

High Temperature Fiberglass Jacketed Cable Assembly

Tru Win



Customer Challenge

A leading semiconductor equipment manufacturer has been utilizing a Winchester Interconnect™ RF cable assembly featuring Winchester's quick disconnect SQS connectors and a competitor's cable in an application requiring repeated, constant flexure. In this application over the product's life-cycle, there have been multiple failures due to the FEP jacket cracking and the kinking of the competitor's cable. The customer utilizes this particular cable across multiple platforms and due to strict Copy Exact (CE) requirements, it was difficult to change any of the components in the current cable assembly design.

Challenge Review

The customer approached Winchester when a new design opportunity presented itself. The customer had a new application but wanted to replace the cable due to the history of the FEP jacket cracking over time. In past applications across multiple platforms, the customer had utilized Winchester's Tru-Win™ TRU-560 flexible cable to solve the cracking and kinking issues exhibited in the competitor's cables. The challenge for this new application, however, was that the cable required a higher current carrying capacity which in turn meant the cable needed to have a 200°C temperature rating while still providing optimal flexibility. What ensued was a year-long collaborative effort between Winchester engineers and the customer's design team to develop an effective RF cable assembly solution that addressed both the legacy issues of the competitor's cable and the new requirements for a higher performing solution in a demanding, high cost of failure application.

Winchester Solution

Winchester first recommended a new version of its Tru-Win TRU-500 cable with a modified outer Fluoroelastomer jacket. This solution provided the flexibility of a Tru-Win TRU-560 cable while also providing a solution for the cracking issue that the FEP jacketed cable had exhibited over time. The Fluoroelastomer jacket solution also had the additional advantage of a 200°C temperature rating. As a result of the new construction, this cable is more mechanically durable than the competitor's cable. The new application also required increased current capacity, which resulted in excessive heating of the cable from the inside. Due to safety standards, the surface temperature of the assembly could not exceed certain temperature limits. In order to meet these requirements, Winchester RF engineers recommended incorporating a fiberglass sleeve over the entire cable assembly.

Winchester provided two sample assemblies for testing and evaluation. It was determined that loose fiberglass particles from the fiberglass sleeve could create a serious problem in a clean-room environment. The ensuing solution was a resin-filled fiberglass sleeve, which was recommended by Winchester and additional engineering samples built and tested.

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The next iteration of the design incorporated a larger inside diameter of the resin-filled fiberglass sleeve. The larger ID created an air layer between the cable jacket and fiberglass sleeve which improved dissipation of heat from the cable and resulted in a reduced outer surface temperature. The use of increased temperature solder at the cable center conductor junction was also utilized due to the elevated center conductor temperature as a result of the higher current requirement.

During final design reviews with the customer, it was indicated that some of the assemblies were easier to install and use more than others. A picture of the installation method was supplied by the customer. From this picture, Winchester engineers recommended setting a specific orientation of the right angle connector relative to the lay of the cable. This reduced stress on the cable and allowed for the motion of the assembly to have the same direction as the curve created during cable fabrication. The final iteration of the design includes the specified connector orientation as well as the use of higher temperature rated solder. It is this final solution that has been shipped and put into production by the customer.

Customer Improvement

- The customer now has a complete Winchester solution that utilizes the Tru-Win TRU-500 flexible cable with a Fluoroelastomer jacket which addresses the cracking and kinking of the cable during operation.
- The new resin filled fiberglass outer jacket with high-temperature solder accommodates the higher temperature and current requirements of this new application. The larger inside diameter of the jacket provides improved heat dissipation to address the "hot to touch" safety concerns.
- The customer now has a solution which it could implement into new designs and that also provides a retrofit for tools exhibiting these issues in the field.
- Ease of installation has been improved due to the clocking of the connectors and subsequent reduced stress on the cables.



Contact our Winchester Interconnect Experts for your custom solution!

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