

Sylvan safety

Given how tree work poses a range of serious safety risks, Will North takes a look at how access and load monitoring equipment can help arborists plan and perform their work safely. A second instalment to feature in the next issue of *Cranes & Access* will also look at the important developments in how cranes and new attachments are being used for this type of work.

The difference between forestry, covered later in this issue, and tree surgery is similar to that between farming and gardening. In forestry, the job is usually to fell, transport, and cut entire trees in large numbers. Arborists, or tree surgeons, are more concerned with removing or pruning single trees or small numbers of them, without interfering with the surrounding environment.

In forestry, speed and efficiency are key. For arborists, precision is more important. The task might be to remove a damaged tree from an urban garden, or to stop an overgrown tree from posing a threat to a railway line. On a job like this, a tree can't simply be felled, for fear that it will then damage nearby homes or railway lines. Instead, it must be cut or pruned

from the top down, with each piece lowered carefully to the ground. This requires an expert eye to estimate the weight of pieces to be cut, something that varies depending on species and time of year.

Anyone working in the lifting industry can immediately sense the risks involved: working at height, suddenly taking on loads of undetermined weight, using chainsaws at height. Other risks perhaps take a moment's more consideration but are equally important.

In normal lifting operations, the load is taken up from ground level and the load moment indicator will warn before it's too late. Taking the weight of a tree section as it is cut offers no such grace period: if the rigging used is insufficient the load will make its way uncontrollably to the ground.



Aerial lifts can improve both safety and efficiency



C&A

arborists



Lifting trees comes with high risks

Similarly, on a normal lift a competent operator will add the load to the hook gradually. Taking a tree section at height applies the full load instantly, possibly with an added dynamic loading, and introduce stresses across the equipment for which it may not have been designed. Slewing gear and telescopic booms are also not built for the regular side loadings or bounce that can occur in tree work.

Cutting trees, cutting risks

As in many jobs, it is impossible to remove every risk from tree work, but they can be minimised. In part two of this article, we will look at how some tree companies have worked with equipment suppliers to remove the need for work at height entirely. But this approach involves significant investment in equipment. Even with the right kit, climbing and work at height may be unavoidable.

One way to cut risks is to use aerial work platforms. When first promoted in the sector, there was a degree of scepticism. Some arborists may have felt that it

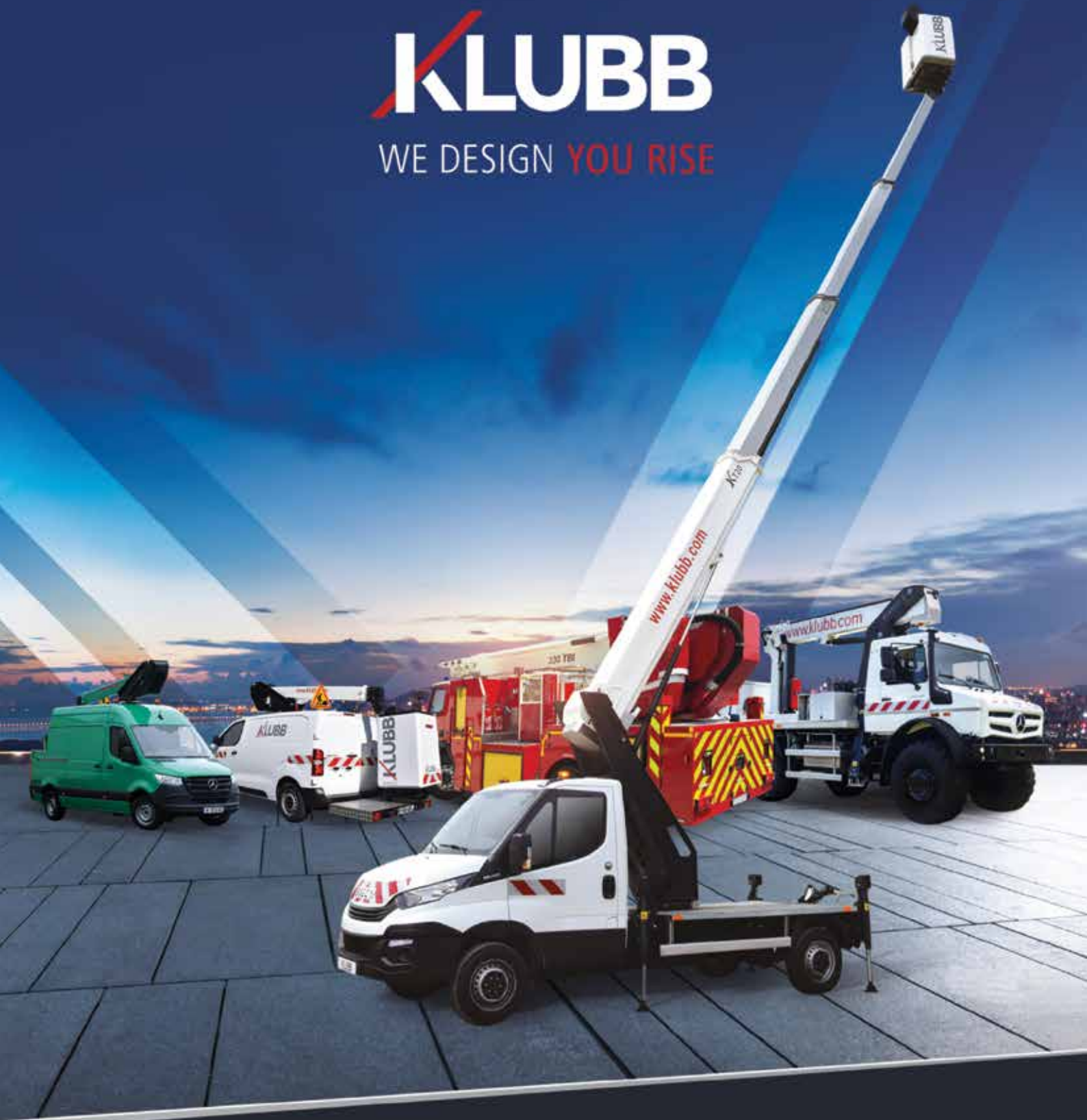
undermined a core competence of the job, climbing and work at height skills. Others felt that the equipment would reduce efficiency.

In the UK, HSE conducted research on the use of platforms. RR123 - Use and Effectiveness of Mobile Elevating Work Platforms for Tree Work compared a number of different aerial work platform designs, in various working environments. The report's introduction says the use of platforms, rather than climbing, offered "a more safe and secure working environment, reduced effort of the operator when gaining access to the working position and potential increases in effectiveness and efficiency." The HSE also produced a guidance document, Mobile elevating work platforms (MEWPs) for tree work AFAG403.

Shaun Day of Platform Basket distributor Promax Access was involved with the development of RR123 and believes the research helped convince the sector of the benefits of using access equipment: "The HSE were using tracked spiders, vehicle mounts and trailer mounts, and timed different

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Arborists often need to reach up, over and through, the branches

jobs being done using different equipment."

He notes that even then many only made partial use of the equipment, using platforms up to 15 metres to avoid the initial climb, but then climbing into the crown to do the actual work. More tree specialists are now buying lifts big enough to work from directly in the crown.

He adds: "The smallest we see now from tree surgeons is an 18 metre lift, while the 20 and the 22 metre versions are increasingly chosen, and we've even got some investing in the 27 and 33 metre machines. The key thing for tree guys is that they need to be far enough away from the base. So, if anything drops, it doesn't cause a problem to the machine."

"Our 33 metre, for example, has 15 metres of outreach, while the 27 metre, has 14.5 metres outreach. Keeping nine to 11 metres away seems to be where tree guys want to be, so it's as much about

outreach as working height." With arborists needing to take all their gear with them, such as chainsaws and protective gear, platform capacities need to be at least 250kg.

It has become a significant part of Day's business. He says around three quarters of the smaller spider lifts are sold to arborists. They often have just a handful of staff, so take just one or two lifts. However, the specialist rental sector is growing. One of Day's customers, Cutting Edge Plant Hire, now runs a range of aerial lifts from 18 to 27 metres, alongside its other equipment. The company also offers rigging gear and other tools, via its store Arb Bits.

On the road, in the woods

Getting to the job also needs to be considered. Spider lifts are good in that they can be transported by a two axle trailer but depending on the type of work, some prefer a vehicle mounted platform. Klubb subsidiary Cumberland Platforms offers what it calls an All Terrain Arb Truck or ATAT. It has just launched the first platform, a 13 metre Palfinger P130 on the new Isuzu D-Max pickup truck, with suspension upgrade to 3.5 tonnes and all terrain tyres. The unit offers a 240kg platform capacity and 6.2 metres of outreach. It can operate within the vehicle width, reducing risks when working alongside roads.

The new model includes a 24 degree departure angle and can tow up to 3.5 tonnes for a gross train weight of seven tonnes, critical for arborists who want to tow a chipper or trailer.

CPL is now the distributor for the full Palfinger Platforms product line. It has the 20 metres P200 as a handy tool for tree work, mounted



The new CPL/Palfinger P130 on the Isuzu D-Max truck

on a 3.5 tonne chassis. This unit offers up to 8.2 metres outreach, with a platform capacity 200kg - which may be a little light for some arborist's work. However, from the Klubb line, CPL can fit units in the KT range on the 3.5 tonne Iveco Daily, with working heights from 17 to 20.6 metres, up to 12.5 metres outreach and 300kg platform capacity.

Versalift, the main competitor to Klubb/CPL for pickup mounted 4x4 lifts, is planning to unveil a brand new product in this sector at Vertikal Days in September. We may well have more information in the next issue.

Expert estimates

A platform can take arborists safely to where they need to work without climbing. But there is one core skill that machinery cannot replace: assessing the load before a tree is cut. Load monitoring equipment cannot replace the expert eye and experience, but it can help assess working methods.

David Ayling of FAD Equipment Store helped develop equipment for this application at Straightpoint including the Impact Block, which was developed with the help of Chris Cowell at Treemagineers. Cowell uses the Impact Block to take measurements via a rapid sampling rate. A normal load cell will take measurements two or three times a second. That may sound fast, but it's nowhere



The Straightpoint Impact Block with Radiolink

near what Cowell needed. When a section is cut from a tree, whether it's rigged to a crane or to a rope system attached to the base of the tree, dynamic loading puts stresses throughout the system. To understand these forces, the Impact Block captures data at a sampling rate of 100 times a second.

The Impact Block is now being used by other expert arborists. Mika Vainionpää is a climbing teacher at Finnish arborist school, Sedu. He says: "Unlike crane related or other typical rigging scenarios, in tree applications, professionals do not always have an anchor above the lifting point. It's a type of negative rigging. Every tree is different. There are no labels in a tree that say to the climber how much the rig can take. You have to study and learn where those limits are. Branches are



Tree care companies are employing higher reaching platforms



Versalift will launch a new pick up mounted lift in September

one thing, while leaves and smaller branches can limit the force, but logs can be more unpredictable.”

Vainionpää used a 60kN Impact Block to measure and record the impact of the heaviest weights at the top and base anchors. Impact Block can be installed at the top of a tree or lower in the canopy before starting to cut limbs off.

“The Impact Block adds weight and rigging to our projects, but that is outweighed by the education it gives us. Trees are very complicated and normal rigging rules don’t apply. However, we are at the lower end of our learning curve with this technology and must continue to conduct tests and deliver education before it can make a widespread difference across arboriculture. For that reason, it remains more of a training product than a site only tool.”

While trainers and academics like Cowell and Vainionpää can use load cells to develop new methods of safe, efficient, working, load monitoring can also be a useful tool on the job. Steve Connally of Adaptable Aerial Solutions in Virginia, USA, uses a 25,000lbs/11,340kg Radiolink Plus load cell in his regular work, having initially put it to work a couple of years ago in Chesapeake, Virginia, to remove loblolly pine trees near a residential property, one of which had been struck by lightning. He used the wireless load cell below the hook on his Palfinger crane, to



Mika Vainionpää of Finland’s arborist school, Sedu, used a 60kN Radiolink Plus load cell to monitor loads while working



monitor each load as it was cut. Four arborists worked at heights of up to 28 metres, to bring down the trees piecemeal. The team employed spliced eye balancing and endless loop slings. The balancers were tied with a non-binding hitch and the round slings were set in a choker configuration using shackles and hooks for attachment at the choking point to prevent fabric on fabric friction.

Wood weights were calculated in advance using a green weight log chart that provides a general guideline by species and size. On-site, the load cell recorded the smallest pick at 1,625lbs/737kg and the heaviest at 6,500lbs - or just under three tonnes.

Connally said: “The crane doesn’t have an LMI like a cable crane. The controller shows the percentage of load on an LED light cluster. Since the wood weight varies considerably with environmental factors, time of year, and the

number of branch unions, it’s necessary to know the weights of the picks in relation to the chart and strength of rigging components. Each lift weight is evaluated in relation to the previous lift and the following. It’s a continuous harmony between the crane operator and the climber. This ensures we stay working within safe parameters.”

Climbing to new heights

While many young people may join the industry eager to spend their working lives climbing, the strains of manual work and responsibilities of middle age may make the risks of work at height far less appealing. With the right access equipment, tree workers can continue to work safely and efficiently, allowing experienced arborists to continue without risking life and limb. The latest load monitoring equipment can help develop their expertise still further.

In the next issue of Cranes & Access we take a look at how users in Europe are trialling new techniques from other parts of the world, including crane attachments that can eliminate work at height for some applications. And we’ll look at new guidance on the horizon to help such new equipment to be used safely.

Resources

- RR123 - Use and effectiveness of mobile elevating work platforms (MEWPS) for tree work
www.hse.gov.uk/research/rrpdf/rr123.pdf
- Mobile elevating work platforms (MEWPs) for tree work AFAG403:
www.hse.gov.uk/pubns/afag403.htm.
- Other HSE Arboriculture and Forestry Advisory Group guidance:
www.hse.gov.uk/treework/resources/publications.htm

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From hoe chuckers to helicopters

When we speak of the tree care market we naturally think of urban or semi-rural neighborhoods and pruning or felling in restricted or difficult to reach areas. But there is another side to tree work, where lumberjacks and 'difficult to reach' takes on a totally different meaning. Saul Chernos takes a look at lifting in the Canadian timber and logging industry.

Canadian forestry has long captured the world's attention. From the earliest days of European colonialism, when immigrants cleared massive tracts of land, Canadians have been reputed as drawers of water and hewers of wood. The Lumberjack Song, a 1969 musical hit by Monty Python, poked gentle fun at a masculine, back to the woods image, with the star attraction wearing a plaid flannel shirt and suspenders (braces), surrounded by uniformed Royal Canadian Mounted Police. In the 1990s, television screens the world over captured images of environmentalists protesting the clear-cutting of old growth in Clayoquot Sound, British Columbia, and Temagami, Ontario.

Forestry is serious business in Canada. Natural Resources Canada estimates it contributes more than \$24.6 billion to GDP and directly employs more than 200,000 people - 1.1 percent of Canada's working population. The industry's ups and downs regularly make headlines, from struggling pulp and paper to softwood lumber trade disputes, to shortages of wood products induced by Covid related



supply chain bottlenecks. Still, tree felling continues apace, with a wide variety of lifting systems and technologies employed.

Forests across Canada differ in terms of the species diversity, and physical landscapes, resulting in different tools being used for extraction and transport to market. Even in a single province like British Columbia, the range of technologies used can be considerable. Gerard Messier, program development manager with the not-for-profit BC



A six wheel skidder in action with additional tracks and chains



Forest Safety Council, identifies significant differences between interior and coastal operations.

In the interior, logging begins with the feller buncher, a tracked machine with a saw blade and grapple extension. "Basically, it reaches out, grabs the tree in its clamp before cutting it and placing it on the ground," says Messier. A four or six wheel skidder then raises one end of the logs with its rear mounted hydraulic arm and drags them to the nearest logging road where the branches and tops are removed. Loader cranes then lift the stripped logs onto trucks

for transport to sawmills and other destinations."

Coastal logging differs dramatically, with temperate forests yielding some of Canada's largest old tree growth, and the terrain often too steep for tracked machines. "A typical coastal operation will be dropped by a feller using a chainsaw to insert cuts into the base of the tree," Messier says. A hoe chucker, a tracked machine designed specifically to navigate the terrain, drags the felled trees towards the nearest road. But if the land is particularly steep, a cable yarder positioned on the road uses a winch with a cable mounted grapple to reach felled timber. The hoe chucker is attached to an anchor - usually a stump with a block or a pulley on the end, to allow it to go up or down the slope. "Imagine the machine sitting on the road," Messier says. "It lets out the wire rope, drops the grapple down, grabs the logs, and then tightens the slackened wire and pulls the logs to the roadside."

Based in Nanaimo on Vancouver Island, Maritime Timber provides hand felling for industrial logging operations that employ skidders, hoe chuckers and loaders. Senior





A Madill swing yarder/cable yarder in action brings logs to the nearest road with blocks, grabs and cables

project manager Brendan Flanagan says cable yarders are used for super steep, worst of the worst operating conditions. The machines, with a gantry on top of a carriage, are relatively mobile, with multiple lines that get strung up through a system of pulleys, snatch blocks and tension lines. "They can either run chokers or grapples. The logs are partially or fully elevated in the air depending on the specific cable system being used and dragging one end is sometimes necessary to overcome the massive size of the timber found in British Columbia."

When terrain is even more challenging, forestry companies will turn to heavy lift helicopter operators such as Erickson's Canadian Air-Crane subsidiary to remove the felled timber. The Erickson S-64 Air Crane lifts up to nine tonnes, while the Sikorsky S61 and Kamov 32a manage up to 4.5 tonnes. Medium lift helicopters, such as the Kaman K-max, manages 2.7 tonnes, while Bell has a range of models, with capacities between two and three tonnes. "There's a variety of helicopters used depending on the size of the timber and the terrain," says Bob Hawthorne, chief pilot with Canadian Air-Crane. The capacity is affected

by variables such as altitude, temperature, and a helicopter's fuel load. Terrain also affects airflow, which in turn can affect the maximum weight.

Helicopters are costly to run, of course, so their use is determined based on the overall value of the haul and also necessity. "They're for when the economics allow, so typically large old growth forests with cedar or high grade fir and spruce," says Flanagan. "They're lifting 11,000lbs (5,000kg) logs pretty frequently and show up for hilly logging jobs where they don't have roads. If a First Nations band, licensee or landowner wants to log an area where they don't want to build roads, it can be done by aerial transportation." It's vital to maximise load capacity and hasten turnaround times for a fully productive cycle on the machine, so units will be stripped of non-essentials such as seating. Some old growth trees are so enormous they'll be sliced down the middle, with halves weighing in the order of 9,000lbs (4,000kg). Crews then use a winch and belly hook to bring the logs down to the ocean, where a barge tows them to market.



The Erickson S-64 Air-Crane lifting logs from difficult to reach spots



Logs heading for market

While coastal mountains can be steep and challenging, so are many interior ranges. Harvesting from the abundant spruce, fir and lodgepole pine in Crowsnest Pass on the Alberta side of the Canadian Rockies, Caber Logging works some of Canada's steepest, hilliest terrain. A recent profile in Logging & Sawmilling Journal described the family business as "the mountain goats of the forest industry" with good reason. The daily routine of felling trees, hoisting them onto logging trucks, and hauling load upon load to the local sawmill can be gruelling and fraught with risk. Slopes of up to 50 percent add to the heavy lift challenges requiring owner Kent Strandquist and his team to get creative. Caber relies largely on Tiger

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Cat skidders, which have tracks suited to steep inclines, to retrieve felled trees. But when landscapes become truly challenging crews bring in hoe chuckers to reach otherwise inaccessible places, grab trees and move them to more level ground. Caber converted one Hyundai 250 tracked excavator, into a hoe chucker, which the crew affectionately named Chucky.

While steep slopes are a fact of life for Caber, Strandquist acknowledges initial nerves when handling equipment such as feller bunchers for the first time in challenging circumstances. "When you first start it feels scary. Once you get used to it, you realise it's just the way the machine is, and it doesn't bother you anymore. I

grew up with this. My dad was a lifetime logger, and my family all did it." Still, Strandquist recognises the job's inherent dangers and Caber has a rigorous training process backed by a 300 page manual drafted with mountains in mind. "I haven't had anybody hurt on my crew for years and I'd like to keep it that way," he says, citing overconfidence and cutting corners as leading risk factors. "On a lot of the machines, we now have two way radios to communicate with each other," Strandquist says, pointing to safety enhancements such as cabs placed so operators sit level with materials being handled in their immediate line of sight.

In Ontario, Dan Searson at H. J. Searson owns more than 2,500 acres of forest in the Ottawa Valley. The business, started by his father Harry in 1960, offering pulp and lumber brokerage services, now harvests hard and soft woods, including red and white pine, spruce, oak and

A truck mounted Serco loader in action



maple. The company designed its own machine for handling and loading felled trees onto trucks, in the form of the Serco loader. "Manufacturers were getting too big and weren't looking out for the customers, who began to complain, so we saw a niche," says Searson. The company formed a 50/50 joint venture with Two Harbors Machine Shop in Minnesota, which manufactured the products.

Two Harbors recently acquired Searson's shares, but H. J. Searson

continues to distribute the product line which now runs to 10 models, some being high mount loader cranes, and others more specialised. The Serco loaders used by Searson can handle a couple of five metre logs weighing up to 4,500kg, topping trucks up to their legal 4.1 metre maximum height. Searco also offers self-propelled and stationary version of the loaders for sawmill type applications.



A Hitachi hoe chucker



A Searco loader with fully packed truck



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