

Are Customized Cables Right for you?

Custom made cables and the fundamental question about the benefits of making the same for specialized applications like medical purposes, aerospace, automotives etc, is a matter to be given serious consideration and one has to look into the pros and cons on the subject matter along with elaborate deliberations with knowledgeable personalities in the industry. A project engineer can choose off the shelf cable-the manufacturer's way- and then adapt it to specific needs, or that same engineer can choose customized cabling designed for a specific purpose – the project engineer's way. There are advantages and disadvantages in either of the two options. One has to review both the cases separately to decide about his choice:

The Cable Manufacturer's way

By their very nature, prefabricated cable products do not give users the chance to elect any of the many choices in the finished products. Control of design, tolerance, materials, and manufacturing techniques belong to the manufacturer. This isn't necessarily a bad thing. These products have proven themselves to be acceptable solution to most applications and there can be many advantages to prefabricated cables including the following:

- Easy prototyping
- Cost effectiveness

The downside of using standard product can include:

- The standard products appear to be “built-on” rather than “designed in”
- Standard product tend to promote the cable manufacturer's brand image and identity rather than that of the final product
- The packaging may not be well suited to the user's needs
- Availability of the product may be at the discretion of the dealer or manufacturer.

The project Engineer's way

Custom cable as a product is designed and manufactured to suit specific applications and needs. They are an integral part of the system and its performance is the prime objective – rather than an accessory to the system where its performance becomes secondary.

Advantages of Custom cables

They allow the designer to:–

- Optimize the conductor count, size, and stranding
- Choose the materials of construction viz. insulation, shield material , jacketing material that best suited the application
- Integrate various function, such as power, signal, shielded sub-assemblies, coax, optical fiber, and breather tubes, into one cable
- Define electrical parameters and tolerances
- Provide applicable test data that will support the end product sale such as flex test data, temperature performance , and chemical resistance
- Include cable products that will build the brand identity of the end product. Examples include color matching, custom cable legends and the specific “feel” or texture of the cable
- Provide specialized agency recognition or approval
- Control manufacturing processes and material sources which are especially critical in medical , aerospace or automotives etc. in application

Although custom cables manufactured have many advantages; they also have some limitations including the following:

- Short runs of customs cables consumes engineering time , set up time and machine time
- There are practical limits to minimum run quantities. For example, to achieve 10 feet of a custom cable, 1000 feet may have to be constructed.
- Since custom products are made to order, lead times may be an issue. Lead times vary as per the manufacturer’ intent but are typically six to twelve weeks (At Cable5.ca, we try to have samples ready in as little as 7 days).
- Custom products may require materials that have large minimum purchases and are not readily available
- Custom cable designs can result in restricted sourcing
- Custom cable manufacturers may not provide one stop shopping unlike distributors who can offer a wide variety of cable constructions from several cable manufacturers and sometimes complimentary products such as connectors
- Custom products are not normally returnable

Therefore, in consideration of all the positives and negatives for customs cable and standard products from the market, we may sum up the conditions and situation when manufacturing custom cable can be considered to be a good idea, as follows:

- When the specific product availability in the market is not there. The original manufacturing company of the specified items i.e. cable for specialized industries like medical, aerospace or automotives., has closed down or non-existent.

- Proper market survey has been made to identify proper manufacturer having proper expertise, Project Engineers /Specialists to design and execute as per the expected level of perfection
- When limitations of custom cable products as elaborated above are fully taken care-off or rather eliminated especially the following: loss of time in all its phases of operations starting from designing to packaging; minimizing wastages ; lead time is maintained scrupulously as per the schedule; raw material requirements are properly assessed and procured in time; proper Research and Design cell for cable designs established in time
- When the volume of custom cable product requirement justifies the investment keeping in view that unless the overall cost factor is kept within proper perspective vis-a-vis the urgency of such an action – the whole proposition will be unwarranted. On the other hand, if due care is taken in all these respects- the custom built cable will be a good idea to reckon with.

To make the issue more explicit i.e. “when having custom cable manufactured is a good idea” – we narrate the following study:

At the very onset of manufacturing a custom cable , a proper designing to be made engaging the right agency who should be provided with proper information in detail promptly . This can significantly shorten the time period of the development process.

The total input is outlined as product requirement of cable for particular use in medical or aerospace or automotive as the case may be in the following heads-

- Mechanical
- Electrical
- Environmental
- Regulatory
- Labeling and Packaging
- Validation and Testing

Mechanical

The ANSI /AAMI standard is often followed to define the minimum mechanical requirement such as flex life, tensile strength, mate and un-mate cycles, and connector retention force. Other mechanical requirements that need definition for cable projects are length, flexibility, color and jacket material.

Electrical

EC-53 is referred to define the minimum requirement for electrical performance. Common electrical characteristics specified are dielectric withstand, sink current, defibrillation withstand, resistance and capacitance. When the specification includes low turbo-electric noise, selection of suitable cable material becomes one of the most important design considerations.

Environmental

The environment where the cable or connector will be used is important to understand very early in the development phase. Points to note carefully are: exposure to moisture, ingress protection level, disinfection, sterilization requirements and all these inter - alia packaging and labeling are also important inputs.

Regulatory

All provisions with the corresponding regulatory authority and pertaining to the product to be duly covered in letter and in the spirit of implementation.

Packaging and Labeling

To be looked into, defined and action taken early in the project to avoid exceeding production lead time

Validation and Testing

The manufacturer has to take care of this most important aspect of proper testing and make available the validation report ready for the user.

Project Management

To maintain time schedule, the progress of work must be reviewed constantly and “Bar-Chart” followed stringently. Interaction between the user and manufacturer should be comprehensive, to make the custom cable manufacturing project turn out to be successful and a good idea to cherish.