Tech Exchange: Medical Connectors

Welcome to Tech Exchange on Medical Connectors!

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1. What are some of the major connector trends today influencing the global electronics market e.g., consumer electronics, industrial automation, medical electronics?

The major trends for connectors in the medical device industry are:
• Healthcare reform and reimbursement are driving the merging of commercial products and technologies into the medical market.
• Miniaturization of medical equipment is driving interconnect dimensions to "nano" sizes.
• Telehealth and wireless communications integration are moving compliance from the institution to the individual.
• Healthcare IT (PACS) - high reliability networking at high bandwidth.

2. How are connectors impacted by the increased focus on sustainability requirements?

• In 2008, Molex implemented the Global Management of Chemical Substances (GMCS) system. GMCS is integrated into the enterprise resource planning system and allows us to manage and assess product bills of material quickly to ensure compliance with legal requirements. It also provides us the ability to systematically phase out substances of concern.
• In 2011, we improved our management systems, with special emphasis on our internal customer environmental request system and supplier portal to build efficiencies and improve data quality.
• One area of concern within the electronics industry is the mining of minerals from conflict-affected areas, such as in the eastern region of the Democratic Republic of the Congo, where the presence of armed conflict and human rights abuses exists. Gold, tin, tantalum and tungsten can be derived from minerals obtained from the

conflict-affected areas. We are adopting a management system approach regarding the supply chain of minerals from conflict-affected areas based on the due diligence guidance provided by the Organization of Economic Co-operation and Development.
• Materials selection for new designs must include a sustainability assessment.
• Due to exemptions, the medical industry is lagging in compliance as compared to other industries in terms of materials.
• Regulations such as RoHS (Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment) and European Community Regulations) impact the general market to develop and implement alternate materials and processes in order to be compliant. However, it can be difficult and costly to have substitutions on legacy products.
• Vendor selection and defined expectations include a component of sustainability.

3. How has the complex integration in functionality design requirements (i.e., all-in-one PCs, smart phones) impacted connectors?

• Smaller form factors such as Molex Micro Products for portable/mobile devices, Copper Flex Films, RF and antennae integration.
• Higher density - more in a smaller space.
• User interfaces simplified but with more functionality, i.e., Molex Switch division membrane and capacitive touch.
• Portability and on-patient devices are requiring more rugged interconnects.
• Cleanliness and clean-ability is a major factor for the new generation of on patient portable devices.

4. How have interconnect solutions changed to meet market demands for miniaturization in wireless communication devices?

• Connectors are now called upon to provide more functionality with ever decreasing form factors.
• As these devices "pack more punch," thermal management and energy efficiency become an important part of the equation.
• For user interfaces, the devices must effectively be operated but still must be small
• Antennas are increasingly being included in devices and their operation in multi-environments is increasing complexity in a shrinking form factor.

5. Select a recent product introduction and describe its competitive advantages and how it can benefit designers and OEMs.

Molex recently introduced its MediSpec Molded Interconnect Device (MID) capabilities utilizing Laser Directed Structuring (LDS) technology for high-density medical applications. This innovative technology delivers packaged interconnect solutions that meet or exceed stringent medical device guidelines while providing multiple benefits including reduced components and materials usage, fewer development and production processes, lower prototyping costs and faster time-to-market. The combined MID/LDS capabilities help medical device designers integrate complex electrical and mechanical features into highly compact applications, which existing flat 2D technologies cannot accomplish.

The MID 3D capability integrates both the electrical and mechanical design into a single molded device, which is ideal for miniaturization and is scalable from small to large volume production quantities. It enables numerous design configuration and material combination options, allowing medical device designers the flexibility to select plating and materials especially for the small form factor applications often found in medical devices. The LDS technology is also suitable for miniaturization strategies, featuring circuitry that can be imaged with a 3-axis laser on a variety of RoHS-compliant plastics with pattern modification.

Additionally, because developers can create prototypes - LDS technology allows them to experiment with the placement of traces and shielding by making changes to the laser position without having to invest in expensive tooling changes - they realize a greater cost savings.

The MediSpec MID/LDS technology has multiple applications in the medical industry including blood glucose meters, drug delivery systems, home healthcare telemetry, remote patient monitoring systems, disposable catheter interfaces, neurostimulation controllers, pulse oximeter sensors, Continuous Positive Airway Pressure (CPAP) devices and Integrated Radio-Frequency Identification (RFID) solutions.

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