters
Kimberly-Clark Corporation	USA	AGVs; AS/RS
Lakeland Limited	UK	AS/RS; mini-load storage and retrieval
Liz Claiborne, Inc.	USA	Conveyors; GOH (Garments on Hangers); In-line scales; sorters, carousels, Pick to Light
Merck & Co., Inc.	USA	AS/RS
Michael's Stores, Inc.	USA	Conveyors; sorters, Pick to Light
National Beef	USA	Carousels; conveyors; sorters
NIKE, Inc.	USA	Conveyors
Ocado	UK	Pallet cranes; monorail trains; mini-load storage / retrieval
Oxford University Press	UK	Conveyors
Panasonic Corporation	USA	AGVs; carousels; sorters
Papyrus	USA	Conveyors
Perkins Engines	UK	Cranes; conveyors; picking robots
Procter & Gamble	USA	A-frame
Random House, Inc.	USA	Conveyors; In-line scales
Reebok International Ltd.	USA	Conveyors; In-line scales; shipping diverts
Robert Bosch Corporation	USA	Conveyors; Pick to Light; sorters
Royal Mail	UK	Order picking and sortation conveyors
Schering-Plough Corporation	USA	AS/RS; conveyors; sorters
Sephora USA, LLC	USA	Conveyors
Stanley Tool Works	USA	Sorters
Subaru of America	USA	Carousels
Swift & Company	USA	Carousels
Take 2 Corporation	USA	Conveyors; Pick to Light; sorters
Thomas & Betts	USA	Conveyors; sorters
Tropicana Products	USA	AS/RS
WRC Media	USA	Conveyors
Zoto's International	USA	Conveyors

RedPrairie AMHE Customer Case Studies

The examples in the Figure 2 customer list above demonstrate a wide variety of industries, locations and equipment to which RedPrairie has successfully interfaced our Supply Chain Execution solutions. This section provides a few sample case studies to elaborate a little bit more on some interesting and diverse customer AMHE success stories.

The Book People

The Book People operate through four main areas of business – a mail order division takes orders from the internet or by telephone from catalogues. Their SchoolLink is a service provided to schools where individual pupils may place an order for books that will be delivered to them at the school. Promotions held by national newspapers are fulfilled by The Book People under the brand image of the newspaper (e.g.- The Times Book Club.)

The Book People also have 144 distributors, who place orders for a selection of titles (as well as being provided certain titles). These distributors then sell whatever they can, for example, by providing example copies to company foyers and taking orders from the staff. Whatever titles are not sold are returned to the warehouse, where they are checked for condition and either sold off as damaged items or are re-jacketed and sold.

The Book People implemented RedPrairie's Warehouse Management at three of their UK sites throughout 2003 – Haydock, Leigh and at an automated site in Bangor, North Wales.

In the Bangor automated site, packing boxes are made up by a Savoye case-erector and are channelled onto two Dexion conveyors, which pass between the picking zones. Despatch notes (one per box) are placed into these packing boxes. In addition to the product information, the notes hold details relating to the carrier, conveyor routing information, a carton ID and the box size. An operator scans the despatch note information and a carton ID label is printed and automatically applied to the packing box using a Savoye label applicator. This scan effectively launches the box onto the conveyor system and the box is then directed to the relevant picking zones via the Dexion conveyor system.



Once the box has visited all the necessary picking zones, it is forwarded to the weigh-scale and despatch area. If the box weight is outside its expected tolerance, the conveyor will route the box to a checking bench area.

At the checking bench the contents of the box will be checked against the despatch note requirements and any necessary amendments are made. The box is then returned onto the main conveyor to join boxes that passed the weigh-scale check.

An automatic Savoye lidding machine closes the box. Near to the lidding process there is a fixed scanner that automatically scans the carton ID to enable automatic confirmation of pick so shipment can take place. At this point a carrier label is printed and automatically applied to the lid of the packing box for despatch.

Warehouse Management also interfaces with the host Maginus system provided by Mancos. The control product for the conveyor installation is the Escada Evolution Ltd platform, which provides starting, stopping and alarm handling facilities as well as a means to view and edit carton information.

RedPrairie AMHE Customer Case Studies

Coty Astor

Coty Astor implemented RedPrairie's Warehouse Management at their manufacturing and distribution facility in Granollers, Barcelona.

The site is highly automated with an automated storage and retrieval system (AS/RS) with capacity for approximately 15,000 pallets covering 3,500 square metres. A Pick to Light System provides approximately 2,300 picking locations. Warehouse Management integrates with the InfoPick Pick to Light system provided by Labware. A conveyor system transports picked goods to a sorter with 25 outbound chutes. All AS/RS and conveyor hardware is provided by Van Der Lande.

External third party logistics companies hold 50% of the total inventory within the facility, so the Owner functionality within Warehouse Management is employed to control stock ownership.

A total of 70 users have access to the RedPrairie application at any one time, either through the PC client, using Radio Data Terminals, or via the Web Client.

The software was implemented on a two node IBM X360 cluster, each machine with three 2.4 GHz processors running Windows 2000 Advanced Server with Oracle.

Warehouse Management is interfaced with two host systems; BPCS controlling the production plants, and SAP, which is used to control national distribution.

Ocado

Ocado, the on-line grocery service in partnership with Waitrose, selected RedPrairie's Warehouse Management to control all activity at a new distribution centre in Hatfield. This operation is thought to be the largest online grocery delivery facility in the world.

Ocado started operations supplying a pilot launch area from temporary warehousing facilities provided by Gist, a third party logistics specialist. At the same time construction work continued on the Hatfield complex.

The system helps Ocado fulfil its unique online-grocery shopping promise to deliver to customers within a one-hour delivery window. After a ramp-up period, weekly orders are now in excess of 30,000.

Warehouse Management controls all movement within the semi-automated warehouse, which is a total of 1,500,000 sq. ft. over four floors, and is designed to service the equivalent throughput of 20 supermarkets. The system provides the intelligence backbone within the site, interfacing with and controlling the sophisticated mechanical handling solution. This ensures that the warehouse operates at optimal levels of productivity, accuracy and efficiency.

The mechanical handling equipment was installed by Thyssen and included pallet cranes, a monorail train system and a mini-load storage and retrieval system.

Ocado currently offers approximately 10,000 of the Waitrose product catalogue grocery lines through this facility.

Warehouse Management automatically provides real-time information on stock availability to customers placing grocery orders at Ocado.com, helping to minimise stock substitutions. This further drives efficiency and eliminates a traditional cause of dissatisfaction when shopping online. The system's wave-picking functionality ensures orders are picked using the storage and retrieval systems, transported around the building and delivered to the appropriate packing stations.

Orders are packed into "pods," small temperature controlled units, which can be loaded onto a local delivery truck. Six of these pods fit onto the trailer of a standard lorry. The lorry then drives to a "spoke" site, which can be little more than an expanse of flat tarmac with facilities for waiting delivery staff. The pods are then decanted to neighbourhood delivery trucks to be delivered to the end customer.

RedPrairie AMHE Customer Case Studies

Lakeland Limited

Lakeland Limited is a family owned mail order kitchenware company based in Windermere in the Lake District. They also have 30 retail outlets throughout the UK, including notably the outlet in the Bluewater shopping and leisure centre in Kent.

Lakeland Limited has been a RedPrairie customer since 1993. In 2002 they enlarged their Kendal distribution centre and implemented the latest version of Warehouse Management in conjunction with a new mini-load automated storage and retrieval system from Jungheinrich as part of their mail order fulfilment initiative.

This system was the first mini-load implementation in the UK by Jungheinrich (previously Jungheinrich had only implemented pallet AS/RS in the UK). The mini-load system was designed to facilitate the fluctuations in demand for the slower moving Lakeland lines.

As soon as an order is received requiring a specific product, Warehouse Management instructs the

mini-load system to move a tote of product to one of the picker accessible dynamic pick faces. When demand ceases for that product the AS/RS is instructed to remove the bin from the dynamic pick face and position it back into storage, thus releasing the location for another item which has demand.

Dedicated fixed pick faces are utilized for the fast movers, such as the Delia Smith omelette pan, in traditional racking of various pallet space sizes.

Peak picking figures are currently at over 10,000 per hour; the system is sized to cope easily with 20,000 picks per hour with the current set-up.

Once a parcel has been packed and labelled, it is placed on a conveyor that transports it directly into the back of a carrier trailer. As the parcel passes a fixed head scanner, the parcel number is read and recognized and automatically confirms shipment within Warehouse Management. An electronic manifest message is then sent to the carrier.



RedPrairie AMHE Customer Case Studies

Oxford University Press

With an annual turnover of over £320 million, Oxford University Press has a presence in over fifty countries, employing some 3,700 people worldwide. Its diverse range of publications includes works in all academic disciplines, including bibles, school and college textbooks, children's books, business books, dictionaries, reference books and journals.

Oxford University Press implemented Warehouse Management in two warehouses in Corby, Northamptonshire on a Hewlett Packard N series server. The first warehouse is a standard distribution centre with wide aisle racking employing the use of

LXE Radio Frequency terminals. Phase two was the implementation of an automated warehouse using a conveyor system installed by Dematic.

After two years, a review of automation systems took place to ascertain whether the conveyors throughout the whole DC fit in with future business plans. As a result of this review, the amount of conveyor was considerably reduced. Now operators pick onto trolleys that are dropped off at packing stations. From the packing stations, the shipping cartons are transported to the dispatch lanes via the conveyor system for automatic lidding and strapping.

Computer 2000 Distribution

Computer 2000 Distribution Limited is the UK's largest trade-only computer and accessories distributor, with an annual turnover of £800 million. They are part of the American company Tech Data, which is the second largest computer distributor in the world.

Computer 2000 opened a new automated warehouse in Magna Park, Lutterworth. The operation went live running RedPrairie's Warehouse Management using Hewlett Packard N class servers – one acting as a hot standby.

The distribution centre is 300,000 square feet and has a mezzanine floor covering 120,000 square feet. The DC comprises bulk storage areas for large items and a Van der Lande conveyor system facilitates tote picking. Pre-cubing processes split the customer orders into tote-sized chunks. The operators pick into the totes as they come round the conveyor to them and confirm the tasks have been completed using Radio Frequency terminals. Completed totes are then routed to one of the 22 pack stations for packing and shipment.



120 full time employees work in the Computer 2000 facility over 3 shifts on a 24 hours x 5-day basis. 3,000 deliveries (despatches) are made per day – a total of 500,000 items are shipped per month.

RedPrairie AMHE Customer Case Studies

Royal Mail

RedPrairie's Warehouse Management has been implemented for a conveyORIZED picking system at the Royal Mail's Swindon site. The site distributes engineering equipment, bicycles, uniforms, stationery and government forms to the entire Post Office network throughout the UK and Northern Ireland. The automation supplier is Dematic, who provide both the materials handling and low level control aspects of the system, including PLCs.

Warehouse Management carries out pre-cubing of orders into totes, routing and check weighing functions, and provides management information to ensure the system operates at maximum levels of efficiency. Currently the automated area of the system operates with paper pick lists into totes, but is likely to migrate to RDT picking and real time control of the picking operation in the future.

The interface consists of telegrams, which are structured messages that are exchanged between Warehouse Management and the Dematic Conveyor Control System (CCS).

An additional distribution facility in Hemel Hempstead has also been operating Warehouse Management since 2004.



Perkins Engines

RedPrairie's Warehouse Management was implemented at Varsity Perkins in 1997. The system controls 8 Daifuku cranes using Daifuku crane controllers, 2 Van Der Lande Conveyor systems and an ABB picking robot using Allen-Bradley PLCs. Warehouse Management talks directly to the PLCs, connected via TCP/IP network links.

The PLC code was written by the automation supplier and the message formats agreed with RedPrairie. The level of interaction between the PLC and Warehouse Management is extremely high; at each decision point on the conveyor, the PLC requests from Warehouse Management the next destination without stopping.

At any one point on the conveyor, the reply must be returned within 700ms.

This system is storing components from suppliers prior to delivery to production to build diesel engines. The components include engine blocks and crankshafts that are picked automatically by a robot at the start of the production line onto an AGV and all the other engine components that are delivered in containers to pick stations along the production line. Containers that are not picked to empty are returned to store. There is also some traditional wide aisle racking storage controlled by Warehouse Management using RDTs.



RedPrairie AMHE Customer Case Studies

American Standard (formerly Armitage Shanks)

RedPrairie's Warehouse Management was implemented at the American Standard distribution centre in Armitage interfaced to an automated control system that manages all routing and communicates with the PLCs. The American Standard operation includes 6 Dematic cranes, 6 conveyors, 2 transfer cars and 150 automated pick stations.

When an order comes in, it is processed by the host sales application and then interfaced to Warehouse Management. Warehouse Management reconciles the order with existing stock and delivery status and feeds the request into a Dematic automated picking system in the mass storage area.

Warehouse Management defines products to be picked in two ways: precisely by an individual high-bay pick face, or generally by product identity and specification. The Demag system plots the most efficient path for picking the desired product so the cranes can deliver the pallet or item to central picking

locations. Operators then come to these central picking locations where they collect the items and move them by hand or fork truck to the appropriate loading area.

Following the installation of Warehouse Management, the site achieved a steady increase in throughput and now handles a 15% increase in workload with the same number of resources.

American Standard have implemented the system in a number of sites throughout the UK with interfaces to the host SAP system, including Wolverhampton and Hull. A site in Dublin, Northern Ireland is also running the same application.

The Armitage site upgraded to a new version of Warehouse Management in June 2004. This included an amendment to the way the crane system works. Warehouse Management keeps integrity of the location the crane system uses to putaway and pick stock from; currently a logical "crane" location is used and holds all products.

CooperVision Global multi-site, multi-product roll out

CooperVision is the second largest global manufacturer of contact lenses, with facilities in 18 countries worldwide. The company chose to implement RedPrairie solutions globally at their distribution centers in three locations over a period of three years – Warehouse Management (WMS), and Workforce Management (WFM) at West Henrietta, NY and WMS at both Delta Park, UK and Liege, Belgium.

In 2006, the first site went live in New York, the largest and most complex DC, where an average of 64,000 order lines are received per day. CooperVision chose both WMS and WFM to interface with their WCS in order to manage the workflow of some 118,000 active SKUs in 210,000 storage locations. Voice and RF technology facilitated full pallet and case picking for wholesale and retail stores, as well as individual pick & pack for direct customer delivery.

The global multi-site roll-out required close collaboration between the RedPrairie and CooperVision project teams in both the US and Europe. The US, UK and Belgium teams worked

together throughout the phases of each project utilizing the knowledge and experience they gained to improve the implementation process. The UK site went live in a phased approach in 2007 and the Belgium site went live in 2009.

The processes managed by RedPrairie systems are similar in the three DCs. All CooperVision sites use lot control specific to their requirements. Outbound items require validation checks at the pack station for shelf life and held lots. Expiry date validation is performed during the inbound process for parts that are stored within the ASRS (Automatic Storage and Retrieval System).

RedPrairie's Integrator tool was crucial to the success of each project as it interfaced with the company's Baan ERP system and the WCS, which in turn manages multiple types of material handling equipment including carousel conveyors, A-frame racking and the P2L controller as well as voice picking.

All of the facilities run on Windows and the SQL servers that are centrally located in the US. In addition, centralized system administration manages the process for all three sites.

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