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## Case Study One

### Medical Healthcare Sector: BloodTrack®

[http://www.gbelectronics.com/blood\\_track.htm](http://www.gbelectronics.com/blood_track.htm)



#### The Market

In the UK, the Serious Hazards of Transfusion (SHOT) scheme reported 15 deaths and 69 cases of major morbidity related to incorrect blood component transfused (IBCT) between 1996 and 2003. According to SHOT 6, the predominant cause of these tragic events was “human error”. Given that the traditional blood storage/distribution system (in the UK at least) involves a clipboard hanging from a blood-bag refrigerator, this might not come as a huge surprise. Access to the refrigerators is often only partially restricted and, since blood is frequently retrieved and administered during an emergency, there is a large scope for error.

The traceability of blood bags also forms part of EU Directive 2002/98/EC (27<sup>th</sup> January 2003) – according to Article 14 – “1. Member States shall take all necessary measures in order to ensure blood and blood components collected, tested, processed, stored, released and/or distributed on their territory can be traced from donor to recipient and vice versa”. A fully automated electronic system also lends itself perfectly to this resolution.

In addition to the safety aspect, blood is an expensive, scarce commodity with a limited shelf life when stored in a refrigerator and an even more limited shelf life when removed. Regular stock rotation, plus the ability to track the whereabouts of a

blood bag after it has been retrieved from storage, are therefore essential elements of cost control in blood transfusion units.

To help overcome these problems, Datalog International Ltd., in conjunction with GBE and Olympus OsYris, have developed and produced a computerised blood-tracking system. This innovative unit was designed to log the blood type and donation date using a barcode system, restrict user-access to the blood bags, enable strict stock rotation, track the location of each blood bag even after it has been removed from a refrigerator, interface with the existing hospital (and laboratory) computer network, and most importantly reduce the risk of error.

## **Product Development**

### *The Brief*

GBE's brief was to design the hardware and mechanical components to complement the blood-tracking software. Specifically to:

- Design the functionality of the blood-tracking kiosk, with focus on the simplicity of use by hospital staff
- Design a bespoke robust kiosk to house the hardware components, keep the size of the unit a minimum, and providing mounting options for a desk, wall, or stand
- Ensure the system passes all relevant EMC and medical directives
- Design the product with competitive manufacturing costs in mind
- Manufacture, programme, and test the BloodTrack<sup>®</sup> unit onsite at GBE.

### *Designing the Product*

#### *Functionality*

Based on the software's operating specifications, GBE determined the need to:

- Incorporate a USB resistive touchscreen with a highly readable TFT screen. (Since the BloodTrack<sup>®</sup> users may be wearing gloves, a resistive touch screen was the preferred option)
- Optimise the optical performance of the 2-D barcode scanner that would 'read' the blood-bag labels
- Maximise longevity by including features such as a self-monitoring power supply, a fluid-bearing hard disk drive, and 24/7 "quiet and cool" running with minimal moving parts. The system would also require a modular design for ease of maintenance, and would need to be sufficiently robust to withstand hospital detergents
- Optimise the type and number of port connections. (GBE tested various small-form factor motherboards, taking into account reliability, i.e. low temperature continuous running, and cost)
- Expand the motherboards so that peripheral devices, such as printers and temperature-monitoring devices, could be added if required
- Develop an internally mounted sound system to accommodate their client's speech interface. (GBE designed the system with full volume control to suit the installation location)
- Design a custom USB relay control board with an in-built watchdog timer to interface the BloodTrack<sup>®</sup> Kiosk with the refrigerator. (No suitable modular single relay devices were available on the open market)

- Incorporate a small-form factor uninterruptible power supply (UPS) with a data link for monitoring and logging performance, and a soft shut down function in the event of a power failure.

#### *The Kiosk*

- An assessment of the potential market and annual sales volume enabled GBE to determine which style and material were most suitable for the outer case (i.e. should it be constructed from sheet metal or include a tool made for an injection moulded unit?)
- After working closely with a sheet metal engineering firm to determine what could be achieved for given costs and for indicative lead times, GBE presented three preliminary kiosk designs to their client, the core dimensions of which were established by the dimensions of the internal components. Mock-up models were made and beta units were produced.
- In order to cater for obsolescence within the LCD industry, and to facilitate servicing and maintenance of the final unit, GBE designed a chassis that could be used for a variety of 12.1” TFT screens (the unit is easier to replace in a chassis).
- To minimise the time needed to assemble the units, and to facilitate servicing and maintenance of the final product, GBE designed an internal bracket on which all the hardware components could be mounted (Figure 1).

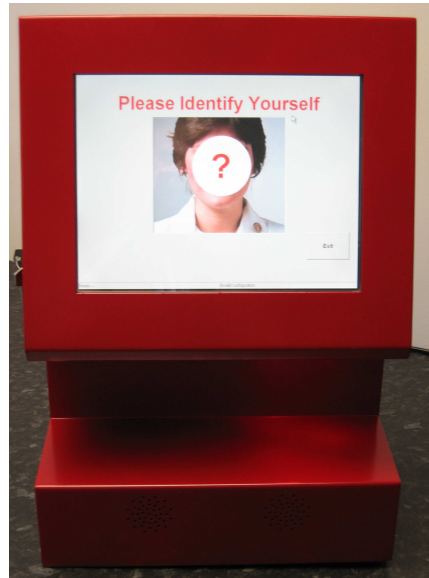
**Figure 1.** Internal component brackets



Safety certificates are obtained for each component, where available, and all the necessary EMC/medical safety tests have been carried out in conjunction with an UKAS-accredited EMI test house. Full product release documents detailing the final manufacturing process were prepared in accordance with GBE's ISO9001:2000 certification requirements.

### **The Final Product**

**Figure 2.** Since its full release in 2003, BloodTrack® has been installed in over 70 hospitals throughout the UK, Ireland, Canada and the USA; and demand continues to grow. As a result of GBE's successful collaboration with OlympusOsYris, Neoteric and Datalog, the development team is now growing their range of blood tracking and safety products.



**Figure 2.** BloodTrack® – installed onsite at Isle of Man, UK.



### **Canada and USA**

In May 2007, GBE and Neoteric achieved full FDA approval for the entire Blood Track® Suite, which meant that the TUV mark could be applied to the BloodTrack® Kiosk. The first US installation was University Hospital New Mexico and the first Canadian installations were in Toronto (Sunnybrook Health Science Centres, General Hospital and Western Hospital).

As of 1<sup>st</sup> May, 2009, BloodTrack® is the leading blood tracking and safety solution in the UK with over 130 installations nationwide.

Should you require further information on this or any of our other products, please do not hesitate to contact GBE. <http://www.gbelectronics.com>