

Know your high-flex-life cable

When your application calls for cable meant to stand the tests of time and motion, you need to know what to purchase and what constitutes product quality.

Cable designed to survive 10 million to 20 million flexing cycles is *high-flex-life* cable. It's different from *high-flex* cable, which is designed to be supple and highly flexible. High-flex-life cable may actually feel stiffer than high-flex cable. The two products are distinctly different and mutually exclusive.

Once you've established that high-flex-life cable is appropriate for your application, you face the dilemma of choosing a supplier. Is high-flex-life cable a commodity, or does it really matter which supplier you choose? Try bending the cable, twisting it, pulling it, rolling it back and forth in a track, having it bear weight, rubbing it and subjecting it to extremes of temperature and to solvents, oils and chemicals. Try doing these things 10 million times in continuous motion, without ceasing. You'll learn quickly that one cable isn't the same as the next.

The productivity of your automated equipment depends on making the right choice. When the cable is one part of many in automated equipment, failure of the cable means failure of the entire process. It's a critical component in your manufacturing, and you need to know what you're getting for your money when you source cable suppliers.

How do you know if a cable will successfully meet your particular needs?

Look beyond your needs. The success of high-flex-life cable in demanding applications isn't enough. Success is defined by *surpassing* demanding applications. The success of high-flex-life cable in surpassing the most demanding applications isn't dependent on the most expensive materials. Success is achieved by superior design – products *designed* to perform with constant bending, rolling and twisting, not products that happen to pass tests developed to meet minimum standards. And the true test of high-flex-life cable is *failure* – cable that is tested to the point of failure and analyzed, reengineered and retested can result in an even stronger product.

How well does *your* cable surpass demanding applications and meet superior design specifications?

Surpassing applications

In today's automated environments, cable failing even once means shutting down – money lost. Wouldn't you prefer a cable that is tested and proven to not only meet intended applications but also tested and proven to go beyond those applications?

Northwire has continuously flexed cables for as long as three years, for more than 36 million flexes. When a cable eventually fails, it is torn apart to determine the nature of the failure, reengineered and tested again. Testing to the point of failure helps ensure a superior product. While 36,000,000 flexes may never be required for your application, you'd rather not take a chance of failure at 10,000,001 for a product that was only tested for 10,000,000 flexes.

- Ask your cable supplier if products are tested beyond industry standards to the point of failure.

Another area of going beyond probable applications is severity of conditions. It's not enough to simply flex cable repeatedly. The cable must be stressed in various ways in the process not only to mirror but to surpass the harshest, most abusive conditions.

When your business depends on absolute reliability of components, a cable that meets the minimum or very basic standards of testing is insufficient. Maximum protection against cable-related failures results from stringent, prescient testing that foresees condition extremes and perils, and eliminates failure probability.

- Ask your cable supplier about stress elements of testing situations. In addition to flexing, are cables subjected to weight-bearing conditions during flexing? Are they twisted, torqued, rubbed, crushed, bent and rolled?

Designed to succeed

In the past, there was a school of thought in the industry that high-flex-life was dependent on expensive cable materials. That isn't necessarily true. High-flex-life is dependent on design of products and tests.

Cable shouldn't be designed, and then tested to ensure that it can withstand likely conditions. Instead, the most extreme of conditions should be anticipated, testing developed to simulate and surpass them, *then* materials selected and cable designed to succeed in the most severe environments – being rolled over by heavy equipment, gnawed on by rodents, bent and pulled and alternately slackened 24 hours a day in a subzero environment. Although every severe condition cannot be duplicated exactly, testing can be standardized to simulate the actual severe stresses, and test procedures defined and made replicable.

- Ask your cable supplier about ongoing research and development, design of experiments and test standard origins. Testing methods at Northwire, for example, were originally formulated to conform to military specifications, which were refined by a prominent medical-device manufacturer.

Details, details

How much detail does your cable supplier provide about test specifications and results? A supplier should willingly provide you with test verification and test reports and welcome you to the test environment to observe it firsthand. Any hesitancy to provide the requested level of detail is a red flag. Simply stating that cable is tested isn't enough. Verifiable, thorough, intense testing adds value to product. Just make sure the added value your supplier claims is bona fide.

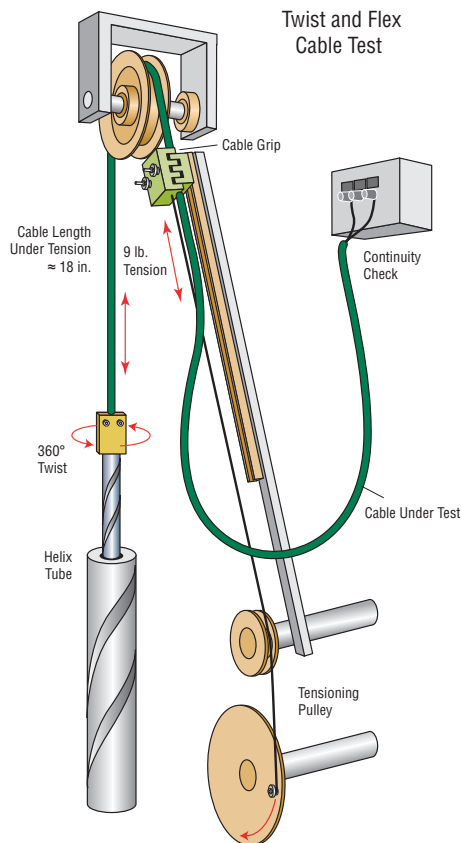
- Ask your cable supplier for test specifications and performance data, including cycles completed. Showing a photograph of a testing process on a Web site isn't enough.

Know what to look for – a primer

One predicament in which many customers find themselves is not understanding what constitutes rigorous testing and what test data means. If you depend upon cable reliability, you need to know what to ask for and how to verify whether your expectation has been met.

- **Product guarantee** – If your cable fails, will it be replaced at no cost? Ask for detailed analysis of how your product was reengineered and tested to improve performance. Before choosing a supplier, you may want to ask about situations in which the supplier has reengineered a cable that failed so you can gauge ability to learn from experience.
- **Testing rigors** – Hallmarks of commitment to continual quality improvement, including testing cable 24 hours a day, seven days a week; testing beyond minimum industry standards to the point of failure; and performing a battery of tests rather than a single test.
- **Test verification** – Ask for test verification data. Visit the test environment in person to verify authenticity if in doubt.
- **Custom testing** – Ask if custom testing is available for your specifications that do not conform to existing tests.

The Northwire Standardized Flex-Life Tests



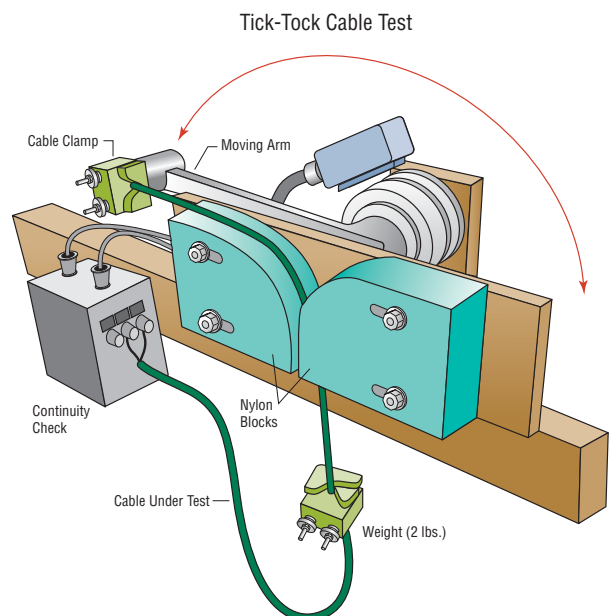
Rolling and torsional flex (twist and flex) testing entails pulling the cable approximately 18 inches over a wheel and twisting the cable 360 degrees.

Twisting takes place in the 18 inches between the grip on the helix tube and the wheel. A nine-pound weight hangs on the cable as it is twisted. The tester runs at approximately 30 cycles per minute. This combined twist-and-roll flex test is the most severe component of the Northwire standardized flex-life test suite.

Bending flex (tick-tock) occurs when one end of the cable is stationary while a bending motion around a fixed object exists at another point in the cable length. The cable is flexed 90 degrees over a nylon block, back to neutral position and backward 90 degrees over another nylon block. A two-pound weight hangs on the cable as it is flexed.

One cycle is a 90 degree bend in both directions. One cycle is completed every two seconds, and cable is tested until failure – whether past 1 million, 2 million, 10 million, 20 million or even 30 million cycles.

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Rolling flex is commonly found in cable track systems. Northwire's "twist-and-flex" test covers rolling flex. In addition to stresses caused by rolling flex, cable in tracks also may be subjected to rubbing abrasion, pinching and twisting on multi-axis cable chains. There is no standardized cable track flex test that takes into account the myriad cable track manufacturers, designs and track materials. Cable suppliers also have little, if any, control over how cables are installed in tracks. At best, a cable manufacturer can subject the cable to the expected and most severe stresses – rolling, abrasion and twisting – anticipated in the cable track system.

Abrasion – The industry standard test for abrasion resistance is the UL 1585 (part of 1510) abrasion test.

Your company's productivity and bottom line depend upon the performance and reliability of the products you select. Be a savvy buyer when you look for a high-flex cable supplier. The manufacturing industry is highly conscious of testing. Make sure the claims a cable supplier makes are substantiated and substantial. Testing worth merit is documented, available to the customer, thorough, multifaceted and continuous. If your supplier tells you otherwise, keep shopping.