

Application and selection of connection specifications for medical equipment

The design of medical devices relies heavily on efficient underlying electronic interconnection systems. Therefore, the connector design and the choice of the right connector is crucial.

When designing medical devices, engineers will face many tests and extremely complex choices that would not occur in other industries. Medical equipment needs to be durable and reliable enough, and the conditions of use are often very strict, including liquid, disinfection and sterilization, physical interference and electromagnetic interference, as well as extremely high insertion and extraction times.

Such medical devices are highly dependent on the effectiveness of underlying electronic interconnection systems. Connector design is an integral part of the design process, and it is important to select the right connector (HRS connector).

Determine applicable options

The first consideration for a Joe's electronics engineer is to decide whether to use an off-the-shelf connector, a hybrid version, or a custom solution. Off-the-shelf products are already on the market and have a variety of configurations to choose from. This kind of product need the engineering investment and mould (tooling) tend to be low, but the lead time is very long, the cost per unit is higher also. The hybrid version (hybrid) on the existing connector provides customized plastic coated (overmolded) features. Compared to off-the-shelf products, such products improve performance and aesthetic value, and have lower design and engineering costs and longer lead times than fully customized connectors. Custom solutions are products designed and manufactured for a particular customer, device, or application. Using custom connectors will make it easier to integrate components or electronic components, as well as marking or marking. Initial investment in engineering and mold making is generally higher, but such solutions are more cost-effective in the long run, depending on the volume of production.

Consider each application

In many cases, customized or hybrid solutions are more popular than off-the-shelf solutions, especially when there are specific considerations.

For example, in a disposal room where dozens or more different cables and connectors are used simultaneously, medical personnel run the risk of misconnecting cables and equipment. Ready-made connectors can be fitted with plastic-coated shells in different colors, and this hybrid product can clearly indicate which connector to connect to which device.

Defibrillation pulses of 5,000 to 8,000 volts are normally required for the device used in a patient with cardiac arrest. In this case, insulation, spacing, materials and air gaps can be customized to meet the specific needs of the application.

Other examples of customized solutions include connectors designed to prevent incompatibilities at insertion time. Or, given human engineering, the ideal medical interconnect system would have to be large enough to make it easy for prospective users to operate and plug in intuitively.

Understand the process

For hybrid or customized medical connectors, the design, tooling, and manufacturing processes typically take four to eight months. Early in the design process, the team should clearly define the requirements, including electric (voltage/data rates, cardiac shock, bandwidth, etc.), mechanical (cable diameter, the human body engineering characteristics, and the expected life of bending, the desired force to insert and pull out the output, etc.) and environment (sealing and intrusion

protection, cleaning, disinfection, sterilization, etc.) and so on various aspects to consider. After the specifications have been determined and the design work (including the physical model) has been agreed upon, prototyping can begin. When choosing a hybrid or customized medical connector, teamwork between all relevant organizations is important. Only in this way can medical equipment be produced that can perform well in the field and meet all mechanical and electrical requirements (including connectors and cable assemblies).

