

Portable Medical Defibrillators

Case Study



Product Description

A line of portable medical defibrillators designed for a leading manufacturer. The systems use a variety of flat flexible cables (FFC) with added value such as EMI shielding and over-molded connectors.

Challenge

The customer was experiencing severe quality problems with their current supplier of FFC assemblies, forcing them to sort incoming material in order to salvage the 5% to 10% of usable material, while also dealing with the unacceptable number of field failures. The cables that the customer was purchasing from their supplier did not meet the dimensional and electrical requirements they had specified, causing the cables to impair the function of the defibrillator when they failed. These interconnection systems were not being built or inspected to any industry standards.

To be more specific, the problem was warping of the connectors, an effect of the soldering and over-molding processes, and flux entrapment from soldering which reduced insulation resistance. The warped connectors would not engage properly with the mating connectors resulting in the cables disconnecting when introduced to shock and vibration. In addition, the reduced insulation resistance caused shorting at higher voltages.

Solution

Miraco's management team immediately saw the seriousness with which this project needed to be handled with respect to the life and death situations that these devices would experience.

Miraco's design team drew upon its vast experience with FFC used in similar applications and determined that the soldering process could not be performed to the high standards required while using the low temperature insulations and adhesives of FFC. Miraco had previously designed an interconnection system which did not require soldering directly to the FFC, to replace this type of product. However, given the high level of reliability required for the customer's equipment, Miraco determined that the FFC assemblies needed to be converted to flexible printed circuits (FPC) and built to IPC-6013 Class 3 requirements which are used for military, aviation and medical applications.

Miraco redesigned all of the FFC assemblies with connectors into FPC assemblies and also redesigned the over-molding to include features to improve the retention of the connectors and reduce movement during shock and vibration. A low temperature, low pressure molding process was chosen for the over-molding of the connectors to prevent heat damage during the process.

In addition, Miraco added EMI shielding to the FFC, which uses a proprietary process for creating lasered ground interconnects with spray silver shielding to meet the customer's strict requirements for ground interconnect resistance.

Results

As a result of the redesign, Miraco was able to provide the customer with a highly reliable interconnection system, built to industry standards, while maintaining comparable pricing. These improvements in quality also reduced the overall system cost for the customer.

Miraco was able to effectively manage the component supply chain and assembly at domestic and international facilities, to minimize lead time for the customer.

These newly designed cable assemblies ultimately replaced 17 interconnection systems across three product lines from other suppliers, resulting in Miraco becoming the customer's #1 supplier of flexible interconnects.

