LARGE WOOD & LOWERING DEVICES

A seriously damaged item of lowering equipment that I frequently have come across, is without doubt the lowering device. The aim of the following article is to help Arborists choose the appropriate lowering device, and appreciate its limitations.

Introduction
In the past, the closest most people came to using a lowering device was to take wraps on a large stub, either in the tree or closer to the ground. This would (and still does) work fine for some tasks. However, if the stub was chosen carefully, it wasn't unusual to see it rip out of the tree with large shock loads!

So, why bother with a stub instead of taking wraps?
Well, anyone who has had to wrestle long lengths of large heavy rope around a tree trunk up against a fence, time and time again, soon looks for an easier solution if their brain matches their braun! It soon becomes no effort at all to take a few wraps around a large stub.

What kind of stub?
The normal criteria for choosing a stub would be one that would stay attached to the tree! This (unsuspectingly) usually gave a good bending radius for the rope as large, strong stubs are chosen. Also, a horizontal or slightly drooping stub was chosen so as not to bind the rope. Providing the rope was half hitched correctly in the tree, this also gave an excellent bending radius and weak links were avoided (ie no additional equipment).

So, why use a lowering device instead of a stub?
Well, the short answer would be – 'How many suitable stubs are waiting for us at the bottom of every tree?' Not many. Plus the bark can shred the rope or sap can bind it. But there are usually plenty of stubs available *up* in the tree, so why not use those? I still do on many occasions, but never with large wood! This is because a half hitch usually has to be formed – This can cause considerable burns to the rope if the section is allowed to run, or prevents the entire rope paid out from helping to absorb the fall energy when topping down. I know this because I have previously managed to destroy new 7000Kg breaking strength lowering ropes with 500Kg lumps of Beech whilst topping down. I also remember stripping out a splice from a 7000Kg breaking strength false crotch! This is what started me to look at improved ways of rigging.

The dynamic loading to a rope used for topping down can be phenomenal, totally voiding the normal working load limit. A falling section can be expected to quadruple in weight over a very short distance. The longer the section, the more fall force will be put into the system! The likely shock load needs to be considered and accounted for *within the working load limit.* This can be greatly alleviated by 'letting the work run'. To do this with consistent effectiveness requires a suitable pulley, lowering device and expertise!

So, what is a suitable lowering device?
It depends upon what you are doing – a figure of 8 can arrest loads of around 300kg, and an Italian hitch even more. However, the Italian hitch will burn the rope as a hot spot builds between the rubbing surfaces of rope on a quick descent. Therefore, only use it for lighter sections (upto 150kg) with slow descents over short distances. Longer descents will require a figure of 8 to help absorb the friction heat.

I wouldn't recommend either of these be used for topping down operations, and both twist the rope into 'hockles'. These devices are lightweight and great for the climber to use in the tree, enabling a sole ground worker to deal with the load as it descends. If used as a substitute for a pulley, they reduce anchor reaction forces and enable the effective rope length to be doubled on the descent (handy if your rope turns out to be ten feet too short!).

The Portawrap or Flying Capstan
This is a good choice for removing large limbs when anchored from above. Most have a working load limit of 1000Kg, but I still come across those with a 'seriously distressed' look! This is because they have been used for topping down large sections, or have had rope wraps taken incorrectly. It is difficult to arrest sections adequately with this piece of equipment when used for topping down. This is because of the way it is attached to the trunk – As the face closes on the section, slack is introduced causing the device to drop then violently catch. It can be used with success for topping down if the section can be allowed to run, gently arresting the fall. This takes experience and practice. Don't use your portawrap for catching loads if it doesn't have a retaining hook or loop to prevent the rope from flying off the device!

Another limitation to the portawrap is its poor bending radius – The larger models can just about cope with a 20mm rope diameter, but I never use it with more than 16 mm when topping down. The device should be anchored with a sling of the same working load limit (WLL), as long as a 7:1 safety factor is maintained. If a karabiner is all that is available to rig the device, use two of them back to back. It is preferable to choke it directly to the sling or use a shackle – they don't have weak gates!

Friction Bollards and Capstans
If 4 foot long by 20 inch diameter sections of Oak/Beech are to be topped down, you will definitely benefit from using a friction bollard mounted tight to the trunk. Especially if the section has to be immediately arrested because of close targets. These have the ability to absorb the heat built up by heavy sections without damaging rope. This can be done via the use of alloy or by filling the device with anti-freeze. A ratcheting capstan will also make light work of removing unwanted slack and shock loading.

Topping down a 4 foot section of Oak/Beech of 25 inches in diameter, should be testing the 10:1 safety factor of a 7/8" double braid long before it should trouble a well seated and designed bollard. It is therefore worrying to see any lowering bollard straining on the strap winch pin because of incorrect fitting to the tree – especially during shock loading! It also isn't uncommon for bollards to slip up the trunk when shock loaded. To avoid this problem, ensure the device is tightened and seated properly; the winch strap should run in a straight line from one corner of the device to the other. Pay particular attention to the manufacturers instructions for mounting.

Always re-direct the line so that it enters the device vertically. A side pull will unseat the device.

Always use a tough pad between the frame and tree, if the tree is to be retained; tensioning the winch strap properly can cause the device to cut and 'buckle' the bark, even if pads are attached for tree protection.

The dangers of topping down very heavy sections will test the strongest gear almost to detruction. Cycles to failure are directly related to the safety factor. Just because some hardware items can take a proof load of half their breaking strength, doesn't mean they can do it for an especially long period of time. This not only chances the risk of injury to persons and property, but will be extremely costly in gear replacement. So much so, in fact, that even timber value of long lengths does not justify it. Big trees should be rigged off other trees or cranes, greatly reducing shock loading. Oak rings for example, of over 30 inches diameter, should be dismantled as discs between 1 and 2 feet long. This can be done with effective alternative techniques other than a crane (see extreme rigging). This work can be done conventionally, but the ropes and slings will likely have to be retired after the job, and there is a real risk of catastrophic failure. I feel that in most of these cases, the risks and costs far out weigh the benefits. In fact it is hard to realise the benefit of wrestling large slings, ropes and pulleys at all.

If a 15 inch diameter by 4 foot piece of Oak weighs 250kg, a 30 inch diameter by 4 foot piece of Oak will weigh about a tonne. If this is topped down and immediately arrested, it could weigh 4 or 5 tonne at best – this will require a rope with a 5 tonne safe working load *and* excellent energy absorption! But what about the anchor forces? If only a 5:1 safety factor is applied to the rope, the pulley and anchor sling will require double the rope's breaking strength. And, depending upon the device, the lowering bollard will be tested up to its proof load. This is when a thorough knowledge is required to appreciate the limitations of links in the system, and the close proximity of your team to the grim reaper.

Always keep a safe distance from the device so as not to stand under a load or have your fingers pulled into and under the rope wraps. Always keep the rope under controlled tension when adding or removing wraps, and, no matter what device you are using, *always* wear a pair of thick leather gloves!

Proper training will teach you how to get the most from your equipment safely, plus tricks of the trade that give trained staff the competitive edge.