Powering a Sterilization-Proof RFID Tag

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The Project: Power RFID tags that are used to collect data and track medical equipment throughout the hospital.

The Solution: Employ high temperature lithium batteries so devices can go through sterilization cycles without having to remove the power source, enabling a continuous data stream.

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A technology-driven world presents a growing number of opportunities for wireless, battery-powered radio frequency identification (RFID) real-time location systems (RTLS) that support enhanced data capture and seamless information management.

While these battery-powered systems have become ubiquitous in manufacturing and distribution applications, this technology is also gaining traction in many wireless applications, especially those involving extreme environmental conditions. For example, high temperature lithium thionyl chloride batteries have been used for decades to power EZ-Pass automotive toll tags, providing a proven track record for reliable performance in withstanding the extreme temperatures associated with automotive windshields. More recently, the same concept has been applied by Awarepoint Corp. for use in the first active RFID asset tags capable of withstanding the high temperatures associated with equipment sterilization cycles.

Driven largely by regulatory compliance requirements and legal liability concerns, hospitals and other healthcare facilities are quickly embracing active RFID asset tracking to save time and money while improving data capture and reporting capabilities. Active RFID systems are ideal for monitoring the location of portable medical equipment, such as wheelchairs, gurneys, IV pumps, and pulse oximeters. RFID asset tags are also being utilized to monitor the physical movements of patients and provide instant access to key patient information. Active RFID systems can also be used to monitor the activities of attending doctors, as well as to provide precise records of surgical and therapeutic procedures, diagnostic tests, as well as

the dispensing of pharmaceutical drugs and medications.

Since many of these applications require autoclave or chemical sterilization cycles at temperatures as high as 135°C, Awarepoint employed high temperature lithium batteries when it designed the Awarepoint T2S, a self-contained, battery-operated active RFID asset tag.

Following data drawn from customer surveys, Awarepoint identified the inability of standard battery packs to withstand extreme temperatures as a hot button problem. Earlier generations of active RFID asset tags used batteries that were not designed to withstand the temperatures associated with autoclave and chemical sterilization systems. As a result, certain medical equipment that requires autoclave or chemical sterilization could not be tracked using traditional RTLS. This increased labor costs and defeated the full-value proposition of using RTLS technology to provide fully automated and verifiable real-time 24-hour monitoring and reporting capabilities.

After thoroughly reviewing all available battery technologies, design engineers at Awarepoint chose TLH-2450 coin-size lithium thionyl chloride batteries from Tadiran as the primary power for the T2S asset tag. The upgrade paid off, as environmental tests showed that the TLH-2450 cell could withstand 135°C temperatures associated with standard autoclave cycles, and could work continuously for 500 steam sterilization cycles on the original battery to reduce maintenance costs. These compact, weight-saving (8.8 g), 3.6 V cells feature 0.55 Ah capacity @ 0.5 mA, and a maximum service life of up to 20 years. TLH-2450 cells are also completely safe, U.L. recognized, and considered non-hazardous when shipped. Other high temperature lithium cells are available in coin-size, as well as cylindrical batteries ranging in size from ½ AA to DD. Custom battery packs are available as well.

Use of the TLH-2450 battery pack also enabled a simple retrofit with no injection molding die retooling required. In addition, since Awarepoint T2S asset tags can be sterilized while remaining attached to the medical device, hospital staff is now able to locate a device in the sterile processing department and determine its clean/dirty status with the click of a button, eliminating time consuming and frustrating searches for equipment throughout the hospital's sterile processing department. Further, alerting capabilities within Awarepoint's Securpoint application allow hospital staff to program T2S asset tags to alert medical staff if a device is returned to service without proper sterilization.

The development of the Awarepoint T2S active RFID asset tag demonstrates how design engineers need to solve design challenges by truly understanding the needs of their customers, then work in partnership with a battery manufacturer to apply an intelligent power management solution capable of raising the bar to higher performance standards.

Online

For additional information on the technologies and products discussed in this article, see *MDT* online at www.mdtmag.com [2] and the following websites:
• www.awarepoint.com [3]
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