Industry Best Practices for Crane Safety

By Steve Chisholm

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To discuss crane safety, it is important to understand some history of crane use, the beginnings of best management practices for crane use and tree care, and a little bit about what is happening with related legislation in New Jersey. I also want to go over some changes to the ANSI standard for the 2005 revision.

I started working off a crane back in 1969, but I have never operated a crane. Today, I choose my crane operators very carefully before we go out into the field. We generally use a fellow who has been working specifically with trees and cranes since 1974, so he is very familiar with tree cutting operations.

The tree care industry has been using cranes for quite some time, since at least the 1950s – roughly 20 years before OSHA came into existence. But, being a smaller industry, we didn't even make a blip on the radar screen for either OSHA or the ANSI/ASME B30 committee when regulations were being drawn up. And that is sort of why we are in the situation that we are in today, with potentially restrictive regulations and standards looming.

As with any other modern piece of equipment, we have been using cranes to make our jobs easier. And cranes have actually improved safety for our industry. We use cranes because we can move larger sections of a tree, and it makes it easier for the climber. We spend less time on conventional rigging and crane use reduces the amount of chain saw cuts that you have to make to dismantle the tree. From our perspective, it is less effort for the climber and less effort for the ground crew; therefore, a safer application.

Cranes can move large sections of the tree with less effort on the part of the climber and crew. If the job is worked following the appropriate ANSI Z133.1 standards, you will save time and labor as well as improve safety for all those on the job site.

ANSI Z133.1-2000, 6.7 Log Loaders, Cranes and Related Hoists: 6.7.6.9 The crane operator shall remain at the controls when the arborist is attached to the crane.

Cranes are carefully designed, tested and manufactured. When they are used properly following the appropriate standards by qualified operators and qualified arborists – and maintained and certified to the manufacturer's specifications – they can give you safe and reliable service.

Most accidents can be prevented through job planning and follow-through. You should always have a job briefing prior to commencement of any work. You want to know all of the hazards that the job presents.

Where does this job planning begin? It begins with the salesperson, who needs to know when the job requires a crane. He needs to relay that information to the crane operator and the climber. With that out of the way, it is necessary to have a crane operator and a qualified arborist visit the site to develop a work plan. When the crew arrives, the job briefing should be carried out so that everybody on the crew knows what their individual tasks are.

The operator and the climber need to be highly qualified and they need to communicate effectively. The climber needs to know that the crane operator he/she is working with knows how to work with cranes and trees and how trees react, both in cuts and picks. A lot of times we have to give specific information to the crane operator and tell him how much weight we are going to pick. We will use his capacity chart and radius to determine whether it is a safe pick.

If the job is worked according to the plan following appropriate ANSI Z133 standards, which we always follow, you will see a time and labor savings. And this is the overall goal – safe efficient crane operations.

Best practices

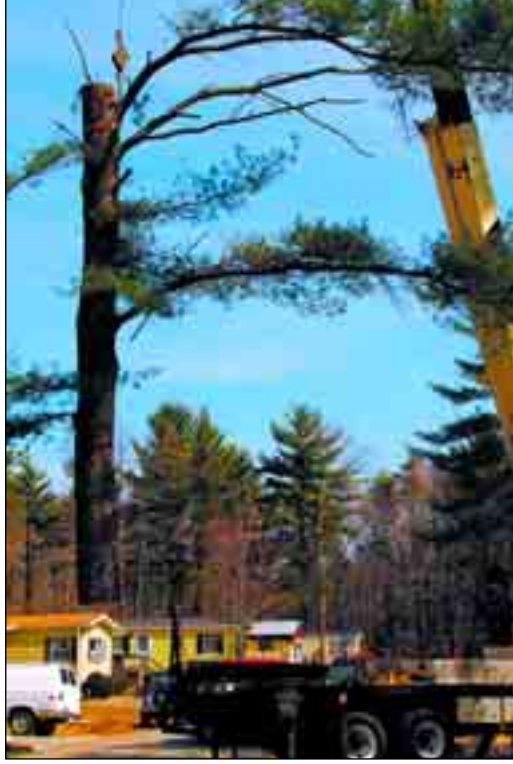
Best practices for cranes that my company uses were developed through collaboration with Don Smith, our crane operator of choice. Smith established his company in 1974, and has many years of experience removing trees with cranes.

We assess the location of the tree and obstructions, such as whether there are wires, other trees, limbs or buildings in the way. We want to know the size of the area where we have to lay sections of the tree down, since they will have to be cut to fit the area. We try to place the crane as close as possible to the tree to get the most strength from the crane. Remember, the greater the boom angle and shorter the stick, the more strength there is. The farther the radius, the less strength there is. One has to plan picks accordingly.

If the boom is to be extended quite far from the crane and you have to come out at an angle, you'll want to take a smaller piece, a piece more appropriate for the angle following your crane's chart or instrument readout and using a green log weight chart.

The crane must be set as level as possible. Outriggers should be extended fully. The operator needs to understand the ground conditions he is dealing with. Is it sandy, rock, or backfill, wet or dry ground? There needs to be a wider shoring area on poorer soil conditions. Cranes should back in over plywood, fiberglass or other matting to do less damage to lawn areas. One needs to know if there is anything belowground to avoid when setting up the outriggers, such as septic, dry well or sewer, and what kind of pressure will be placed on that ground.

The area of operation is important. The crane should be operated in the direction



Strap placement for picks is very important. Straps should be placed with chokers in the uphill position. There shouldn't be any twisting or swing when the piece comes off. The goal is to create a balanced pick.

Tree removal using a crane, circa 1950s. Photos courtesy of Asplundh Tree Expert Co.

ANSI Z133.1-2000, 6.7.6.10 The crane boom and load line shall be moved in a slow, controlled, cautious manner with no sudden movements when the arborist is attached. The lifting or lowering speed shall not exceed 100 ft./min. (0.5 meters/sec.). The crane shall be operated so that lowering is power-controlled.

where there is the most stability. The best area of stability is over the rear. When the boom swings to the side, stability is lost. When we set the outriggers down, we generally extend the boom and put a little bit of a load on to test it, before we put the boom up in the air, to see if we are going to have any problem with the outriggers collapsing in that ground area.

Again, communication is the key. Everybody needs to know what is going to happen with the piece being removed. They need to know if it is going to be lifted up, lowered or come straight up. Here again, if somebody is uncomfortable with the way the operation is laid out, the crew needs to change the plan.

The operator and climber need to know each other's ability. Does the operator have experience in tree removal? Depending on whose crane is available, we may have to go through the routine of describing how a tree reacts when the operator is taking the piece if the operator is not experienced in tree removal. The climber has to have experience working with a crane as well. You don't want to put a guy on a crane or up in a tree with six months or even two years worth of experience without them having any experience with a crane operation.

The crane operator needs to be at the controls at all times – and the signals between the crane operator and the climber are key for that safe pick. Knowing crane hand signals is very important. The crane operator, if qualified and competent, will know these hand signals.

Although there are many variations, there are two basic methods of tree removal:

1) The climber works out of the tree. This is only if the tree is healthy and safe to work in. A lot of times the climber is more comfortable because he is used to that environment. The disadvantage is that the climber has to continually go back up to place the slings.

2) The climber works off the crane. This method is used when we have a dead or overly hazardous tree or where there is no available tie-in point in a sound tree. The advantage to this is that there is always a safe tie-in point. The disadvantage is that the tie-in point moves with the crane.

Strap placement for picks is very important. Straps should be placed with chokers in the uphill position. There shouldn't be any twisting or swing when the piece comes off. Straps should be placed in such a manner that the pick will come up as

smoothly as possible, which eliminates shock load on the crane. If necessary we use multiple straps. The goal, obviously, is to create a balanced pick.

Some people have the impression that we expect the crane to catch the tree sections we are cutting. This is not how we operate. You need to know where to place your slings so that you can have a level pick.

With a lift cut, the butt end must be slightly heavy. The piece is raised up as in traditional rigging. When a crane lowers a piece, it should do so in the same manner as one would do with rigging: gently, slowly and in control of everything.

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ANSI Z133.1-2000, 6.7.6.7 The crane operator shall test the adequacy of footing prior to any lifting. A green log weight chart (in Annex E) should be available to the crew.

With a crane pick generally the first cut is an undercut – just like with drop cuts – and the second cut is straight through. When raising a limb, the top side is notched and the back cut is on the underside so that the crane can pull the piece up. With lowering it is the reverse: notch on the bottom, back cut on the top and then lower it gently.

Knowing the tree species characteristics is also important. You need to know how that wood is going to react when it is cut. Is the wood going to snap, or have a lot of hinge wood like an oak?

I maintain that cranes make tree work safer. New Jersey's Fatality Assessment Control and Evaluation (FACE) program, part of the State's Department of Labor, compiled the fatality listings in New Jersey from 1990 to 2004. In that time, New Jersey suffered 34 tree industry fatalities by tree failure. Ten of those, roughly 30 percent, were due to the climber being attached to the tree, the tree or the limb failing and the climber falling to the ground. By contrast, we had only one fatality where the climber was attached to the crane, and that was caused by electrocution.

New Jersey is attempting to implement crane operator certification and we are seeking an exemption for tree care operations. Arborists in New Jersey aren't opposed to certification per se; however if the law went into effect it is quite possible that our operations would be considered non-conforming and we could be subject to stiff fines. In New Jersey the penalty for a first offense is between $100 and $10,000. A penalty of not less than $500 and no more than $100,000 for subsequent offenses could put an arborist out of business.

We actually want to be included under the law, but only if the ANSI Z133 standard is the standard governing our activities.

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