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INFORMATION CONCERNING RFID IN SCANDINAVIA May 2009

COLD, WET AND WINDY, BUT THE RESULT WAS GREAT!

Monday, the 23d of April. We had booked a runway at Barkaby Airfield in Stockholm, Sweden. Finally we were going to test the UHF technique in high speeds. The test was ordered by Banverket, The Swedish Rail Administration. All week the weather had been fantastic, perfect in every aspect. On top of that, two exiting suppliers had promised to lend us testing material and personnel to help us out. We were heading for a great day of testing.

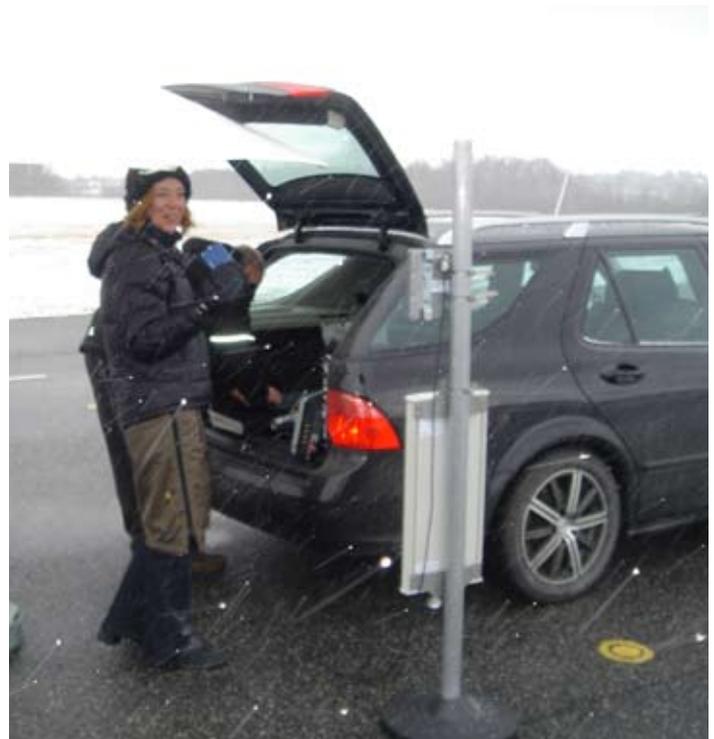
Believing the spring had arrived, I was very surprised when snow started to fall on the 22nd. And it wasn't a little snow. It kept snowing and snowing and snowing. In that evening alone it came down approximately 15 centimeters of snow. This was not good for testing in high speeds with a traditional car.

The morning after, the snow had stopped falling but there was a still quite a few centimeters on the ground. But that wasn't going to stop us. When we arrived to the airport we happily discovered that the runway was clear from snow, and we were all set to go.

THE BRAVE FEW WHO DEFIED WEATHER AND WIND WERE:

Lennart Andersson from Banverket, The Swedish Rail Administration
 Staffan Sjögren and Daniel Hjorth from Scirocco
 Anna Tham and Fredrik Dahlegren from Intermecc
 Me, Gunnar Ivansson, from LarningWell and my friend Mats Herpel who performed the driving during the day.

The reason we were doing these tests was a preliminary study report I did for Banverket late 2008. Banverket have



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to any higher speeds than 155 km/h before having to step on the brakes.

We tried different speed intervals with one to three tags attached to the car and we also tested different distances between the car and the antenna (approximately 3 m seemed optimal). The results showed that we could easily read at least three tags with 1.5 m apart in speeds over 155 km/h with 96 bits EPC identity. However, in order to read the EPC code, the tags UID and using full user memory, we had to keep the speed down to about 100 km/h.

We didn't experience any difference worth mentioning in the performance of reader equipment from the different fabrics, but we did notice substantial differences in the tags. Only one of the four types we tried could manage speeds above 70 km/h.

All we needed now was a "top speed" and since we couldn't drive the car any faster we needed help. At that time a couple of policeman riding motorcycles entered the field for some training. We asked if they could help

us to get a peak rate in the score card. "We would love to help you, but unfortunately this isn't any weather for high speeds on two wheels" Well, some other time then.

However, I feel confident to say that I believe that we should be able to read the EPC code on a single tag in speeds over 200 km/h. If using more than one tag, I believe we could do it in speeds over 170 km/h, using good transponders and correctly adjusted equipment.



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CONTACTLESS PAYMENT STICKER

CERTIFIED BY

MASTERCARD TO LEADING BANKS IN THE UNITED STATES AND EUROPE

Oberthur Technologies, deploys its FlyBuy contactless stickers to three banks internationally, including one of the largest card issuers in the United States. The sticker is the latest evolution in Oberthur Technologies' pioneering work into the development of contactless payment and form factors. approved and developed in cooperation with MasterCard, Oberthur Technologies' FlyBuy Sticker offers end users a fast, convenient and innovative way to pay.

The sticker is a contactless payment device that can be attached to any surface including a mobile phone, PDA, MP3 player or key ring, allowing the end user to choose their very own personalized payment device. To pay, the user simply needs to place the device with the Sticker attached in front of the contactless reader. It can be used as a normal payment card at any Point-of-Sale terminal accepting contactless. Tested in pilots internationally, the FlyBuy Sticker is designed to work with existing business models, and can be personalized on any standard contactless equipment. With quick time-to-market, the FlyBuy Sticker enables issuers to add contactless payment capabilities to any existing mobile device, independent of handset type or model. The FlyBuy Sticker upgrades products already in circulation and provides a cost-effective solution to assist issuers in increasing market share for low-value payment transactions. The sticker's unique design makes it a powerful branding tool to solve the 'top of the wallet' challenge faced by issuers globally.

"Contactless stickers offer the next step to make PayPass the favorite payment method for consumers" comments Art Kranzley, Chief Emerging Technology Officer MasterCard Worldwide, "The FlyBuy Sticker offers real benefits not only to MasterCard merchants in terms of both transaction volumes and reduced waiting times in line,

but it also enables consumers to tap and go on any mobile phone, PDA, or MP3 player. This can have a significant effect on purchasing behavior, offering advantages for the payment industry as a whole in the medium term."

"As the number one provider of contactless payment cards in the U.S., Oberthur continues to focus on product innovation," says Martin Ferenczi, Managing Director of the Americas Region for the Card Systems Division of Oberthur Technologies. "The Flybuy Sticker has drawn immediate interest from U.S. banks as their customers insist on easier and more convenient ways to pay."

"We chose Oberthur's sticker technology as the only real mobile payment solution available today for mass deployment that works with all existing handsets" commented Beat Stocker,

CEO of Switzerland-based issuer, Aduno-Gruppe.

The FlyBuy Sticker offers issuers the possibility to mass deploy contactless payment technology to their customers in a format tailored to the individual taste of the cardholder. With three issuers already shipping the sticker in Europe and the United States, and several new pilot projects launched in other regions, the volume issuance of Oberthur Technologies' FlyBuy Sticker is underway.

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RFID-ENABLED ITEM-LEVEL INVENTORY MANAGEMENT SYSTEM FOR RETAIL PROMOTIONS

UPM Raflatac, Seeonic and Alliance, a RockTenn company, announce the deployment of a new generation of Alliance's MAXRPM™, an inventory management system for retail promotional items that uses RFID technology to provide retailers and manufacturers with real-time business insights of retail promotion performance at the item level.

The solution, an industry first, pairs a free-standing, RFID-enabled MAXRPM™ retail display, developed, built and sold by Alliance, with Seeonic's SmartWatch™ service and UPM Raflatac UHF Gen2 DVD Spine tags, to create actionable intelligence that business users can use to optimize the manufacturing, distribution, management and marketing of high margin promotional inventory such as entertainment DVDs.

While retailers have long used retail promotional displays to market entertainment DVDs and other promotional items, these units have never provided business intelligence, forcing staff to count inventory manually and increasing human error and labor costs. As a consequence, retailers have lacked access to accurate, timely data that would help them ensure stock availability, fine-tune ordering strategies and drive consumer products merchandising sales by making changes to product packaging or marketing strategies. Meanwhile, manufacturers have lacked data that would enable them to match production to consumer demand, anticipate

demand spikes and distribute inventory efficiently, while reducing production and logistics costs.

The new MAXRPM™ inventory management system solves these challenges by providing real-time, web-accessible data and analytical and modeling tools retailers and manufacturers can use to optimize and evolve production and sales strategies on a continuous

basis. In addition, the MAXRPM™ system provides leap-ahead benefits over disposable promotional displays. A free-standing, battery-powered and semi-permanent unit with intelligent shelves, the MAXRPM™ system functions autonomously, can be easily deployed in any retail environment and can be customized with new banners. As such, it provides retailers with a versatile, reusable and environmentally



sustainable tool to showcase retail promotions, while measuring their success.

“RFID technology provides an unprecedented level of insight into consumer demand and behavior,” says Jan Svoboda, Sales and Marketing Director, Americas, RFID, UPM Raflatac. “The business intelligence provided by the MAXRPM™ system improves the ability of manufacturers and retailers to collaborate on forecasting demand, maximizing product sales and per-store revenues.”

“The MAXRPM™ system provides business users with resources that take the guesswork out of inventory management”

The MAXRPM™ system contains an embedded inventory management system that uses SightWare™, an electronic module with an UHF Gen2 RFID reader to read RFID-tagged merchandise stored on display shelves. This data is captured in real-time and communicated wirelessly to a secure, web-accessible business intelligence service and relational database, Smart-Watch™, hosted by Seeonic. Smart-Watch™ provides powerful analytical and modeling tools, SmartPlan™, to help business users track and manage inventory and reduce out-of-stocks. The MAXRPM™ system can also be paired with RFID-enabled loyalty cards to motivate consumer behavior,

such as visiting stores at specific times to receive special offers or merchandise giveaways.

“The MAXRPM™ system provides business users with resources that take the guesswork out of inventory management,” says Harley Feldman, President and CTO, Seeonic. “The Seeonic platform allows manufacturers and retailers to make informed decisions about production and ordering and adapt instantly to changing conditions.”

The MAXRPM™ display system is currently installed at the Sam M. Walton College of Business RFID Research Center at the University of Arkansas as

part of the global leading retail test center. “Our research studies have demonstrated that retailers achieved a 16 percent reduction in product out-of-stocks with merchandise identified and tracked using RFID EPC technology,” says Dr. Bill Hardgrave, Director of the RFID Research Center and Executive Director of the Information Technology Research Institute.

“Manufacturers and retailers have long known that they have a short window of time to drive sales of new product releases before prices fall”

“In addition, RFID-enabled stores were 63 percent more effective in replenishing out-of-stock products than control stores not equipped with the technology. Essentially, this meant fewer total out-of-stock items and fewer occurrences of empty shelves when the merchandise was in the back room.”

“Manufacturers and retailers have long known that they have a short window of time to drive sales of new product releases before prices fall,” says Jim Einstein, Executive Vice President and General Manager, Alliance. “The MAXRPM™ system enables them to make the most of this ‘golden hour,’ delivering a superior customer experience and optimizing the sales of these important, high margin products.”

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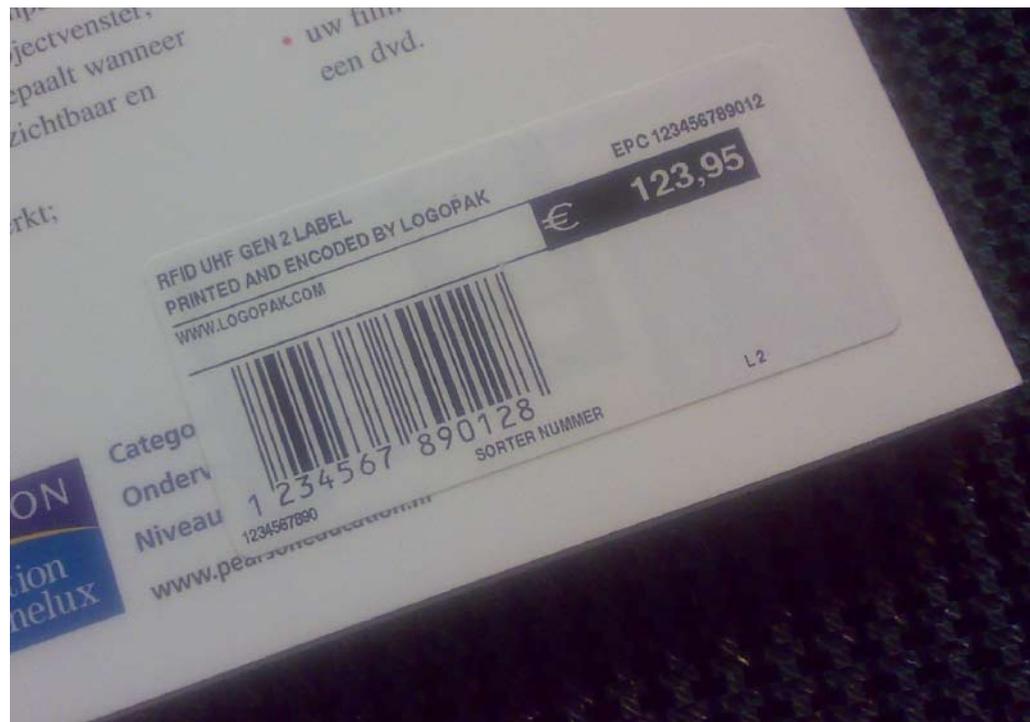
A CASE FOR BOOKS AND RFID

Centraal Boekhuis in Culemborg, The Netherlands, has been the logistics partner in the Dutch book trade for more than 135 years, assuming a key position by bridging the publisher with book stores. Currently, during stocking at Centraal Boekhuis, the books are identified with a label printed and applied by Logopak 906 II TB labelling systems. This lift-label contains a bar code for the sorter, the price and additional information for use by the customer and the book stores.

Logopak was approached by Centraal Boekhuis to meet their requirement of accurately printing and applying a label with an EPC Class 1 Generation 2 RFID tag, at a rate of 60 books per minute, inclusive of data verification. Additional requirements included a special data format, as well as an in-machine logfile creation.

After a visit of an engineering team on-site, Logopak came up with a solution and with the help of Centraal Boekhuis built a mock-up of the production line at the headquarters outside Hamburg. "It was a very interesting experience", says Lars Thuring, Managing Director of Logopak Systems AB, Sweden, "as all involved were working close together to specify and test the system.". About 7000 RFID Tags later the system was successfully demonstrated and a decision for the next step, a field-test in the Netherlands was made.

Labels are printed in real-time and applied at a rate of 60 books per minute. Labels are accurately applied utilising a telescoping applicator with blow-on



technology without slowing the books through the sorting process. Accommodation for varying book heights of up to 80mm is incorporated into the Logopak labelling solution.

Centraal Boekhuis has successfully run its six sorter lines utilising the reliable and robust Logopak 906-II TB print and apply labelling system since 2003. In addition to the six Logopak machines, five other Logopak systems are in use at Centraal Boekhuis for mail order labelling.

One of Centraal Boekhuis' most important customers is the book trade group BGN (Boek Handelsgroep Nederland), which is comprised of 42 stores including SELEXYZ stores. In 2006 BGN opened its first store utilising RFID-based technology in their logistics supply chain. Smartstore Selexyz Scheltema is located in Almere, The Netherlands. The RFID labels are manually applied to the books, which

proves to be very labour-intensive and is only feasible in a small number of SELEXYZ stores. From the onset it has been apparent that automated print and apply RFID labelling would ultimately need to be implemented in order to satisfy the growing number of books requiring the RFID tag. The field-test was held early in the 2008 with the RFID-enabled prototype replacing one of the Logopak 906-II labellers used normally. Two complete production runs were defined and executed, involving personnel, IT-systems, several thousand books and detailed test and verification process. "The results were above expectations and the next full-time RFID print-and-apply systems from Logopak have been installed with more to follow."

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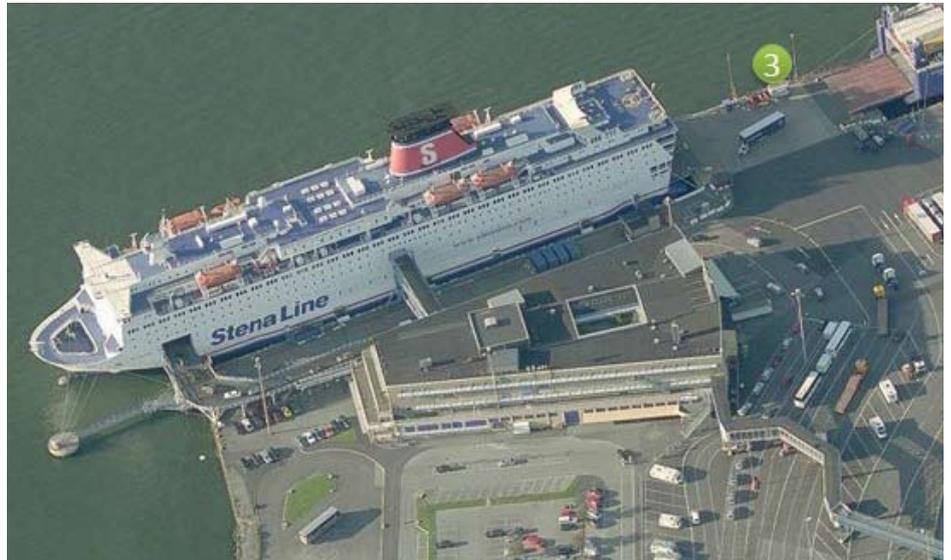
FUTURE LOGISTICS CONCEPT INCREASES TRANSPORT SECURITY

Ports play a critical role for the global goods trade. There is a clear long-term trend that the goods volumes passing through ports will increase in combination with new international security regulations, which involves major challenges to a port's daily operations. The transport system is characterized by a continuous need of information.

The information is often inadequate and it is received with varying delays due to extensive manual handling. There is a great need of finding new solutions that can make the goods flow more efficiently at the same time as new security requirements are met.

Presented with this challenge, the project "Secure and efficient transports through ports" was initiated and has been performed within the area of societal critical transports within the Security Arena at Lindholmen in Gothenburg. The logistics concept has been based on actual trailer transports between Volvo Logistics' cross-dock terminal and Stena Line's port terminal in Gothenburg, Sweden. The project has been coordinated by Volvo Technology and involved the Swedish Civil Contingencies Agency – MSB, the Swedish Customs authority, Stena Line, DSV Road and Wackfelts Åkeri. Starbright Consulting, previously Litiium Mobile Applications, in cooperation with Savi Technology, delivered and implemented the RFID system to the project, which has been one of the basic prerequisites for improved information sharing.

In order to increase the security level, both truck and trailer are equipped with RFID-technology. In addition, the trailer is equipped with an electronic



seal which is connected to GPS-tracking of the trailer. This implies that logistic stakeholders and the Customs authority receive transport status and potential unplanned events during the actual transport in real-time.

As the trailer departs the Volvo terminal, the trailer is information-wise connected to the truck by the means of an RFID reader mounted on the truck and an RFID tag on the trailer. The information is sent to Stena Line and the Customs in a standardized format providing the prerequisites to prepare the trailer's arrival to the port. If the information is correct at arrival, the driver is assigned a green lane into the port, which automatically identifies the transport units and opens the gate. This implies that the trailer does not need to be left unattended during check-in at the same time as the process into the port is streamlined. Through the on-board computer, the driver is notified of where the trailer shall be parked inside the port facility. When the truck exits the port, the truck is again identified by RFID and involved stakeholders are notified that the transport assignment is accomplished.

The concept shows that focus can be

spent on value adding activities instead of on waiting time at ports. During the project, the transport time was reduced by 25% concurrently as the period a trailer is left unattended was eliminated from previously adding up to 20% of the total transport time. By increased efficiency comes increased security since the possibilities for malicious activities such as smuggling can be reduced. The pilot project clearly indicates how problems with increasing needs of efficiency and security can be met in a way that supports all stakeholders; an approach which is necessary in order to attain end-to-end security.

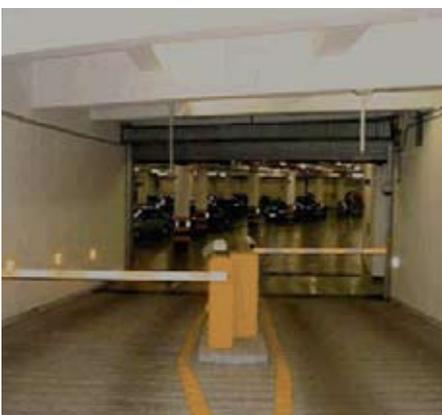
The project was presented at ITS world congress in New York in 2008 and the results will be presented at the ITS world congress in Stockholm 2009.

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RFID AT CHINA UNIONPAY

The successful installation at the Head Quarter of China UnionPay has overcome the problems that hindered the organisation for many years.



LR-3 Reader
S1255 MarkTag

SUMMARY

The Head Quarter of China UnionPay (The Banking Association of China consists of all the banks operating in China) is located in the financial district of Shanghai CBD. Cytel installed a fully automatic LPR system when the complex was built a few years ago. To increase the security level, while not reducing the traffic throughput during peak hours, Cytel added the latest TagMaster LR-3 readers to seamlessly integrate long range reading technology to the existing LPR system. With double verification on tags and license plates, the security greatly enhanced levels on both access controls to the property as well as the protection of the company vehicles, against unauthorized usage.

BUSINESS BENEFIT

China UnionPay has a large fleet of company vehicles that are used for business purposes by various department/personnel. Before the TagMaster readers were installed, the organisation was unable to control the vehicle usage properly, since there was no identification of drivers apart from the record of entry and exit time of a particular vehicle. With the TagMaster readers and tags, the system can tell exactly which vehicle and tag combination entered or left the property at what time. It effectively prevents the unauthorised usage of company vehicle while, at the same time, increases

the security level of access to the property.

SOLUTION

TagMaster long range readers and tags are perfect products for vehicle and people identification. Unlike other products on the market, TagMaster readers have a very well defined and directive reading lobe to avoid misreads usually caused by side or back lobes. Thanks to the advanced frequency hopping technology, which is a unique feature of TagMaster readers, you get much less interference with other systems and it improves the reading range in a difficult environment. The highly developed technology by TagMaster guarantees excellent and reliable reading without dead spots in the defined reading lobe.

CONCLUSION

The successful installation at the Head Quarter of China UnionPay has overcome the problems that hindered the organisation for many years. It sets an excellent example for companies with similar problems of vehicle management.

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RFID QUALITY MEASUREMENT

The Logopak RFID Quality-Station offers a new possibility to ensure a high degree of safety when using RFID. For traditional labelling with barcodes, Logopak labellers offers an integrated barcode-scanner for quality control purposes. After the label has been applied the barcode is scanned and verified, thus giving an assurance of readability and positioning immediately. This stops faulty labels from being shipped to the customer and first being detected upon arrival.

Through a consequent development of the Logopak labelling systems in the direction of RFID, the same option is now possible for automatic verification of RFID transponders using a RFID Quality-Station. The station can be placed next to a conveyor and verifies the readability of the applied RFID-tags. The readability is verified over a larger reading distance in the far-field range, which simulates the reading in a larger RFID reader-portal and enables an early detection of read failures on the tagged product / pallet. In co-operation with experts from Metro and Checkpoint Systems a procedure is being developed to allow for comparable quality measurements for various products and pallets. The intelligent evaluation of the reading-results results in a quality value, which can be saved for later uses.

“We plan to introduce the QS station

during mid-2009” says Lars Thuring, manager of Logopak Systems AB in Göteborg, Sweden, “and are proud to be able to offer another building block for our RFID- and barcode-systems.” The RFID QS station will be compatible with the EPC Global UHF Class

1 Gen 2 transponders and support the GS1 standards.

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RFID gates by ABB's loading platforms.

Transport units are marked with RFID tags. The information system immediately raises the alarm when it detects a loading error.

ABB AVOIDS SHIPMENT ERRORS WITH RFID TECHNOLOGY

RFID technology provides significant benefits to ABB Oy in the management of outbound goods streams. The system developed by Vilant Systems Oy prevents loading errors for consignments, and it records movements of goods automatically in the stock control system. When outbound consignments are loaded, there is a significant saving in floor space used, because it is no longer necessary to assemble goods in a consolidation area. Instead, goods-vehicle trailers can be used for storage. The automation in question covers around two million transactions per year.

The system used by ABB is based on RFID-reader gates situated by the loading platform, via which all transport units, belonging to the consignment and marked with adhesive RFID

tags at the parcel level, are delivered. Vilant's RFID software is integrated with ABB's own SAP system.

In the SAP system, the registration number of the vehicle arriving for loading is recorded, after which Vilant Server 5 software controls the progress of the delivery automatically. Because the system knows what the consignment should include, the gate issues an error warning if there is an attempt to load the wrong goods onto a vehicle. Also, the gate will not even close until all goods belonging to a consignment have been loaded onto a goods vehicle. Thus, in practice it is impossible to make incorrect deliveries.

ABB has now been using pioneering RFID solutions since 2004. The application of RFID started with the control of re-usable plywood boxes then used in orders of standard raw materials. This system, which is still in use, is based on the fact that all boxes equipped with RFID tags travel through RFID gates both at the supplier and at the factory. An empty box leaving ABB's factory will trigger

off a material order at the supplier, and likewise the departure of a full box from the supplier will generate an electronic notice. When it arrives at the factory, a full box is recorded automatically in the SAP system in the stock control system.

ABB Oy's Head of Processes, Julle Ala-Lahti, has been pleased with the RFID applications provided by Vilant Systems Oy: "Vilant Systems took full responsibility of the implementation. Their consistent and rigorous approach revealed improvement potential in our material flow and offered prompt results."

ABB's systems are based on the Vilant Server 5 product family and Vilant Systems Oy's RFID hardware products. UPM Raflatacin RFID tags are used as identifiers.

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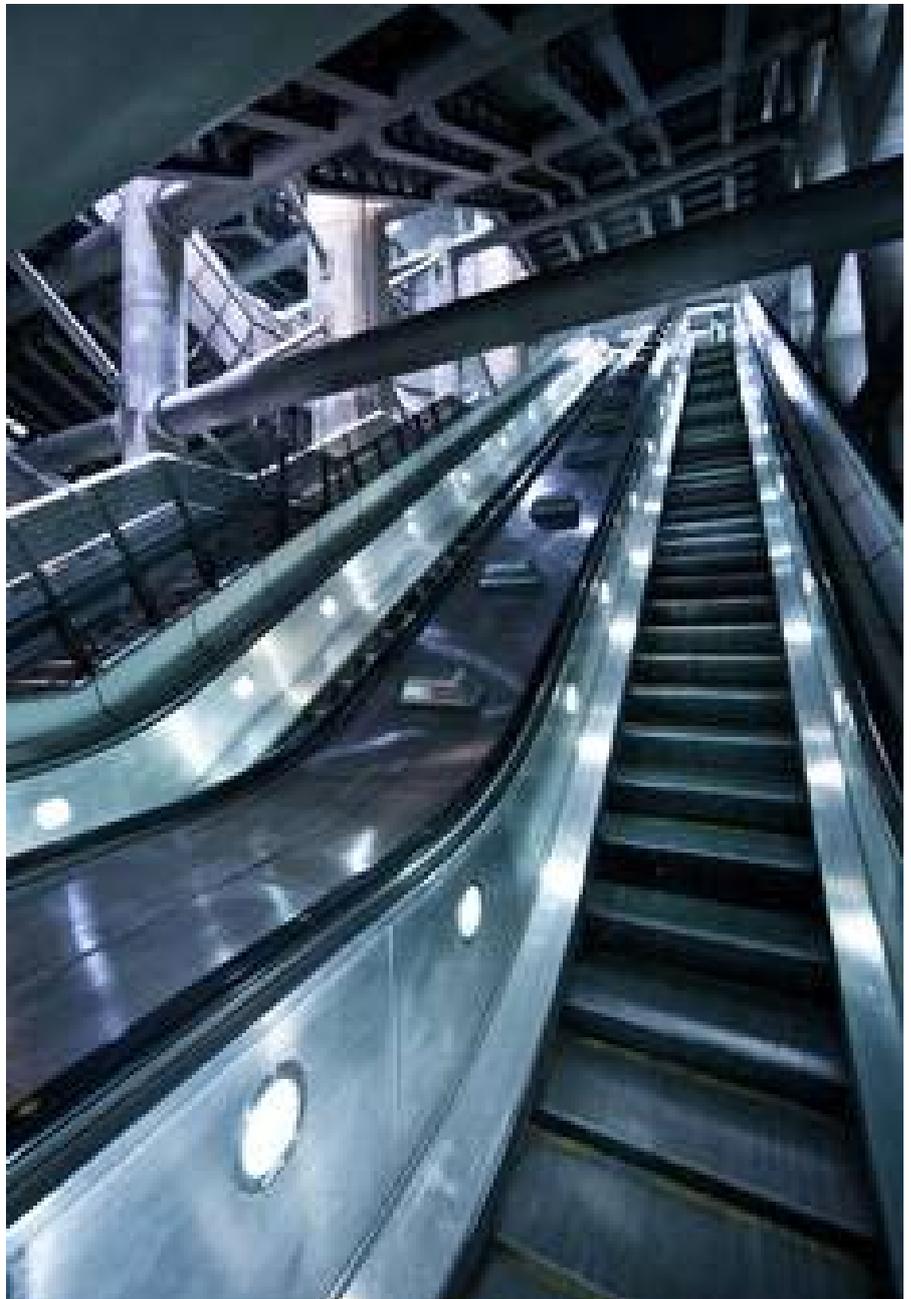


LONDON UNDERGROUND USE CONFIDEX IRONINSIDE TAG ON ESCALATORS

Tampere, Finland – April 6th , 2009 – Confidex, a fast growing company with unique expertise in RFID design, manufacturing and engineering, today announced that it has shipped more than 10,000 of its Confidex Ironside UHF Gen2 Hard Tag to London Underground in the UK. The tags shipped via Confidex partner CoreRFID Ltd are to be used to improve escalator maintenance.

Although Confidex has shipped Ironside tags to several customers in substantially larger volumes, the London Underground application is of great relevance to other escalator operators around the world. Maintenance and safety of escalators is important for Metro operators such as London Underground and for shopping malls and other public places.

The escalators of the London Underground carry more than three million passengers every day from the street to the platforms and back again. Most commuters and tourists don't give the travelling metal staircases a second thought; a fact that is a testament to the reliability of the system and the care taken over the maintenance of escalators. The steps that make up these escalators are subject to constant wear from the feet of passengers and from the mechanical movement on the



escalator track. A failure in an escalator step could cause serious injury. If an escalator step were to fail during rush hours, lives could be put at risk and serious disruption to travelers would result.

To prevent such an event, London Underground, has implemented an inspection / maintenance regime that ensures the structural integrity of every step is checked at least once during the course of every year. With almost 30,000 escalator steps, in almost 200 escalators, needing to be checked this requires significant effort by London Underground's engineering staff.

To address the need for faster, more accurate and more cost-efficient maintenance, London Underground decided to use RFID technology. They selected CoreRFID Ltd, based in Warrington, UK as their solutions provider and Confidex for their tag expertise company. A decision was made early on to use UHF Gen2 (ISO-18000-6C) technology as the only viable technology able to read tags attached on metal from a distance.

To address the need for faster, more accurate and more cost-efficient maintenance, London Underground decided to use RFID technology. They selected CoreRFID Ltd, based in Warrington, UK as their solutions provider and Confidex for their tag expertise company. A decision was made early on to use UHF Gen2 (ISO-18000-6C) technology as the only viable technology able to read tags attached on metal from a distance.

CoreRFID developed the "Step Tracking System" as the maintenance management solution. This uses PDA with RFID Reader (Nordic ID's PL3000 ruggedized hand held reader) mounted on a cradle beside the escalator and application software to read and write



information on the tag. The choice of the ruggedized and extremely durable Confidex tag was seen as a key to the success of the pilot project.. "It was obvious to us that Confidex had the best solution here. The tags to be used had to last in the very challenging environment of an operating escalator with vibration, temperature variation, grease and dirt as well as magnetic fields all being a factor. In consultation with Confidex we selected the Ironside Tag. We have more than 18 months experience with most of Confidex Hard Tags and Speciality Labels and we were confident about the choice." says Richard Harrison, Technical Sales Director of CoreRFID.

"The tags are installed under the steps, attached with acrylic adhesive provided by Confidex and in spite of the very tough environment and constant movement, not a single Ironside Tag detached from its escalator step over the two months long trial period" continues Richard. "However, in the future all new steps will come from manufacture with tags riveted on them."

Operational deployment has now started across the Bakerloo, Central, and Victoria lines and other underground stations where London Underground is responsible for escalator maintenance.

"This has been a very good collaboration between our three organizations. We are very pleased to see a well managed project from idea to trial and pilot moving to a full scale roll out," said Torbjörn Andersson, Confidex Vice President of Sales & Business Development. "There are clear advantages for London Underground in using RFID. Having an automated system that provides essential data without interrupting escalator use is something many other users and operators of escalators can take advantage

of. Operators and maintainers looking for improved Maintenance, Repair and Overhaul for their escalators and travelators can look to Confidex and CoreRFID who will publish a case study of the application in the near future."

Confidex Ironside is a "Hard Tag" in Impact resistant material. It is among the most durable, on-metal, high temperature resistant Gen2 tags available to date. The tag, which use NXP's G2XM chip featuring 240bit EPC, UID and 512bits of user

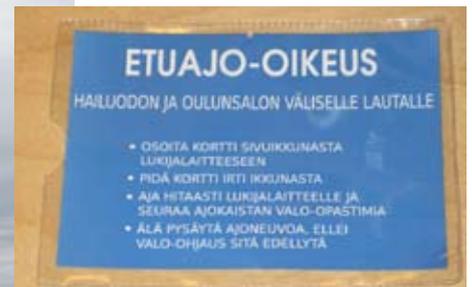


memory, was an early recipient of SAE's AS5678 certification. "The flagship Confidex Ironside Hard Tag is already used in a variety of applications, on metal containers, airline food carts, postal roll cages, power transformers, stillages in automotive manufacturing and on road maintenance equipment to mention a few said Torbjörn Andersson."

A complete Technical Product Specification including installation guide is downloadable from Confidex website: <http://www.confidex.fi/ironside0.html>

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UPM RAFLATAC'S RFID TAGS ENSURE SMOOTH CAR FERRY TRAVELLING IN HAILUOTO



UPM Raflatac supplies passive UHF RFID tags to Finnish Road Administration's pilot on vehicle identification in Hailuoto island's car ferry traffic.

Aim of the pilot is to ensure smooth passage to the ferry for all travellers, but especially for professional transportation and local residents. Before the pilot, constant misuse of a priority driving line destined for these two groups occurred on a daily basis causing provoking difficulties.

In the Hailuoto area, a licence with an embedded RFID tag is sent beforehand to all drivers entitled to use the priority driving line to the ferry. The licence is then shown through car's side window. When accessing the ferry, the system automatically identifies vehi-

cles with appropriate RFID licences, and grants them access. Readers can identify RFID tagged licences through a window even from a distance of several meters. As a result access control to the ferry is significantly improved. The automated access control used in Hailuoto is based on a standard passive Gen 2 UHF system with UPM Raflatac's DogBone tags. Readers are connected to a server program via mobile network (GRPS). Administrators can follow and control the ferry traffic in real time from a web browser in any location. The complete solution has been developed by Vilant Systems. Thanks to encapsulation, the outside located, year-round RFID solution well endures challenging conditions, such as rain and frost. Due to Hailuoto's location in Bothnia, the northern part of Baltic Sea, this is crucial. UPM Raflatac's DogBone inlay was selected

to the pilot because of the reliable performance and excellent read range it provides.

"UHF technology offers an automated, reliable and robust way for personnel and vehicle tracking. The pilot uses cost effective passive RFID tags in vehicle identification, and is thus a remarkable opening even on a larger scale," says Jari Ovaskainen, Business Development Director, UPM Raflatac RFID.

The Finnish Road Administration's RFID pilot started in June 2008.

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STATE OF HAWAII DEPARTMENT OF AGRICULTURE AND HAWAII FARM BUREAU USE RFID

State of Hawaii Department of Agriculture and Hawaii Farm Bureau use RFID to track and trace fresh produce for food safety certification pilot program

The State of Hawaii Department of Agriculture and the Hawaii Farm Bureau have partnered to deploy a three-year pilot RFID initiative. The Hawaii Produce Traceability initiative uses UPM Raflatac RFID inlays to track and trace fresh produce throughout the State's food supply chain. The innovative initiative, the first of its kind in the US, is designed to promote food safety by providing product visibility down to the farm or even field level. The RFID system provides detailed, real-time information which can be used to optimize the supply chain, enable recalls in less than an hour and improve inventory control.

In the first phase Lowry Computer Products developed an RFID solution leveraging hardware from Motorola and Symbol Technologies, and Globe Ranger system software. The system pairs waterproof labels with UPM Raflatac ShortDipole UHF inlays with the Lowry Computer Products' Fresh Harvest Solution to provide real-time supply chain data of when boxed produce is planted and harvested, what pesticides are used and when and where RFID-tagged boxes are scanned. The data is automatically uploaded into a database, where it can be used by program participants. It is also available for public review on the initiative web portal, www.hawaiifoodsafetycenter.org.

Growers were offered the opportunity to participate by either slap-and-ship tagging or usage of a hand-held RFID system. Boxed produce is read at the distribution center upon entry and exit of both the physical facility and cold storage. Tags are read again at the retailers' point of entry, removal from cold storage and at end of life. Both the distribution center and retailer use a fixed portal RFID reader.

Participants can use gathered data to optimize harvest productivity, strengthen food processing controls, increase cold chain visibility, reduce produce dwell time on shipping and receiving docks, accelerate transportation times between trading partners and improve inventory turns.

This enables them to optimize margins in the competitive food industry. In the event of a food recall growers can quickly identify if they are impacted, thus enhancing their brand and protecting revenues. Affected growers can localize the impact of relevant recalls to the field level, minimizing losses.

State officials are considering enhancements to the next two phases of the project, such as deploying RFID-enabled cellphones to enable more farms to participate, and implementing produce temperature tracking to reduce the threat of food spoilage. The initiative could be expanded to cover 5,000 State farms at full implementation.

"The Hawaii Produce Traceability initiative is an integral part of the State Food Safety Certification system," says Dr. John Ryan, Administrator, Quality Assurance Division, State of Hawaii Department of Agriculture.

Growers were offered the opportunity to participate by either slap-and-ship tagging or usage of a hand-held RFID system.

This project provides the backbone for future and more preventive closed-loop sensor technologies

Many of Hawaii's leading growers, distributors and retailers, have chosen to participate in this voluntary program

"This project provides the backbone for future and more preventive closed-loop sensor technologies which are capable of measuring and reporting biocontaminants and temperature variations via the RFID system as produce moves through the supply chain. The RFID system will provide managers with improved real-time control over potential food safety problems and help to prevent widespread human and economic impact."

UPM Raflatac tag performance is currently being tested on shipments between Armstrong Produce and the Kaneohe, Hawaii Marine Base commissary. This important addition to the pilot program is in compliance with the Department of Defence RFID directives. "The Hawaii Produce Traceability initiative is providing UPM Raflatac with the opportunity to showcase the versatility and durability of its ShortDipole tag, which provides exceptional yields and performance throughout its lifecycle," says Jan Svoboda, Sales and Marketing Director, Americas, RFID, UPM Raflatac.

Many of Hawaii's leading growers, distributors and retailers, including Sugarland Farms, Hamakua Heritage Farms, Kula Country Farms, Maui Pineapple, Twin Bridge Farms, Kahuku Brand, Armstrong Produce and Foodland Stores have chosen to participate in this voluntary program. The initiative tracked several types of fresh produce including e.g. asparagus, eggplants, pineapples and tomatoes.

Funding for the pilot program was provided by the U.S. Department of Agriculture, Economic Development Alliance of Hawaii, Federal State Marketing Improvement Program, and Hawaii Farm Bureau Federation. The pilot has been awarded with a Computerworld Laureate Gold Medal for using information technology to benefit society.

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ASSET MANAGEMENT, TRACKING AND TRACING AND SUPPLY CHAIN – TRANSPARENCY WITH RFID

The increase in productivity in the companies is an important tool for holding one's own against global competition. But whereas production planners and engineers primarily concentrated on actual production, there is still enormous potential regarding logistics within the plants and the entire company. Radio Frequency Identification (RFID) is regarded as the key technology to make large progress in this field. Using RFID, it is possible to completely and automatically detect and record

1. RFID IN INDUSTRIAL LOGISTICS

Increasing productivity in companies is an important tool for holding your own in the global competitive environment. While production planners and engineers focused primarily on actual production, there is still great potential for cost-efficiency across the board in logistics within plants and businesses.

It is becoming ever increasingly important to have a command of logistics processes. As a result of globalization, production costs are accounting for a smaller proportion of the overall value created, while logistics costs make up an ever increasing share. According to calculations by the World Trade Organization (WTO), international trade grew at four times the rate of the global gross national product last year. The frequent lack of transparency is particularly problematic when attempting to optimize logistics processes: given the large number of organizations involved and the lack of data standards, information exchange between the parties concerned is barely possible. What's more, some of the objects in logistics simply lack a unique identity which is indispensable for facilitating tracking along the distribution chain. However,

It is becoming ever increasingly important to have a command of logistics processes.

without a unique identity, individual objects or consignments cannot be tracked without going to significant effort.

Radio Frequency Identification (RFID) is regarded as the key technology for "shining more light into the dark".

RFID enables movements of goods to be recorded completely and automatically: there is no need to limit yourself to spot checks, nor do you have to carry out manual process steps for detecting. The

precondition is, however, that all the distribution objects have to be fitted with an RFID transponder conforming to EPCglobal standard (Electronic Product Code). Smart labels, i.e. low-cost disposable labels with foil backs, are affixed to pallets and packages. Even though the price of smart labels has come down markedly in recent years, many businesses have so far shied away from making the investment in the requisite infrastructure (readers, antennas, software).

The costs associated with reusable containers, such as skeleton boxes, barrels or plastic boxes, are much more advantageous. Since these transport containers pass repeatedly through the cycle from the producer to the end customer, this lessens the costs of RFID transponders; there-

fore, a return-on-investment can be achieved more quickly. Therefore, high-grade data carriers can also be used here which offer better protection against environmental influences and mechanical stress.

Three applications can be implemented by equipping the containers with RFID:

- "Asset Tracking" to optimize the condition of the transport containers;
- "Tracking and Tracing" for the complete tracking of products and raw materials;
- "Supply Chain Management" for automated transport of goods.

These applications are modular and can, therefore, also be introduced bit by bit, complying with the relevant standards.

2. COSTS UNDER CONTROL: ASSET MANAGEMENT

Asset management involves optimizing the stock of containers. First of all, it is important to ensure that there is always an adequate number available for shipping the goods produced. On the other hand, the stock should be kept as low as possible so as to tie up as little capital as possible. In addition, it is also a matter of reducing

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stock depletion or improving secondary processes such as repair management.

RFID has proved to be a key technology in this application. Every asset, in other words, every drum, container or tool, is equipped with an RFID transponder (Figure 1). Since the radio chips are used for the entire service life of the container, transponders are used which are adequately protected against detergents, temperature influences or mechanical stress by a robust housing. The smart labels normally used in distribution logistics are too

connected to the company's production and logistics software (Manufacturing/Logistics Execution Systems, MES/LES) via RFID edgware. The data on key performance indicators (KPI) undergoes further compression there. It is then analyzed by the business-management systems. The advantage is that any movement in the assets is automatically tracked by the RFID without the need for manual intervention. At the same time, the only data processed is that which is actually required at the relevant level.

automatically which barrel has been delivered and where, and whether this barrel has been returned yet.

There are further advantages for internal processes. Whenever, for example, a barrel is taken out of circulation because it is damaged, it has to be re-examined in the repair center. Since these containers do not have unique identities, it is impossible to keep an electronic record of the life cycle and condition of the barrel. RFID allows all this information to be saved directly in the transponder. The transponder may also be used to save goods-related information, e.g. type of beer, alcohol content, best-before date, other benefits arise. Nowadays, the documents which accompany a consignment can go missing or no longer be able to be assigned precisely. Where any uncertainty exists, the goods have to be destroyed due to the stringent food regulations. This may also be a significant factor in the business-to-business environment, e.g. when raw materials or semi-finished products are supplied in the food industry. If the data is saved in the RFID transponder, it is almost inextricably linked to the goods; the loss of accompanying documents ceases to be a problem.

However, the example of "barrel tagging", i.e. affixing RFID transponders to barrels, also presents a problem as far as the radio technology is concerned. Because the barrels are made of metal, reflections and shielding play a significant part. Consideration also has to be given to the mechanical conditions: it is important to ensure that the transponder does not become damaged during the journey from the brewery to the end customer (conditions may be rough). Thus, standard transponders may not be used for this. Therefore, comprehensive testing is required before every introduction.

2.2 ASSET MANAGEMENT IN PRACTICE

RFID-based asset management has been successfully implemented at Siemens Power Generation (PG)'s Berlin

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Fig. 1: The likes of transport containers are fitted with sturdy RFID transponders in industrial asset management.

sensitive. Nevertheless, the chips frequently conform to the EPCglobal standard, which offers considerable advantages over other standards. Firstly, the industry can offer passive (and thus cost-efficient) data media with a wide range by approving the EPC-GEN2 standard. These transponders are available for a matter of a few euros, even with a strong plastic housing.

Furthermore, there is a need for RFID reader infrastructure. These systems can be designed as fixed installations on the loading gates or in the warehouse or as portable, mobile readers. Many applications can be implemented in a first phase with relatively few RFID readers. These readers are

2.1 TRACKING BEER BARRELS

One scenario to illustrate the implementation of a system of asset management throughout a company is the tracking of beer barrels. Demand for the expensive stainless steel containers is very seasonal, i.e. bottlenecks can quickly occur during the summer. Since the barrels are often not identified nowadays when they leave or arrive at the breweries, there is no simple way of tracking which customer still has (empty) barrels in its store and which customer has already returned all its barrels. Therefore, the breweries have to conduct manual checks to establish where the empties are located. Fitted with an RFID transponder, they could tell precisely and

plant where turbines are produced for gas-fired power stations. Blades made from highly heat-proof steels are an important part of the turbines. The workpieces are held in the machining centers in jigs which vary depending on the model and size of blade. There are 3500 of these jigs in the

to the production area, recording the details of every single tool as it enters and leaves the area (Figure 2). Used in conjunction with warehouse-management software, this has enabled tool planning to be simplified, and error rates have come down considerably – with manageable cost and effort.

However, the individual product's identification number can also be saved directly. This is where one of the key advantages of the RFID comes to the fore: the virtually unrestricted possibility of reprogramming the transponder data. This means that whilst the transponder remains physically connected to the container, it always contains data relating to the current product contents. The drawback: the container can no longer be identified as an asset.

From the point of view of standardization, which has yet to resolve this problem, assigning the product and container via suitable software appears to be a “cleaner” solution: ultimately the RFID transponder identifies the container first of all, it only identifies the product indirectly. However, the container identifiers then have to be linked to the product data in the company's databases, which may require connection between different database systems. “Enterprise Service Bus (ESB)” architecture is very advantageous here because the requisite rules on combining data do not have to be “programmed” into the existing applications. This makes it markedly easier to “interconnect” the existing databases.

However, as soon as the actual goods can be identified via the transponder on the container, various other applications can then be supported. A first step which can be performed within a company is to track and trace the life cycle of a product, i.e. recording all the stages of production and logistics for a particular product. This is important for generating complete documentation automatically in order to satisfy statutory requirements, such as those in the food industry, or in order to optimize the company's own processes by means of greater transparency. Put simply, it is a matter of recording all of the relevant stages of production. What was done with the specific product, and when? Where did the outsourced parts or ingredients come from? Which test results were obtained during quality control? And where was the product then delivered to?



Fig. 2: Expensive special tools (left) are managed with RFID at Siemens Power Generation. RFID antennas control the use of tools at the entrances to the production area (right).

production facility at PG. The jigs are subject to extremely high dimensional accuracy because they have a direct impact on the quality of the end product. Therefore, the jigs undergo regular testing and gauging by the plant's own Tool-Making facility. In the old system this was documented with a sticker, although this meant that the actual information was not available on the jig. Consequently, Production Planning did not have reliable data to hand to indicate whether there would be a jig available of optimum quality at the scheduled time.

All the tools in the new system have been fitted with RFID transponders. They must be particularly robust in their design: the requirements were a high reading rate when fitted on metal, as well as adequate immunity to the effects of cooling water, lubricant and strong electromagnetic fields. UHF antennas have been erected at various points, such as at the entrance

3.

100 PER CENT TRACEABILITY: TRACKING AND TRACING

The concept can be broadened by tracking not the container, but rather its contents, by RFID: this is made possible by marrying the product and transport container data. However, a problem arises with the UHF transponders which are currently in use: RFID chips currently only support one identification number. If the container is identified via this chip, the assignment to the product takes place via a database. On the one hand, this contradicts the idea that RFID chips carry all the relevant data. On the other hand, the timing also has to be taken into consideration: since the containers are used repeatedly, they contain different products from different production batches each time around. This needs to be taken into consideration in the analysis of the data.

3.1 TRACKING AND TRACING IN PRACTICE

This type of concept was implemented by Grupo Leche Pascual, for example, a Spanish firm which manufactures liquid egg-based products. Its problem was that the eggs came from a number of poultry farms dotted around Spain, and a particular batch's origin could only be tracked in production with considerable effort. However, should quality problems arise on a farm, all the eggs and egg-based products affected would have to be taken out of

automatic settlement with suppliers.

The RFID application now enables the Spanish food producer to meet the stringent food standards on tracing and quality assurance. Real-time tracing also makes for more effective production planning, enabling down time to be avoided. Not least of all, this "monitoring" has also enabled Leche Pascual to save on costs due to reduced loss of materials. The company has, thus, been able to optimize its logistics and improve the quality of its products.

the goods arrive, the latter can conduct a 100% check by RFID to ensure that the correct goods are actually on a particular pallet. All mistakes, such as incorrect deliveries, can now be detected early, without having to go to the effort of intervening manually. The transparency which this creates is so important to the likes of the major commercial operations that they are gradually requiring their suppliers to affix RFID chips to their pallets.

Other industries are also considering introducing RFID to optimize their logistics processes. The car-manufacturing industry, which has been using RFID in production for over 20 years, is now also aiming to use this technology for supply logistics. As with other supply chains, this is primarily about achieving greater transparency through the supply chain. This comprises both the tracking of consignments of goods (where are the goods at present?), as well as the avoidance of errors. Container management, i.e. tracking the transport boxes frequently used in this sector, is of particular interest. Therefore, Odette, the umbrella organization for the European car-manufacturing industry, is working on standardizing RFID data for container management on the basis of EPCglobal. Island solutions that agreed a manufacturer and a supplier are particularly unfavorable in the car-manufacturing industry because the large system suppliers like Siemens VDO or Bosch produce parts for a number of manufacturers: consequently, it would be unimaginable to have different RFID systems per customer. On the other hand, there is no need to affix smart labels to the individual items if the transport containers are tagged.



Fig. 3: Grupo Leche Pascual uses RFID to allow it to track its egg-based products at all stages thanks to the use of RFID-tagged trolleys. By equipping the refrigerated trucks with antennas, there was no need to install RFID infrastructure at their suppliers' farms.

circulation as quickly as possible, albeit only those containing raw materials supplied by that very manufacturer. In order to solve this problem, RFID transponders were fitted to all the Leche Pascual trolleys which were used to transport the eggs. RFID antennas conforming to the EPCglobal standard were fitted directly into the refrigerated trucks, enabling a complete system of monitoring to take place from the moment the eggs were collected from the farm. The RFID data is supplemented by using other sensors, such as those for the Global Positioning System (GPS) and for temperature control. Other antennas are also set up in production, e.g. when the eggs are weighed. Identification via RFID is applied here for the purposes of quality control and for

4. CONTROLLING DYNAMICS: SUPPLY CHAIN MANAGEMENT

Whilst asset management generally remains limited to one company, Tracking and Tracing has enabled suppliers to be incorporated under certain circumstances. However, comprehensive analysis and optimization of the supply chain are only a small step away once the RFID infrastructure is also in place outside the company. Tracking and Tracing initially requires a combination of container and product IDs. Once this has taken place, an electronic delivery advice with the container number can be automatically generated when goods are dispatched, for example, and be transmitted to the consignee. When

5. RECAP

RFID technology offers great, promising opportunities for furthering the automation of industrial logistics. Whilst there may still be hurdles to cross in standardization, the projects which have been implemented confirm that the technology works in practice, in particular in terms of cost efficiency.

UPM RAFLATAC AND BLUE SPARK TECHNOLOGIES PARTNER TO DRIVE BATTERY-ASSISTED PASSIVE RFID RESEARCH AND PRODUCT DEVELOPMENT

UPM Raflatac and BlueSpark Technologies are pleased to announce a recently formed partnership specifically targeting the development and launch of new and innovative products and applications in the emerging battery-assisted passive (BAP) RFID market.

Both companies bring to the alliance deep and unique product knowledge and engineering expertise applicable to BAP RFID technology. UPM Raflatac is a world-leading developer and supplier of HF and UHF radio frequency identification (RFID) tags and inlays. Blue Spark is an industry-leading supplier of thin, flexible-printed battery solutions for use in a host of industrial and consumer applications, including RFID and smart cards.

The research and development partnership has been enabled by the launch of a new EPC Gen2 battery-assisted passive RFID chip from Swiss-based EM Microelectronic. EM's new EM4324 RFID chip is capable of battery-assisted read ranges of up to 40 metres (131 feet) and features a 1024-bit, non-volatile memory. The chip also includes a 'low battery' alarm. Radio frequency performance and durability assurance will be provided by UPM Raflatac's tag and inlay design capabilities, supported by the company's worldwide production and testing facilities. Power will be supplied by a variety of Blue Spark's thin, flexible-printed battery solutions, including the ultra-thin Blue Spark UT Series.

"UPM Raflatac is well known for its excellence in passive technology and as a passive inlay market leader. Entry into a new market requires the best possible partners to meet industry requirements and expectations. Battery-assisted RFID inlays excel in applications demanding a longer read range and robust reading," says Samuli Strömberg, Vice President, Marketing, UPM Raflatac, RFID.

"Blue Spark is excited to partner with industry leader UPM Raflatac. Together, we can leverage our knowledge and experience to create a virtual 'idea factory' that will enable us to develop and test exciting new products built around our respective technologies and bring them to market in a timely way," says Gary Johnson, President and CEO of Blue Spark Technologies.

Both companies view battery-assisted passive RFID as the next chapter in the evolution of the RFID market. BAP effectively bridges the gap between pure passive RFID technology and high-end active and real-time location systems (RTLS), from both the price and performance standpoints. The companies are focusing their efforts on the development of high-volume BAP RFID-enabled products for consumer, life sciences and industrial markets.

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