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Wire Rope Lubrication: Facts, Fiction and Friction

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Facts, Fiction and Friction with Wire Rope Lubrication

by Victor Mendez

The Kirkpatrick Group, Inc., manufacturer of Kirkpatrick Wire Rope Lubrications Systems has kept very busy since their story last appeared on these pages back in 2003. Owner and President Bob Kirkpatrick points out their number one goal remains unchanged and that goal is to provide clients with innovation, safety and support for the care and maintenance of their wire ropes.

Yokosuka Naval Base Base. Twin SU35B Wire Rope Lubricators used on barge crane.

"What is unique about the testimonials we've received over the years is that they've come to us unsolicited through third parties. Their evaluations and opinions concerning the performance of our product came directly from their own successful use of it in their wire rope preventative maintenance programs."

The use of wire rope pressure applicators has now become a main stay in most wire rope maintenance applications worldwide since Kirkpatrick first introduced them to the world market in 1982. Wire rope pressure lubrication has changed the manner in which industries maintain their wire ropes on a worldwide basis simply because their use has established that the working life of wire rope has been extended. In addition, labor savings has proven to be as much as 50 times greater as compared to the labor costs and time spent using manually applied methods.

Labor savings have been proven in official independent studies. One recent experience confirming this directly was during a trip to the California Maritime Academy. During the tour aboard the training vessel Golden Bear with the Chief Mate, Kirkpatrick observed a group of 4 cadets' hand lubing the 7/8" 1,500 foot mooring line on the ships front winch.

"I asked how long they had been working the job and they told him several hours. I added, 'what if I can provide something guaranteed that will do the same job in 30 minutes and also clean it and provide optimal penetration instead of only surface coating?' That's all it took to close that case. The sale was made."

California Maritime Academy hand lubing.

Since 1982, Kirkpatrick has gained a broad knowledge of what it takes to optimally apply wire rope dressings to wire rope, no matter what method is used. This a direct result of his own infield and daily troubleshooting experience over the last 33 years.

The bottom line is that preventative maintenance should supplement the original layup material and if that layup material is viscous enough it is an impossibility to go through the core, according to Kirkpatrick. "This is because there is already a preexisting protective coating barrier there. This is not negative but good. The goal is to keep the original layup material intact for as long as possible.

"The fact is that the most important time a wire rope can receive a coating is during the manufacturing process when every strand can be coated prior to the wire rope being closed. I always push customers to use as viscous a coating as possible. This is especially true in the mining industry. It may be a little more

All photographs courtesy of The Kirkpatrick Group, Inc.

expensive; however, the rewards of a longer wire rope life more than justifies it.

"Protection against friction wear and strand rubbing is guaranteed with heavier viscosity wire rope lubricants marrying well to the original lay-up material. Our systems will apply any viscosity product including oils. Therefore, my opinion is not generated from its shortcomings in the application of different consistencies. We can perform with them all if they are able to be pumped. That is in a range of NLGI Grade 3 greases.

"In the case of oils used on working ropes where friction wear is of high concern and adequate fluid film protection between the strands is a must, those oils only apply microscopic layer protection against strand rubbing. They can also serve to emulsify and wash out the original layup material. By analogy, would you oil your car wheel bearings or grease them? In the event that oils are used, it is necessary to treat the rope more often because once the original lay-up material is gone; the oils must take its place."

United States Coast Guard training, Galveston, Texas.

Currently, most wire rope contractors are being required to pressure lube their customers' wire ropes in offshore field applications or prior to delivery to the drill ships or rigs. There is also so much out there yet to be learned. The growth Kirkpatrick has experienced has resulted in the fact that they have a data base of more than 10,000 clients involved to some degree in wire rope preventative maintenance.

Kirkpatrick has outfitted every ship in the Navy as well as every Coast Guard Tender built since 1984 – some 600 – with one of their lubrication systems. With a product which is so well established comes responsibility too.

"I sit at my desk every day and find that I have to send troubleshooting emails out around the world. I thoroughly enjoy the process. I am exposed to every industry where wire rope is used as well as to so many different cultures. They all have their own style of doing business. However, they all have one thing in common: They need follow through and support to analyze their applications and then after sale support to make the use of our systems successful for them. I feel we definitely have the know-how."

During pressure lubrication wire rope passes through a 100% pressurized and controlled immersion many times faster than manual applications. This in turn reduces labor costs, improves safety as well as increases the working life of the wire ropes being treated. The outer surface and groove pattern is wiped clean of water and contaminants which then allows optimal penetration of coating; there is less lubricant waste and more fluid film support between the strands, helping out in reducing friction wear.

"I thoroughly understand the end user's maintenance operations because I used to be in the crane business. I know what to quote them, what they require, whether for offshore cranes, mooring lines for tankers or whatever it may be."

Kirkpatrick likes to remind those he deals with of the facts regarding pressure lubrication, as well as straighten out the numerous misconceptions. "There is this idea that the pressure inside the collar may go has high as 5,000 psi. We tested a competitor's system on a one inch six strand with their lubricant and the internal pressure was approximately 10 psi. Using our system with the competitor's coating product, we had an internal pressure of 100 psi. In either case it is a far cry from the 5,000 psi which came up in discussion, an impossibility because no lubricator is a closed hydraulic system.

"The reason for this is that the lubricant moves through and around the wire rope in the stationary pre-travel mode and then as the wire rope travels through the seals more pressure is released as the wire rope removes the lubricant feeding into the seals. In any event the amount of internal pressure is dependent on the strand density and the configuration of the wire rope it has to penetrate.

"Place 100 psi into that pump and at the very down stroke pressures surge to 5,000 psi, but it has nothing to do with the internal pressure of the collar. What actually controls collar pressure is how much lube is contained at any one moment. The most we have ever witnessed or seen was 700 psi using a grease and that was on a double-armored cable."

Ninety-nine percent of the time the lubricant is not going through the core, according to Kirkpatrick. If the pressure lubricator is constructed correctly, it will fill every open space in the rope that is available to receive the load. The other way to do it is to surface coat the wire rope with a rag."The main thing that I would emphasize is helping people understand how pressure lubrication works, what the strengths of the systems are as well as to eliminate all the misconceptions caused by the misinformation."

To help with that issue, Kirkpatrick implemented a new, well-equipped training center in Dallas, Texas supporting their customers. Training is offered free of charge to any customers who have purchased a system from their Dallas offices or from an established stocking distributor of their product line. Clients from around the world have taken advantage of the training since it first started back in 2012, something of a surprise to the company.

The company has a wide variety of agencies that have come to depend on

their pressurized lubrication systems. Among these are the U.S. Coast Guard, the U.S. Navy, Army, Army Corps of Engineers, NATO, Canadian Coast Guard, and Canadian Navy along with a number of other organizations globally.

The Naval Air Systems Command – Chief of Naval Operations Pre-production Evaluation Final Report concluded that the Kirkpatrick Model SU35B Wire Rope Lubricator evaluated during the project appeared to have significant potential for reducing material usage and waste disposal costs. Significant labor savings were found to be possible due to the reduced labor required to perform cable cleaning and lubricating events.

"Of equal importance, the wire rope lubrication system is a safer alternative than the previous method used because it does not require personnel to place grease on their gloves and wipe the crane cable. The cost analysis showed a 10-year return on investment (ROI) of approximately $135,900.60 and a breakeven point of .41 years," according to the Navy's report.

The Navy Public Works Department, San Diego found the Kirkpatrick Model SU35B Wire Rope Lubricator system to increase productivity and reduce costs. Their results were that the automated wire rope lubrication system extends the life span of wire rope, reducing the costs of removing and disposing of worn out wire rope and the purchase and installation of replacement rope.

"Operating costs are also reduced, because cranes are less frequently taken out of service to be refitted with new wire rope. The automated system cleans and lubricates wire rope at a rate of 100 feet per minute as compared to the manual rate of approximately one foot per minute.

"Cleaning and lubricating wire ropes on cranes using the old manual method took approximately five eight-hour workdays per crane. Using the automated system, wire rope on a crane can now be cleaned and lubricated in one eight-hour day. This represents significant savings in labor costs. The automated wire rope lubricator has reduced PWC San Diego's annual cost of cleaning cables from about $320,000.00 a year to approximately $34,000.00, a yearly generating savings of approximately $286,000.00."

The U.S. Navy as a whole has adopted a proactive and progressive position toward protecting the environment and complying with environmental laws and regulations. Rather than merely controlling and treating hazardous waste by end-of-the-pipe measures, the Navy has instituted a program for pollution prevention to reduce or eliminate the volume and toxicity of waste, air emissions, and effluent discharges. Therefore the Kirkpatrick system is a great fit in reaching these goals.

G&H Towing, Galveston Texas USA treating 1,500' of 51mm tow line using Kirkpatrick Model JU120 & Dynagard Blue.

Cranes are used for a variety of duties in the Navy and form an integral part of Navy operations. They are used for essential duties such as lifting aircraft and helicopters onto aircraft carriers, assisting in the hanger bays, loading and unloading supplies at the pier, removing aircraft from the flight deck during emergency situations, and performing maintenance on aircraft and helicopters on shore.

Navy maintenance practices require that crane cables be periodically cleaned and lubricated. The cables are constructed of multiple wire ropes that have been twisted together. Cleaning and lubricating provides corrosion resistance and extends the service life of the cable. Cable performance is improved by eliminating additional drag caused by the buildup.

The first step of crane cable maintenance involves cleaning the cable to remove any accumulation of dirt, ma-

Hoover Dam Trolley before lubrication 3-12 inch (89mm).

rine growth, old grease, rust, and small particles of metal from between the wire ropes that form the cable. After cleaning the cable, grease is reapplied to allow the crane cable to achieve its top operating speed and hauling ability. Metals that are scraped off during the cleaning process are disposed of as hazardous waste.

The SU35B was unique among other systems because of its groove cleaners. The groove cleaners, located in front of the lubricator collar, remove contaminants, surface greases, and buildup in the inner strands of the cable before lubrication. One pass of the SU35B over the cable accomplishes both the cleaning and lubricating steps.

The system was found to eliminate the use of degreaser for cleaning cables, reduce the generation of wastes (degreaser, rags, grease) during cleaning and lubricating, provide a safer working environment and improve the efficiency of wire rope cleaning and lubricating as well as reduce the amount of hazardous material (grease) applied to the cables.

The man-hours required to clean the cables using the WRL are significantly less than the conventional method, thus creating labor savings. Overall, the WRL was effective and efficient in reducing material usage, waste generation, and labor; and, as a result, it reduces the cost of cable cleaning and lubricating.

The unit is compact and portable, so installation requirements are minimal. The unit does require an air supply. The air capacity required depends on the diameter of the cable. The unit's minimum amount required is 35 cubic feet per minute (cfm). Although the unit is portable, it is essential that it be set up correctly for optimal cleaning and lubrication.

The site arranged for the WRL to be temporarily attached to a forklift in order to achieve an angle for the lubrication collar to operate properly. The ability of any given site to mount the lubrication collar in such a manner is dependent upon available equipment resources. It is also important to optimize the speed at which the cable is pulled through the lubrication collar and the pressure with which the grease is applied.

The Navy and other clients are advised to clean the pump system and air motor twice a year. To clean the pump, a small amount of lightweight motor oil is placed in a pail and run through the pump system until the motor oil exits the system clean. The air motor is maintained by placing air tool oil in the system to bleed out dirt and other contaminants.

Looking ahead to the future, the Navy reported that: "Due to the small size and simple system design and operation, the WRL may be acceptable for shipboard crane maintenance. The WRL can be used on any type of crane cable, provided the correct diameter of the cable is given. The Kirkpatrick Group, manufacturer of the WRL, has successfully implemented the WRL on board Navy vessels. The WRL has been used to lubricate elevator cables that transport aircraft and support equipment to the flight deck of the ship."

Kirkpatrick suggested that the WRL be mounted parallel to the ground for the equipment to work effectively and efficiently. Site personnel experimented with mounting the WRL and determined that the WRL and cable needed to be mounted at an angle between horizontal and vertical, depending on the height of the crane. The reason for this is to gain optimal grease on the cable. If the cable becomes vertical or there is tension on the cable, it can cause the grease to be applied unevenly and damage the equipment.

"Navy personnel also established that the best method to mount the WRL at NASNI was to clamp it to a forklift using two ratchet straps. The cable was held at roughly a 45-degree angle as it was fed back onto the crane. Because each site's operations and equipment are different, mounting requirements may vary."

Bob Kirkpatrick feels that his firm has designed the most efficient wire rope lubrication system available today. "We understand what is required to provide those we serve with the right system for their specific application prior to purchase and then to maximize the customer's use of that system once it is received.

"For our clients, we make sure they feel that we're as close as their cell phone, e-mail or fax machine. We are available with the answers they need – 24/7. More often than not they will be communicating directly with me." WRN