

Seals and other Materials Shield Against EMI Problems in Medical Devices

Demonstrating compliance with global EMC (electromagnetic compatibility) regulations is a major milestone in the development of new medical devices. Faster running systems in smaller, lighter designs are more likely to offer problems with EMI – electromagnetic interference. Clinical settings are increasingly filled with signals from other medical electronics, computers, cell phones, etc. Consequently, EMC compliance standards are becoming more comprehensive.

The European Union's Medical Device Directive and its related standards (EN 60601-1-2), are becoming the world reference for EMC in this industry. Medical devices meeting the European Norm are typically assessed by the FDA as compliant with US standards. The EN specs set levels for both emissions leakage from a medical device, as well as assessing the device's own immunity to EMI.

While medical electronics devices typically see longer service than computers and telecom equipment, the approaches used for EMI shielding are similar. Noisy pc-board components can be reduced by effective board layout and regulating chip speeds. But, some form of shielding is often needed to reach compliance standards. Conductive seals and other forms of improved EMI shielding materials are available in a wide array of choices.

In medical equipment, shielding at the outer enclosure is the most common design approach. Whether metal or metallized plastic, the outer housing of a medical device will have openings for cables, switches, monitor, keyboard and more. In addition, the seams where housing panels are joined can present pathways for unwanted signals to leave or enter.

It is at these seams where seal-type conductive EMI gaskets are used to maintain shielding protection. A conductive elastomer gasket provides current continuity between conductive panels. And, by its inherently conformable nature, provides a level of environmental sealing. More often, a separate environmental seal is employed outboard of the EMI gasket to guard against clinical solutions, such as saline or bleach. Another

option is a co-extruded elastomer gasket. This features a conductive side for shielding alongside a non-conductive environmental seal in a single, continuous strip.

Other EMI gasket types include strips of metal fingers or wire mesh, as well as soft foam rubber covered with conductive fabric. Metal fingerstock and knitted wire mesh are both highly conductive and popular choices for shielding on medical cabinetry. A typical application is along the perimeter of a door or access panel. Conductive fabric-over-foam gaskets are ideal when only low closure forces are available between enclosure parts. They feature very low durometer urethane cores and may offer some secondary dust protection.

Conductive elastomers, metal fingers and mesh, and fabric-over-foam gaskets are all available in continuous lengths and cut-to-length pieces. They're usually attached to panels via integral adhesive strips or tangs that clip onto cabinet edges. Elastomers and fabric/foams can also be shaped for use at connector sites, backplanes and other aperture sites.

Medical equipment monitors and displays, whose clarity can be crucial, may be pathways for spurious signals. EMI shielded windows, conductively mounted to a device's enclosure, are effective in eliminating these problems. These windows contain a fine wire mesh and recent developments have dramatically improved their optical clarity. They can further be treated with glare resistant coatings to improve a screen's readability.

At the pc-board level, individual components can be shielded using stamped metal cans or metallized plastic covers. The plastic covers feature a thin layer of conductive elastomer or paint to give shielding properties. These cans and covers mount to metal traces on the board to complete the conductive package. Integral conductive elastomer gaskets on the can edges provide a more flexible EMI seal than soldering – an attractive feature for handheld medical devices in plastic housings.

Growing needs for EMI control across the electronics industry are leading to new shielding systems. Savvy medical electronics engineers can take advantage of improvements for their current and future designs.

*Norman Quesnel, MarCom Mgr
Chomerics Division, Parker Hannifin Corp. Woburn, MA, nquesnel@parker.com*