



Arborist Rigging Operations

By Ken Palmer, ArborMaster®

There are many decisions to make both prior to and during a rigging operation. An arborist not only has to deal with the forces of falling branches, equipment strength properties, crew communications and work flow, we must also assess the tree for its overall stability as well as the stability of potential anchor and rigging points.

Working safely, productively and professionally in trees while carrying out many of the diverse procedures that today's arborist is faced with, truly requires a solid understanding of basic physics and terminology. Educated decision-making ability as well as the skills to carry out complex procedures is both expected and required in order to practice modern arboriculture as a profession today.

The rigging techniques presented here are meant to give a general overview of some basic rigging methods and to introduce some rigging terminology that can help an arborist to communicate clearly and concisely. This article is not meant to be a substitute for a systematic **training** process that educates the practitioner as to the why best practice must be observed and trains the arborist how to develop the skills to safely and productively carry out rigging operations.

Basic Principals

The basic principle in rigging is to tie off the limb or section of wood being removed with a rigging line that is run through a rigging point somewhere in the tree and or in a nearby tree. Friction, somewhere in the system is typically used to assist a worker on the ground to manage the force that will be generated, to control the descent and many times to decelerate the piece after it is cut from the tree.

There are many ways to tie a rigging sling to a tree in order to attach rigging equipment, and many ways to attach a rigging line or tag line onto the section of tree being removed. The only correct way is to choose a knot specifically for its ability to perform a given task and to tie, dress, and set the knot correctly.

However, there is a default method, and it goes like this: "if you really don't know the right knot, just tie any lot." It sounds like a joke but many of us are familiar with the default method and it is neither safe nor is it professional. An arborist must not only know the ropes, he must know the knots!

Butt Line

A butt line is a rigging line tied near the point of the cut. If a butt line is used alone, the tip end of the limb will drop when the cut is made. Tip-tying the limb will cause the butt end to drop when the cut is made. Either method will cause the limb to swing so the climber and ground crew must make sure that they will be able to control the cut piece so as to not injure the climber or damage obstacles below.

Tying the rope at the balance point of the limb can allow the limb to be lowered horizontally with less swing. This, however, is difficult to judge, and the climber could create a battering ram if not careful. It should be noted that there are other more advanced techniques and tools that can be used to balance limbs.

Double Hitch

A Double Hitch is a combination of a tip tie and a butt line. This technique is sometimes called a Drift Line or Load Transfer Line when the lines are rigged between two trees and far enough apart to for the load to be “drifted” or “transferred” away from its original position. The two lines must be carefully chosen to minimize swing or maximize control with no tangling. However, a limb that is double hitched is generally safer and easier to control though it may require two workers to handle the rigging lines.

Tip Tie and Lift

Tip Tie and Lift is a method of lifting a limb to a vertical position before lowering it. In order to minimize the potential of the limb swinging out of control, the rigging point must be set as directly over the cut as possible. A face notch and back cut is made that will allow the hinge to work until the limb is almost vertical before it closes and beaks off. Mastering the cutting method allows the climber or bucket operator to move away before the limb is lifted, greatly enhancing the operation safety.

A tag line can be used in combination with each of these methods. The tag line does not support the weight of the piece and it is not rigged through the tree. It is only tied to the limb to help ground workers either break the piece off (sometimes called a pull rope), control the direction of swing, and assist in landing the piece safely.

Removing a Section of Wood

When a limb or section of wood is rigged for removal, the climber must be able to use the appropriate method of cutting it off. A top cut alone will create an indefinite hinging type effect. Depending on the species and condition of the tree, this can cause a limb to peel beyond the branch collar. A top cut with an undercut will minimize the risk of an uncontrolled swing or peeling, but the limb may not drop free in one smooth motion. This can create a significant jolt to the climber and the tree when the limb releases from the tree. A notched cut or face notch with a top cut (back cut) will allow for more control on the drop in many situations, with less chance of limb barber chairing (splitting of the limb), or rotating on the cut.

Another technique worth being familiar with is slide-lining/speed-lining method. In its most basic application, slide-lining is a method of attaching limbs or logs with rigging equipment such as slings and pulleys to a line that is tied high in a tree on one end and low to another tree or anchor point some distance away from the tree being worked on. One end of the line is controlled by a ground worker in order to land the piece after it is cut and it ‘slides’ diagonally down the slide-line to the ground. The climber cuts the section and allows it to slide down the rope to the ground. The purpose is to remove sections while avoiding obstacles below the tree while possibility moving the sections closer to the truck and or chipper. Once again, it should be noted that there are many more advanced methods of setting up a slide-line that can give more control over the piece being removed.

Removal Strategy

The strategy for dismantling a tree will depend on the circumstances. The climber should plan a systematic order of removal to avoid being left with a limb that is too difficult or dangerous to remove. Removing the easiest limbs first could eliminate potential rigging points that would be very useful later in the removal process.

Trunk Removal

One of the most difficult and dangerous aspects of tree removal is chunking out trunk sections that are rigged vertically upon themselves (blocking down wood). Safety, as always, is the primary concern. An arborist block should be tied under the point of the cut with a rigging sling that is at least twice as strong as the rigging line being used because the force that the rigging point will experience is often twice that which the rigging point will experience. The face notch and kerf cuts below the hinge should then be made before tying off the section of wood to avoid cutting the rope with the chain saw.

After passing through the arborist block, the rigging line is often tied to the section with a half hitch tied above the cut, and a running bowline is tied higher on the section. important thing to remember is that whenever possible dynamic forces and shock loading can be greatly reduced by letting the line run so as to gradually decelerate the load. The ground worker running the rigging line should take an adequate number of wraps on the friction device in order to control the load while standing well clear of the drop zone. The rigging line should be held loosely in the hands at first then pressure is applied to the rope in order to slow it gradually.

Never try to rig a section of tree that is too big. Never add a weak link and/or an unnecessary connecting link to your rigging system. Always consider what could happen if any component of the system should fail. 'Fail safe' means that if something were to fail, everyone would be safe!

The key to arborist rigging operations is a sound understanding of the potential forces, the structural integrity of the tree, the right equipment for the job that is able to handle the highest potential forces with an acceptable factor of safety and a large mental toolbox.

Ken Palmer is president of ArborMaster® which provides safety, skill and productivity training for people and organizations who work with, in, and around trees. www.ArborMaster.com