

Oceanographic Research

Custom Synthetic Solutions



## Deep Ocean Research



## Custom solutions that meet the challenges posed by harsh environments and deepwater discoveries



Approximately 70% of the earth's surface is covered by the oceans, and only a very small percentage has been explored. The average depth of the ocean is approximately 2.3 miles (3,700 meters) with the deepest part being the Challenger Deep in the Mariana Trench at approximately 6.8 miles (11,000 meters).

The deep ocean is an environment completely unfriendly to mankind. Pressures are too great for traditional exploration methods, and research here demands alternative approaches. Exploring the ocean requires many different talents: biologists, chemists, technicians, programmers, physicists, engineers, geologists. It also requires new material technology and a proven track record of success.

Cortland has assisted the research community for decades, designing and supplying products to work and succeed in this very demanding environment. Data collected by the various scientific research institutions require equipment that meets the considerable challenges posed. This requires innovative rope and strength member designs, improved quality control, and specialist materials; as opposed to the general designs and products manufactured by more standard suppliers.

For this unique underwater research world, we provide:

- Deep water synthetic fiber rope solutions
- Oceanographic mooring systems
- Synthetic reinforcing over braids
- Hair fairing to reduce drag and strumming
- In-line attachments or lifting points (cable grips)

We continue to use advances in technology and engineering to provide innovative fit-for-purpose synthetic solutions for the ocean sciences.



# Solutions built for deep water demands

Unlike other fabricators that build and stock standard off-the-shelf components, Cortland designs and manufactures custom solutions to the specific requirements of each individual project.

Solutions designed for oceanographic working environments need to withstand factors such as cold temperatures, flexing, bend cycling, tension cycling, corrosion, fish bite, marine abrasion and compression. The engineering team at Cortland works directly with customers to design solutions specific to their application. We carefully consider performance characteristics such as safe working load, torque balance, elongation under load, compression due to operating depth, buoyancy and corrosion resistance.

With decades of experience, knowledge of deep water environments, and history with material sciences we deliver solutions that achieve superior strength, durability and efficiency for deep water applications.



### **Deep Water Synthetic Fiber Ropes**

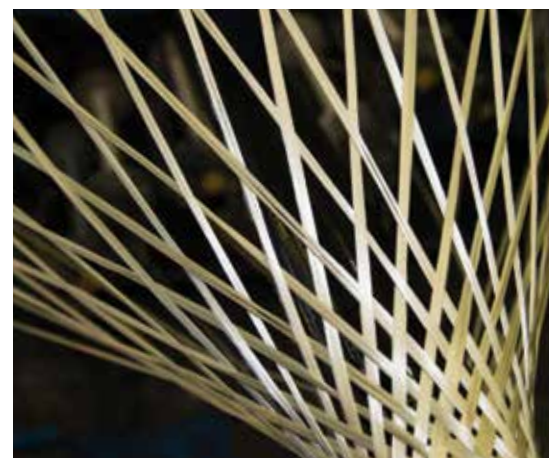
Today's deep water operations are pushing traditional installation wire ropes beyond their limits. Cortland produces highly engineered fiber rope products utilizing an extensive range of fibers, constructions, and coatings to maximize performance during the lifetime of a product. Fiber rope performance ranges from dynamic applications such as deep water lifting and lowering applications with heave compensations, as well as permanent mooring, fastening, and station keeping solutions.

### **Synthetic Reinforcing Over Braids for Research Cables**

Synthetic fiber strength members that incorporate high performance materials; i.e. UHMWPE, BOB<sup>®</sup>, or Vectran<sup>®</sup>, can be applied as braided designs by Cortland over supplied electrical cables. Synthetic reinforcing over braids can enhance cable capability and ensure full function in a demanding environment. We have a strong track record of success, from involvement on tsunami buoy warning systems to strength members on ultra-long CTD cables for research.

### **Braided Hair Fairing**

Unwanted vibrations reduce the fatigue life of rope and fittings, generate noise, and dramatically increase the effective drag. Hair Fairing from Cortland is an over braid with extensions along two or more axes, resulting in significant reduction in cable vibration. Cortland was the first manufacturer to develop the braided Hair Fairing to reduce cable noise and drag without affecting winch or sheave performance. A full selection of material blends and one to four take-outs around the circumference are available to achieve the best results for the intended application and environment.



# Cortland offers lightweight and robust components for specific oceanographic activities



## **Synthetic Coring Ropes**

The need for accurate and undisturbed seafloor core sampling and testing is important for research and studying the environment. Coring equipment has become increasingly sophisticated, heavier, and deployed at greater depths. In addition, this equipment is being deployed in some of the most challenging regions ranging from extreme high and low temperatures to 6.2 miles (10,000 meters) water depth.

We engineer rope solutions using high performance or standard fibers to offer customers the proper performance. High performance fibers are generally limited to three major types: UHMWPE, liquid crystal polymer (LCP) and Aramids.

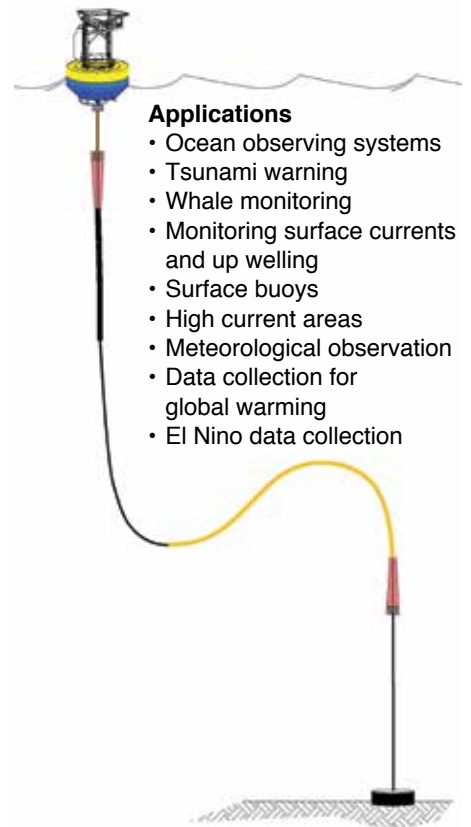
UHMWPE has excellent fatigue and robustness properties; however it suffers from low heat tolerance. LCP provides good fatigue properties with excellent creep resistance. Aramids have excellent heat and creep resistance properties but do not perform as well in abrasion resistance, tension-tension and bend fatigue.

Cortland has utilized the advantages of both UHMWPE and LCP to develop Plasma<sup>®</sup>, and BOB<sup>®</sup> (Braid Optimized for Bending) rope constructions. These solutions lead the way in deep water lifting applications where serious fatigue is induced by AHC (active heave compensation) units.

Cortland's synthetic ropes reduce weight, improve speed, and boost overall vessel operational efficiency of coring operations when compared with steel wire rope. We specialize in building and delivering custom designed coring rope solutions that are high strength, long length, low weight, and have a proven track record in the most challenging deep water conditions.

**Oceanographic Mooring Systems** Cortland's deep water Oceanographic Mooring Line Systems are responsible for holding many of the world's most important data collection buoys in place. From offshore tsunami warnings to meteorological observations, our custom buoy mooring systems are designed and constructed to stay in position in harsh marine environments.

Our oceanographic mooring systems can be custom engineered to ensure full functionality and secure placement of the attached buoy. Sections of the mooring system can be constructed to any length necessary using a wide array of traditional or high performance synthetic materials incorporating high strength, low stretch, and high modulus performance characteristics. Individual sections can also be positively buoyant or weighted using a lead core. Our exclusive extruded jacket technology can also be added to reduce strumming or provide fish bite protection.



## Value-added components that provide seamless integration with data collection methods



### **Inline Attachment or Lifting Points**

Synthetic cable grips are used to grip many types of cables and ropes with multiple surface materials, from large hydraulic umbilicals and synthetic ropes to small fiber optic cables. Synthetic cable grips are designed to minimize any external damage with non-metallic content.

They can be used as a “quick fit” temporary attachment, or as a permanent attachment, and can be retrofitted without the need to gain access to the end of the cable. This allows for inspections and maintenance on equipment or cables and ropes while deployed.

In addition to standard cable grips, custom designed spliced hold back points can also be utilized on our braided synthetic ropes.





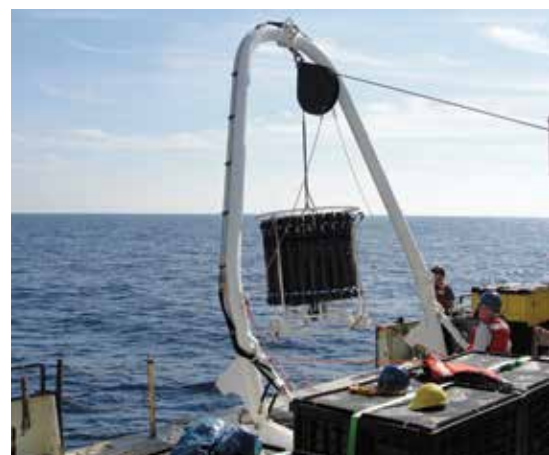
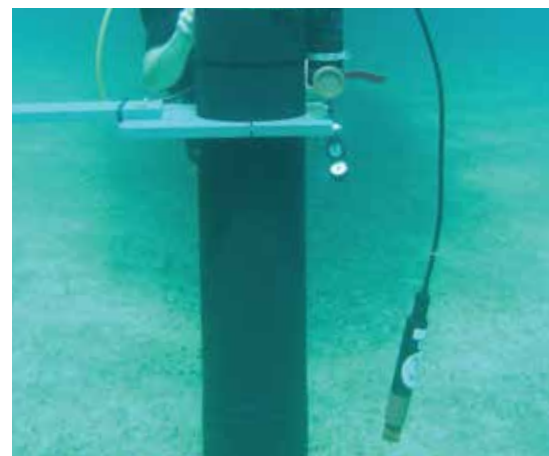
Cortland is one of the few manufacturers globally that can design and manufacture high performance synthetic fiber over braids for oceanographic research cables. The synthetic over braid offers strength equal strength to steel wire armor, yet at only 1/7th the weight; and with no electromagnetic interference (EMI), radio frequency interference (RFI), signal suppression, directional irregularities or white noise arcing.

#### **Strength Members and Over Braids in Marine Research Equipment**

Hydrophone cables are used in detecting and recording various types of underwater signals. Understanding the needs in hydrophone studies, Cortland provides braided synthetic solutions as well as outer sheathing applications which offer durability and strength in underwater exposure, to customer supplied electro-mechanical components to complete the hydrophone cable assembly.

Magnetometers are used for oceanographic mapping surveys. Magnetometer tow cables, however, are perhaps the most vulnerable part of the system and the part that is subjected to the greatest physical abuse. Cortland offers synthetic fiber reinforcing over braids for strength, on many magnetometer tow cable assemblies today.

Research and sampling cables benefit from lightweight characteristics and non-metallic components for highest measurement accuracy. Synthetic fiber strength members offer the strength of steel but at 1/7th the weight, are non-metallic, and are fatigue resistant.



Our design engineers listen to your requirements and develop solutions to meet your expectations



#### **Our Manufacturing Capabilities**

- 12-Strand braided synthetic fiber ropes up to 7.87" (200mm) in diameter
- Continuous long length capability for ocean depth requirements
- Small braiding capabilities
- Braided and faired jackets up to 3.94" (100mm) in diameter
- Custom synthetic EM cable reinforcements
- Synthetic fiber strength braids and servings; wide range of materials, technical and processing experience
- Extruded jackets up to 2.36" (60mm)
- Buoyant extrusion solutions using proprietary compounds, and achieving a specific gravity of 0.78
- Abrasion resistant sheath material solutions for harsh environment applications

#### **Terminations**

Cortland has a wide capability for mechanical terminations. These can be tailored to be fully synthetic solutions (i.e., spliced terminations, formed molds, etc.) or a hybrid termination incorporating both metallic (thimbles, shackles, chain, etc.) and synthetic components. We also offer custom engineered hardware solutions to increase operational efficiencies.

#### **Testing Capabilities**

- Standard electrical characteristics tests (e.g. IR, CR, etc.)
- Optical tests
- Mechanical tests
  - Tensile tests
  - Fatigue cycle tests
  - Tension/tension tests
  - Cycle bend over sheave (CBOS) tests
  - Elongation tests
  - D:d testing
- Third party witness and approval (by key industry authorities)

Few companies offer the understanding of oceanographic research methods, the dynamics of the ocean environment, and extensive materials experience with high performance ropes and strength member fiber over braids. These high performance materials provide high strength-to-weight benefits, improve safety and boost operational efficiency.

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#### **Solutions**

- Deep water synthetic fiber rope solutions
  - Synthetic reinforcing over braids
  - Oceanographic mooring systems
  - Hair fairing or other options to reduce drag and strumming
  - Inline attachments or lifting points (cable grips)
  - Custom fabrication expertise
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#### **What can we do for you?**

Whatever your particular challenge, Cortland welcomes the opportunity to solve it. We have the unique experience to help today's marine researchers save time, increase safety and gain far better efficiencies. Our service doesn't end with product delivery. We also provide on-site support / field support and training for everyone involved with operating and maintaining the solution we provide.

Please email [cortland@cortlandcompany.com](mailto:cortland@cortlandcompany.com) for an initial discussion, or visit us online at [cortlandcompany.com](http://cortlandcompany.com).



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Cortland is a global designer, manufacturer, and supplier of technologically advanced ropes, slings, and strength members. Collaborating with customers, our team uses its experience in high performance materials and market knowledge to transform ideas into proven products.

For more than 35 years, our custom-built solutions have been developed for work in the toughest environments and to overcome some of the world's greatest challenges. They consistently enable our customers to meet the demands of the aerospace, defense, medical, research, subsea, marine, and energy industries.

Cortland is a part of the Enerpac Tool Group (NYSE: EPAC), a diversified industrial company with operations in more than 30 countries. [cortlandcompany.com](http://cortlandcompany.com)