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THE CORDAGE INSTITUTE
Working on behalf of the Cordage, Rope and Twine Industry since 1920

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HIGH-TECH FIBERS LEAD THE WAY TO SMART RIGGING

By G.P. Foster, Technical Director Emeritus, Cordage Institute

The concept of **Smart Rigging** is the new way to use high-tech fiber strength members to provide better and more efficient systems to lift, support and control objects. The stronger high-tech fibers are leading the way along with improvement of the physical properties, the development of new constructions, the use of a wider range of terminations, new rope finishes to improve abrasion resistance, and the development of new test methods and inspection guidelines.

The Development of Kevlar® by DuPont®, with grams per denier (gpd) of 18 and higher and the availability of stronger polyester fibers, gave a message to the industry that there would be new opportunities to expand markets.

The term "Flexible Fiber Strength Members" has become a popular description that would relate to the new constructions, not necessarily like a conventional rope, that use the stronger high-tech fibers.

The high-tech fibers that are being used to meet the demands for new applications, many of which are replacing wire, are:

Aramids … ranging from 18 to 29 gpd
(Kevlar®, Technora®, Twaron®)
HMPE … ranging from 25 to 41 gpd
(Dyneema®, Spectra®)
LCP … ranging from 22 to 27 gpd
(Vectran®)
PBO … at 42 gpd (Zylon®)
Polyester … over 10 gpd (DuPont®,
Performance Fibers®, Kosa®)
Note: Physical and environmental properties for these fibers are available from the Cordage Institute. Call 610-971-4854 or e-mail info@ropecord.com and ask for CI 2003.

Cost/Benefits are dramatic: Lower weight with higher strength, lower weight per foot, lower or zero weight in water, easier handling and reduced manpower, reduced exposure to injury, increased productivity, reduced size, cost and weight of related equipment, easier to store, easier to lift and handle, no grease or contaminants, no fish hooks, optimum flexibility, faster and simpler change-outs and more manageable operations for long lengths (deep water), virtually no stretch, minimum creep, good to excellent abrasion resistance, minimum moisture regain and, in some fibers, high melt/char levels.

The cost of the stronger fibers are somewhat higher than industrial grade fibers. However, their cost becomes secondary because the benefits and advantages, listed above, significantly reduce the overall costs for a given application.

Applications: The high-tech fibers have significantly expanded the use of fiber rope and flexible strength members, including replacement of wire. In most cases, it comes under the heading of Smart Rigging and in other cases, there are completely new and "outside the box" applications.

- Aramids have an interesting history of their use as strength members. Elevator cables, mooring lines, and cable supported bridges are a few.
- Standing rigging on sailboats has used stainless steel wire and rod for many years, but now PBO and Vectran fibers are being used.
- Running rigging for sailboats has used fiber rope ever since the early sailing skiffs and square riggers. Now high-tech ropes are a standard for the high performance sailboats and even for the average round-the-buoy racers.
- Oil exploration and production has moved to deeper waters 5,000 feet and deeper. The solution has been polyester rope moorings. The first success was offshore Brazil, and now being used in the Gulf of Mexico.
- Oceanographic rigging is another area where high-tech fibers are critical to operations.

Terminations: A factor in the application of high-tech fibers is the ability to terminate the product. The conventional method is an eye splice, but there are now efficient mechanical termination to use with fiber rope.

Finishes for fiber ropes and coatings have now been developed that can improve the performance of fiber strength members, especially useful in rigging applications.

Standards and Guidelines are in existence now and are being updated continually. The basic standard for slings has been the ASME (American Society of Mechanical Engineers) B30.9. Chapter 9-4 has standards for synthetic rope slings. Chapter 4 provides rated loads for eye and eye and endless slings for vertical, choker and basket hitches. The Cordage Institute Technical Committee is developing new data for the high tech ropes.

This article was excerpted from the August 2005 issue of Wire Rope News. To get a copy of the complete article, with pictures, contact Wire Rope News by e-mail at info@wireropenews.com.

KATRINA: DAMAGE TO OIL FIELDS WORSE THAN IVAN

By Valerie Darroch, Newsquest Media Group

Damage to oil platforms and pipelines in the Gulf of Mexico caused by Hurricane Katrina could be 3 times as bad as when Hurricane Ivan struck the area last year, warned international energy consultancy Wood Mackenzie.

Eugene Kim, senior energy analyst at WoodMac's Houston office said efforts to inspect damage to offshore installations and subsea pipelines will be severely hampered by the mass destruction of onshore communication, power networks and lack of crew willing to leave their families to go offshore.

WoodMac is finalizing a report on the impact of oil and gas supply interruptions on commodity prices and Kim said preliminary estimates are that crude prices will be "upper dollars-60" per barrel in the near-term and crude gas prices will jump from around dollars-10 currently to dollars-12-dollars-14 by winter.

Energy prices, which surged in advance of Hurricane Katrina, eased after the International Energy Agency (IEA) said it would release emergency gasoline stocks from European refiners. The IEA said members will release two million barrels per day for 30 days and the US will release 30 million barrels of crude oil from the US government's emergency stockpile.

The US market lost about 42 million gallons of gasoline production daily, equal to 10-percent of the nation's normal consumption, according to government estimates.

The American Petroleum Institute estimates that about 58 oil and gas platforms and drilling rigs in the Gulf of Mexico have been damaged, including Shell's Mars deepwater platform.

"Mars is a much larger producer than the fields which were damaged by Hurricane Ivan", Kim said. He warned that the damage estimates so far are based on purely visual assessments and the true extent of damage may be far greater. "Only when you reman the platforms and push the start button will you know the damage level. It's early estimates, but the numbers look quite staggering . . . these are three times greater than with Hurricane Ivan."

Aberdeen-based Wood Group, which has a significant presence in the Gulf of Mexico and Louisiana, is still assessing Katrina's impact.

A spokeswoman said offshore personnel had been evacuated prior to the storm and efforts to account for all employees were continuing. "The safety of personnel and their families is our highest priority," she said, adding that some of the facilities had been affected by loss of power and flooding.

www.rigzone.com 9/5/2005

MOORING FOR FPU

InterMoor Inc., an Acteon company, has finalized an agreement with ATP oil and Gas Corp. to anchor a Floating Production Unit (FPU) in the Gulf of Mexico's Mississippi Canyon 711 for ATP's Gomez project, InterMoor Vice President Tom Fulto announced. InterMoor will provide and install a 12-point, taut-leg mooring system using polyester rope, which offers lower cost and better performance than conventional steel catenary systems.

Additionally, InterMoor will secure the FPU to the seabed with subsea Suction Embedded Plate Anchors (SEPLAs), making this project the first permanent mooring system to use SEPLAs.

InterMoor's system has a design life of 10 years and a water depth of approximately 3,000 ft.

Ocean News & Technology July-August 2005

DEEP THINKING BRINGS RECOVERY AIDS

A condensed report from International Tug and Salvage, May/June issue

Alex Crawford, technical director of Deep Tek Ltd., faced an unprecedented challenge to salvage precious materials from Persia, a WWI ship resting 3,000m below in the Mediterranean Sea.

Results from previous recoveries indicated that the use of steel wire for strength members for a deepwater project had many problems.

1. The outer layers of steel wire as a strength member, over time, deforms and weakens under heavy loads.
2. Repeated lowering of the rope into salt water and recoiling it takes a further toll on the steel's strength. Once broken, it cannot be repaired.
3. Most serious, however, was its weight penalty. Every 300m length deployed weighed one tonne. In other words, even in 1250m, with no load attached, one-third of the cable's safe working load was used. With every extra meter, more lifting capacity would be taken up until there was none left at all.

For these reasons, it became obvious to Crawford that harnessing man-made fiber as a strength member was the only way forward for his vision of opening up the seabed for sustainable exploitation. Accordingly, he designed and developed a patented winder, which replaces a conventional hoist umbilical, by helically wrapping power and signals around a man-made fibre strength member, as the underwater equipment is lowered and winds them off again when it is being recovered.

Continued on Page 3...

This now proven technology is now being marketed by Deep Tek Ltd as a cost effective way for doing work in ultra deep water, whether the application is in salvage, military, the oil and gas industry or science.

The choice of a man-made fibre was crucial. It was imperative to create a safe load bearing capability for diameter same as steel with minimum elongation. Crawford thus selected a custom braided strength member produced by Puget Sound Rope, a unit of the Cortland Companies in the USA. The rope is based on Puget Sound's Plasma® 12x12-strand using Spectra® fibre. Spectra has the highest strength-to-weight ratio of any synthetic fibre pound for pound, and is ten times stronger than steel. Its strength to weight ratio, both in water and in air, was a critical factor in its utilization by Deep Tek. Since Spectra rope floats, its full strength is available to carry the intended load. Furthermore, Plasma rope is highly flexible, reducing stress from repeated use and can be significantly lighter than steel. It not only requires less power to lift, but can be deployed from smaller more competitive ships, due to overall weight savings compared to dispensing tonnes of wire rope and concomitant reduction in winch size.

Using this innovative rope technology, Crawford excavated the Bullion room of Persia and brought over 100m^3 material to the surface. The bullion, specie and treasure known to be onboard, however, eluded him – "We cleared the area and simply it was not there. This is one of the hardships of salvage. With the aid of the winder and Plasma rope, we achieved everything that was expected of us in engineering terms, including deploying 7.5 tonne pieces of electro hydraulic equipment in 3000m water depth, and cutting through 60mm layers of concrete and 11 mm plates of steel, all from a DPI ship."

One thing is for sure, in the process of the salvage operation we have not only proven the potential of the winder system but we learned a tremendous amount about handling and performance of Plasma rope when used in exacting onsite conditions. The potential in ultra deep water is enormous and wire rope will never be an option again. Visit Alex Crawford via www.deeptek.co.uk.

IN MEMORIAM
MIRIAM FOSTER

On October 2, 2005, Miriam Foster, wife of the Cordage Institute's Technical Director Emeritus Gale Foster, passed away.

Donations in Miriam's memory may be made to the Glastonbury Abbey's "Listening to Other Voices" Lecture Series, 16 Hull Street, Hingham, MA 02043; or St. Paul Church, Pastoral Care Program, 147 North Street, Hingham MA 02043.

HIGHLIGHTS FROM THE CORDAGE INSTITUTE'S SUMMER TECHNICAL MEETING

The Cordage Institute's Summer Technical Meeting was held August 16-17, 2005 at the Embassy Suites at the Philadelphia International Airport. The following task groups met:

1. Fiber Rope Slings and High Performance Rope Subcommittees
2. Roundslings Subcommittee
3. Reduced Recoil Risk Rope Test Method Task Group
4. Technical Manual Task Group
5. Five-Year Review Task Group

Below is a summary of what was reported.

Fiber Rope Slings/High Performance Rope: Hank McKenna reported that the Fiber Rope Slings Committee was waiting for the High Performance Rope standard to be developed before it can move on. Rafael Chou reported that he expects the High Performance Rope standard to be ready for internal ballot by May 2006.

CI 1905, Roundslings: Dennis St Germain reported that the editorial changes were made to the document based on comments from the March 2005 internal ballot. The subcommittee approved the revised draft, and the document would be sent out for external ballot.

Standards up for Five-Year Review: Bill Fronzagalia (for David O'Neal) reported that CI 1201 (Fiber Rope General Standard) and CI 1303 (Nylon-Polyamide-Fiber Rope) were sent out for internal ballot in May 2005. The documents would be ready for external ballot once a few sticking points were resolved. Some of the suggested changes, including conversion to SI units as the primary unit of measure, would require Board approval.

Marine Grade Nylon Yarn: John Flory reported that he was waiting for additional yarn samples to move forward.

CI 1502, Reduced Recoil Risk Test Method and CI 1500, Test Methods for Fiber Rope: Elizabeth Huntley reported that editorial changes were made to CI 1502 to address comments from the March 2005 internal ballot. The document was now ready to be sent out for external ballot. The Task Group would next review the Canadian standard, and determination on the future direction of reduced recoil risk rope standards would be made at the next Technical Meeting. Changes to CI 1500 would be sent out for external ballot along with CI 1502.

CI 1401, Safer Use of Fiber Rope: Elizabeth Huntley reported that editorial changes were made to the document to address comments from the March 2005 internal ballot. The document was now ready to be sent out for external ballot.

Technical Manual Update: Dave Richards reported that several revised chapters are ready for internal ballot.

ASTM D13.16 Rope and Cordage Committee: Dave Richards reported that ASTM D4268 went out for committee ballot. There was one negative vote and several comments received. The primary problem was in definitions. John Flory is the lead on the revised D4268.

Escape Rope: Rafael Chou reported that he had been in contact with the New York City Fire Department regarding an escape rope and system for firefighters to use when trapped in a burning building. Bill Fronzaglia suggested that the Life Safety Applications subcommittee consider the development of standards and guidelines for escape rope.

Technical Standards for Rope Coatings: Koen Van Goethem presented a paper on rope coatings. Bill Fronzaglia proposed the formation of a Coatings subcommittee. The first goal of the subcommittee would be to set a mission.

This was the first Technical Meeting held in Philadelphia and it was well received.

ABACA (MANILA)

Today, new uses for abaca have surfaced. Experiments to determine the viability of using this natural fiber in hitherto unforeseen applications are going on. Even now, abaca supporters are already looking forward to a new dawn.

Abaca was probably first brought to the attention of the western world about the 16th century. In 1521, when Ferdinand Magellan landed in Cebu, he and his party became aware of a native fiber, abaca, being used for textile.

Years later, the fiber gained widespread attention as a raw material for rope. A landmark event in the history of abaca's role in ropemaking came in 1821 when Lt John White of the US Navy brought an abaca sample to Salem, Massachusetts. This eventually led to extensive use of the fiber in cordage manufacture in the United States. In 1858, of the Philippines' 27,500 tons of abaca exports, nearly two thirds went to the United States for the "rigging of those ships which made the American Navy famous for speed and daring throughout the first half of the nineteenth century."

Abaca maintained its preeminence as cordage raw material par excellence for much of the twentieth century. Meanwhile, synthetic fibers had made their entry into the world of rope. As early as the 1930's, research was already being carried out to evaluate the role of man-made fibers in rope making. However, not until the 1960's did synthetic fibers pose a serious challenge to the preeminence of abaca in the rope industry.

The Marker, a publication of Manila Cordage,
First Semester 2005, vol. XXXIV

MEET THE NEW BOARD MEMBERS

Below is a brief introduction to the three new Board members recently elected to the Cordage Institute Board.

Jack Kruesi, Bevis Rope Mfg. Co.

Paul John ("Jack") Kruesi has been the owner and President of Bevis Rope Manufacturing Company since 1978. He is known for his innovations in merchandising and marketing in both the US and international hardware and home center markets. The company also serves the commercial, marine, electrical and fishing industries with an international exposure. He and his wife Candy reside in Chattanooga, Tennessee, where he is actively involved in a number of environmental and animal welfare organizations.

Luis Padilla, Teijin Twaron

Luis Padilla is currently the North American Sales Manager for the rope and cable market for Teijin Twaron, USA. Before joining Teijin Twaron, USA, Mr. Padilla worked as a Product Development and Technical Service Manager in the textile auxiliary business. He received a BS in Textile Chemistry from North Carolina State University.

Bob Thompson Fiber-Line, Inc.

Bob Thompson graduated from Drexel University in Philadelphia in 1992 with a degree in Commerce & Engineering. He went back to school in 1995 for his MBA at Loyola College in Baltimore while working in the specialty metal stampings industry for U.S. Can Company.

Mr. Thompson started with Fiber-Line, Inc. in April of 1998 as the Engineering Manager of the Hatfield, PA location. After spending 5 + years in Engineering, he changed positions in the company to his current position as the Business Development Manager. He just celebrated his 9th wedding anniversary and has a 4 year old daughter named Grace.

NEW MEMBER PROFILE FI-TECH, INC.

Fi-Tech, Inc. is a leading manufacturers representative serving the synthetic fiber and related industries in the USA, Canada and Mexico. Established in 1972, Fi-Tech operates from offices in Richmond, VA and San Luis Potosi, Mexico.

For the rope and cordage market, Fi-Tech currently supplies Galan twisting machines, yarn splicers from Heberlein Fiber Technology and specialty winding machines from Nuova Protex.

For those rope producers making their own fibers, Fi-Tech also has a complete line of related equipment and supplies such as spinnerets, filters, aspirators, winders and spares parts for European machinery. Additional information can be found at www.fi-tech.com.

TECHTEXTIL NORTH AMERICA

On March 28 -30, 2006, in Atlanta, Georgia the world's leading companies in the technical textile and nonwovens industry will meet in Atlanta for three days of education, networking and business development.

Techtextil North America is the only place in the U.S. where innovations from all sectors of technical textiles and nonwovens can be experienced in a single trade event. It continues to grow and attract an eclectic collection of engineers, researchers, manufacturers and product specifiers.

Keeping pace with industry growth and a changing world, Techtextil North America will again raise the bar showcasing innovative products and services in the higher performance areas of technical textiles.

IMPORTANT EVENTS

Cordage Institute
Winter Technical Meeting
January 10-11, 2006
Embassy Suites - Philadelphia International Airport Hotel

Cordage Institute 2006 Annual Conference
May 10-13, 2006
Amelia Island Plantation
Amelia Island, FL
(Near Jacksonville)

Knots & Notes

Samson Rope Rescues Stranded Fishermen From Nooksack River... Samson recently donated several hundred feet of Static Rope to the non-profit volunteer organization Summit to Sound Search and Rescue. Shortly after the donation, the rope was used to save two lives. In May, two fishermen were stranded on a sandbar in the Nooksack River when Summit to Sound SAR was called to action. With dangerous water rushing around them and unable to make it to the shore, the fishermen were pulled to safety by SAR volunteers using Samson Static Rope.

Summit to Sound SAR President Tony King reports, “We are grateful to be associated with such a fine and caring company as Samson. The Summit to Sound SAR is made up of over 25 men and women who are responsible for purchasing their own gear that can cost from $1,000 to several thousands of dollars.” Randy Nulle, Samson Sales Director, states “It doesn’t get better than this; to hear that our product was used to save lives puts the value of the work we do in perspective. Samson is proud to support the heroic efforts of an organization like Summit to Sound SAR.” For more information about Summit to Sound SAR, visit their website at www.summittosound.org.

Samson Press Release, August 18, 2005

Significant Events in the History of Man-Made Fibers

1664 Robert Hooke proposed invention of artificial fibers better than silk.
1845 Schoenbien invents nitrocellulose.
1855 Audemars invents process for making nitrocellulose fiber.
1868 Hyatt develops plasticized cellulose nitrate (celluloid).
1884 Chardonnet produces first regenerated cellulose.
1889 Chardonnet displays first textiles from regenerated cellulose.
1890 Despeisses invents the cuprammonium process.
1891 Cross, Bevan, and Beadle patent the Viscose process chemistry.
1892 Libby produces glass fiber.
1898 Stearn and Topham make the viscose process work to produce fibers.
1907 Production of cellulose acetate “dope”.
1919 Henri and Camille Dreyfus begin production of acetate fiber.
1929 Carothers produces high molecular weight polymers for DuPont.
1930 Polystyrene commercialized by I.G. Farben/Dow.
1936 Poly(methyl methacrylate) (PMMA) commercialized by Rohm & Haas.
1937 Vinyon (PVC) fibers produced by American Viscose Corporation.
1938 Carothers develops Nylon 66.
1940 Saran invented by Dow Chemical.
1941 Low density poly(ethylene) developed.
1946 Polyester fiber first produced by DuPont and ICI. (Polyester is invented by Wheetfield and Pickinson)
1947 Acrylic fiber commercialized by DuPont.
1954 Isotactic poly(propylene) process invented.
1955 High density poly(ethylene) process invented.
1966 Poly(p-benzamide) developed.
1968 Poly(p-phenylene terephthalamide) (Kevlar) commercialized.
1978 Stamylan UH patented.

Wellington Sears Handbook of Industrial Textiles

METS 2005, November 15,16,& 17, Europa Complex, Amsterdam RAI Centre...METS 2005 will be the most comprehensive marine equipment trade show of all time and the largest in the world! It is strictly trade and strictly marine products.

- Expanded exhibition area
- One thousand exhibitors
- 15 national pavilions
- Inspiring conferences/seminars
- Worldwide attendance
- Thousands of new products

You may now pre-register via www.metstrade.com for your personal free entrance badge. Over 15,000 visitors attended last year, so pre-registration will save you a lot of waiting. For more information, visit www.metstrade.com.

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