

Pipeline Inspection Tool



Customer Challenge

A customer approached Winchester Interconnect™ related to its sensor driven patented pipeline inspection tool. The customer provided Winchester with samples of the cable assemblies that lie within the tool and requested a value engineering analysis. As the customer manufactures mechanical components and fittings for oil pipeline inspection equipment, it needed additional electro-mechanical know-how and capacity to supplement what had previously been produced in-house.

Challenge Review

Oil pipelines often undergo maintenance for performance and pipeline safety. In fact, the U.S. government requires that a percentage of pipeline be inspected annually to maintain safe operation. Inspections can uncover a thin area of pipe, a cracked weld, a dent or other damage. Given that any failures can raise environmental concerns and cost money due to pipeline downtime, effective inspection is critical.

The customer's proprietary instrument consists of a sensor cable assembly which connects to a data recording device that keeps the sensor data. This data is ultimately loaded onto a computer for analysis to understand where a pipeline may need maintenance or repair services. Data accuracy is critical and is dependent on the reliability of the sensor system.

Winchester engineering examined the customer's instrument and discovered that the design of the sensors made it easy to install backwards into the sensor shell. Some sensors were still functional even when installed backwards due to the built-in reverse polarity protection, or diode, in the integrated circuit. However, over time, the diode can fail as too much current is being forced through in the reverse direction.

Winchester manufacturing also took note of the curing time needed to pot a nano connector that is attached to one of the cable assemblies housed within the instrument. It took 8 hours for the potting material to fully cure before final assembly and testing. Any attempt to shorten the curing time would mean running the risk of air bubble formation within the potting compound which can result in performance failures.

Winchester Solution

Winchester engineering redesigned the sensor PCB so that it cannot be incorrectly assembled in the sensor housing. A mechanical change of keying one side of the PCB was suggested so that it could only be inserted in the correct orientation into the sensor shell before it is potted. This redesign made it impossible to install a sensor in a reverse configuration and ensured optimal performance.



In addition, Winchester leveraged its existing overmolding capabilities and expertise to suggest a high-pressure overmolded design to replace potting of the existing nano connector. With a curing time of generally less than 30 seconds, an overmolded solution will dramatically improve production throughput.

In addition, the overmold solution eliminates possible quality issues related to potting, such as air bubbles.

Ultimately Winchester was not only successful in demonstrating its electro-mechanical expertise and manufacturing capabilities to offer this customer a reliable outsourcing alternative, but the design and process improvements suggested by Winchester's engineering team improved performance and significantly shortened production time.

Customer Improvement

Winchester provided the customer with value engineering analysis of its instrument and implemented:

- Manufacturing process improvement of the cable assembly
 - Suggested an alternative solution to eliminate potting
 - Cycle time reduction on the assembly production
- A keyed PCB solution to eliminate assembly errors



Contact our Winchester Interconnect Experts for your custom solution!

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