Rolling Bend Flex Test Report

For Assembled & Bulk Ethernet Cabling

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Overview

In industrial environments and robotic control systems, data cabling can be subject to various forces and conditions that it was not designed to handle. For this reason, a more ruggedized solution is required. L-com's continuous flex Ethernet cable assemblies were developed to resist damage that can negatively impact cable performance and ultimately the performance of attached equipment.

For continuous motion flex testing, there are various test methods available. Many are familiar with the "Tick Tock" test since it has been around for quite some time. The test is named "Tick Tock" because the test fixture's swing arm moves back and forth through a 180 degree arc similar to the movement of a clock pendulum. Based on field observations and various experiments, it is our conclusion that the "Tick Tock" test method does not simulate real world cable flexing conditions since the supported bend cable bend radius is fixed by a mandrel. This is not typical of a cable installation on a robotic arm.

A more realistic test is an unsupported rolling bend trial. In an unsupported continuous bend, the cable design must prevent the bend from becoming concentrated in a small area. Flex concentration to a small area can lead to cable failure through nicking since flexing at a kink can cause conductor and shield failure. A robotic arm can extend to various lengths and exhibits diversity in the flex motion that inevitably spreads force over a sizable section of the cable. In order to simulate these movements a more complex type of flex testing equipment is required, specifically a device that can simulate a rolling bend. Loosely making the comparison of a human arm to a robotic arm, a rolling bend test can simulate not only the bending of an elbow (like the "Tick Tock" test) but also the reach of the arm which in fact turns out to be critical.

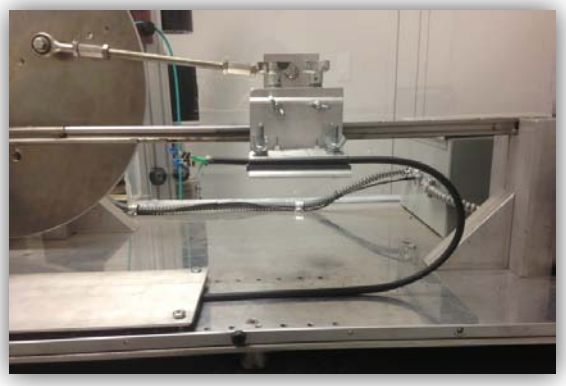
Scope

The focus of this test report is concentrated on the destructive flex forces involved in a continuous motion application. The test features an unsupported cable span at the point of the bend/flex motion.

Method

- We utilized a cable assembly that was built and tested for electrical performance in accordance with the TIA 568 standard for patch cabling - results were recorded

- The cable was attached to rolling bend test fixture based for the desired bend radius



- Flex cycling was performed for a desired time interval (i.e. 1M or 10M flex cycles)

- The cable was tested again for electrical performance in accordance with the TIA 568 standard for patch cabling. Results were recorded and compared to the original test. A visual/mechanical inspection was performed as well to identify any physical damage to the cable.

Conclusion

All cables tested exceeded performance requirements for the application. Flex testing had no significant impact on the electrical or mechanical performance of the cable.

Test Results

10X Flex Test 1.25 Million Cycles	
Jacket cracks	*None*
Tape cracks	*None*
Braid strands broken	*None*
Abrasion of insulation	*None*
Conductor Failure	*None*
Return Loss	*Pass*
Cross Talk	*Pass*

20X Flex Test 10 Million Cycles	
Jacket cracks	*None*
Tape cracks	*None*
Braid strands broken	*None*
Abrasion of insulation	*None*
Conductor Failure	*None*
Return Loss	*Pass*
Cross Talk	*Pass*

Products Tested

Bulk Cable

TFDL5025, TFDL5026, TFDL5083, TFDL5088

Cable Assembly Series

TRD695AHF, TRD855HFO

NOTE: Additional cable series will be added to this report as testing is completed

Credits

L-com Global Connectivity and Quabbin Wire & Cable developed this test report jointly. Testing was performed at Quabbin's state-of-the-art manufacturing and test facility in Massachusetts. L-com's Hi-Flex cable series features the proven quality and performance of Quabbin cable products. L-com's unique connector design and termination techniques ensure reliable performance for your application every time.

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