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BETWEEN the BRANCHES

Long Distance Chipping

James Farquhar, district manager for Alberta, Saskatchewan, Manitoba and Montana reports on an E625C skidder test on the job site of Peace River Logging.

Peace River Logging is a northwestern Alberta chipping operation jointly owned by Daishowa-Marubeni International Ltd. (DMI) and Woodland Cree First Nation. The Company started production in August 2004 with a single chipper and purchased a second the following year.

General manager Bernard Fortin and superintendent Erik Lokseth are no strangers to Tigercat. They have run two 870C feller bunchers since mid-2005 and purchased an E620C skidder from Wajax in the spring of 2008.

Recently the company has been investigating ways to improve productivity. One such measure would be to reduce the number of times that the chipper must be relocated on a given cut block by increasing the skidding distance beyond 400 m.

Lokseth says that increasing the skid distance will reduce the number of roads and chipper landing sites required. This in turn reduces impact on the environment while eliminating the costs and lost production associated with road building and moving the landing.

INSIDE

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Peace River installed a grapple on the front of the machine to manage residual material that is later grinded for hog fuel.

cont. from pg. 1

BTB TEAM

Robin Barker

Judy Brooks
(circulation)

Paul Iarocci
(editor)

Rick Routliffe

Currently, odd shapes encountered in the cut blocks dictate that the chipper must be moved frequently in order to guarantee adequate and steady wood supply. The ultimate goal is to have the ability to skid these areas and feed the chipper without moving it. All this must be accomplished with as few machines as possible, so when Peace River Logging wanted to try to extend the skid distances, the company knew Wajax was the place to turn. The Wajax branch in Grande Prairie had a Tigercat E625C six-wheel drive skidder in inventory and ready to go.

Skidding over 400 m (440 yd) and feeding a hungry chipper is no easy task but with 2,32 m^2 (25 ft^2) of grapple area, the E625C did the trick. In addition, Fortin believes the six-wheel machine will be an advantage during summer when wet soil conditions become an issue. The high flotation of the bogie system would allow the machine to skid over softer ground.

Peace River's E620C skidder is fitted with a large grapple on the dozer blade to handle the residual material that is dispensed from the chipper (Tigercat will be developing its own front grapple). This material is the bark and debris removed by the flail knives before the tree is fed into the chipping knives. It is later fed through a grinder and used as hog fuel to generate power for the mill.

Targeting between 16 and 18 super B loads per chipper per day for daily production averaging around 1 900 m^3 (2,500 yd^3) makes this a busy site. Teamwork is the key. Wade Sanchuck heads up maintenance. With two chippers, two bunchers, four skidders and many support vehicles, Sanchuck is a busy man.

The other two team members I met were E620C operators Earl L'Hirondelle and Trevor Biglow who put the E625C through its paces. They enjoy the comfort and power of the four wheel machine, although I think Earl had

Bigger is better. High capacity grapples help guarantee a steady wood supply to the expensive chippers.

Long distance skidding capacity reduces the need to move the chipper.

a hard time giving up his new toy. Smooth and powerful were the recurring comments during the day. “Skidding to age 65 in this E625C won’t be a problem,” he commented. “Frozen drags are not a problem. You just grab and go.”

Aside from myself, the demo was attended by Wajax branch manager Darren Kutschinski, service manager Ryan Cooley and territory manager Dave McWhirter. Although Peace River is not prepared to purchase additional skidding capacity at this time, I will mark this test as a success. The team members at Peace River Logging agreed, believing the machine would be a definite asset to their logging operations. ■

Michael Kastegård's Tigercat 1014 chipper. Because of limited space, the machine must traverse the long stacked piles. High mobility is important.

Biomass Harvesting in Sweden

– Paul Iarocci

Biomass energy is essentially solar energy stored through the process of photosynthesis in organic materials like wood, straw, vegetable oils and by-products from the forest, agricultural and industrial sectors. Although fossil fuels are also derived from solar energy stored in plants, fossil fuels require thousands of years to be converted into usable forms. Biomass is produced over a very short time frame and properly managed, biomass energy is renewable.

Even in fossil fuel resource rich Canada, biomass is emerging as an important source of renewable energy. Conservatively, it accounts for 5% of secondary energy use by the residential sector and 17% in the industrial sector, mainly in the forest products industries. Principal uses include firing boilers in pulp and paper mills for process heat and providing energy for lumber drying. This is significant because lumber and pulp and paper production account for a whopping 35% of Canada's total energy consumption.

BTB travelled to southern Sweden this fall to see two-machine forwarder/forwarder-based chipper biomass systems in action and to gain an understanding of how the biomass market is unfolding in the heavily forested and sparsely populated Nordic country.

It turns out that Sweden's bioenergy program is far more advanced than Canada's. In addition to using by-products of mill processes to power other processes, Sweden has actually created a market for limbs and tops that were previously left on the forest floor after harvesting. According to the Swedish Energy Agency, biomass (including waste and peat) contributed about 27% of the total primary energy requirement for Sweden in 2007 and year by year this figure continues to rise. Although biomass remains a co-product of timber harvesting, some forestry contractors are reporting that biomass harvesting is currently more lucrative than the timber harvesting component of their businesses.

Conversely, in Canada over 11 million tonnes (12 million tn) of leftover harvest slash is either burned or left to rot in the bush, according to Douglas Bradley, president of the Canadian Bioenergy Association. Harvesting leftover wood is still considered expensive and is not integrated into Canada's harvesting practices to the extent that it is in Scandinavia. "But soaring energy costs, advances in waste recovery equipment and government support for bioenergy generation is changing the economics," said Bradley.

This is surprising because with the in-woods

processing model, it is necessary to extract biomass from the forest separately while in most of North America, where roadside processing usually predominates, this extra step is eliminated – the material is already at roadside. In spite of this more favourable scenario, it has rarely been deemed economically viable to process the by-product.

The notable exception in Canada is the Maritimes where according to Prince Edward Island based forestry consultant Bruce McCallum, "We are already harvesting close to a million tonnes of roadside slash, short wood waste and land clearing debris annually for biomass energy. Of course, we also have a very high percentage of short wood systems and we depend much more heavily on oil for heat and energy rather than cheaper natural gas which is more readily available from Quebec west."

Håkan Gustavsson, owner of Skogsentreprenader based in Eskilstuna in southwestern Sweden harvests timber and biomass. A Tigercat 1055 forwarder is employed for forwarding both the round wood and brush. When working in a biomass application, the 14-tonne machine forwards an average of 20 loads per day of branches and tops to roadside from recently harvested timber tracts. A load of brush weighs about 6 tonnes (6.6 tn) which is equivalent to 19 m^3 (25 cubic yd) of chips. Compare that with a 14-15 tonne (15.5-16.5 tn) load that the machine carries when forwarding round wood and it becomes apparent that the duty cycle is much lighter for biomass harvesting.

For Skogsentreprenader, an average job yields 1 000 m^3 (1,000 tn) of logs and

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1055 operator Anders Berglund uses quicker crane settings when forwarding biomass.

An average payload weighs in at about 6 tonnes (6.6 tn), equivalent to 19 m^3 (25 cubic yd) of chips.

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500 m³ (650 cubic yd) of biomass chips. Ideally, if the ground is dry enough and a brush mat is not required to forward the round wood, 1055 operator Anders Berglund

Highway trucks transport the containers to a generating station or district heating plant.

prefers to extract the biomass first because it is easier to work with fresh branches when forwarding. The material is stacked at roadside and covered with an impermeable paper. This results in lower moisture content and reduces the infiltration of ice and snow into the piles. Most Nordic contractors are paid according to the energy value of the delivered fuel, so moisture content is important.

In 2008 southern Sweden had an extremely rainy summer. Adding biomass extraction in addition to regular timber harvesting not only provides access to additional markets, it also increases flexibility. Because biomass is light in weight compared to round wood, forwarder ground pressure is lower, permitting the machine to operate when the ground is very wet. If necessary, biomass can be left at roadside until freeze-up, allowing the heavier chipper unit to operate on hard ground.

Anders likes operating the 1055, citing good stability and a strong crane as advantages. He also likes the large cab. “I could sleep in it,” he quips. He uses two crane settings, one for quicker response when forwarding biomass and a second with slower functions when loading logs.

Håkan markets the chips directly to companies that generate electricity or to district heating plants that supply a large proportion of Swedish homes and businesses with cost-efficient heating. By selling direct to the end user he retains additional profits. A key motivator for bioenergy in Sweden is the contribution that it makes to the rural economy of the country and to the forest industry in particular.

Why not chip in-field and eliminate one forwarder from the system? Håkan says the chipper is too large, heavy and clumsy to drive in the woods, especially in soft ground conditions. He has tried to chip in-field in the past and actually found it less efficient. It is better to have the lower cost forwarder doing the legwork in the bush so that the chipper (a far more expensive machine) is available full-time at roadside to exclusively do the job it is designed for. By chipping in-field, productive time would be wasted when moving from pile to pile and especially when transporting full loads to roadside landings. This work can be accomplished more economically with a standard forwarder.

Anders likes the large cab.

The chips are dumped into containers.

When asked why it is necessary to use a forwarder-based chipper at roadside as opposed to a track-based machine that blows chips directly into a trailer or container, he says that even though the machine works at roadside, mobility is very important for moving from pile to pile at locations where space is very limited. This approach also provides more flexibility in piling slash. All this is a consequence of Sweden's tried and tested CTL systems which operate on small parcels of land with very tight landing areas. "I have tried other systems and this is the best," he says.

To see the other half of the two-machine biomass harvesting system, BTB caught up with Michael Kastegård, owner of Kastegårds Åkeri, another company specializing both in timber and biomass extraction. Working primarily on private land, Michael purchases biomass from landowners and markets it directly to end users. In addition, he contracts his services to a biomass marketing company.

Michael owns a Tigercat 1014 18-tonne (20 tn) forwarder equipped with a Bruks mobile chipper unit. With ample speed and horsepower and a large comfortable cab, Michael likes the Tigercat forwarder in the chipper carrier application. Average production is 200 m^3 (260 cubic yd) of chips per day based on six hours of machine utilization.

Since the slash is piled throughout the network of logging roads, the chipper moves often. Once filled, it drives to a location that can be accessed by highway trucks and dumps the load into a container that will be picked up and transported to the end user.

Michael concurs that biomass harvesting is more lucrative than round wood although he cautions that the capital investment is greater as well. A forwarder-based chipper represents nearly a $1 million investment, and the chipper is a high maintenance piece of machinery. In an eight-hour shift, as much as two hours can be devoted to regular maintenance, mostly pertaining to the chipper.

Tigercat has a forwarder/harvester assembly, service and sales facility in Hede, Sweden.

Murray Howson favours Tigercat 845C feller bunchers equipped with 2000 series bunching shears.

When The Chips are Down Under

– Paul Iarocci

Of Australia's 1,74 million hectares (4.3 mil. acres) of plantations, over 40% are some variety of eucalypt hardwood. In conjunction with ample port facilities, Western Australia, Victoria and Tasmania have all established very large plantation hardwood reserves with ten to fifteen year rotations. Annual exports are valued at $570 million (US), making Australia the world's largest exporter of hardwood chips. Suffice to say, chips are big business down under.

BTB visited two contractors 2 600 km (1,600 mi) and a Bass Strait apart: Edenborn Pty Ltd based in Albany, Western Australia and Fielding Logging in Riana, Tasmania. The two companies are reaching similar ends – ultimately producing chips primarily destined for Asian pulp and paper mills – by very different means

Edenborn Pty Ltd

Murray Howson, owner of Edenborn Pty Ltd, specializes in harvesting ten to twelve year old Eucalyptus globulus (blue gum) plantations in Western Australia. Average stem size ranges from 0,05-0,15 m^3 (0.06-0.17 tn) and height, diameter and limb characteristics vary from stand to stand.

As a large contractor with multiple crews, Murray can tailor the number of machines to the stand profile and site conditions. Generally one track feller buncher feeds two high capacity skidders, although this can vary depending on skid distances and other site specific factors. He can also vary the processing method, choosing between roadside processing with single grip harvesters or in-field chipping with Precision Husky flail-chippers.

Murray initially purchased a Tigercat 822C feller buncher equipped with a 2000 series shear but now favours the 845C feller buncher equipped with the same attachment. The shears generally accumulate seven to eight trees per cycle, clearing three rows per pass.

Three Tigercat H250B processors at work on one of Edenborn's round wood sides.

Murray notes that the cutting cycle time is slightly longer compared with a disc saw but the low maintenance shears are ideally suited to the rocky soil that can easily damage saw teeth. The only other drawback is cutting capacity. The shear is simply not designed to exceed 45 cm (18 in) butt size in hardwood applications. The trees that grow along the edge of the plantations often exceed this diameter.

For skidding Murray runs 630C models and an increasing number of E620Cs over dead flat to very mildly rolling terrain. Skid distances of 300 m (330 yd) and under are common but can approach 600-800 m (650-875 yd). On short skids, the operators tend to pull single bunches quickly over the good terrain. The 35.5 tires seem to be the best fit, reducing the bounce effect while offering more ground clearance, better traction and flotation and increased operator comfort. With longer skid distances, a two-stage system might be used. One machine pulls double bunches from the back of the cut block while the other is dedicated to clean up and short hauls to the deck area. If anything characterizes Murray's operations, it is flexibility. Sometimes the skidders alternate long and short drags; whatever it takes to maintain a steady flow of wood for the chippers or the correct deck sizes for the roadside processors.

The skidders spend a great deal of time dealing with slash accumulations at roadside. With no biomass markets yet developed, all of this debris must be returned to the cut block. Consequently, after dropping a bunch, a number of extra movements are required.

High capacity grapples improve productivity in small stem blue gum applications.

The operator must use the dozer blade to pile up the debris and then turn around and back up to pick up a load with the grapple. The slash must be taken out to the cut block and deposited into rows before going to retrieve the next drag.

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On one of the round wood sides, three Tigercat H250B processors work at roadside and Murray is seeing excellent results and

The skidders spend considerable time removing debris from the deck area.

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higher production compared with excavator conversions. Based on the T250B loader platform, the H250B was developed to compete with excavator-based carriers in roadside processing applications. Similar in purchase price, the D6-based H250B is better suited to the job with more hydraulic and cooling capacity and no extra guarding required on the cab or upper assembly.

On one of the chipping operations we visited, a Precision Husky flail debarker and chipper fed by two 630C skidders was chipping 750-800 m^3 (825-880 tn) of round wood per nine-hour day. On another low standing volume site Murray is experimenting with what he calls a Y-formation where one chipper unit is matched to two flails with two excavator/loaders in between feeding the chipper and managing slash. With this system, chipper utilization is even higher; the time required to load a truck decreases from 60-90 minutes to around 45 minutes.

Which system to use and why? A flail-chipper system requires large volumes to be efficient. As the tree size decreases, the flail-chipper system becomes more viable compared with single grip processors but according to Murray, "It is not just piece size that determines in-field chipping versus a round wood system but the length and shape of the tree and how many branches it has." Long, tall trees are more efficient to process, he explains because it is awkward and time consuming to put them through the flail. "A single grip is very efficient at debarking long straight trees with not too many limbs."

Conversely, short and limby trees don't go through a harvesting head well and are easier to process with a flail. Of course, when evaluating the overall system, other considerations must be taken into account such as highway transportation methods and the cost of electricity for chipping at the mill compared with diesel to fuel in-field chippers.

Fielding Logging Limited

Fielding Logging, owned by Lawrence Fielding, harvests Tasmanian blue gum plantations for Gunns Limited. As Australia's largest hardwood forest products company, Gunns manages in excess of 110 000 hectares (270,000 acres) of plantations. With operations in Australia and New Zealand, the integrated company owns and operates sawmills, veneer factories and four wood chip export ports in Tasmania.

Tasmania's forestry industry is in the midst of a broad transition from a heavy reliance on native old growth forest to modern, efficient blue gum and radiata pine plantations.

The slash is deposited in rows in the cut block on all of Murray's operations.

The dual cylinder grapple with constant pressure keeps a good grip on the slippery debarked logs.

A family affair: Makarla, Lawrence and Jeff.

An interesting aspect of Lawrence's operation is that many of the techniques and practices learned from the native hardwood harvesting days have been applied to the tough plantations that he currently works. These are not the flat, neat and tidy tracts typical of Western Australia. The terrain is rolling and steep. The trees are not as uniform in profile and due to the longer rotation, the piece size is large – up to 0,4 m^3 (0.45 tn) per stem.

Fielding Logging uses harvesters to fell and process at the stump. Lawrence has two purpose-built machines, a 15,000 hour Tigercat H845B with a Waratah 622 Warrior purchased way back in 2000 and a new 622B equipped Tigercat H822C.

Throughout Australia the forestry companies want the tops and branches left in the cut block. "I can't see the sense of taking the rubbish from the bush and then bringing it back again. It's already in the right place and all spread out," comments Lawrence. At the stump processing avoids the extra handling and keeps the branches well distributed.

Although Lawrence processes at the stump, you won't find a forwarder on his job. His son Jeff transports debarked 11 m (36 ft) and 5,5 m (18 ft) lengths to roadside with a 630C skidder. Skid distances are limited to around 300 m (1,000 ft) and mostly uphill.

The 630C replaced a 630B with a single-cylinder grapple that Fielding Logging owned for a number of years. Jeff comments that the new dual-cylinder 1,76 m^2 (19 ft^2) grapple is much better suited to his job as it holds the slippery, debarked logs much better. "Having the two cylinders is a big advantage. It makes picking up the drag a lot easier. Just put the constant pressure on and go." Jeff routinely pulls 6-10 tonne (6.5-11 tn) drags up 5-15 degree slopes.

The seemingly odd pairing of an in-field harvester and skidder is beneficial in this application. The skidders are not hauling unnecessary weight and there is far less drag resistance when pulling slippery debarked logs rather than full trees. Tigercat district manager for the area, Glen Marley comments that blue gum branches can cause significant drag

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The H822C felling and processing Tasmanian blue gum.

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Coppice

Blue gums are capable of regenerating by coppicing – new multiple shoots emerge quickly and reliably right out of the stump of a recently felled tree. In Australia, blue gum plantations are often regenerated in this manner and it is common to see plantations with forked trees where two stems have emerged from the same stump. There are a number of advantages. Many of the costs associated with both suppressing coppicing and replanting are eliminated. Early growth is often superior compared with seedlings due to the substantial pre-existing root system.

On the downside, forestry companies cannot take advantage of new and improved seed stocks. Also after two years, the five or six shoots emerging from the stump must be manually trimmed back to one or two of the best formed and most viable stems. This is a very labour intensive endeavour that results in a stand of forked trees that at first sight look small in diameter and easily managed by a shear. In actuality these trees have quite large diameter butts below the fork, making for a tougher felling application.

A mature blue gum regenerated by the coppicing method.

Everything finds a way to grow in Australia.

resistance. Like spears, the branches can even lodge into the soil.

Lawrence's daughter Makarla, who recently joined the crew, operates a Hitachi excavator equipped with talon grabs and a crosscut saw. The machine's functions range from cleaning up stray logs to organizing skid bunches and shovelling logs out of steeper sections and gullies – anything to improve the productivity of the skidder. "She'll move two logs to the next heap and even up

Piloted by Lawrence's son Jeff, the 630C pulls processed 11 m logs uphill.

the bunches," explains Lawrence. "She can separate long and short logs in the bush rather than at the landing."

Lawrence cites many advantages of a skidder over a forwarder in his application. First and foremost is speed. The 630C can very quickly pick up a 10 tonne (11 tn) drag – more than half the payload of the average high capacity forwarder – and move over the terrain at a comparatively higher ground speed. It is more stable in rolling terrain and slopes and of course there is no unloading. Less crosscutting is required which saves processing time and improves harvester productivity. The machine itself is simpler with a lower purchase price. In addition, it is quicker to load trucks with 11 m (36 ft) lengths compared with short wood and quicker to unload at the mill where it takes two grabs rather than four to get the wood off the truck.

Lawrence Fielding entered the logging business in order to maintain a trucking contract. The mill he worked for decided to stop subcontracting the trucking service, opting instead to download it to the harvesting contractors. Unless Lawrence had a harvesting contract, he would be left out in the cold. So he started a harvesting crew. Ironically, now he just logs and contracts out trucking services. All Fielding Logging round wood is processed at the Gunn chip mill facility in Burnie. ■

Most of the chips produced in Australia are bound for large pulp and paper mills in Asia.

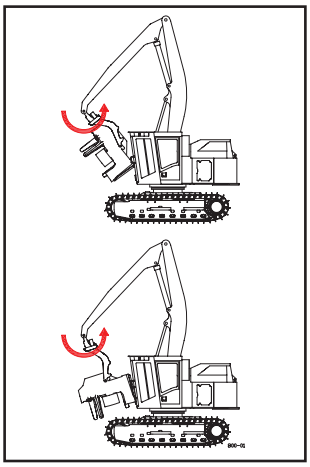

Figure 2. Harvester head swinging

The tight tuck boom has many advantages but requires extra care and awareness on the part of the operator.

Focus on Safety

Tight tuck harvester booms

– Robin Barker, engineering administrator

The Tigercat 800 series harvester boom systems are designed to enable the harvesting head to be tucked in close to the machine and consequently, the operator's cab. This ability maximizes the manoeuverability of the carrier and harvesting head to work around standing trees while thinning in dense stands.

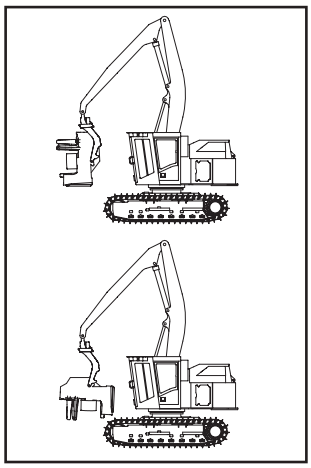

Figure 1. Harvester head tucked in close

Working with the harvesting head close to the machine offers a number of operational benefits. It increases the operator's visibility, permitting better placement of the head on the tree and improved awareness of saw bar location and penetration, tree species and areas of rot, splits and crooks. The potential to damage standing trees, the harvesting head and stick boom components is reduced. When working on uneven ground the stability of the machine is improved because the weight of the boom, head and tree is not extended as far out in front of the machine. Finally, the working area or boom swath is increased, reducing the need to reposition the machine as frequently during harvesting.

However, working with the harvesting head in close to the machine also increases the chances of the harvesting head making contact with the front area of the cab, particularly if the head is swinging backwards as it dangles from the end of the stick boom.

To avoid contact of the harvesting head with the cab, it is important to understand and follow these procedures.

1. When nearing the boom positions shown in Figure 1:
   - Always keep the head in the upright harvesting position.
   - Do not tilt the head from the harvesting to the processing position as the saw housing may contact the cab.
   - Reduce the speed of boom movement. Rapid movement could cause the base of the harvesting head to swing backwards towards the cab.
   - Avoid any sudden movements with the track drive system as this could cause the head to swing backwards into the cab.
2. Never bring the harvesting head in close to the machine while the harvesting head is swinging on the end of the stick boom. (See Figure 2)
3. Do not use the head to pull downed trees directly towards the cab. If the clamping arms slip on the tree, the head may quickly swing towards the cab.

Should contact between the harvesting head and the cab occur at any time during the operation of the machine, it is essential to inspect the cab, the front door and the front window immediately to determine if any damage has occurred.

Be certain to read the two sections in your Operator's Manual titled *Care of Polycarbonate Windows in Cab* and *Inspection and Maintenance*.

The information contained in these two sections can also be found on the Tigercat web site at http://www.tigercat.com/safety.htm

Saw Teeth Revisited

Regular readers of BTB will note that we have spent considerable effort lately on the subject of saw teeth. It is an important topic worthy of some more ink...

– Rick Routliffe, service instructor and advisor and Duane Barlow, attachment product manager

Since entering the market in 1992, Tigercat has significantly improved feller buncher productivity. Ongoing refinements have been applied to both the base carrier and felling heads in order to further this goal.

Tigercat innovations such as deep-pocket accumulating heads and the ER boom system, combined with more efficient hydraulics and greater engine horsepower have substantially improved productivity. Likewise, horsepower delivered to the saw blade has been increased to reduce blade recovery time, further enhancing overall machine performance. A stopped saw blade can now reach full speed in 20–25 seconds. (With earlier machines this was closer to 35 seconds.)

These performance increases reduce cycle times, allowing many more trees to be felled in a given time period. However, it has

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Sharp teeth create wafer thin chips that are less likely to plug the saw housing.

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been common practice to measure saw tooth life based on machine hours. Divide the cost of a set of replacement teeth by their lifespan and a cost per hour is established. This costing method is flawed because it does not consider how many trees have been cut by the teeth. Remember, if we cut more trees per hour, the teeth will not last as many hours but they will cut just as much wood.

> If we cut more trees per hour, the teeth will not last as many hours but they will cut just as much wood.

In order to maintain high productivity and protect critical saw components, it is necessary to be aware of some obvious and subtle negative effects that are a direct result of dull saw teeth.

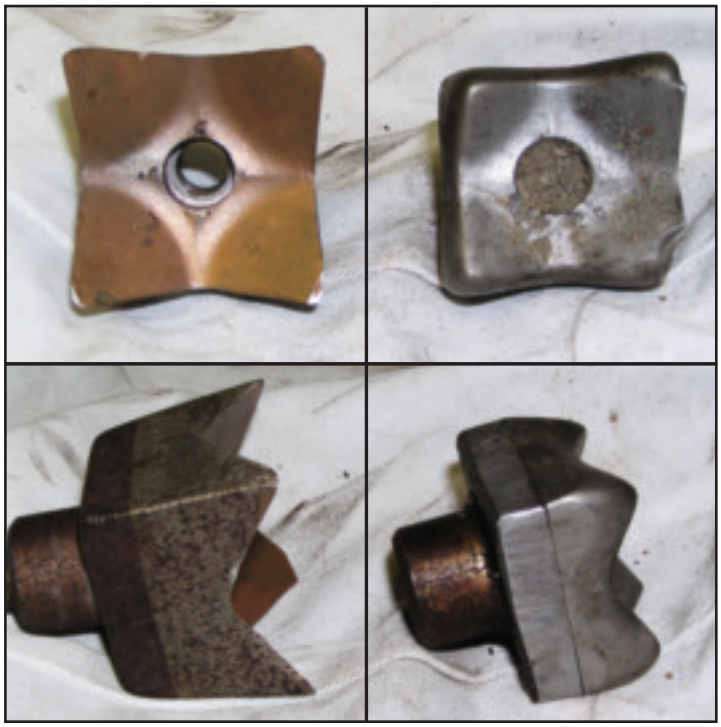
Let's say that we are going to hand fall two trees. To cut the first tree, we will use a four pound axe. For the second tree we will use a three pound round rock secured to an axe handle. Why are we using a four pound axe, but only a three pound rock? Well, the round rock used to weigh four pounds when it had a sharp edge but it has been pounded into so many trees it has lost a quarter of its mass and all of its edge. Both tools will fell the tree but that is where the similarity ends.

When we swing our sharp axe, most of the energy is used to drive the cutting edge through wood fibre. The applied energy is used effectively and efficiently and the tree is felled quickly with minimal damage to marketable fibre.

When we swing our rock against the tree, it smashes into the wood fibre, denting rather than slicing. The energy contained in the momentum of the rock is spread over a large surface area rather than being concentrated on a sharp edge. Much of the applied energy is reflected back through the rock, then the handle and finally into our arm. Over time this energy will damage our arm. Further, since much of the applied energy is not used to slice wood fibre, we will have to swing our rock many more times before we smash our way through the trunk. This is frustratingly slow, painful and inefficient. Well I'm tired now so let's compare our axe/rock example to a saw blade.

Pictured side by side are two saw teeth, a new one (the axe) and one that is excessively worn (the rock) and resulted in a cracked blade.

SHARP | WORN BEYOND BELIEF



With the teeth traveling at over 300 km/h (190 mph), the impact force is tremendous. This force will either slice wood if the tooth is sharp or smash it if the tooth is dull.

A sharp tooth directs most of the energy through the sharp edge, slicing the wood fibre. The remaining energy is reflected back into the blade through the tooth holder and is easily absorbed and dissipated within the blade.

A dull tooth smashes through the wood fibre. Most of the applied energy is reflected back into the saw blade through the tooth holder. Over time, this huge pounding force on the relatively small area where the tooth holder is connected to the saw blade will cause fractures to develop in the blade on either side of the tooth holder connection. Damage can also occur to the tooth holder, the tooth retaining bolts and the expensive saw drive components. The damage is not a defect in material or manufacture but the direct result of severe and prolonged stress.

Sharp teeth remove wafer-like chips from the cut. Ideally the chips are about 3 mm (1/8 in) thick and have clean cut edges. Good quality chips are much less likely to plug the saw housing. Sharp teeth are also less likely to pull saplings or other wood debris into the saw housing.

If the edges of the chips are ragged, the saw teeth are dull and not cutting efficiently. Chips thicker than 3 mm indicate one of two problems. Either the blade is slowing excessively due to dull teeth or the blade is being fed too quickly through the tree. Fast feeding causes teeth to dull more quickly and increases stress on the components.

Dull teeth require a more aggressive feed by the operator, further compounding wear and structural damage. This creates a vicious cycle which rapidly accelerates tooth wear and damage. Machine performance is further affected because the aggressive feed tends to kick the butt of the tree forward or sideways causing poor stem alignment.

In addition, operating with worn teeth reduces the thickness of the cut, increasing friction between the blade surface and the cut surface of the tree. This causes the blade to slow excessively, requiring more power to cut.

If you replace your teeth and notice a big change in productivity or performance, the old teeth were too dull and should have been replaced sooner.

Abrasion

Aside from cutting trees and impacting objects such as rocks and metal, one of the primary causes of tooth wear is abrasion.

Abrasion is insidious because it not only wears the surfaces of the tooth but can wear the tooth holder and blade rim as well. Saw teeth are designed to be proud of the tooth holder at the leading edge in order to protect the tooth holder and saw blade. This is especially important in sandy applications. Excessively worn teeth will not protect the blade and tooth holder from abrasion.

The tooth profile is larger than the tooth holder. The tooth is designed to protect the holder and blade from abrasion wear. When the tooth is no longer of a greater height and width dimension than the tooth holder, the blade and tooth holder are no longer protected and begin to wear.

The tooth profile is larger than the tooth holder. The tooth is designed to protect the holder and blade from abrasion wear. When the tooth is no longer of a greater height and width dimension than the tooth holder, the

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Cut to the Chase

Three ways to damage a tooth

1) cutting trees
2) abrasion (sand, etc)
3) impact with a foreign object (rocks, metal)

Three reasons not to operate with worn teeth

1) poor cutting performance for higher fuel consumption, lower productivity
2) risk of damage to the blade and other saw components from impact forces because the teeth are pulverizing rather than slicing through the tree fibre
3) abrasion damage to blade and tooth holder because dull teeth do not protect the blade

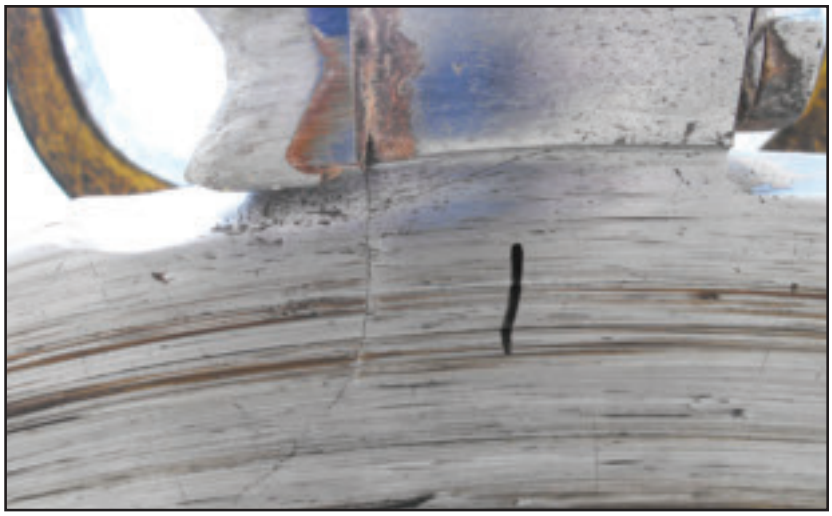
Three interesting facts

1) A saw tooth installed on a 1 420 mm (56 in) saw blade spinning at 1,150 rpm is travelling at 309 km/h (192 mph)
2) Every second the 18 saw teeth will contact the tree fibre 345 times
3) A saw blade spinning at full speed (19 revolutions every second) has approximately 745 kW (1000 hp) of stored energy.

blade and tooth holder are no longer protected and begin to wear.

If you replace your teeth and notice a big change in productivity or performance, the old teeth were too dull and should have been replaced sooner. Here is a simple rule of thumb to evaluate teeth and determine when it is time to replace a set: Wide kerf teeth should be replaced when the kerf has worn 6 mm (1/4 in). For example if the new tooth has a 59 mm (2 5/16 in) kerf, it should be changed once the dimension has been reduced to 53 mm (2 1/16 in). Similarly, narrow kerf teeth should be replaced when the kerf has worn 5 mm (3/16 in) from the original size.

Here is a something to think about that may put it all in perspective. You are putting fuel in your machine and converting that fuel to energy that is transfered to the saw teeth. If you are using dull teeth you are wasting fuel and actually paying money to destroy your saw blade and other expensive saw components. Would that money not be spent more wisely by replacing worn saw teeth and cutting wood efficiently rather than pounding the fibre and damaging expensive components in the process?



An example of a cracked blade due to impact forces caused by operating with worn teeth.

School Trips

Take our Kids to Work

On November 5, 2008 Tigercat sponsored the annual Take our Kids to Work day, a Canadian national program that illustrates the importance of education and skills development by introducing job and career options to grade nine students. 18 young people accompanied their parent or sponsor to work at Tigercat.

Safety in the workplace was taught and demonstrated throughout the day. Students toured six of the seven Tigercat facilities. Highlights included viewing a Tigercat product video and workplace safety video specially designed for young workers. The students met with technical publications department member Chris McMillan and spoke to Tigercat designers about Solid Works, the computer-assisted design program. The opportunity to drive a piece of forestry equipment with a qualified operator and a pizza lunch followed. Thanks to the many Tigercat team members

that participated and made the day a success.

Grooming Students for the Forest Industry

On November 19, a group of grade eleven and twelve students and two teachers from North Hastings High School made the trip from Bancroft, Ontario to tour Tigercat. Enrolled in the Northern Outdoor Studies class, the students were given the opportunity to learn about Tigercat forestry equipment and job opportunities. The program was very similar to the customer tours of the Tigercat facilities that many machine owners would be familiar with. Living in northern Ontario, the students are already familiar with the logging industry and were particularly interested in understanding what it takes to manufacture premium quality forestry equipment.

To quote from a related article in The Bancroft Times, "As we went from plant to plant, we knew each one would offer a new interesting experience and new adventure." Thanks to the Tigercat people that spent time with this group.

Start Them Young

On December 16 Tigercat received a wonderful thank-you note from Ms. Mann's Grade Two Science Class from Graham Bell – Victoria Public School in Brantford. The sixteen children were studying a science unit on machines and enjoyed watching a video of Tigercat forestry machines. Along with the comment, "Your machines are awesome," Tigercat received many colourful, hand drawn pictures. Looks like there are some potential machine designers amongst this group of young people.

– reported by Judy Brooks

Barry Anderson and buncher operator Dennis Holman.

Hard Rock Logging

The Flin Flon, Manitoba area is best known for lakes and hard rock underground mining. The amount of rock in the region adds an element of difficulty and complication to many tasks and logging is no exception. The rock is brutal – hard on saw teeth, undercarriages and tires and the equipment takes a beating.

Anderson Logging is owned by brothers Bob, Barney and Barry and they live it every day. The company runs two Tigercat feller bunchers, a 1997 model 845 and an 860C purchased in 2006.

Taking advantage of the many lakes in the area of their hometown Cranberry Portage, the brothers harvest wild rice and manage to do a bit of ice fishing during the busy winter season.

Barney's son Barrett and Bob's daughter Beth show off the first fish of the new year.

Tigercat expands South American presence

Tigercat has appointed ICC Peru SAC as its authorized full service dealer for the country of Peru. Established in 1995, ICC Peru is a leading after-market supplier of track components, engine parts and ground engagement tools. In addition to the construction and mining segments, ICC Peru was the distributor for Franklin Equipment Company until its unfortunate bankruptcy in December 2008. ICC Peru still retains one of the largest stock of Franklin parts in the world to support the large population of these machines in Peru.

ICC Peru operates from its main office and service facility in Lima with sister company ICC Oriente operating out of Pucallpa in the Development Zone of Peru. Tigercat is pleased to be working with such a well-established and respected organization for the sale and support of Tigercat machines in the country of Peru.

Tigercat District Manager Appointed for South America

Tigercat is pleased to announce the appointment of Andres Muñoz to the position of district manager for the territory of South America effective March 1, 2009.

With ongoing success and machine population growth in the South American market, Andres' extensive experience in the forestry industries of Chile, Uruguay and Argentina will play a key role in Tigercat's regional support strategy. Andres has a deep sixteen year history in maintenance and product support of mechanized logging equipment throughout South America.

Based in Concepcion, Chile Andres will focus on service and sales training, machine demonstrations and advanced troubleshooting support. He will act as a key conduit and liaison between the dealer and factory personnel.

TURNaround

Contact your Tigercat dealer or visit www.tigercat.com to find out more about Tigercat's new turnaround seat. It is currently available on the 635D. The 630D with turnaround is coming soon.

Editor's Note

The tragic wildfires that ravaged Victoria, Australia in early February took countless lives, destroyed entire towns and decimated some of the most beautiful and majestic working forests on earth. Tigercat wishes to acknowledge those who have been affected by this incomprehensible tragedy. The long list includes a number of Tigercat machine owners and operators as well as their respective families and friends.

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