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Quicker and cheaper

When the UK Health & Safety Executive started to apply pressure on tree companies to use aerial work platforms around 10 years ago, there were many (particularly the older more experienced climbers) who took issue with the policy. They argued that climbing the tree to carry out the work was quicker and safer because access platforms were not designed to cope with the intricacies of tree work and difficult to get into the heart of the tree. Perhaps 10 years ago the climbers may have had a point? Truck mounted platforms with 4x4 capability were few and far between and those that were available were very expensive. Truck mounted lifts on standard road chassis did not have the capability to work in areas other than on solid ground near a road or driveway and struggled to reach more remote areas.

The spider lifts were still relatively new, with only a handful of manufacturers to choose from and although the platform heights available were more than adequate, the high purchase and rental cost caused many to choose platforms that were really too small for the job (often 12 metre units). This resulted in a number of accidents caused by setting up the platform under the work area rather than off to the side and out of the way, resulting in cut tree limbs falling into the basket and onto the machine.

Over the years the average working heights chosen by arborists has increased through 15 and 18 metres, with some using platforms of 22 metres and above. However with the majority of arborists using 4x4 pick-ups and a two axle trailer,

the combined weight of the platform and trailer needs to be around 2,700kg, which tends to limit users to spider lifts of 18 to 19 metres.

The use of powered access for tree trimming and cutting is now relatively commonplace, at least on commercial contracts, primarily driven by Health & Safety compliance by the main contractor/clients. On domestic tree work however, which is much less strictly regulated and more cost driven, their usage is a good deal less common. However according to Adam Watmough of Watmough's Forestry based just outside Melton Mowbray in Leicestershire, the use of a spider lift to carry out a contract is both quicker and cheaper, compared to climbing the tree.

"We have owned an 18 metre Platform Basket 18.75 for five



Climbing is still done but platforms are generally quicker and safer

years and it is so much quicker and cheaper than using guys to climb," says Watmough. "The main advantage is speed - we might take half a day to complete the contract whereas without the platform it can take two days. Less time and less men allows us to offer a much lower price even after allowing charging for the platform."

"Some climbers say they feel safer when working from the tree but most prefer the platform," he adds. "On a recent contract with a load of climbers, I set up the platform so that I could reach six trees within its outreach, and with one relocate completed trimming 12 trees when the best and fastest of the climbers had only completed three!"

This would seem to counter the argument that a climber is quicker at the start of a contract but may slow down if the job lasts for several

days due to fatigue. It has also been said that the use of platforms helps older tree workers continue working when too old to climb - however it would appear that a platform used by an experienced operator - both young and old - is just simply quicker. Safety, of course, is down to the individual, common sense and training, however all things being equal, the platform is almost certainly safer as well.

As they are not specifically designed for tree work most platforms can benefit from some application oriented modifications, such as additional protection to prevent damage from falling branches. Spanish manufacturer Mecaplus produces an automatic self-levelling platform specifically designed for tree work which has plenty of protection with all hoses fully covered to avoid damage. On other platforms engines, hoses and levers are all susceptible and a careless moment dropping a branch onto an engine can be catastrophic.



Watmough's new Unimog with chipper and a spider rented from Higher Access

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Make sure the platform has enough working height for the job

"One guy I saw dropped a large branch which hit and ripped off the fuel line of a petrol powered platform. Petrol, a hot engine and lots of cut wood and brush created a raging fire almost instantly. Although thankfully I was able to extinguish the fire, you have to be so careful to ensure that logs and branches are dropped away from the platform."

Watmough's Forestry is a six man company that has invested in the equipment needed to carry out a wide range of work throughout its 10 year existence. As well as the Platform Basket spider lift, it has two custom-built Hi-Lux 4x4s, a Landrover 130 with custom tipper, two Timberwolf 190 chippers and it has just invested in a 2150 Unimog with TP250 chipper on the rear and a Dücker flail (verge mower) with seven metre reach on the front.

"We carry out a lot of power line clearance work for utility companies and this keeps us very busy throughout the year," he says. "The spider lift is ideal for this type of work as utilities prefer access equipment to be used, as it is quicker and safer. The bird nesting season is officially from March until August, when it is recommended that vegetation works – tree or hedge cutting – should not be carried out. Power line work during this period can still be carried out as it has an exemption due to the high risk caused by trees affecting the power lines. When we first purchased the machine we were using it all the time as we were doing a lot of work as part of a five year plan to reduce the impact of trees on power lines. When not in use we rent the platform out, but

always with an operator which ensures it is used correctly and looked after. The Platform Basket is an excellent machine and if there have been any issues, dealer Promax has been brilliant and has always sorted it out for us, even coming out on a Sunday to fix a problem."

While a number of different platforms are used for tree work, the spider lift has a number of features that arborists find useful. Because of the need to access remote trees and travel over rough terrain a longer track length both reduces ground pressure and helps reduce the break-over effect when travelling over poor terrain as well as when reaching the top of a loading ramp or incline. In



Spiders are ideal at tracking over rough terrain to get to the workplace

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A view from the basket

travel mode, narrow spiders can be quite unstable, so extending tracks increases stability and some can also raise the chassis to give greater ground clearance.

"When tracking to a site where there is a possibility of the machine toppling over to the side, we always travel with the outriggers partially extended so that if it did start to tip the legs would stop it from going over completely," says Watmough. "A high and a low speed travel speed is also useful as there are many contracts when we have to track a good distance with the machine to reach the work area."

"The platform load monitoring system is better located well away

from the basket - on the Platform Basket machine this is on the main lift cylinder - to avoid unintentional damage when operating in and around trees etc. And finally options such as a single person basket, safety partition panel for use during chain saw works are useful as is platform rotation and a good basket capacity. The essence of tree work is to go up and throw down - so protection is vital to avoid expensive damage. I have made some minor modifications to our lift and have also made suggestions to the dealer in the hope that future platforms will have the modifications included."

Watmough found there was a problem with the lower control

levers fouling on branches when the machine slewed, breaking them off. To protect them and cure the problem he fabricated and installed a tube frame.

"Some machines have protection on the top of the outrigger cylinders and also on the chassis to protect from falling branches. Sensor malfunction can be a problem particularly with a lot of sawdust present when working with the chain saws. Every time we come back from a contract the machine is carefully inspected and cleaned including checking and making sure the sensors are working correctly."

"I may be tempted to add a larger spider lift in the future, but perhaps not yet as most of the power lines in the areas we cover have been cleared under the five year plan and will not require a lot of work for a year or two," he adds. "Even so we will still be busy with power line clearance. For the local utility companies it is much easier to spend £17 million a year on tree work than say putting the lines underground."

Pricing and winning domestic work

is difficult for us as we will not cut corners - having trained arborists, the proper equipment and full tree insurance (not landscape which is much cheaper) - our quotes are often undercut by local companies just happy to win the work by not using the safest of methods. So we tend to focus on commercial work and win all of our work now by word of mouth which is a great recommendation of the standards we achieve."



Climbing is a skilled and physically tiring activity



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The hazards of working with trees

A common quip among crane rental companies is “lift hot tubs and trees at your peril” with a good number of them avoiding this type of work at all costs. You don’t need to look too far to find just cause for such an attitude. The website www.vertikal.net is littered with examples of cranes that have overturned while helping remove trees from the backyards of homes.

While it is true that the majority appear to have occurred in North America and Australia, plenty of examples can be found throughout Europe. The difference in numbers may simply be due to Europe’s greater population density leaving fewer homes with large trees in their gardens?

There are generally two reasons for cranes overturning while working with trees, one is ground conditions - usually due to the crane operator setting up on a domestic driveway, lawn or over a septic tank or drain. As the crane takes the weight of a chunk of tree the ground gives way under the outriggers and over goes the crane, with its boom usually landing on the roof of the house.

The second is simple overloading, including dynamic overloading (shock loading) which appears to be equally as common. The crane is rigged to a section of tree, which is then cut free and falls or slips

away from the remaining tree trunk and proves heavier than expected. It may also swing out increasing the planned radius - add in a little dynamic loading and the outcome is very predictable. The net effect is that the crane is seriously overloaded and overturns.

The fact is that assessing the weight of tree wood is rarely taken seriously enough. For example, the weight of a growing tree can almost double from its dormant state or when dead. The variety of tree can also make a massive difference with the density of a live oak tree can be three times that of some trees and yet half that of some heavy pines. The calculation formulae provided by specialists are not exactly the simplest of equations, especially for those with an aversion to mathematics.

We also wonder how often those cutting the tree are tempted to go for increasingly longer sections



If possible have the arborists remove limbs before taking the trunk

as they move down the trunk and the cutting gets tougher? The combination of longer, larger diameter pieces can catch even a prepared crane operator out, especially if he cannot see the tree as it gets lower. Sitting out front of the house, he has to rely on the tree surgeon’s staff to provide signals and information. Applications such as this are a perfect example of how remote controls can allow the operator to keep a close eye on what is going on. Alternatively he needs a bright and trustworthy

assistant and should to be able to estimate the weight of a timber.



Shock loading can also cause problems



Typically when lifting a tree goes wrong the house catches it



Setting up on uncertain domestic grade ground is a common cause for overturning



Another idea is use a crane small enough to get close to the tree

Weight calculation

One calculation is to work out the trees volume using $\pi r^2 \times \text{length}$. This is done by measuring the diameter of the tree trunk at chest height, then half it to give the radius, square this and multiply the result by Pi ($\pi = 3.14$). Multiply this number (the area of the trunk) by the length of tree being lifted to get its volume and then depending on the density you can get a rough idea of the weight. The diameter can be calculated by measuring the circumference at chest height and dividing by $\pi(3.14)$.

So for example a one metre diameter tree has a radius of 0.5 metre so $0.5 \times 0.5 = 0.25 \times 3.14 \times 1 = 0.785$ gives one cubic metre then check a tree density chart and

multiply by the length. No one said it would be easy!

Given that from a lifting point of view it is always best to over-estimate the weight, we would recommend a much simpler calculation by taking the diameter of the tree and assume it is square rather than round. This means that a one metre length of a one metre diameter truck is roughly a cubic metre - much easier. Compare this to the calculation above when assuming the tree is a circle and it over-estimates by almost 30 percent - a useful margin of safety.

It should be noted that the total branchwood of a tree can be as heavy or even heavier than the trunk so make adequate allowance if the tree is not fully trimmed before

lifting – it is heavier than you think. Charts are available giving the density and weight of different trees by the cubic metre and reveal some surprising figures. A cubic metre of green oak for example weighs roughly one tonne a cubic metre. Beech and ash are surprisingly heavier, being in the region of 1.25 to 1.28 tonnes, while some pines can be almost two tonnes a cubic metre. With this single piece of information an operator can quickly calculate the rough weight of the larger tree parts he is being asked to lift.

Given that most trees that require a crane will have a trunk with a diameter of between 500mm and a metre a rough rule of thumb is to

allow 500kg per metre for trunks up to 500mm, and 2,000kg a metre for larger trunks up to a metre in diameter. This rough rule of thumb includes a reasonable margin for error, always helpful when working with trees. Once the operator has calculated the radius and boom length required for the job it allows him to inform the arborists the maximum length of tree trunk he is prepared to handle. And finally do build in plenty of extra margin for error – or you can always leave the job to those who like to ‘sail by the seat of their pants’.

The UK’s HSE publishes some very useful information on tree work <http://www.hse.gov.uk/treework/>



Estimate the cubic size of the log then allow up to two tonnes a cubic metre – then limit the length of the sections to suit the crane

Wood (dry)	kg/cu.m
Apple	660 - 830
Ash, black	540
Ash, white	670
Aspen	420
Balsa	170
Bamboo	300 - 400
Birch (British)	670
Cedar, red	380
Cypress	510
Douglas Fir	530
Ebony	960 - 1120
Elm (English)	600
Larch	590
Lignum Vitae	1280 - 1370
Mahogany (African)	495 - 850
Maple	755
Oak	590 - 930
Pine (Canadian)	350 - 560
Pine (Red)	370 - 660
Redwood (American)	450
Redwood (European)	510
Spruce (Canadian)	450
Spruce (Sitka)	450
Sycamore	590
Teak	630 - 720
Willow	420

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