TerranearPMC Safety Share

Week of April 28, 2014 – Critical Lifts

In November, 2013, a large crane, used to place the last piece of the roof for the 2014 World Cup venue in Sao Paulo, Brazil, suddenly collapsed, killing two persons and suspending construction activities until an investigation could be completed. A photographer was on-site and captured the entire incident, observing the crane pitched to the side before crashing down, damaging the stadium. It is suspected that the construction crew was working feverishly to meet its December deadline.

A few weeks ago, on April 12 in Bourne, Massachusetts, two construction workers died after the crane they were using on high-tension power lines tipped over. It was not particularly windy at the time of the accident and the ground under the crane was observed to be solid.

Based on OSHA's analysis of crane accidents in general industry and construction, there are an average of 71 fatalities due to crane accidents each year. A major reason for these types or tragedies occurs when a crane tips over. When a crane tips over, it is generally due to its rated capacity being exceeded.

Although all crane lifts require pre-lift planning to determine factors such as load weight, crane configuration, rated capacity, and site conditions, some lifts require more extensive planning by qualified persons and are often referred to as “critical lifts”.

There are many definitions of a critical lift. NIOSH defines a critical lift as one with the hoisted load approaching the crane’s maximum capacity (70% to 90%); lifts involving two or more cranes; personnel being hoisted; and special hazards such as lifts within an industrial plant, cranes on floating barges, loads lifted close to power-lines, and lifts in high winds or with other adverse environmental conditions present. The Department of Energy further defines a critical lift to include lifting high value, unique, irreplaceable, hazardous, explosive, or radioactive loads. Other organizations, such as the Army Corps of Engineers and various construction safety associations, while maintaining the most important aspects, have their specific definitions. Regardless of the nuances between organizations and how they define a critical lift, the actual definition is not as important as the planning necessary to safely perform the lift.

All cranes have capacities to help the operators understand how large of a load they can lift. The rated capacity, however, is not always constant. As the crane’s lift configuration changes, so does its rated capacity (also known as the load capacity). So, even if a crane has a standard rated capacity at one position, as soon as the crane’s configuration changes, so will its load capacity. This will have a direct impact on the crane’s ability to lift loads, regardless of the crane’s rated maximum weight capacity. Many times, rated capacity issues cause crane tipping or other stability problems. This makes it imperative that the operator understands the various capacity issues that are anticipated.

Keep in mind that both the crane and the hoist line have their separate rated capacities. So, while a crane’s rated capacity might be high enough to handle the load, the cable might not. If this is not recognized, instability problems, limit switch failure, and boom collapse can occur. If the wire

snaps, not only will the load fall, potentially harming those on the group, but the wire can also whip around and fly into someone, causing decapitation, internal injuries, and more. In short, this is a very dangerous situation, so you have to make sure that you read capacity ratings for both the crane and the hoist line.

Before making a critical lift, a critical lift plan, prepared by a qualified person such as the crane operator, supervisor, or rigger, should be considered. The lift plan should be documented in writing and made available to all personnel involved in the lift. The critical lift plan often includes the following information:

Description of the lift	Crane position and configuration
Lift height	Load radius
Boom length and angle	Size and weight of the load
Percent of crane's rated capacity	Personnel involved
Rigging plan	Communication method
Ground conditions	Environmental conditions
Inspection procedures	Procedures for hoisting personnel (if applicable)

The critical lift plan should document all pertinent information (i.e. load weight, crane and rigging capacities, inspections, wind speed) and should include approval and sign-off provisions. The critical lift plan should be based on the operational limitations specified by the crane manufacturer's load chart. Measured load weights, as opposed to calculated load weights, should be used when available. Another important factor is calculating the maximum radius. This is defined as the distance between the center of rotation of a crane and the center of gravity of a freely suspended load. The radius must be known and should be measured. At a minimum, a dry run should be performed by placing the empty hook over the pick and set locations; measuring radius for each case, then calculating the lift according to the farthest distance.

A pre-lift meeting involving the participating personnel (i.e. crane operator, lift supervisor, rigger) should be conducted prior to making a critical lift. The critical lift plan should be reviewed to ensure that the project team is prepared to safely conduct the lift. Whenever feasible, a practice lift with similar crane configurations and load conditions should be conducted. Practice lifts should always be performed by the same crew, using the same lifting equipment, as those used for the critical lift.

To help ensure that crane operators are qualified, OSHA now requires that persons who perform crane activities receive formal training (29 CFR 1926 Subpart CC). This training consists of a written examination that includes the safe operating procedures for the particular type of equipment the operator will be operating and a technical understanding of the OSHA Crane regulations. In addition, a practical exam that demonstrates the operator's ability to safely operate the equipment must be completed, and includes, among other skills, the ability to properly use load chart information and recognize items required in the shift inspection.

A prudent man foresees the difficulties ahead and prepares for them; the simpleton goes blindly on and suffers the consequences

Proverbs 22:3