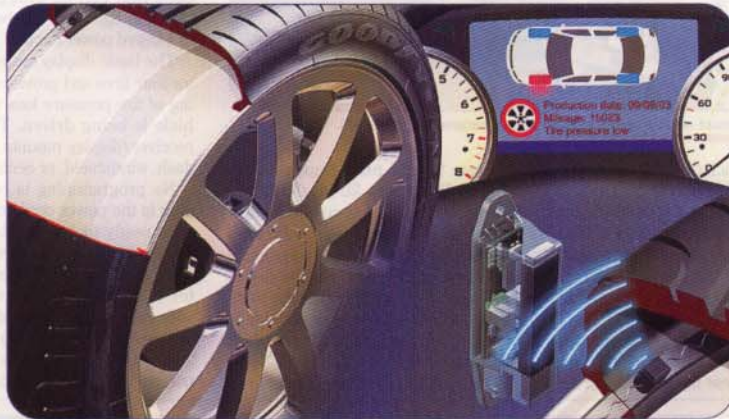


Batteries expand application arena

The increased number of applications that employ RF signals makes proper battery selection even more important



Batteries are expanding into many new applications, such as providing all-weather power for tags used in tire-pressure-monitoring systems.

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Batteries with various chemical systems have evolved with new capabilities such as an ability to operate in both extreme heat and cold temperatures, with a shelf life of up to 30 years and a resistance against mechanical shock and vibration. As a result, many new RF battery applications have become possible.

Automating gas and water meters

A lithium thionyl chloride battery is well suited for automated meter reading, they are often exposed to both the heat of summer and the cold of winter and must provide a long operating life. Factors such as a hermetic seal and the passivation film that lithium metal in the cell forms during storage contribute to a long shelf life of 30 years or more. Also, because liquid positive material is used, that battery type exhibits excellent low-tem-

perature performance down to -55°C .

Today, industrial and domestic meters for gas and water usage reporting are being equipped with a reader that includes an RF signal transmitter to collect meter data. Radio-based automated meter readers use off-site (hand-held), mobile (vehicle-based), and fixed-network reading technologies.

Automotive

The automobile industry is another emerging market for primary batteries. While electrical cars with various electric power sources employing rechargeable batteries—such as lithium-ion batteries, nickel metal-hydrate and fuel cells—have been demonstrated both experimentally and in several new feature vehicles, the requirement for primary miniature cells is steadily increasing in the automotive industry.

The keyless entry devices usually contain lithium manganese dioxide (LiMnO_2) batteries. Today, more than 60% of passenger cars sold are equipped with RF keyless entry systems, and in a few years, will probably reach nearly 100%.

Tire-pressure-monitoring systems (TPMS) is clearly a major emerging market for coin cells in the automobile industry. Since some SUVs had serious tire pressure problems, the federal government through the National Highway Traffic Safety Administration (NHTSA) is finalizing legislation to require all automobiles to be equipped with TPMSs.

In the TPMS application, the direct monitoring system uses a small transmitter and pressure monitor on each wheel of the car. The transmitter sends a signal to the vehicle's dashboard readout so that the driver immediately notices an instance of tire underinflation.

As this transmitter is totally exposed to the outside environment, its coin cell power source must withstand the high temperatures of summer and the low temperatures of winter. Besides temperature extremes, the batteries must withstand the heat generated by a rotating tire as well as vigorous movement.

Devices such as Maxell's CR2450HR and CR2450HREX cells have been designed to meet these stan-

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red to identify the problem tire. The vehicle can be pulled to a safe location and the tire associated with the color adjacent to the red LED can be inspected. If air pressure continues to drop to 18 psi, the second-level warning will activate an audible alarm and the LED will flash red.

From toll collection to drug delivery

Highway toll collection systems such as "E-Z Pass" can also use the CR2450HR battery. Traditionally, the transponder for this application has been using lithium thionyl chloride coin cells because of their high capacity and long shelf life. Since this newly developed cell has a long shelf life—up to 10 years—it can also serve this application.

Most recently, medical institutions are experimenting with a newly emerging drug delivery system that uses a battery-activated drug patch



RFID inventory tracking tags verify inventory locations on ships, planes, and warehouse pallets.

that attaches to a patient's skin. The technique, called iontophoresis, is a non-invasive drug delivery method that uses electrical current to move solubilized drugs across the skin to the underlying tissue.

One major medical supply company is currently running FDA trials in the application of this technology to the automatic injection of morphine by such a patch at hospitals. One patch, containing a single day's dosage, is attached to the patient after surgery to reduce or eliminate pain. The battery employed is a lithium (LiMnO_2) coin cell, with a CR

type number, selected because it is thin enough to fit into a drug pouch.

RFID

The RFID industry has been in the limelight because many retailers and industries are adopting RFID chips for better inventory control, distribution, and accurate billing. In contrast to passive devices, an active RFID chip has its own power source, a battery. Because chip can read and write, it can be used not only for ID, but also for other pertinent information that is rewritten, added, or changed.

A pallet or skid with this type of chip can be re-used for different products many times. Batteries, such as LiMnO_2 coin cells or Li-SOCl_2 cylindrical cells, power the tag with this kind of chip. This application also requires a wide range of temperature variation, since the pallets can be left outdoors in the winter and on an ocean freighter in the summer. □