



# Case study

Leeds Teaching Hospitals NHS Trust successfully pilots' RFID technology to track and trace its orthopaedic loan kits

Leeds Teaching Hospitals NHS Trust has been a pioneer in implementing automatic identification and data capture (AIDC) technologies using GS1 standards. The Trust has carried out a successful proof of concept RFID pilot to track and trace its orthopaedic loan kits containing vital hip and knee joints. The pilot identified benefits for hospital staff and suppliers, reduced administration and improved accuracy and efficiency.

## Background

Leeds Teaching Hospitals NHS Trust is the largest in the UK and includes the largest teaching hospital in Europe. The Trust provides high quality acute hospital services for the population of Leeds and the surrounding area and acts as a regional centre for a number of specialist services such as cancer and cardiac surgery. In total it employs over 14,000 staff across eight sites, treating around a million patients a year with a budget of £790 million.

*"Leeds Teaching Hospitals NHS Trust fully supports the Department of Health's recommendations that the GS1 coding system should be adopted throughout the health-care system in England and we have been working closely with GS1 UK to ensure that we meet these requirements. We are also helping to drive the adoption of GS1 standards to improve patient safety and productivity through our active participation in the GS1 Healthcare User Group's Leadership Team and believe that RFID should be rolled out in parallel with other GS1 standards such as bar coding,"* says Graham Medwell, Information Manager – Supplies Department at Leeds Teaching Hospitals NHS Trust.

The Trust's key drivers for implementing GS1 standards include patient safety, improved productivity and compliance with NHS requirements to track and trace

implanted products and ensure that the true cost of each procedure including the consumables are recorded accurately.

## The Problem: Manual checking process and inconsistencies with existing electronic system

Orthopaedic Loan Kits are multi-component products made up of core surgical implants, tools and medical consumables which are necessary to undertake medical procedures such as elective knee and hip surgery. There are usually 20 to 30 components in each kit stored in a large box with a total market cost of around £40,000. At the extreme end of the scale the largest loan kits contain about two hundred components and are stored in man-sized four-panelled containers.

A manually-intensive checking exercise is carried out when the loan kit is dispatched to the hospital, when it is received at the hospital, when it is returned to the kit supplier and again when it is received by the supplier. A missing element during an operation can cause severe delays and even result in cancellations after the patient is under the anaesthetic. The checking process at each point can take up to 2 hours depending on the complexity of the kit, leading to a lot of administrative work and associated cost for both the kit supplier and the Trust.





Loan kits are usually ordered over the phone rather than using the automated electronic ordering system which is used for most other products. Staff tend to work around the system which can result in data inaccuracies. The Trust is also unable to track its loan kits accurately from purchase order to invoice due to the manual process. The ordering, checking and invoicing processes for these kits are very time consuming, labour intensive and often result in lengthy invoice reconciliations.

### **The Solution: Tracking orthopaedic loan kits with RFID technology**

The Trust identified Radio Frequency Identification (RFID) technology as a potential solution and in conjunction with GS1 UK, Depuy (a Johnson and Johnson company), Sybase and GHX (Global Healthcare Exchange - a GS1-certified data pool and e-commerce exchange provider), carried out a proof of concept RFID pilot to simplify the ad-hoc checking, receipting, issuing and final return of its orthopaedic kits. Leeds worked closely with GS1 UK to ensure that it complied with GS1 standards where possible.

During the pilot, each item in the kit was RFID tagged using EPC Gen 2 Class 1 UHF tags and identified with a unique code to enable the accurate track and trace of all the components in each kit. The Trust attached a label with an embedded EPC Gen 2 RFID tag to each component of a kit. The unique component identifier was encoded into the RFID tag and also into the bar code and human readable sections of the label.

Staff used a PDA (handheld computer) with an integrated RFID reader to receive, return and allocate components of the kit for use. During the pilot, 100% read accuracy was achieved within the read distance of one foot between the PDA and the orthopaedic kit components.

The type and density of the container used to hold the loan kit during the pilot did not require the removal of the components to read the RFID tags. However, if a heavily metal-clad container was used instead, the tags might not be readable. After taking advice from internal radio specialists, there were no problems of interference reported whilst testing the RFID equipment in the clinical area.

*“Currently, Leeds staff take approximately 5 minutes to carry out the manual reconciliation of the components in a typical loan kit, with the largest kits taking up to 2 hours. Using RFID, this time can be reduced to less than 30 seconds,”* says Graham Medwell.

The Trust's Sybase RFID Anywhere solution was also integrated with its existing stock control system, which was already integrated with its purchasing and corporate ERP system. This allowed staff to create a shopping list for each kit so that orders could be generated by simple drag-and-drop style requisitioning. The requisitions were then matched with the purchasing system where purchase orders were produced and then transmitted electronically to the supplier.

### **Significant benefits**

The proof of concept pilot found significant benefits from implementing RFID technology:

- Clinical staff were able to check the contents of a kit instantly, without the need for manual counts at each step in the administrative and clinical process
- The turnaround time for suppliers from sale to receipt of payment could potentially only take approximately 10 days compared to the current 2 months due to less administration and more accurate invoicing
- The Trust had complete control of its data from order to invoice. This improved its visibility of stock and data quality enabling the accurate track and trace of its kits.

*“Our RFID pilot has proven that the technology is scalable and the concept is possible. To be able to fully implement RFID at Leeds and reap the benefits, we would need to drive adoption within the healthcare sector. We need to get the major suppliers and healthcare providers on board to see the benefit of implementing RFID in healthcare,”* says Graham Medwell.



The next step is to expand the trial to prove the operational aspects of using RFID before rolling it out more widely in the NHS. Although the pilot has proved that the technology works, the application can only be successful if the kit components are RFID tagged at source by their manufacturer and if hospitals have RFID readers which can read them.

This requires robust open standards which do not tie hospitals to a single supplier of either loan kits or RFID readers. The GS1 standards are widely adopted within the NHS and by technology suppliers and are recommended by the Department of Health in its 'Coding for Success' policy document. These standards define the identifiers together with the RFID air interface and data management which enable kit suppliers to tag their products at source, confident that hospitals will be able to process them using a wide variety of readers and applications.

### **Conclusion**

The Leeds Teaching Hospitals pilot for the management of orthopaedic loan sets using RFID tags is an excellent example of how RFID can provide very significant efficiency gains for the NHS and its suppliers. Standards, such as those provided by GS1 and EPCglobal are essential to enable these gains to be realised.



## TECHNICAL APPENDIX

### Glossary of Hardware and Software used in the Leeds Teaching Hospitals RFID pilot

**Printer:** SATO GL408e

**Tags:** Rafsec G2 "MemoryStick" Short Dipole

- EPC certified Class1 Gen2 UHF tag operating at 865.6-867.6 MHz
- 3.82" x 0.59"
  - 512 bit memory
  - Designed to fit in 4" wide labels

**PDA / RFID Reader:** 7527s-g21000000 Psion Teklogix Workabout Pro 3rd gen short terminal, Windows mob 6 classic, colour 128mb flash, 128mb RAM, Bluetooth

UHF-CAL-A2-G2 Psion Teklogix CAEN module A828EU 50mw UHF lateral polarization multi purpose end cap with GSM shroud

Docking station

Psion battery high capacity 3000mAh

### GS1 Standards

The RFID tag and reader communication standard is defined in **GS1 EPCglobal UHF Class 1 Gen 2 standard**

The data structure on the RFID tag is defined in the **GS1 EPCglobal Tag Data Standard**

The GS1 standard identifier for each kit element is the **GS1 Global Trade Item Number (GTIN)**

The above standards and associated data and reader management standards are available at [www.epcglobal.org](http://www.epcglobal.org)

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