



An Actuant Company (ATU)

Industrial/Energy segment

# Overview

- Three manufacturing facilities



Puget Sound  
ROPE

Anacortes WA (ropes)



Cortland  
FIBRON BX

Hoddesdon (umbilicals)



Cortland  
CABLE

Cortland NY (cables/ropes)

- Sales and service facilities
  - Aberdeen and Houston
- 200 employees
- Primary product lines
  - Cables (armoured and synthetic)
  - Umbilicals
  - Synthetic Ropes & Slings
- Web Site [www:thecortlandcompanies.com](http://www.thecortlandcompanies.com)



# Example Applications

## *Specialty Rope & Cable*

**Seismic Tow Cables**



**Heavy Lift Sling**



**Tugboat Ropes**



**Heavy Lift Deepwater**



**Utility Stringing Lines**



**Safety Lines and Tethers**



## *Umbilicals*

**Diving Bell**



**ROV**



**Subsea Workover/Control**



# Deepwater Lifting Ropes



# This is Not a Mooring Rope

## Mooring Ropes

- static design (parallel strand) o.k.
- large size (PET) o.k.
- infrequent inspection o.k.
- no flex fatigue
- can be torque matching

## Lifting Ropes

- flexible design essential
- wire-like size for winch capacity
- frequent use, frequent inspection
- greater flex-fatigue resistance
- no torque

# Choice of Rope

- Careful balance between performance and constructional attributes e.g.
  - Bend fatigue performance
  - CoF
  - Strength to size ratio
  - Cost
  - Manufacturability (length and size)
  - Field inspection
  - Field repairable
  - Has to be designed to match the handling system

# 12 x 12 Design

(U.S. Patent No.5,931,076)



## 12 x 12

- ✓ Torque-free
- ✓ No Length limitation
- ✓ Good strength translation efficiency
- ✓ Highly flexible
- ✓ Good flex fatigue
- ✓ Easily repaired\spliced
- ✓ Easy to inspect, inside and out
- ✓ Compatible with both drum and traction winches (suitably designed)

# Fiber Materials for Lifting Ropes

- HMPE dominates heavy marine (Spectra/Dyneema)
  - Neutrally buoyant (floats)
  - Low CoF
  - Highest strength-to-weight
  - Highest abrasion resistance
  - Low creep although very sensitive to load and high temperature
- Aramids/LCP
  - High temp resistance
  - Moderate to poor abrasion resistance
  - No creep
  - CoF higher than HMPE

# Heave Compensators

- Achilles'-heel for HMPE and Aramids
- Heat builds up inside the rope
- High temperature increases creep rate and abrasion locally for HMPE
- Aramids/LCP, although exhibiting high temperature resistance, fail due to fiber on fiber abrasion
- Rope fails in sheave area with no damage to remainder of rope

## BOB (Braid Optimized for Bending) Fiber Blend

- Goal - Utilize the low CoF and robustness of HMPE and the high temp performance of Aramid/LCP
  - Must match modulus and failure strain
  - High-modulus fibers best candidates
  - High-temp and low-temp blend
  - High-temp best in creep
  - Low-temp best in internal abrasion
- LCAP (Vectran) has much better internal abrasion resistance compared to aramid
- ✓ **BOB – Blend of Spectra and Vectran**

# Summary

- BOB 12 x 12 exceptional field performance to date. (over 400 lifts in deep water during 18 months of ops, ops manager commented; *“would have consumed 4 steel wires over the same number of jobs and lifts”*)
- No requirement to carry spare rope
- Field inspection and repair procedures developed
- Field splicing and proof loading methods established
- **Integrated rope management as part of the winch system is key to successful operations**