Six *dangerous* misconceptions about crane safety

KNOWING THE FACTS COULD SAVE YOUR LIFE

By Larry Dunville

Nearly every product today has a warning label. In fact, many products have *multiple* warning labels, lights, and bells. We even have warnings telling us our coffee is hot!

It's little wonder, then, that many of us suffer from warning overload and just ignore the warnings. Unfortunately, warning overload has made it difficult to get a meaningful safety message out, especially when the warning is about something we think is just plain common sense.

Being aware of these six common misconceptions will save your equipment and even may save your life.

Overload

Misconception. I don't need to worry about overloading the crane; the manufacturer built a big safety factor into the design.

Fact. This is the single most dangerous misconception about overhead cranes. Although some parts of an overhead crane are designed with a built-in safety factor, this is not true of the whole crane system. Furthermore, the crane is attached to a building that does not have these same safety factors. Picture an overloaded crane sitting on the floor amid a collapsed building because the crane's safety factors were greater than the building's.

The crane and building probably were supplied by the lowest bidder. Do you really want to bet your life that the low-priced bidder put in extra capacity that wasn't asked for?

It's also important to know that only some hoists are equipped with overload protection. Since 1974 all chain hoists are required to have an overload protection system, but wire rope hoists *are not*.

Economical load-checking devices can be added to almost all brands and types of hoists. Do you know exactly what 30 tons is when you see it? Without markings, who could tell? Even when the load was clearly marked, countless problems have occurred when operators failed to remove all tie-down chains or anchor bolts. These new overload devices are inexpensive insurance against easy-to-make and potentially deadly mistakes.

Side Pull

Misconception. As long as the hoist has enough rope, I can pull a small piece of steel out of the adjoining bay without a problem. After all, the piece I'm picking up is well below capacity.

Fact. This is one of the most common mistakes made with overhead cranes. According to the Hoist Manufacturers Institute and the Crane Manufacturers Association of America, hoists and cranes are designed to lift straight up and lower straight down only.

Side pull causes a number of dangerous conditions. First, the wire rope often comes out of its grooves and "scrubs" against the remaining rope or drum, resulting in damaged rope. Sometimes the rope actually jumps the drum and tangles itself around the shaft, resulting in stress to the rope.

In addition, side pull causes stress in unintended ways even worse than rope problems. In a somewhat oversimplified example, let's say a bridge beam is taller than it is wide, because its primary loading is vertical. Pulling at a 45-degree angle would put equal lateral and vertical stresses on the crane, possibly causing bridge beam failure, even with a pick that's only half of the rated capacity.

Upper Limit Switch

Misconception. When I lift, I need all the height I can get, so I must lift until I hit the upper limit switch.

Fact. Again, this seems like common sense, but it's dead wrong. The upper limit switch in a hoist is designed to prevent the hook assembly from colliding with the drum. It is a safety device, not an operational device. If the ultimate upper limit switch fails, the hook block and the drum will collide and the wire rope probably will fail, dropping the load.

If you need an operational upper limit switch, install a second switch that is wired in a fail-safe mode. That way, if the operational limit switch fails and the ultimate upper limit is struck, the hoist still will turn off. Failure of the ultimate limit switch shuts down the hoist in the full up position, telling the operator to get help. If you don't wire it in this manner, you won't be able to tell when the first switch has failed until they both fail and the crane drops the load.

Secondary Braking

Misconception. All hoists have a secondary brake, so I can work underneath a load without fear of injury.

Fact. Like the previous misconceptions, this one seems to be common sense too, but the practice is terribly dangerous. All hoists are required to have a primary and a secondary brake. All electric hoists have a primary brake that usually is a fail-safe disk brake or drum brake. This means that if you have a power failure, the brake will continue to hold the load until power is restored.

For the secondary brake, some hoist manufacturers use a mechanical load brake. Others—about 80 percent—use a regenerative brake.

A mechanical load brake will hold the load if the primary brake fails. However, this brake generates a lot of heat and usually isn't used for applications with more than 30 tons or for high-usage applications of any capacity. Also, it is expensive and seldom used anymore.

The critical fact about a regenerative brake is that it does *not* hold the load in the event of primary brake failure, but rather will lower the load at its normal operating speed.

You should *never* stand under a loaded hoist. Doing so will definitely "split your skull," whether the load is free-falling or falling at a so-called "controlled speed."

Reverse Plugging Speed Control

Misconception. When the crane is traveling in one direction, the easiest way for me to control velocity is to "feather" the reverse button.

Fact. In the old days this was a reasonable method to control speed. Motors and contactors were much larger and heavier. They could take the abuse and were big enough to dissipate the heat. Modern motors and contactors are much more compact, and heat means premature component failure.

The Occupational Safety and Health Administration (OSHA) legally mandated crane brakes in the 1970s. Although this mandate was intended to increase safety, it just compounded the problem with hard decelerations and swinging loads. Adjusting the brakes for one speed and load results in wild gyrations at another speed and load.

In an effort to protect more delicate electric components and OSHA-mandated motor braking, manufacturers have developed various methods of soft start and soft stop, usually with variable AC inverters. These devices provide definable acceleration and deceleration curves. They also eliminate motor contactors and provide dynamic braking.

Reverse plugging is no longer an option. You can push the reverse button all you want, but until the crane comes to a complete stop, the reverse button does not work.

With older hoists, the load stops immediately. With new inverter-controlled hoists, every stop and every start goes through a prescribed deceleration ramp. It's much like driving a car—you have to decelerate before stopping and accelerate before hitting top speed.

Daily Inspections

Misconception. The crane worked yesterday, so I can assume it will work today.

Fact. Daily inspection is the simplest but most overlooked rule of crane operation. OSHA requires it, but few companies comply. This inspection doesn't require a maintenance person, just a commonsense check list. It should take one operator about one minute at the beginning of each shift:

In the event of primary brake failure, a hoist equipped with a regenerative secondary brake will *not* hold the load, but rather will lower the load at its normal operating speed.

- **Look.** Take a quick survey of the area. Does the crane look to be in operable condition? Have any parts fallen to the floor? Is anything hanging? Are there any signs of collisions or damage?
- **Listen.** Start running up the hoist. Do you hear any unusual sounds? Does the hook stop when it hits the upper limit switch or when it is lowered to the ground? (Not all hoists have lower limit switches, so check with a supervisor before performing this test.) Does the trolley and bridge movement sound right? Does the hoist appear to be working in all directions, and are the buttons' directions consistent with the movement? (Remember, if the power phases have been reversed, the directions buttons will be wrong, and all safety circuits will be disabled.) Are the end stops in place and functioning?
- **Document.** On the daily inspection sheet, check off that the crane looks and sounds operational and that it performed normally. Afterward write your initials.

The misconceptions discussed here probably represent a small fraction of the issues involved with crane safety, but they comprise the overwhelming majority of crane accidents and breakdowns. Make sure you and those around you understand these six topics, and chances are you'll have a safe and productive day. ■

Larry Dunville is president of Dearborn Crane & Engineering, 1133 E. 5th St., Mishawaka, IN 46544, 574-259-2444, fax 574-256-6612, ldunville@dearborncrane.com, www.dearborncrane.com.

Occupational Safety and Health Administration, 200 Constitution Ave. N.W., Washington, DC 20210, 800-321-6742, www.osha.gov.

Reprinted with permission from the June 2003 issue of The FABRICATOR®, copyright 2003 by The Croydon Group, Ltd., Rockford, Illinois, www.thefabricator.com.