Non-Destructive Evaluation (NDE) of the World's Largest Wire Ropes

with diameters up to 165 mm (6½ in)

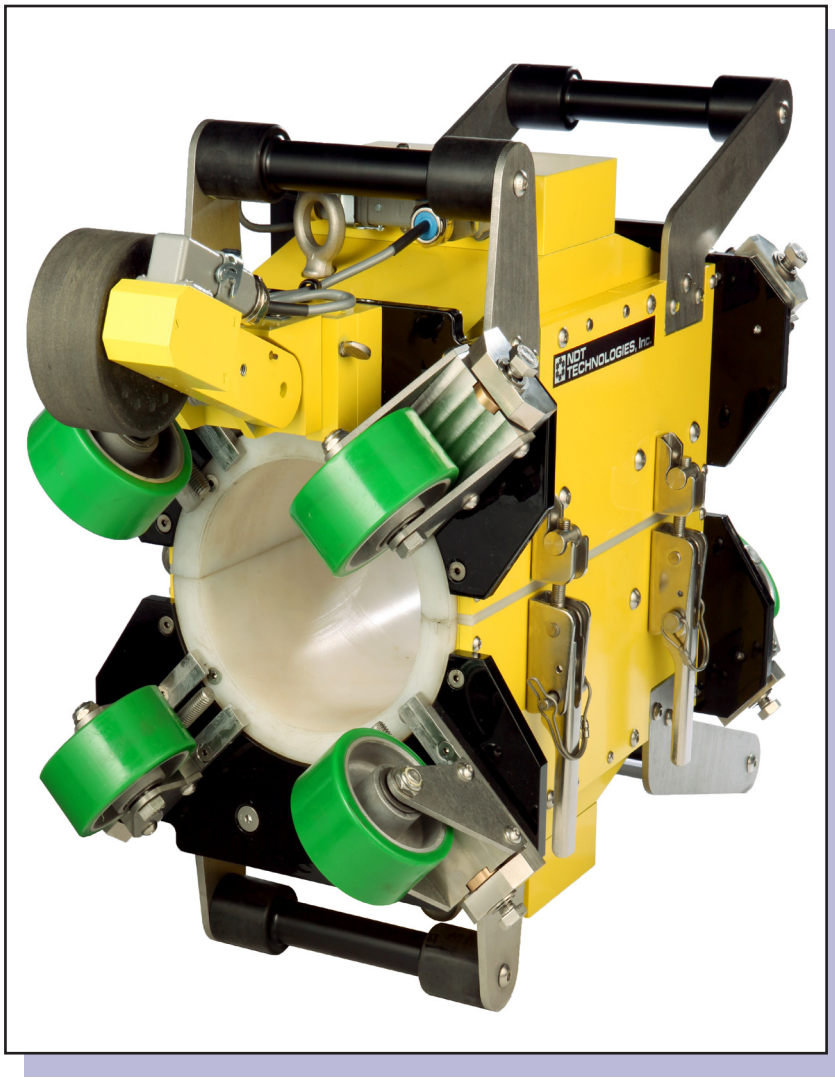
Many offshore wire ropes, such as subsea construction ropes and mooring ropes, have large diameters that are greater than 100 mm (and up to 160 mm) and lengths in excess of 2000 m (and up to 4000 m).

These ropes represent seven-figure investments. They are known as high-value offshore ropes and usually have densely-packed non-rotating multi-strand constructions or are of the spiral strand type, frequently with plastic sheathing.

In contrast to smaller ropes that are often considered disposable items, premature discard of these high-value ropes is unjustifiably wasteful. Potential savings from additional years of service life are substantial. Considering this situation, a properly implemented NDE inspection program promises to lengthen, and possibly even double, the safe service life of these ropes – an extraordinary return on investment.

To achieve rope life extensions, suitable inspection equipment and inspection procedures for high-value offshore ropes are now offered by NDT Technologies.

Based on 30+ years of R&D experience, our New Generation wire rope NDE equipment offers uncommon accuracy and reliability – especially for the quantitative characterization (measurement) of internal rope deterioration.



What sets us apart from the competition?

Our wire rope NDE instrumentation is highly accurate, with exceptional resolution and superior signal fidelity, and it uses our proprietary technology to reliably detect and accurately measure external and internal wear, corrosion including corrosion pitting, inter-strand nicking and clusters of broken wires.

NDT TECHNOLOGIES, Inc.

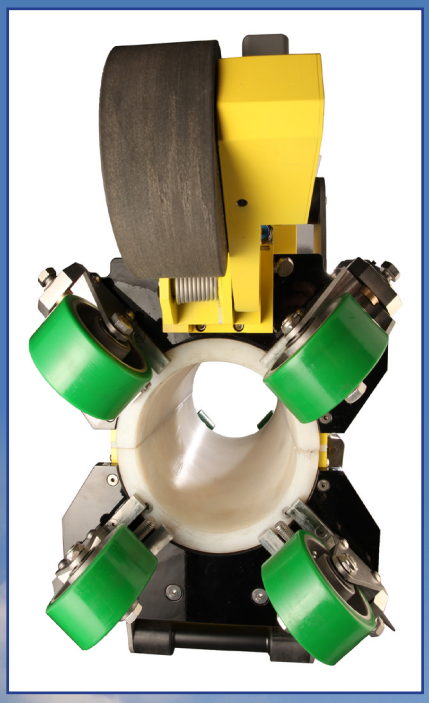
Wire Rope Nondestructive Evaluation

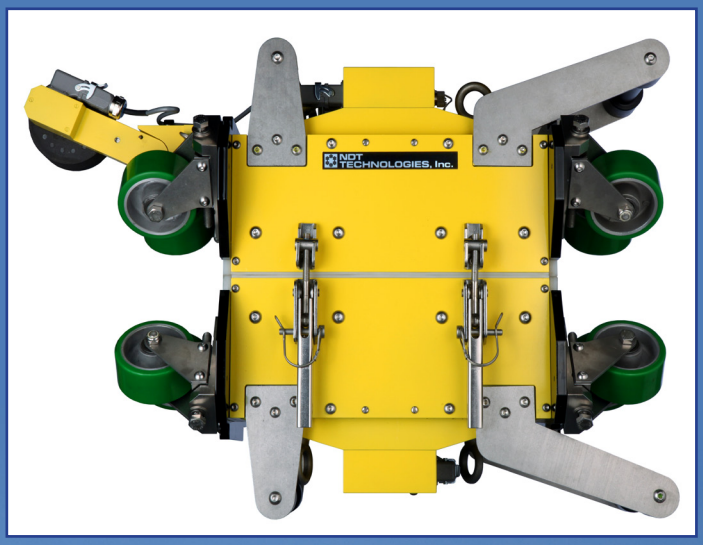
P.O. Box 637 • 345A Nutmeg Road • South Windsor, CT 06074
Phone: 860.757.3055 • Fax: 860.757.3038 • info@ndttech.com • www.ndttech.com

The main features of our New Generation design are:

- **Optimized** for the inspection of tightly packed high-value multi-strand ropes and spiral strand.
- **Accurate and reliable inspection to the core,** including detection and quantitative characterization of inter-strand nicking, external and internal broken wires in clusters, wear, and corrosion including corrosion pitting.
- **Modular sensor heads** with removable sensor section, distance counter, guide wheels, handles, and all cabling including cable enclosures. For repairs, individual parts can be replaced in the field.
- Sensor heads of the proven **hinged clamshell design**. Compared to an arrangement that consists of two separate half-heads, this configuration facilitates mounting on the rope under inspection. It makes handling safer and simpler, and it eliminates the need for a separate mounting/roller frame.
- **Non-contacting inspections** that are unobstructed by grease, marine growth, protruding wires, plastic sheathing, etc.
- Sensor heads are **marinizable** simply by installing subsea connectors.

Based on our modular design principles, sensor heads can be readily designed and built that are tailored for a wide variety of applications.





Triple-Function Nondestructive Test Instrumentation

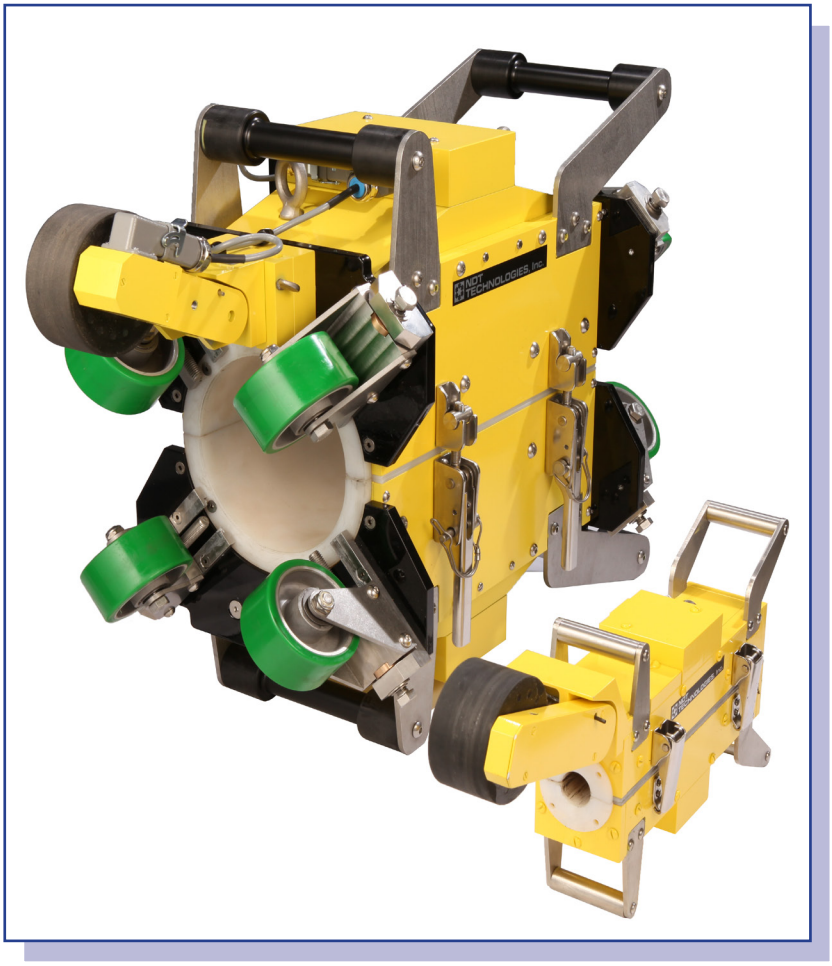
A New Tool for the Safe and Economical Use of Wire Ropes

Many modern wire ropes have densely-packed non-rotating multistrand or IWRC constructions. These ropes tend to deteriorate internally without externally noticeable indications. Major internal degradation modes include wear, corrosion including corrosion pitting, interstrand nicking and clusters of broken wires.

For these ropes visual as well as conventional nondestructive inspection methods are insufficient.

For example, loss of metallic cross-sectional area (LMA) by itself is frequently not a good indicator of the actual wire rope condition because internal and external wire fatigue breaks as well as corrosion pitting cause little or no LMA.

Similarly, the so-called localized-fault (LF) signal that is available from all existing wire rope testers is unsuitable for determining – or estimating – the number of broken wires in clusters. Its indications can be seriously misleading and, therefore, wasteful or dangerous.



What sets us apart from the competition?

Rope retirement decisions must be based on **quantitative** retirement criteria such as

- Maximum acceptable number of broken wires per unit of rope length, or
- Maximum permissible percentage loss of metallic cross-sectional area.

Among all competitors, only nondestructive test instrumentation from NDT Technologies can reliably measure and quantify this type of rope deterioration, a unique capability that is necessary for making rational, safe and economical rope retirement decisions.

For example, our instrumentation can dependably inspect rotation resistant multi-strand and IWRC ropes, an important category of ropes that includes most crane ropes. This feature has been independently verified and documented by Round Robin tests conducted under the auspices of the Safety in Mines Research Advisory Committee (SIMRAC) of South Africa (for documentation please inquire).

NDT TECHNOLOGIES, Inc.

Wire Rope Nondestructive Evaluation

P.O. Box 637 • 345A Nutmeg Road • South Windsor, CT 06074
Phone: 860.757.3055 • Fax: 860.757.3038 • info@ndttech.com • www.ndttech.com

NDT Technologies implemented this capability by introducing the concept of **Wire Rope Roughness (WRR)** as an additional quantitative indicator and, based on this notion, by developing the **WRR Analysis Method**.

Here, WRR is defined as the aggregate surface roughness of all wires in a rope. WRR is typically caused by and indicates corrosion pitting, interstrand nicking, broken wires and clusters of broken wires.

Accordingly, our triple-function wire rope test instruments offer three different types of signals:

(A) **Our Loss of Metallic Cross-Sectional Area (LMA) Signal** measures LMA with exceptional accuracy that is unequalled by any competitor. LMA is typically caused by corrosion and wear. The LMA Signal is quantitative and can be accurately calibrated.

(B) Our proprietary **Wire Rope Roughness (WRR) Signal.** Using the NDT_CARE (Computer Assisted Rope Evaluation) software, a WRR analysis of the LMA signal can be performed that allows the accurate quantitative characterization (measurement) of internal broken wires (single and in clusters) and corrosion pitting. The WRR Signal is quantitative and is calibrated together with the LMA Signal.

(C) A **Localized Flaw (LF) Signal** is also available that can, to a limited extent, be useful for qualitatively locating single broken wires and corrosion pitting.