



Construction & RFID: The ROI

A White Paper on RFID Technology In The Construction Industry

The ROI from the use of RFID in Construction

White Paper

This White Paper has been written for senior line-of-business managers in organisations in the building and construction sectors. It examines the areas where the use of Radio Frequency Identification (RFID) can provide valuable business benefits and return on investment for companies in the construction sector.

ROI from RFID in Construction

It covers issues including:

- Where has RFID been used for business benefit in construction?
- What issues contribute to successful applications and achievement of ROI?
- How can construction companies pilot and explore the use of RFID technology?
- What are the trends in RFID that will affect future decisions on its use in the construction industry?

Key features of this white paper include:

- A survey of applications in the construction sector
- RFID in audit, track and trace applications
- RFID in security applications for construction
- RFID and the construction supply chain
- Health and safety: issues and applications for RFID
- Issues for determining RFID ROI
- Issues for implementing RFID applications
- Trends in RFID
- How the RFID industry is meeting construction industry needs

This White Paper has been produced by CoreRFID Ltd, a specialist in this field. CoreRFID works with construction industry clients and with software system and solution suppliers to the construction industry, identifying and supplying the best technologies for their requirements.

Management Summary

Management Summary

Efficient management of the supply chain for the materials used in construction projects can significantly reduce material costs and improve success in meeting project timescales. Knowing exactly where valuable tools and equipment are can be key to a successful construction project. Protecting employees from potentially harmful situations is an important concern of businesses where industrial accidents and injury are an ever present danger. Demonstrating compliance to regulation and legislation is central to corporate governance but can consume resources and costs.

All of these issues can be addressed in part by the use of radio frequency identification (RFID) technology and for these reasons, RFID was one of the technologies focused on in the BER's Construction Research Programme¹.

RFID is a term that covers a wide range of technologies that together offer a means of reading and/or writing information, without contact, on tags that can be fixed to a wide range of items from wooden pallets and metal pipes through to blocks of concrete and tool.

Of the various RFID technologies, some are well established and with a pedigree of successful use, others are more innovative but with less of a track record. As a result care is needed when selecting



An RFID tag identifies on-site plant and prompts for required maintenance.

the components for a particular application. This process is being helped by increasing standardisation that now includes some globally agreed and implemented standards.

RFID is widely used in many supply chain, security and retail applications. It can make an important contribution to the construction sector.

A technology that can change business practices and processes, RFID is too important to be left solely to the IT team. Success in using RFID comes from marrying an understanding of its capabilities (and limitations) with a vision of its relevance to the business and the projects that the business engages in.

As a result applying RFID in your business requires the combination of the involvement of technical expertise, those with practical experience of the business and leadership from the top.

This White Paper seeks to provide

- the background needed to identify potential application areas for RFID
- the information needed by those in a leadership role to initiate and review RFID projects
- details of areas that need to be considered in creating a cost justification for RFID projects

¹ "The Construction Industry Research Programme Project Showcase", DTI (now Business, Innovation & Skills), February 2007

Introduction

The UK construction industry accounts for over 9% of the UK's Gross Domestic Product and employs over two million people. It is a major contributor to the UK economy.

At the same time it is an industry that is facing some of the greatest challenges presented by the threat of global warming and environmental damage. Regulation and the industry itself are driving improved practices in construction to improve the contribution that construction makes to sustainability in communities and the economy at large.

Because the industry employs such large numbers of people, uses such large quantities of material and has such a large impact on the built environment, any measures that it can take to improve the utilisation of people, assets, and materials have a significant effect on the profitability, efficiency and reputation of construction businesses.

Need for improved control

Information and communications technologies make a contribution to improving profitability. One technology in particular, Radio Frequency identification (RFID) has emerged to improve the ability of construction businesses to keep track of tools and materials, to log and monitor activities on site, to improve the supply chain and to help promote improved health and safety.

The importance of RFID

RFID allows information to be read or written, without contact, on tags that can be fixed to any of the tools or materials used in the construction sector. As a result it becomes possible to track and trace individual items through what has been termed an "internet of things". It can improve the quality of data within organisations by replacing manual data collection methods with automated ones. It can help make information about assets or resources more visible by enabling the collection and consolidation of information for reporting. It can help improve accountability by establishing who did what with which and when.



This high performance RFID tag can be mounted on metal and read from up to 6 metres away.

Application areas

RFID technology makes it possible to uniquely identify assets and consumable materials. It can track tools, material pallets, construction equipment and in some cases individual employees. RFID allows data carrying tags to be attached to many of the elements of a construction project. These tags can be read and written with low cost scanners providing a quick, contactless, way of establishing where something is, what it is, when it was last used or checked. It can link things and their location; things and the people that use them; people and the places they go.

The BER research perspective

Some tags can even announce their location to a network in real time, allowing tools to be instantly located across any site that has a WiFi network, without the need for additional infrastructure investments. Continued developments in the field of wireless communication and intelligent tags make an ever growing range of applications practical and create opportunities for costs savings in business.

RFID was identified by the DTI (now Department for Business Innovation & Skills) as a potentially key technology for supporting the construction industry. Their report on the Construction Industry Research Programme Showcase (2007) concluded that RFID "offers construction new opportunities to improve the maintenance of assets and manufacturers to develop new products and services". The programme highlighted areas of potential cash savings and efficiency improvements through:-

- Increases in Productivity
- Data capture
- Job tracking

Advantages from the use of RFID in construction.

- Quality control
- Stock management
- Improving customer information

RFID is a versatile, widely used and proven technology for monitoring materials, tools, capital assets and people. It can be used to report on their whereabouts, track the history of their use, and help control where they can (or cannot) be used. It can provide information on the usage of consumable materials and provide the means to keep track of items through the supply chain and on into their eventual installation and subsequent use.

Examples of application areas for RFID in the construction sector include:

- Control of the location of valuable assets.
- Maintenance control and management
- Access control to sites or areas within sites and monitoring of security staff activities on site
- Material identification and tracking; plant equipment tracking and control;
- Plant hire;
- Health, safety & environmental compliance

These applications offer potential benefits to the business which can, in turn, be translated into a valuable return on investment for RFID projects. The areas where RFID can be useful to construction businesses include:

- Improving the traceability of materials from manufacturer to site and into the final construction, so supporting the integration of the construction phase and the maintenance phase.
- Enhancing security and reducing loss of materials, tools and other capital items
- Speeding information flows on the location of equipment, tools and materials
- Improving the control of inventories of materials and tools, reducing wastage and avoiding loss of time in projects as a result of non-availability of materials and tools.
- Improving control of maintenance and health and safety processes.
- Reducing paperwork and making efficient information capture possible in demanding environments
- Gaining real time information on the progress of projects as an aid to better decision making and improved customer information

Business benefits & ROI

These advantages translate into financial benefits that provide the basis for a return on investment in the use of RFID technology. Areas where RFID projects contribute to ROI within construction projects are:

- Reduced inventory costs through "just in time" delivery to site
- Lower asset costs for tools and equipment through better utilisation
- Less "shrinkage" in inventory and asset base
- Less time lost to industrial injuries, lower compensation payments
- Lower sub-contractor costs through better control

To date, however, the construction industry has been slower than others to take advantage of these technologies. In other sectors the presence of very large enterprises that can impose an approach for their industry (as for example WalMart have done in the US retail sector, of the

US Department of Defence have done for their contractors) has enabled the creation of industry standards that make it possible for many other enterprises to exploit the technology. The nature of the construction industry has, so far, meant that individual businesses have to find an ROI based solely on their own investment and their own use of the technology.

Even so, it can be expected that with wider use of the technology, more cross-enterprise applications will become practical.

These applications are most likely to emerge in areas which the industry considers to respond to the key drivers for RFID technology adoption. Recent research highlighted nine main areas where construction industry professionals expected RFID technologies to make a contribution. These are:

- Effectiveness & efficiency in supply chain management
- Tracking & tracing of vehicles, tools and components
- Inventory management
- Improving quality & safety
- Proof of delivery as an aid to on-site quality
- Tracking essential components (windows, pre-configured concrete, steel or timber elements)
- Maintenance systems (equipment, plant, alarms, etc)
- Combating counterfeit, fraud and theft
- Deconstruction, demolition and waste disposal.

One of the factors that ERABuild consider could influence the development of the use of RFID technologies in the USA is the growing influence in the construction industry of the suppliers that have previously served the mass-markets of the DIY sector. Enterprises such as The Home Depot, that originally served only the consumer, are now, increasingly, serving the building trade. Their consumer oriented approach has led them to exploit RFID in their supply chain and they are active members of EPCGlobal and the Global data Synchronisation Network.

The recent introduction of new standards (especially Gen2) now makes it possible to develop global, pan-corporate, RFID applications it can be expected that consumer supply-chain solutions will start to appear within sectors such as construction.

Applications of RFID in Construction

Example Applications

Costain

Costain is responsible for the largest local authority sponsored road improvement project in the UK; the Church Village By-Pass in South Wales.

Tool tracking & safety management

Costain needed to control the tools used in different areas of the Church Village By-pass project. With the site needing everything from heavy plant to office equipment, the range of equipment in use is enormous. Some tools are used by different staff and at different locations along the 7.5km route. Tools can be forgotten and mislaid. Often the problem is knowing "who had it last?" If tools can't be found new ones have to be procured or hired, incurring additional expense for the project. CoreRFID are helping Costain to solve this with a system that identifies

all capital equipment on site with RFID tags on each tool.



Church Village By-Pass uses RFID tags to track tools.

Software running on a HP and Motorola portable computers is used to issue and check in tools. Staff sign for the item concerned and the software controls whether or not the staff member is entitled to have access to the item in question. Details of tool movements are recorded on a database hosted by CoreRFID. This can be accessed by authorised Costain staff, providing instant information on just where a tool should be.

The system improves the accuracy of data about what tool is where and who checked it out, and it provides visibility of tool usage, allowing the right decisions to be taken about when to hire tools and when to return them.

The same system is used to check if staff have been properly trained to work with the tools they are asking for, helping to retain Costain's safety record for the project.

Stafford Tower Crane

Whereas Costain are using RFID to track their own use of hired tools, Stafford Tower Crane are using the technology to track items out on hire to their clients. Stafford Tower Crane of America, a crane leasing company uses a RFID system to track its cranes and major component items. The company tags its cranes and associated components with active RFID tags and uses these tags to gather data about the locations of those cranes and parts.

Keeping track of equipment out on hire.

For Stafford Tower a system that helps to locate cranes and parts quickly is essential. The new system replaces an existing manual tracking system and copes with the problem that construction projects initially require a crane but then need to add tower components to make the crane taller as



Tower cranes use extra components as the height of the building increases. Keeping track demands effective systems.

construction progresses.

A particular contract may involve components being ordered and shipped to site three to five times or more. By the time a contract is completed the crane may have as many as sixteen additional components. In addition components may be moved from directly one site to another while others return to Stafford's own yards.

As a result there was a risk that components might be missing for a particular contract or phase and items needing maintenance could be overlooked. The results could be delays in projects or, potentially, failure of equipment causing further delays or injury.

Since the cranes cost up to \$700,000 apiece, and individual components typically cost about \$17,000 each the asset value being controlled is significant. Companies renting cranes pay around \$25,000 per month and so any delay in being able to make use of them has an immediate cost in addition to the costs of project delays.

Now, to keep track of the cranes and components they are all fitted with RFID tags which can be read from as much as 800 meters away. Their unique ID numbers are captured by a tag reader, carried by Stafford personnel at the job site. This lets them know immediately if all components are present and at which construction site they are. The tag information is used to update an asset data base that can be interrogated by either Stafford or the customer, providing Stafford clients with the additional benefit of an improved service that helps them to plan and monitor their use of rented assets. A subsequent version of the system will involve RFID readers and GPRS equipment mounted in the crane cabs. The Stafford system provides improved management of assets, the chance for better tracking of maintenance activities and better customer service.

Now with legislation planned in the UK that will create a register of tower cranes the need for tracking cranes and their components will become even more important.

Moreau Construction

Managing tool usage.

A similar application demonstrates how a smaller construction business can take advantage of RFID. Moreau Construction is a Québec based construction firm with around 300 permanent employees. They also use contract staff for long-term jobs. Moreau have a tools asset base worth around one million Canadian dollars.

In 2005, Moreau adopted RFID tags to speed up, simplify and streamline the tracking of its power tools on job sites. Tools are carried in and out of company premises several times a day by Moreau staff and before the introduction of RFID, keeping track of them tools used by workers at different job sites was a cumbersome task and one that didn't always work.

This is a common problem for construction firms. Statistics provided by the Canadian theft-prevention service provider National Equipment Register, show that construction companies lost up to \$1 billion due to misplaced or stolen equipment in 2004.

Moreau found challenges in identifying a good partner to help them with their implementation and had difficulties in the early stages with the selection of the right technologies for their environment. They wanted to be able to scan tags in such a way that tools didn't have to be taken out of their cases to scan them and they needed tags that would work when attached to heavier tools with stronger magnetic fields than those found in non-industrial grade tools.

Moreau Construction invested around C\$25000 (£12700) in their RFID application but found that this was more than repaid in their first year of operation.

Thermo LLC

Dubai International Airport Project is Dubai's largest construction site. Thermo LLC are using an RFID solution to track materials and manpower at the Dubai International Airport expansion project. Everyone from the labourers to senior management wearing the green RFID tags which

Tracking staff on site. keep track of who is where.

Thermo, contractor for Terminal 3, Concourse 2 at Dubai International Airport has to manage upwards of 9-10,000 staff. Keeping track of individuals in a 1.25 km² site is not easy. Before RFID, Thermo used a manual system of gate passes, for security purposes. The RFID solution is automatic, and has allowed Thermo to save many of the seventy strong army of staff to take care of the manual system. Thermo saved staff for timekeeping and security. The system has also been integrated with human resources and health and safety recording systems.

"There was a degree of apprehension but we decided there was no reason why it wouldn't work on this project. It has been a major success"

Cliff Wilson :
Senior Commercial Mgr Thermo

Thermo achieved significant cost savings in the first month of using the RFID system as a result of the staff reductions realised, so showing that RFID payback can be rapid.

The system uses 50 transmitters, with a 40-metre coverage radius, placed around the site to record workers' movements. This has allowed Thermo to dispense with manual sign on systems. They estimate that they have saved half an hour per man per shift, a cumulative saving of 10,000 man-hours per month on site, allowing them to quickly re-coup the \$250,000 invested in the system

Thermo also hope to use the technology as part of their HR initiatives. It will provide a link between identification badges issued to employees and their HR database helping to manage visa, health and medical requirements.

BRE

The Buildings Research Establishment participated in a number of projects to explore the use of RFID technologies within the building and construction industries. Several of these addressed the issues associated with RFID within the supply chain and in one particular project the BRE worked with Cemex Rail Products using RFID to tag and track pre-cast concrete rail track components. Cemex produce over 100,000 linear metres of pre-cast concrete bearers and railway sleepers each year and while one block of concrete might look much like another, all are individual pieces tracked through the manufacturing process against a specific order.

With the help of BRE, Cemex used RFID to track blocks through manufacturing and within the Cemex storage yard. Passive RFID tags were embedded with steel re-enforcement and, once problems associated with tag failures and quality were overcome, the system proved that it could be used successfully.

As a result of the project Cemex discovered that it was practical to embed tags during manufacture and that doing so provided the ability to track blocks. Other in the British Pre-Cast Concrete Federation have gone on to suggest that the use of RFID could lead to "smart concrete", allowing concrete blocks to be re-used across sites or projects.

SMD

Ensuring that safety nets will do the job that they are expected to do depends on monitoring their exposure to sunlight. UV light causes the nylon ropes used in netting to deteriorate and, if nets are used without checking for extended periods of time, they may fail in just the circumstance when they are needed.

To avoid this problem, Structure Metal Decks implemented an RFID based solution that allows safety nets to be checked out whenever they are removed from stores and to be checked back in again once they are returned. In this way their exposure to the elements (and thus the risk of failure) can be easily monitored. RFID offered a quick and easy way to tag and trace the nets in use, allowing nets to be checked after a given time on site. The solution was chosen after trials with an approach based on bar code labels had failed because labels could not withstand the

Tag & Track Applications in Pre-Cast Concrete.

Health & Safety checks help to protect site workers.

dirt and damage resulting from the treatment of nets on site. Manual systems were also found to be impractical.



SMD's safety nets protect staff installing decking at London's 2012 Olympic Stadium.

Craig Galway, SMD's Contracts Director considers that his company will have better control of how the nets are used, and be better able to maximise their usage before the lifetime expires. What's more, the system tracks how long it takes to repair a net, as well as what led to its breakage or damage, so providing information that will help SMD make better use of their assets.

Reactec

There are 3000 claims each year for industrial injury disablement as a result of vibration related disease, many of them in the construction industry. To prevent industrial injury to workers operating vibrating equipment requires the ability to track the performance of power tools and the time that workers spend operating them.



Reactec's RFID based Havmeter system helps reduce industrial injury.

Vibration control specialists Reactec have developed Havmeter, an RFID based product that collects data on the vibration resulting from using different tools, allowing the total vibration dose to be measured and limited.

Devices on the tools measure vibration and RFID tags are attached to tools. This data can then be accessed with a small iPod style reader device carried by the worker. Data is collected on which tools are operated for how long and whether their current vibration levels are within expectations. The system provides benefits in reduced risk of injury, conformance to legislation and improved tool availability by highlighting tools which are in need of maintenance.

Controlling the risk of vibration related injury.

Other Projects In Construction

Other examples of the use of RFID in construction projects include:

- Concrete maturity monitoring – every slab of concrete in the Freedom Tower, currently under construction in New York is being tagged with RFID and temperature sensors to monitor concrete maturity.
- Columbus Brick in the USA have implemented RFID across their manufacturing and logistics chain to improve delivery efficiency and the level of information available to customers.
- Fluor Construction are using active RFID tags to track the shipment of metal pipes.

Contributions To The ROI : Cost Savings

Reduced costs contribute to ROI

RFID technologies contribute to three main areas of cost savings within construction businesses; reduction in labour costs through increased productivity; reduced material costs through better management of logistics and savings in capital costs through improved utilisation of assets or reduced repair costs.

Each of these three areas offer important opportunities for the deployment of RFID based systems.

In terms of reducing labour costs RFID projects can contribute in such areas as:

Reduced Labour Costs

- Savings in time lost to industrial injury or accidents through improvements in health and safety
 RFID can limit access to hazardous areas to qualified personnel; it can control usage of vibrating tools and resulting industrial injury; it can ensure tools are adequately maintained to reduce the risk of accidents as a result of failure and can be used to check that only trained staff use certain equipment.
- Reducing time lost due to ineffective material logistics
 Research indicates up to 10% of working hours on construction sites can be wasted because of this. RFID can improve material logistics and make it easier to synchronise workers and materials.
- Reduced payroll costs
 RFID tagging can automate data collection on attendance and hours worked saving administration costs.

The material and equipment costs of construction projects typically account for around 50% to 60% of the total project cost. As such contributions by RFID to the reduction of material costs can significantly affect project profitability. RFID can contribute to saving material costs through:

Reduced Material Costs

- Improved material logistics
 Reduces capital tied up in assets, saves costs in order and invoicing, supports just-in-time construction approaches.
- Better inventory management
 Saves on site storage costs, reduces material "shrinkage", avoids costs of stock-outs and reduces costs related to on-site movement of materials. A recent assessment of stockholding costs by a European steel stockholder identified savings of over 2% in the total annual cost of holding stock.
- Identifying and tracking bespoke components
 Supports rapid movement of components to the required site location and ensures that components belonging together stay so.
- Simplifies traceability
 Automates the ability to keep track of components or raw materials from suppliers, links together components from a single manufacturing batch.

- Better re-use and re-cycling
Allows reusable items to be tracked and put back into inventory, simplifies the processes of identifying components or materials for re-cycling.

RFID also offers the opportunity for savings in the costs of capital utilised in the business.

Reduced Capital Costs

- Reduced maintenance costs for capital equipment
The identification of equipment through the use of RFID can give maintenance staff access to the correct maintenance or repair procedures for that unit, saving time and improving equipment reliability.
- Reductions in loss / theft of capital equipments
Trials in 2006 on a major construction site in London indicated that RFID combined with GPRS could be used to track the location of valuable assets including construction plant.
- Improved asset utilisation
Better availability of transport and tools through reductions in lost equipment and better information on the location of equipment.

Contributions To The ROI : Revenue Increases

Increased revenues contribute to ROI.

Identifying areas in which RFID can contribute to increased revenue in construction businesses is more challenging than identifying areas where costs can be saved. However examples of ways in which RFID technologies can help construction businesses increase revenues include:

- More efficient operations
Improvements in the efficiency of operations open the possibility of improved pricing and consequently more competitive proposals to clients. This in turn leads to increased market share and higher revenues.
- Improved project progress information
This contributes to greater success in meeting schedules, increased customer satisfaction and reduced penalty payments. Greater customer satisfaction in time feeds through to increased revenues.
- Reduced snagging
Although speedy handling of snags boosts customer satisfaction, reducing the incidence of snags in the first place is better. Ensuring that correct items are used through better component identification helps here.

Issues To Consider In Introducing RFID

This White Paper doesn't seek to provide an exhaustive guide to implementing RFID projects but it is worthwhile to consider some of the issues mentioned here before embarking on use of the technology. Probably of greatest importance is to use care when selecting the area in which RFID is to be used. Application areas need to have the payback potential sufficient to reward the risk and need to be sufficiently straight forward to be feasible with current resources and technology.

ERA Build's view of applications in construction.

The ERA Build project identified a number of application areas where the research or visionaries within the construction industry were pointing the way forward.

Applications in the construction landscape

Present Applications	Future Applications
Tracking items through production	Inventory management
Quality control in production delivery and construction.	Logistics for just-in-time delivery or customer managed inventory
Operational control in production; for example by ensuring compatible components are used together.	Product identification and traceability
Access, safety and security control on sites	On-site inspection
Facilities management of sites	De-construction management including managed materials disposal
Tracking and tracing rental items	Tracking and tracing of bulk product
Asset management, including real time location of assets.	

At the time of publishing their report, ERA Build considered that only a few RFID application areas (access control, operational control and quality control) had reached maturity but that others (facilities management, asset management, production systems and tracking / tracing for single items) were "ready for take up".

ERA also made a number of key recommendations for the construction industry with respect to RFID. The most important of these were:

- Establish best practice for using RFID in the construction industry
- Grow the level of expertise in RFID technology
- Improve the scope and effectiveness of standardisation
- Foster a culture of innovation with respect to the use of RFID

In fact, since the ERA report was published (almost three years ago) a number of trends within the RFID industry have responded to some of these issues.

Key Trends in RFID & Their Importance In Construction

One of the difficult issues facing organisations planning to deploy RFID is that the term covers a wide range of different technologies, each with their own associated capabilities, standards and risks.

Certain RFID technologies have a pedigree of over fifteen years of use while others are brand new, lacking in standardisation and with uncertain performance and reliability. For organisations to be successful with RFID technologies they need to keep a clear eye on which class of technology they are working with and what the trends in technology are.

Five key trends can be identified within the RFID sector:

- Standardisation is broadening to ensure that pan- company and pan-country projects are practical.
- Increasing availability of solutions based on "active" tags.
- Technically more capable UHF systems are becoming feasible as the price of tags and readers falls in response to standardisation initiatives.
- Application implementation is becoming easier through the availability of integrated data collection terminals based on software platforms such as Windows CE, and RFID-aware software systems such as SAP and Microsoft's BizTalk.
- The understanding of the strengths and weaknesses of the technology is growing as more solutions are implemented. Greater knowledge amongst implementers reduces risk.

Of all of these trends, improvements in standardisation are likely to offer the construction industry the greatest opportunities in respect of using RFID across the supply chain of materials and components.

GEN2; an example of improvements in standardisation

The recent introduction of the GEN2 standard for UHF tags and readers has, for the first time, created a single global standard in one area of RFID. This is helping to drive innovation in reader and tag technologies as suppliers see a global market for their products and it also provides a basis on which customers can plan to use the technology across company or country boundaries.

Where WalMart in the USA was able to mandate RFID tags on stock shipped by its suppliers, it will now become possible for construction companies to take up a similar stance, knowing that they can implement common systems wherever in the world the construction project may be taking place.

Active tags are offering new applications as they become more readily available.

Active tags, that is those with their own on-board battery that can power the identifying chip, offer the benefit over passive tags that they can be read from a greater distance and can announce their presence, rather than waiting to be read. New forms of tag with on-board sensors can detect if they are moved for example. Some can be used in conjunction with existing wi-fi infrastructure, so that a site network becomes the carrier for data about individual tagged items and can allow a tag to detect where it is in relation to the network.

While more expensive today than passive tags, such tags can be useful in allowing valuable items (such as tools) to be quickly located anywhere across a site or complex of sites.

Developments in battery technology and standards in this field can be expected to increase the potential of active tags over the coming years.

The introduction of UHF tags and readers has significantly increased the distances across which tags can be read and the speed with which tags can be read.

The possible distances between the tag and the reader has risen from a few centimetres to as much as 10 meters (or with active tag technologies up to 100 metres) and UHF tags can be

UHF tags bring faster, easier reading

read at the rate of hundreds per second. As a result it is feasible to consider portal style reading stations where a lorry could have its identity confirmed and data collected from all the tags relating to the stock items carried on it while the vehicle is driving through the portal.

The combination of improved speed and greater range will make a wider range of applications practical.

Middleware integrates RFID with the rest of the business's IT systems.

Software is often at the heart of an RFID project. RFID provides a way of collecting vast amounts of data. The challenge is then to collate and understand the information collected. Improved data visualisation tools help in this process as does the use of data compression to optimise the data held on a tag so that reliance on a central database is reduced.

Development in these two spheres, together with the emergence of improved interconnecting software ("middleware") that is more "RFID-aware" will make it easier to design applications that integrate RFID data within the overall business ERP system.

A growing expertise pool makes more projects possible.

Finally the growth in knowledge and expertise as a result of the implementation of more and more RFID projects helps to reduce risk. Although RFID continues to be an area in which the pace of change creates many potential pitfalls, the growing use of the technology means that there are more and more technicians in the supplier community and in the user community that have had experience of real world projects and the real life problems that these create.

As is often the case with emergent or relatively new technologies, the availability of expertise has limited the use of RFID. Now, with more experience staff available and more capable suppliers and solution integrators, it becomes possible for many more projects to be delivered with confidence.

RFID Industry Initiatives & The Construction Industry

Although not amongst the earliest adopters of RFID technology, the construction industry is now deploying innovative applications that offer the potential of significant business benefit. The construction industry itself is taking initiatives to exploit the technology. Established suppliers to the construction industry are also responding to the opportunities presented by RFID. And, the RFID suppliers are responding to the potential for the technology within the business.

RFID In Construction Consortium

The most recent initiative of the construction industry itself has been the formation of a new organisation hopes to help the construction industry take advantage of the technology in the work place. The non-profit group, known as the RFID in Construction Consortium, aims to provide education and support to industry members seeking to deploy RFID technology, as well as other forms of automatic information and data capture (AIDC) systems.

The consortium's president is Jose Faria, an associate professor at Florida International University's Department of Construction Management and the group has been founded under the umbrella of International RFID Business Association that has helped to create similar RFID groups in such vertical industries as tires, health care, animal identification, retail and aviation. The RFID consortium intends to educate end users in a vendor-neutral and technology-agnostic and expects to help companies to examine the solution to particular problems as part of a total picture, without focusing solely on the RFID aspect of the implementation.

Industry supplier initiatives

As RFID has come to be seen as a mainstream technology, construction industry suppliers are also seeking out ways in which they can use RFID to add value to their own products. Probably the most high profile example of this has been the introduction by Crosby Group of a range of RFID equipped lifting gear. By introducing RFID on their products, Crosby Group are making it easier for their clients to demonstrate compliance to rigging and lifting safety regulation in the USA. In the UK, RFID suppliers are already providing similar solutions to support compliance to the requirements of the Health & Safety at Work Act.

RFID Industry Initiatives

RFID suppliers have come forward with industry specific software solutions and with hardware adapted to the particular needs of the industry sector. Examples of RFID technology adapted to the needs of the construction industry include:

- Nail tags : RFID tags that can be simply nailed into timber elements to identify, for example trusses or other wooden components, especially useful with pre-shaped or custom timber pieces that may look similar but have subtly different dimensions or shapes.
- Heavy duty wood implant tags : tags able to cope with the peculiarities of being embedded within timber components yet still able to giving good reading distances. Often used for reusable items such as pallets.
- Tags for attachment to steel or concrete embedding
- Heavy duty reader devices suitable for site deployment.
- RFID readers integrated with heavy duty mobile computers
- Software designed specifically to meet the needs of the construction industry in areas such as tool management, health and safety management, asset control.

In Conclusion

RFID is a technology that has widespread application within the construction industry. One of the difficulties the industry faces is that the wide range of uses to which the technology can be put mean that experience of deployment across the industry is fragmented. As a result the growth of a pool of expertise and recognised best practice has been slower than for other forms of technology.

The same difficulty faces those seeking to construct solid business cases with a well argued return on investment.

Even so, by using the experiences from other industries and the use of similar technologies, combined with the expertise of suppliers within the RFID industry with experience of the distinctive needs of construction, it soon becomes clear that RFID has an important contribution to make to the performance of contractors, component suppliers, tool hire companies and others in the construction industry.

The costs of getting started with RFID can be quite low. Deploying a technology demonstrator may prove to be the easiest, quickest and least risk way to assess feasibility and to identify the likely benefits and potential pitfalls of an implementation.

Piloting the technology can be the best way to assess its potential contribution but the benefits are most likely to fall in one of the following areas:

RFID pilots & the possible benefits

- More accurate information on the location and availability of assets
- Better visibility of asset related information
- Improved accountability for asset related actions
- Improved asset availability through more effective maintenance
- Easier and more reliable demonstration of regulatory compliance
- Reduced project costs and timescales through better supply chain management.

But, whichever the benefit area that is most relevant, the best way to ensure that business gains those benefits is through an active programme to establish the role that RFID or similar products should take in the business.

About CoreRFID Ltd.

CoreRFID works with over 1100 customers across the UK, Europe, the USA and the rest of the world, providing them with the systems and support they need for their applications.

Many customers have continued to do business with CoreRFID over a number of years. Users of CoreRFID solutions are found in finance, broadcasting, construction, defence, government and telecommunications. Customers include the Costains Group, BAA, Balfour Beatty, Thames Water, the Channel Tunnel, Galliford Morgan and Amec. CoreRFID specialises in the complete range of technologies for track, trace, audit and control applications, assisting customers in making the right choices for business critical applications. CoreRFID provides customers with:-

- RFID tags, sourced worldwide or custom manufactured
- Tag reader / scanner devices.
- Hand held computers for tag reading / scanning.
- Design and development of the software.
- Training and implementation service.

Experts In Track, Trace, Audit & Control

In a field where new development makes new applications practical, CoreRFID keeps in touch with the latest advances and makes it easy for clients to get the benefit of them.

CoreRFID selects RFID components from a range of best-in-class technology providers. CoreRFID Pilot Packs provide a low cost way to try out RFID technology and assess the feasibility of potential applications. CoreRFID has strategic partnerships with portable computing suppliers and providers of Ultra High Frequency and active RFID components, making it possible for CoreRFID's clients to exploit these technology. CoreRFID software solutions are developed using the Microsoft .Net Framework making it easy to integrate track, trace audit and control applications with other back office systems.

Our Organisation

CoreRFID Ltd has established a reputation in the global RFID industry for delivering innovative products and services that help its customers to deliver successful solutions.

With bases in the US, UK and Europe, CoreRFID is now working on some of the most advanced RFID projects, delivering RFID based systems, often in short timescales. The business invests in products and in its staff and enjoys the strength provided by profitable growth, loyal customers and an experienced team. The CoreRFID team of experienced engineers and its sales and administration centre is based in Warrington, in the North West of England.

© Core RFID Ltd 2009

CoreRFID Ltd. Dallam Court, Dallam Lane, Warrington, WA2 7LT

T: +44 (0)845 071 0985 F: +44 (0)845 071 0989 E: info@corerfid.com

W: www.CoreRFID.com www.rfidshop.com

First published: June 2008. Revised & updated: June 2009