AlphaWire
Cables you trust. Service you deserve.

White Paper

Medical devices become smaller and more mobile as components become more miniaturized

Anyone who has ever watched an episode of Star Trek (any series) knows that the crew member wearing the red shirt on any team exploration is inevitably going to become a casualty. When the inevitable happens, there is always a medic or doctor that comes to the aid of the crewmember using a handheld medical Tricorder to diagnose the injuries (if they're still alive).

While those shows are simply science fiction, the devices they use are quickly becoming a reality as technology is increasingly becoming more miniaturized and portable. Also, the Google X-prize Tricorder contest may help push the miniaturization effort along. This fact is becoming more prevalent in the medical industry as diagnostic devices are leaving the lab and hopping into the pockets, vehicles, or homes of those who need them. This means that the technology will continue to require more robust, smaller, and lighter components.

Most portable medical devices on the market today center on patient monitoring or diagnosing using self-application sensors (pulse, blood sugar, temperature, etc.) along with mobile devices to send the relevant data to medical professionals. Using smartphone/tablet applications with simplistic sensors is fine for basic medical functions, but wholly inefficient when it comes to precision and in-depth analysis that most portable devices have the capability to do.

As semiconductor technology continues to be miniaturized, more can be packed in the available space, like larger multi-core processors, increased RAM and storage, HD displays, or a host of connectivity IC options. For devices to decrease in size and become more efficient, the components must do the same and improve. Wire and cables are achieving this through modified polyphenylene ether (MPPE) insulation. Using MPPE as a wire coating allows cables to be 45% smaller and 40% lighter over a wide range of cables. For example, Alpha Wire offers a line of EcoGen cables and wires,

which use MPPE insulation to offer a better product. In addition, MPPE is environmentally friendly and fully recyclable.

Reliability is also of a big concern. Since a person's life may depend on these new devices, the product must be as reliable as possible and in some cases include a failsafe mechanism to prevent any unintended consequences. To do this many companies are providing extra shielding to protect from external noise. This noise consists of mainly electromagnetic interference (EMI) and radio frequency interference (RFI). Other than shielding the cables, the connectors are also of a great concern.

Figure 1. Smaller portable devices are being designed and placed in homes, offices, and institutions

Connector noise can be overcome in a variety of ways. Like the cables, a shielding can be used to reduce noise interruption. In addition, filters can also be used to decipher the noise in the line and eliminate it from electrical signals. Most of these filters will block out high-frequency noise. However they also allow engineers to have some control over a circuit's capacitance and electromagnetic pulse performance.

Wireless technology is set to play off these new devices as more companies are integrating better connectivity options such as Bluetooth, which can take advantage of low-powered devices through their 4.0 iteration that features the previous version's protocols integrated within a Wi-Fi platform (known as Bluetooth Smart and Bluetooth Smart Ready). Near Field Communication (NFC) and Zigbee are also popular options for portable medical devices, as they can establish a fast stable connection, albeit in shorter proximity. They provide the standardized RFID and personal area network protocols including support for ISO/IEC contactless IC cards.

While some of those portable machines rely on smart devices (using apps), others are stand-alone units that incorporate all the hardware from their stationary big brothers. These smaller devices include everything from integrated SoCs, microSD storage, and LCDs packed into an enclosure about the size of a smartphone. Other examples of mobile technology include hemodynamic equipment (hypertension evaluation), respiratory monitoring devices (asthma), and portable pathogen sensors that test air and water for viral entities. These devices rely on a high level of accuracy to garner detailed data that's analyzed by healthcare professionals. However, the smaller devices become, the harder it is to maintain a high level of precision.

Manufacturers consistently rely on developers to design the latest in microcontroller semiconductors, solid-state dynamic storage solutions, and AMOLED HD displays, but give little thought to the wiring connections that bind all of those together. To gain a truly accurate reading from those medical devices, developers need to decrease or eliminate the electronic noise that forms as a result of all that technology that's packed together in a small space. The smaller the enclosure, the more electronic noise that's generated.

To solve this problem, engineers have been designing and developing flexible, shielded wiring and cables, which can eliminate some of the background noise encountered in mobile devices. Alpha Wire has developed a unique thermoplastic shielding, making the wiring not only smaller, but also lighter.

Known as MPPE (modified polyphenylene ether), the material has dielectric properties that are inherently superior over traditional PVC coating, allowing for less insulation to shield the wiring. If that's not enough, the material is flame resistant and 100% recyclable, making it ideal for inclusion in the ever-increasing green technology market, which is expected to grow to over $20 billion alone by the year 2018.

All in all, it is important to recognize the ever-changing market and to be in the front of the pack when it comes to updated and miniaturized technologies and the components that reside within them.

LAPP TANNEHILL
800.633.6339
www.lapptannehill.com