



# Medical Device Technology Improves Blood Testing, Vaccination, Biologics and Medication Delivery Processes

Advanced embedded motherboards, IoT gateway controllers and medical-grade panel PCs (MPCs) are increasingly finding their way into various applications in the medical industry – including blood testing, vaccines and biologics, and medication delivery. With the help of advanced embedded computer hardware, new medical device technology can accurately capture, process, send and store large amounts of data that can be used to help with patient treatment. Integrated medical devices can connect to central processors to deliver fast, accurate results and help prevent errors. Such technological advancements have improved medical device performance and enhanced medical process efficiency. Diagnosis is delivered faster and more accurately, leading to better options for disease prevention, treatment plans and, ultimately, better survival rate and longer life expectancy.



An example of how technological advancements can be implemented to enhance medical process efficiency can be seen with the simple labeling process of medical laboratories. Medical personnel can process data from procedures such as blood testing in order to reliably create labels in printed form. This system is automated to eliminate human errors and can include identification features such as bar codes to help track test materials/specimens, ensure the accuracy of patient profiles and keep a record of the results. It can link to the patient's current medical record and provide a centralized area for all of the patient's related medical information for easy evaluation. For research laboratories, vaccines and biologics can utilize the labeling system to ensure accuracy of vaccination and biologic types and dosage. Accuracy of labeling can make a difference between life and death.

These medical labeling systems are controlled by embedded computers or motherboards that can be configured to manage various applications. They can be designed to meet the required medical standards and be compliant with a variety of medical safety requirements. These systems can be customized for additional inputs or outputs, scaled processing power or increased memory to fit the needs of various applications. The resulting medical computer systems are often highly specialized and optimized for specific applications.

## How Advanced Medical Device Automation Works

The hardware components that make advanced medical device technology possible are embedded motherboards, embedded controllers and medical-grade touch panel computers. Devices like medical-grade panel PCs need features such as high ingress protection, anti-microbial enclosures, and medical certifications in order to work in medical environments. Embedded motherboards

can be customized to suit medical device manufacturer requirements such as high computing capabilities, increased storage needs and extensive expandability. In order to send and transmit data from one location to another for analysis and storage, these computer systems both need extensive communication options such as 3G/Wi-Fi/4G/LTE. Finally, these computer systems have to be able to generate output, either as text and images on a medical device screen or on a base such as paper or label material. All of these computer hardware components integrated in the medical systems have to fulfill the specific system integration parameters and compatibility test with the equipment software and also other peripherals – as well as perform effectively the required functionalities. Similarly, medical panel PCs need to be integrated into and compatible with other existing medical systems in place at healthcare facilities or laboratories and must also be compliant with numerous medical standards and regulations.



Most medical devices usually contain an embedded board or system that is used as the “brain” of the specific applications. It is often integrated for use to control the operation of the device in conjunction with software and other connectivity. When communication needs are complex and data collected from many devices needs to be sent to a specific location for storage and further analysis, information can be captured and transfer effectively via an IoT gateway device. Many of these gateway devices come equipped with software stacks such as Intel®'s IoT Gateway Solution that incorporates software for manageability, connectivity and security. Medical edge equipment can connect with the IoT gateway devices and utilize it for data storage and transfer. Laboratories can also capture and transfer test results to the doctor's office securely via the use of IoT gateway devices. In each case, these communication channels must have high reliability and the capability to rapidly, securely and accurately transmit the necessary data. Well-designed gateways ensure that there are no bottlenecks in the system so that medical personnel have access to data as quickly as possible.

## Axiomtek's Medical Products

Axiomtek offers comprehensive lines of embedded boards, IoT gateway controllers and medical-grade panel PCs that can be utilized for medical industry applications that include blood testing, vaccines and biologics, and medication delivery. These systems are highly reliable, scalable and can be integrated and customized to fit a variety of demanding medical equipment needs

## Medical-Certified Touch Panel PCs

Axiomtek's medical-certified, all-in-one touch panel PCs are high performance, high graphical display units known for their excellent



reliability and user-friendly interface especially when dealing with patient test results and medication information. The MPC product series features high ingress protection for dust/liquid spillage, IPX1 full anti-microbial enclosures to prevent bacterial invasion and UL60601-1/EN60601-1 medical-grade certifications. Their low noise operation and ruggedized designs make the MPC product series well suited for nursing cart interfaces, point-of-care terminals, and computer terminals that print out medication labels and more. Axiomtek's feature-rich medical panel PCs have the ability to run with various operating systems and have many different software tools – making them easy to integrate into hospital systems or existing networks.

## Embedded Motherboards

Axiomtek's embedded motherboards are designed to rapidly and accurately process large amounts of data while also featuring high expandability options for USB, DIO, PCI Express, and Gigabit LAN ports. Axiomtek's embedded boards are suitable for many different medical applications and come in a wide variety of form factors, including 3.5-inch (CAPA), COM Express, Pico-ITX, Mini-ITX and more. In the past, Axiomtek's highly customizable embedded motherboards have been selected by many well-known medical device companies as their product of choice for integration into advanced medical equipment such as blood testing systems, DNA sequencing machines, robot-assisted surgical systems and more.

## Embedded Computers

Axiomtek's fanless embedded computer systems are versatile, highly customizable, and are easy-to-integrate into a variety of medical hardware systems. They also offer scalable CPU options for various medical computing performance needs and extensive wireless communication capabilities with 3G/4G/GPRS/Wi-Fi for data management and device-to-device communications. Axiomtek's embedded computer systems are feature-rich and highly expandable. They offer rugged features such as wide operating temperature ranges and IP65 enclosures. Many of the systems in Axiomtek's comprehensive product line have been selected by system integrators and medical device manufacturer for their medical equipment such as vision systems, robot-assisted surgical system controls, DNA sequencing machines and more.

## Advantages of Medical Device Emerging Technologies

Innovative medical device applications speed up standard medical procedures while facilitating compliance. Work flow in the operating room and elsewhere is often better. Communications of treatment plans, patient history and current status as well as lab results are also improved. Patient records can be more accurate, efficiently handled and complete while routine administration is made easier.

For procedures such as blood testing and the administration of medication, specific problem areas can be addressed with the integration of advanced computer hardware. The labeling of blood vials, IV lines, and syringes is sometimes a major source of errors that could lead to disastrous results if done incorrectly. When labels are generated via an automated system and applied immediately at the appropriate time during a procedure, errors such as mistaken vial swaps are greatly reduced. Likewise, labeling errors due to poor handwriting can be completely

eliminated once they are accomplished by a computer. When syringes are labeled and barcoded, they can be scanned before use as an additional safety check. These computer advancements can improve overall safety by keeping track of patient records, identifying ways medication has been given to a particular patient, and noting what procedures are planned as well as the subsequent treatment course of actions.

## Axiomtek Pico-ITX Helps Improve Blood Testing, Vaccination and biologics labeling processes and Medication Delivery

Axiomtek's Pico-ITX embedded motherboards are ideal candidates for a variety of medical device applications. These embedded boards are compact, come with choices for the latest Intel® Core™ I family or Celeron® processors, and feature excellent expansion capabilities and comprehensive communication options. Axiomtek is experienced in helping our customers with customization via design assistance for specific medical devices.

**Use Case:** Axiomtek's Pico-ITX motherboard was selected by a world renowned medical device manufacturer to be the heart of an application that utilizes the Pico-ITX board's broad capabilities. The motherboard is used to automate printing of full-color labels that comply with the relevant medical standards. The labels display the contents of vials or the medication name for syringes as well as expiry dates, concentration and diluents (if applicable). A bar code and a message are printed on the label to eliminate human errors. The label printer contains the integrated Pico-ITX embedded motherboard prints the labels on demand in the operating room or laboratories. The data shown on the label is available for further processing, transfer and storage.

With Axiomtek's Pico-ITX motherboard controlling automatic label printing applications, healthcare organizations can ensure that all containers have the correct contents and test materials are properly identified. If used for medication labeling, the system ensures that appropriate medication is given to the correct patient with the correct dosage and timing.

Axiomtek's design assistance team and R&D resources have helped many of our customers with their projects and delivered successful and timely deployments of the equipment. Our advanced computer technology has certainly helped enhance patient safety and, ultimately, customer satisfaction.

