CASE STUDY

Hybrid Fiber and Copper Catheter System Cable

Customer Challenge

An interventional medical company, dedicated to innovation in diagnostic technology and imaging systems for cardiovascular angiography, came to Winchester Interconnect™ for assistance with their performance and aesthetics. The desired application was for a catheter system and consisted of a single fiber with multiple copper wires in the same cable and connector.

The assembly needed to be highly reliable as it was used to connect the telemetry system with the catheter. If either the cable or connector fails, the readings will not be taken and the test will have to be repeated, causing the patient increased risk and unnecessary delay.

Challenge Review

Winchester's engineers reviewed the proposed customer design of a copper and fiber assembly and reviewed some of the limitations associated with it.

The copper connector was both expensive and difficult to terminate. The overmold was not made for high performance strain relief and affected the overall aesthetic of the application. Additionally, the copper conductors were very large with multiple shields for individual twisted pairs as well as overall shields, resulting in reduced flexibility. Fiber constraints included very tight tolerances and a consistent appearance for the fiber pigtail. Finally, the cable would come into contact with the patient's body, so a compliant material for the jacket was required.

Winchester Solution

Due to the application being new and not a set design, both Winchester and the customer had the freedom to make design changes. Several iterations were made to the design; the most notably, moving from a single hybrid fiber and copper cable to an application with separate fiber and copper connectors.

For this design, Winchester proposed using a hybrid cable and an overmolded split where the fiber and the copper diverged. This allowed the use of off-the-shelf copper and fiber connectors, but required a custom cable assembly that was rugged and reliable.

Winchester also suggested several changes to allow for a smaller cable, such as verifying its power requirements and reducing the shielding given the tight fiber tolerance.

Further testing yielded additional design changes, including a more simple connector for the copper part of the assembly. After additional electrical testing, the individual shielding was deemed not required and eliminated, resulting in the diameter of the cable being reduced, which produced improved flexibility. In addition, Winchester worked with the cable vendor to create a custom cable with internal tubing to house the fiber. This allowed for a tighter tolerance and reduction of the bend radius of the overall cable, which resulted in allowing for a longer life and less risk of breakage.

Winchester Interconnect™

We Energize Innovation™

Customer Improvement

Winchester's overmolded hybrid fiber and copper catheter system cable provided the customer with:

- Excellent flexibility by optimizing the cable construction
- Longer life by improving individual copper conductor size and stranding
- Cable construction and fiber termination procedures to guarantee reliability
- Improved aesthetics by matching colors, materials, and the look and feel of the product

Contact our Winchester Interconnect Experts for your custom solution!

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