

# Technology Trends in the Blood Bank Industry

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The blood bank industry has a life-saving mission, but it's also highly competitive with hundreds of blood bank centers operating within the U.S. alone. Demand for blood, has also been in fluctuation, making efficiency an even bigger aspect in the medical industry since all blood has a shelf life. Blood banks need to be highly organized in their processes to ensure purity and accuracy. Demand for blood products often fluctuates, making efficiency even more important to remain competitive.

In recent years, nationwide demand for blood has dropped with the increase of certain, more advanced medical procedures. Less invasive techniques, such as laparoscopic surgeries, are on the rise as well as "bloodless" surgical techniques that eschew blood transfusions and minimize blood loss. A few other factors, such as ordering less blood to have on hand "just in case" and a move away from the practice of "topping off" a patient with extra blood, are also at play. In addition to less demand due to alternative medical techniques, the nation's blood supply has fallen greatly in response to lower demand for blood.

With a decrease in demand, competition heightens. Blood banks need market share and volume. More challenges arise especially in delivery timeframe. Hospitals and surgical centers might not need as much blood as they previously did, but when they do need it, they need it immediately. Other challenges for this industry involve not just quantity or availability but quality. Blood products have a limited shelf life. They require precise temperature controls and multiple quality tests to be completed routinely in order to ensure purity and blood type.

Fortunately, advanced medical computer technology has become increasingly available, accessible and affordable. It can help blood banks maintain a competitive edge while ensuring the integrity of the blood supply. Technology trends, including the smart blood bank inventory control systems have been helping them to protect the blood supply, stay competitive, and continue saving lives.

## "Smart" Blood Bank Inventory Control Systems

Blood banks must keep the blood they collect safe, secure, and viable -- and they must do so in accordance with strict regulations. Blood bank refrigerators have evolved to become more than just safe cold storage devices. These refrigeration units come equipped with the compressors and insulated cabinets required of any refrigeration device while also providing advanced control over temperature, storage contents, warning alarms and more. Another hardware trend used by "smart" blood bank units involves refrigeration with RFID (radio frequency identification) technology. For example, a blood bank storage unit can now be fitted with RFID scanning machines to read blood donor labels and their contents, track on-hand inventory, and track when items have been removed or added. These RFID systems can transmit their data wirelessly to control stations for review and analysis. A network of blood banks can track which of their locations can provide enough blood guickly during an emergency. These blood bank's smart inventory tracking and storage refrigerators are mostly controlled by industrial-grade hardware and software that have become increasingly more advanced. Axiomtek's embedded motherboards, embedded systems and medical-grade touch

panel PCs (MPCs) are designed to be integrated for use in applications such as those of blood bank's inventory control.

Axiomtek's embedded motherboards are typically found at the heart of the medical devices. Once integrated into a blood inventory and storage unit, the embedded motherboard performs the job of controlling, monitoring, comparing trends, and reporting temperatures to ensure smooth and reliable operation. These embedded motherboards can process large amounts of data, both rapidly and accurately. They can wirelessly transmit key data via their Wi-Fi or Ethernet features to provide control centers with crucial operational information, i.e., real-time temperature monitoring, detailed supply of blood, alerts for any issues that may arise, reordering timing and additional requirements, etc.

Some of these blood bank refrigeration units include user-friendly graphical displays, icons, and alarms to visually and audibly communicate the system's status. For example, a green thermometer icon communicates that conditions are normal whereas a red flashing one would indicate that the temperature is too high. Audible and remote alarms are also available, enabling blood bank workers to promptly respond when a warning is triggered. Axiomtek's medical panel PC product series can provide medical workers with an easy-to-use, touchscreen interface with full HD LCD display. They are also constructed with antimicrobial enclosures for bacterial protection and come certified with multiple medical certifications.

"Smart" blood bank refrigeration can feature:

- Biometric fingerprint readers to control access
- Wi-Fi to communicate with other components and devices
- Ethernet connectivity
- Touch panel PC displays
- Stable temperature control
- Permanent record of temperature storage conditions



# Technology and Inventory Management in Action

The San Diego Blood Bank uses a proprietary inventory management system to monitor the available stock at network hospitals in real-time and quickly replenish supplies when they run low. This system automates the blood component inventory, ordering, and delivery processes. A color-coded dashboard provides at-a-glance information as to supply levels and soon-to-expire products.

The blood bank's inventory management system polls inventory at each of the hospitals it serves every five minutes, allowing it to register any supply level changes in near real-time. Not only is this helpful from a customer service and restocking standpoint, according to an article in the San Diego Union Tribune, the system can even send out emails to potential donors of a critical need within 15 minutes.

In order to make network blood bank inventory management systems possible, advanced industrial computers such as Axiomtek's eBOX product series can be used to process, deliver information, and perform needed actions - right from the edge. It can also offer remote operational control and deliver required data through cloud computing to control center for further analysis, reporting and improvements. Axiomtek's eBOX products offer high computing power, easy integration and deployment, high software compatibility, extensive storage space, multiple communication options, high flexibility for configurations of systems and high customization options. These systems allow for detailed blood tracking that can include tracking specific contents in a storage unit (blood type, plasma, platelets, etc.), where the blood is being kept, and which type of blood is needed for specific clinical areas within a hospital.



The overall benefits of having an advanced inventory management system are:

- It offers benefits to medical personnel such as nurses and doctors with visibility of blood supply and transfusion status in order to save lives, provide accurate diagnosis and treatments.
- The systems will improve efficiency of clinical areas and blood banks. It also provides improvement to inventory management, as well as decreasing staff workload, delivery time, blood waste and required inventory levels.
- It can help ensure compliance with regulations and hospital

guidelines for recording, traceability, and accountability. • With these improvements in efficiency, hospital staff can provide increased patient safety such as ensuring the right blood goes to the right patient in a timely manner. It also offers improved access to life-saving blood products.

Axiomtek's Advanced Products for the Medical Industry

## **Embedded Motherboards**

Axiomtek's embedded motherboards provide medical device system integrators with high computing capabilities, highly customizable features and extensive expandability options. These embedded motherboards come in a variety of form factors, including 3.5" (CAPA), COM Express, Mini-ITX, and more. These motherboards also provide extensive communication options with PCI Express card slots for wireless communication capabilities and expandability options for USB, DIO, Gigabit LAN ports and more. Axiomtek's embedded motherboard products have been selected by many well-known medical device companies as their motherboard of choice for integration for a wide variety of medical equipment.

# Medical-grade Touch Panel PCs

Axiomtek's medical-grade touch panel PCs feature high performance, high graphical touchscreen full HD capable displays with extensive reliability and user-friendly interfaces when dealing with blood inventory related applications. It has also been used in other medical applications including nursing cart interfaces, point-of-care EMR terminals and more. The MPC product series features UL60601-1/EN60601-1 medical-grade certifications, high ingress rated front bezels for protection from dust and liquid spillage, and IPX1 full anti-microbial enclosures to prevent bacterial invasion. Some models offer 10-point multi-touch support. Axiomtek's medical products are ISO13485 certified and offer unparalleled reliability and product longevity.

## **Embedded Systems**

Axiomtek's eBOX product series is versatile, highly customizable and easy-to-integrate into a variety of medical hardware systems. These systems come with scalable CPU options for medical computing performance needs and wireless communication options with 3G/4G/GPS/GPRS/Wi-Fi for data management and device-to-device communication. They also offer many rugged features such as wide operating temperature ranges and high ingress protection ratings for dust and liquid spillage. This comprehensive product line offers a wide variety of embedded systems and can meet any complex requirement medical device manufacturers may require.

# **Design and Integration Assistance**

Axiomtek can assist medical device manufacturers with embedded motherboard designs and provide system integration support for embedded solutions and MPCs. Axiomtek's design assistance and R&D resources have helped many medical OEM/ODM customers from the conceptual stage to deployment and anywhere in between.

#### **Product Showcase**

# Feature-rich, Highly Customizable Industrial ATX Motherboard

# High Graphical Performance Medical-certified Touch Panel PCs



IMB500 – High Computer Power Advanced ATX Motherboard

- Scalable CPU options with 7th/6th Generation Intel® Core™ i7/i5/i3, Pentium® or Celeron® processors with Intel® Q170 chipset
- Rich expandability options including one PCIe x16 slot, two PCIe x4 slots, four PCI slots, one PCIe Mini Card and one SIM card slot
- $\bullet$  Enhanced data storage reliability with five SATA-600 with RAID 0/1/5/10
- Intel® HD Graphics supports Ultra HD display with triple view capability via HDMI, VGA, and DisplayPort

#### **Best in Class Mini-ITX Single Board Computer**



**MPC153-834** – High Graphics Quality, Fanless Medical-grade Touch Panel PC

- High performance Intel® Celeron® J1900 quad-core processor with PCIe Mini Card slots for wireless communication and data transfer options
- EN60601-1/CE/FCC class B medical certifications with dust/liquid spillage-proof IP65-rated front bezel and IPX1 antimicrobial plastic enclosure
- 15.6" WXGA display with PCT or 5-wire flat resistive touch screen
- Flexible power options with wide voltage range of 100V 240VAC-DC with 60W power adapter or optional 9V – 36VDC with terminal block

#### Easy-to-integrate and High Expandable Fanless Embedded Computer Systems



**MANO500** – High Quality Industrial Mini-ITX SBC with Scalable Performance CPUs

- Scalable CPU options with 7th/6th Generation Intel® Core™ i7/i5/i3, Pentium® or Celeron® processors with LGA1151 socket
- High memory capacity and high rate data transfer speed with two DDR4-2133 SO-DIMM support max up to 16 GB
- Rich I/O options with two RS-232/422/485 ports, four RS-232 ports, four USB 3.0 ports, six USB 2.0 ports, two Gigabit LAN ports, and eight digital I/O channels
- Ultra HD 4K display support through Intel® HD 530 Graphics chipset for four display interfaces via HDMI, VGA, DisplayPort, and LVDS/Embedded DisplayPort (eDP)



**eBOX670-891-FL** – High Performance, Feature-rich and Compact Embedded System

- Scalable CPU options with LGA1151 socket 7th/6th Generation Intel® Core™ i7/i5/i3 or Celeron® processors
- Rich I/O options with four COM ports (RS-232/422/495), six USB 3.0 ports, two USB 2.0 ports, 32-channel programmable DIO and one audio port (mic-in/mic-out)
- Wireless communication options with two internal PCIe Mini Cards and one SIM slot for WLAN/WWAN/mSATA
- Operational stability with extended operating temperature range of -40°C to +60°C

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