Revolutionising Research
Electromechanical cable proves its reliability on oceanography missions

Cortland’s electromechanical cables are used by scientific research institutions around the world to track and monitor changing ocean conditions.

Oceanographic working environments are harsh, so equipment must withstand factors including cold temperatures, bending, tension cycling, corrosion, marine abrasion, compression and even attack by sea-life. They must flex and bend to deal with winching, marine currents, and high pressure.

Each cable custom-designed and manufactured by Cortland provides the physical connection for real-time power and communication connectivity.

The Challenge
A scientific team from the US GEOTRACES program commissioned Cortland to devise a reliable cable solution. Most crucial to the mission was a solution that had no exposed metal, as any additional metal from the sampling system affects the sample quality for trace elements such as iron and zinc in the deep oceans. The equipment had to deploy rapidly while still returning clean samples for the studies.

Metal-clad electro-mechanical cables, traditionally used on oceanographic expeditions, work close to the limit of safe working load capacity regulations for

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“The US GEOTRACES carousel deployment, with an electromechanical cable from Cortland

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winching when lowered to depths of more than 5,000 meters, due to the weight of the cable itself. The cable had to be lightweight to achieve the necessary buoyancy for effective deepwater sampling, strong enough to handle variable loads under tension due to the movement of the ship and be long-lasting—it was to endure more than 100 deployments per GEOTRACES expedition.

The cable also had to safely hold the weight of the equipment, which can exceed 500 kg when a carousel of 24 12-liter sample bottles is full. It had to reach depths of up to 7,000 meters, where pressure forces are more than 550 bar (55,000 kPa).

The Solution
Cortland worked with Dr. Greg Cutter, Professor of Ocean, Earth and Atmospheric Sciences at Old Dominion University, Virginia, to develop a solution for US GEOTRACES.

A 14 mm Vectran® cable was designed, manufactured and supplied by Cortland for the deepwater oceanographic research application. The use of Vectran, a high-performance synthetic fibre, provided the high-strength, low-stretch and flexible properties needed as the cable’s strength member.

Within the core, Cortland supplied electrical and communication wiring with the capabilities to relay signals through deep ocean depths. Surrounding the entire cable construction was an abrasion-resistant, extruded-polyester outer jacket.

The Result
The materials used in the cable were strong, but lightweight and flexible. The outer coating was durable enough to handle deck and overboarding activity on the vessel, and to withstand potential damage from temperature changes, tension cycling, and ultraviolet light.

These protective elements allowed uninterrupted signal between surface and carousel for the crucial real-time data monitoring of temperature, pressure, conductivity and other sensed parameters throughout the lowering process, and triggering sample bottles during ascent. Cortland’s synthetic version was designed to have all the functionality and capabilities of steel cable alternatives, yet at much lighter weight, while also minimising metal contamination.

“Cortland’s cable allows US GEOTRACES to do more,” stated Dr. Greg Cutter, ODU. “We can lower the carousel deeper than ever without weight concerns, collect more samples faster, and there’s virtually no risk of contamination from exposed metal components.”

US GEOTRACES has used the Cortland custom cable for dozens of missions, in regions as diverse as the Arctic waters to the tropical waters of Polynesia. It has proven ideal for the expeditions, carried out every two years since 2008. Overall, it has been the main cable on more than 600 ocean deployments. It is set to be employed again in 2021.

Near identical cables are now in use in China, Germany, India and Antarctica.

For more information visit cortlandcompany.com.