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June is National Safety Month!

Safety is the Main Concern

Preventing Accidents, Incidents and Near Misses

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Changing the Florida Skyline

Sims Crane and Equipment

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The Importance of Asking "Why?"

by Katie Mackey

A cornerstone of any safety program should ask "Why?" when issues occur.

We do not live in a perfect world. You can plan, educate and prepare for the worst and just hope for the best. In fact many would probably say, those companies who work on continuous improvements are not only better equipped to deal with circumstances when they arise but they have fewer accidents, incidents and near misses than companies who do not.

Regardless of where your organization falls in the safety spectrum of "totally unprepared" to "we're ready for anything", there is one very important lesson that you can always remember when something goes wrong or someone notices a potential issue. That key point is to ask "Why?"

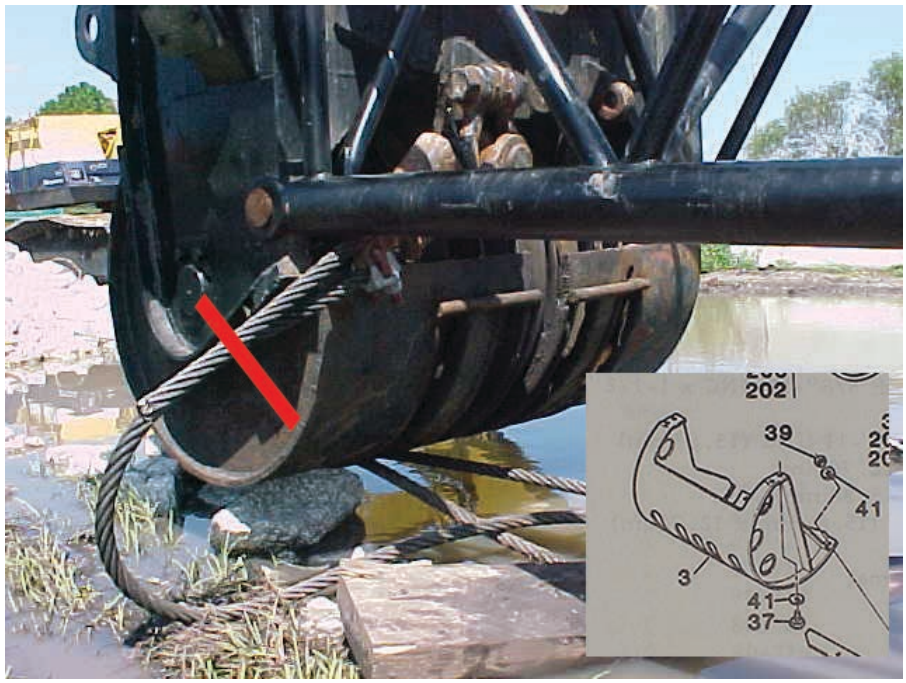
It is a three-letter word that many times gets overlooked, in the rush to clean up or get back to work. But it can reveal areas that may only require a simple fix to keep something from happening again. The following three examples show how the significance of asking "Why?" and how truly investigating the "Why?" made the difference in the future of these operations.

An Accident

Two mobile cranes were working on setting a bridge girder when the wire rope of one of the cranes snapped causing the beam to fall on a nearby aerial lift, fatally injuring the two workers in the basket. Since there were fatalities, an OSHA investigation was launched to ask the "Why?"

Inspection of the wire rope showed some wear and minor flattening, but the damage noted did not appear to be significant enough to cause a failure of the wire rope. However at the cut ends of the wire rope it appeared that one strand was cut and pushed back, as if the wire rope had made significant contact with an obstruction prior to the complete failure of the remaining strands.

Upon observing the boom tip, it looked like the wire rope may have come in contact with the rope guard as there was significant wear on the guard. To determine if this was indeed what happened, the crane was repaired to a serviceable state, reeved to the same 4-part configuration as when the accident occurred. Then a test was performed that involved painting a section of the replaced wire rope, and using masking tape around the rope guard and testing to see if there was contact at various boom angles. Once the boom was raised it was clear the wire rope was making contact with the rope guard and as the crane was raised to the approximate position on the day of the accident, the contact remained. This indeed seemed to be the source of how the wire rope was cut, but why was there rubbing/wear at all?



According to the image in the service manual (inset) there should be no rope guard above radius line (marked in red). *All photos courtesy of Crane Tech LLC*

This called for closer inspection of the boom tip and a comparison to the manufacturer's service manual, which noted a significant difference in the construction of the rope guard versus the diagram in the manual. It was apparent that at some point in the crane's history, the guard had either been modified from its' original state or had been replaced with an non-OEM part. It could be said, that the crane owner had just been lucky until this point, but unfortunately two individuals and their families paid the ultimate price.

Accidents like this should be a reminder that it is NEVER permissible to modify the crane in ANY way without express written consent and documentation from the crane manufacturer. Likewise if a part needs to be replaced, it is key to use OEM-specified parts. After this accident the crane owner was able to replace the rope guard with the correct part and

Accident is defined as an unplanned event that results in personal injury or property damage.

Incident is an unplanned event that does not result in personal injury but may result in property damage or is worthy of recording.

Near Miss is an event that does not result in an injury or damage. It is important to record and investigate near-misses to identify concerns that could possibly lead to an injury or damage.

Cut end of wire rope showing shortened strand (left). Wear observed on inside of rope guard (middle). Test with paint and tape to determine if wire rope contacted the rope guard (right).

continue to use the crane, and this time it was safe for future lifts.

An Incident

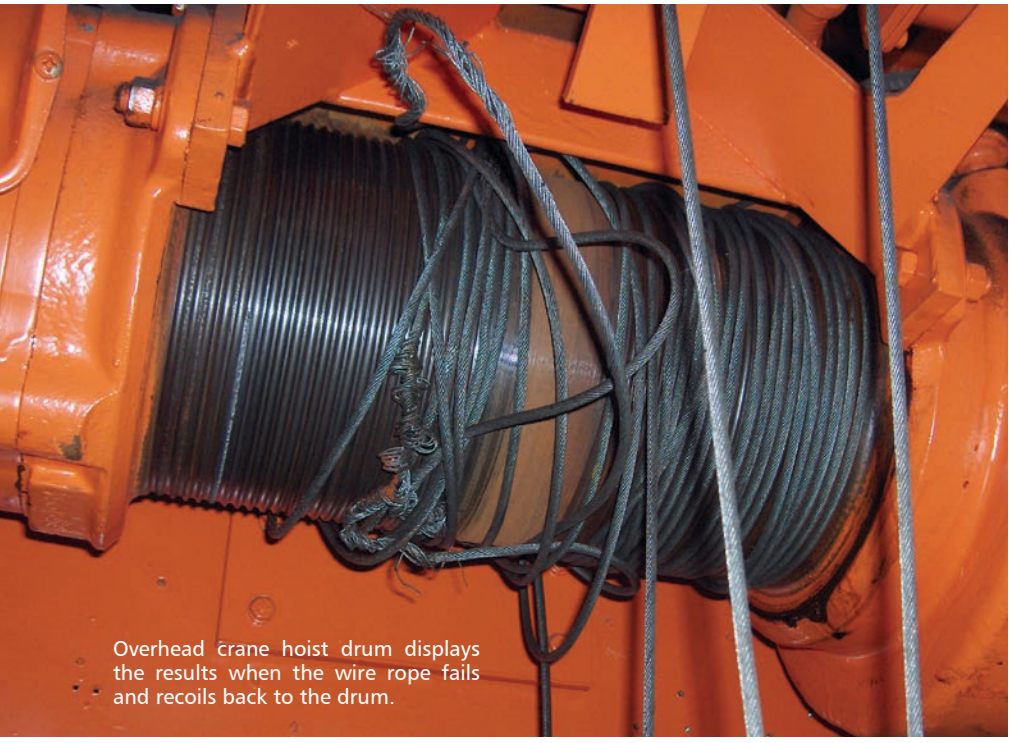
A wire rope broke on an overhead crane in an automobile factory and the block came crashing down. Thankfully no one was hurt, the wire rope was replaced and everyone got back to work. Three days later it broke again…and the block came crashing down.

How could this be? It was a new wire rope. Did anyone stop to ask "Why?" Was the wire rope installed properly? Maybe there is an issue with the crane? Maybe an issue with the operator? Maybe it was the wrong wire rope? An investigation took place but they could not determine what happened. The wire rope was replaced and operations resumed—but this time with a surveillance camera on the crane.

We wish we could tell you that the story ended there, but it did not. Two days later the wire rope broke a third time, but this time it was caught on video. So what would cause a brand new wire rope to break? The "Why?" was due to the crane operator's improper operation.

The operator was using the crane to drag the load instead of lifting the load. Something he was probably shown by a mentor and probably thought it was a good use of time. However, overhead cranes are only meant to lift loads vertically.

As the operator dragged the steel die across the factory floor, the horizontal side pull was causing the wire rope to wear against the drum groove edges and the underside of the trolley. As a result the wires and strands were getting severely worn and cut. After a few days of heavy use the wire rope broke. The operator received training on how to properly use the crane and there were no more incidents.



Overhead crane hoist drum displays the results when the wire rope fails and recoils back to the drum.

A Near Miss

A client mentioned that one of their mobile cranes was experiencing issues with their wire rope on the drum, leaving gaps in the lay and crushing the wire rope as it was spooled off and on. They asked "Why?" The first thing to know is that when a crane's hoist rope has not been installed correctly, broken in and re-spooled, or misused the wire rope may not properly lay on the drum. It can expand away from the drum when there is no tension on the hook, try to bunch up against one flange on the drum, or react in many other undesirable ways. So this called for a closer look.

First, it was identified the type of wire rope was correct by the manufacturer specifications. The right lay rope was coming off the drum in an over wound fashion as per the manufacturer instructions. But "Why?" was the wire rope not sitting properly on the smooth drum. To find out the source of the issue, the crane was reeved to a single part line and the boom extended at a high angle. As this happened the client could see the crossover, or transition, from the first layer of wire rope on the drum to the second layer was not even—causing the wire rope to spool incorrectly as it was used.

They were able to fix the issue, keeping the first layer of wire rope tightly wound to create a firm foundation for the layers of wire rope that will be wound over it and checking the cross over between layers to ensure that wire rope lays properly in the groove created by the layer below. Once this was done, they were able to start working again without continued concern of the wire rope crushing and breaking due to winding issues.

This type of near miss is quite common and as such, the drum should be visually inspected daily as part of the operator's pre-use checklist. Then

Wire rope not spooling properly on a crane's drum is usually an easy fix when caught early. This photo shows rope that is probably crushed and damaged beyond use.

when spooling issues are detected they can usually be remedied by running as much wire rope off the drum as possible (leaving the minimum wraps on the drum) then re-spooling the wire rope making sure it winds nice and tight with no gaps between the wraps and a smooth cross over between layers.

If loose and uneven spooling is not addressed quickly, it can and usually does create excessive wear, crushing and distortion of the wire rope. The results of such abuse are a reduction in the wire rope's effective strength and a shorter service life. So asking "Why?" can not only extend the life of the wire rope but lead to safer operations as well.

In the case of the mobile crane pictured on the cover, the crane was having issues with the wire rope showing evidence of crushing but the owners could not figure out the "Why?". They called in Crane Tech to help determine the cause. A new hoist rope was installed on the crane and the boom was raised to 60-degrees, allowing the wire rope to be spooled off and then spooled back on and checked. After one use, the rope already showed crushing damage. This required a call to the manufacturer to consult as to "Why?" this would he happening. The size and type of wire rope was verified for the crane and the manufacturer suggested that the crushing was due to overuse and wear, but this was not the case as the rope had just been installed.

The "Why?" needed even further investigation. It was clear by the damage that the wire rope was not laying properly in the grooves created by the preceding layers. This required closer inspection of the crossover point. On this crane, the drum had a tapered transition manufactured into the drum to help the wire rope spool properly. After a detailed inspection and additional conversations with the crane manufacturer, they determined that the drum had a manufacturing defect causing it to pinch the wire rope and not transition the layers properly. The drum was replaced, the crane received a new hoist rope and the crane was safe for operation again. While manufacturer defects are not very common, this example demonstrates the importance of not giving up on asking "Why?" until a true resolution is found.

Training as a Factor

In the absence of formal training, workers often do whatever they need to do in order to get the job done. Untrained workers are often unaware of the dangers from performing tasks incorrectly, nor do they even know they are doing

Mobile Crane Periodic Wire Rope Inspection

Tips for Safety

When it inspecting wire rope on a mobile crane, there are several key tips to help keep the inspector and operator safe:

1. The crane operator and inspector must start with a meeting to discuss each person's role and how the inspection will be preformed—it helps if the crane operator knows what the inspector will be doing.

2. The inspector must NEVER stand next to the crane drum when the crane's house lock is not engaged.

3. The inspector must NEVER inspect wire rope as it is coming onto a drum—the rope should be inspected as is it is being spooled off the drum.

4. The inspector must have fall protection so both hands can be used during the inspection.

5. The wire rope is never spooled more than about 36-inches at a time. This allows the inspector to reach each section of rope for inspection.

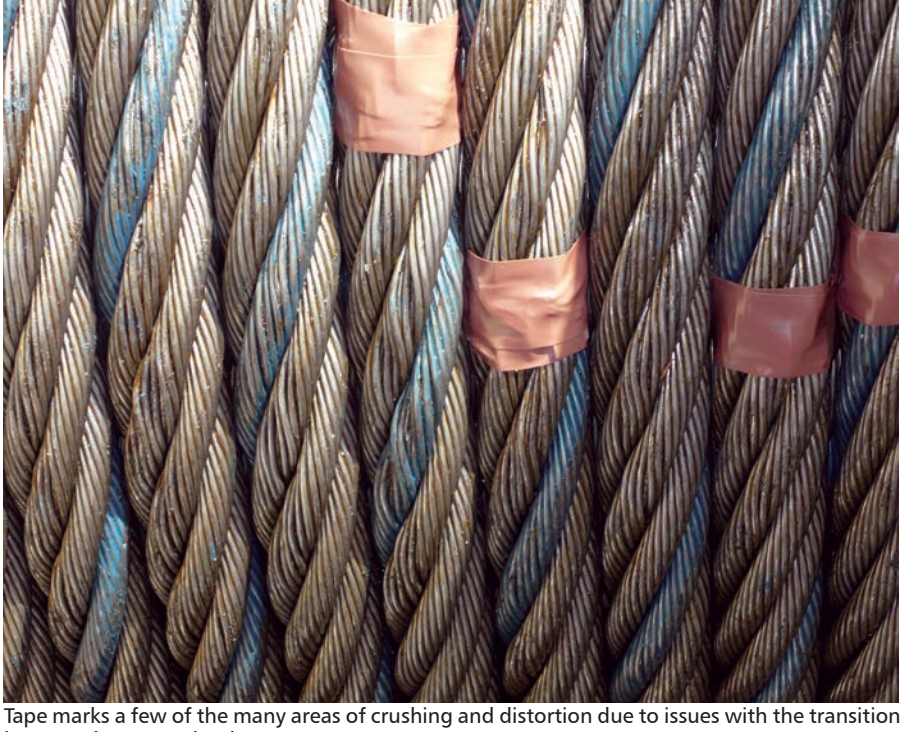
6. The inspector must wear protective gloves that allow for feel of the rope—only half the rope can be seen at any given time, so feel is critical to the inspection.

7. The crane operator NEVER spools rope off the drum until they clearly understand the inspector's instruction to do so. A suggested method would be having the operator adjust the rear facing mirror to see the inspector—and the drum does not move on verbal command alone, but they must see the inspector's hands held up and away from the drum.

8. If direct visual communication cannot be maintained a signal person should be used.

9. The operator should understand that some areas of the rope inspection take longer than others—at times there may be longer or shorter delays between spooling commands.

10. Absolute safety must be maintained at all times—any misunderstanding of a command from the inspector must be met by not moving the drum.



Tape marks a few of the many areas of crushing and distortion due to issues with the transition between layers on the drum.

something wrong. Other times employees simply do not know what to look for, what an issue or concern might be.

When employees use what they were "taught by co-workers" or just copy what their previous co-workers did, they could be putting their lives on the line. Hand-me-downs are fine for clothes and toys, but when it comes to lifting and rigging knowledge a casual "here let me show you this" may not be the best policy in the long run.

Companies need to have documented training programs in place that includes technical and practical instruction with written examinations and performance testing for their operators, service personnel and inspectors as applicable. But documented programs are only as good as the operations behind them. They must have follow through with opportunities for re-training as needed or frequent refresher training.

Ultimately, as Robert Noyce the co-inventor of the first microchip stated, "Knowledge is power. Knowledge shared is power multiplied." Companies who proactively take the time to ask "Why?" and fully investigate the circumstances will be empowered to resolve issues as they arise and keep sites safer—a win for all involved. WRN

Crane Tech, LLC is a training and consulting provider that has served the material handling industry for over 40 years. Among their programs, Crane Tech offers mobile crane operator, safety for management and inspector courses. Accident investigation services are also available. Crane Tech can be reached at 813-248-4800 or sales@cranetech.com. For more information visit www.cranetech.com.

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