

ShortCuts

FROM SKOGFORSK. NO 1 | 2017 | LEADING SUSTAINABLE DEVELOPMENT



The quest for **TIMBER VALUE**

74 TONNE TRUCKS – approved by the parliament

NEW COLLABORATION generates societal benefits

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Logging and scarification: MAJOR THREAT TO DEAD WOOD

74-TONNE TRUCKS



A new law comes into effect on July 1 2017 that will allow heavier vehicles, and thereby cheaper forest transports with reduced environmental impact, on Swedish roads. A new bearing class will be introduced, allowing vehicles of up to 74 tonnes on all roads with sufficient bearing capacity.

■ On May 3, the Swedish Parliament approved the Government proposal to introduce a new bearing class, BK4. This new class will permit vehicles with a gross weight up to 74 tonnes.

The Government's proposal included a statement that the new BK4 road network must not risk goods being switched from rail and ships to roads. However, in the vote, MPs agreed with the Traffic Committee, which argued that the bearing capacity of the roads should determine the extent of the new BK4 road network regardless of any risk of cargo being switched between transport solutions.

Earlier this year, Skogforsk investigated the effects of a limited BK4 road network that would not risk cargo being switched from railway and ships to

roads. The conclusion from the study was that the forest industry would have very little benefit from such a limited road network.

The law on the new BK4 class will come into effect on July 1 2017. Before then, the Swedish Transport Administration will decide on which parts of the road network will be granted BK4 status, and the Swedish Transport Agency will decide on the technical specifications that will apply for the heavier vehicles.

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READ MORE: The Government Bill on cargo transports (2016/17:112) can be downloaded (PDF) from regeringen.se.

NEW COLLABORATION

GENERATES SOCIETAL BENEFITS

IVL Swedish Environmental Research Institute and Skogforsk have signed a letter of intent to increase collaboration on sustainable forestry, raw material supply, and utilisation of forest ecosystem services.

■ “IVL and Skogforsk are both working towards a sustainable society. Both institutes have a strong link to industry and a similar role in generating applied knowledge and services that benefit society,” says IVL's CEO Tord Svedberg.

The Swedish forest is regarded as an important resource in the transition to a climate-neutral

society and bio-based economy. The transition will require greater and more efficient use of forest raw materials, while impact on biological diversity, the environment, and the forest's other ecosystem services must be minimised.

How the forest ecosystem services are used will continue to be a very important issue, and research, increased knowledge and dialogue are needed for trade-offs and decisions.

“Managing the transition to the bioeconomy will require new approaches. By working together, Skogforsk and IVL can set up broad, interdisciplinary collaboration projects that highlight climate issues, bioeconomic



development and technical advances,” says Skogforsk CEO Charlotte Bengtsson.

Skogforsk and IVL together cover large parts of the forest-based bioeconomy's supply chain, from silviculture to bio-

based products and materials. The collaboration will comprise joint research projects.

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SKOGFORSKS NEW ORGANISATION:

MORE INTERDISCIPLINARY RESEARCH

Future forestry issues are complex, and Skogforsk is now reorganising its structure to facilitate more interdisciplinary research.

Skogforsk activities are now organised in four programmes, which work with research and innovation: Operational Systems, Plant Breeding, Forest Management and Value Chains.

The programmes will work more closely and two processes will facilitate implementation of new knowledge: Societal benefits of forest and Digitalisation.


SKOGFORSK


Forest Operations

Develop knowledge about forest management for different goals. Research conducted in the programme concerns production, growth, quality, environmental impact, risks of damage, and efficient conservation.

“We will work in a broader and more integrated way over several research programmes, to reduce the environmental impact of forestry”

PROGRAMME MANAGER **Isabelle Bergkvist**
ASSISTANT PROGRAMME MANAGER
Karin Hjelm



Value chains

Develop technology, methods models and systems to, on the basis of market orientation and customer demand, optimise the value generated by the raw material from the forest.

“It’s about improving efficiency throughout the value chain, identifying which forest products are available to meet customer demand and increase value for forest owners.”

PROGRAMME MANAGER **Mia Iwarsson Wide**
ASSISTANT PROGRAMME MANAGER
Maria Nordström



Operational Systems

Works to improve productivity and reduce environmental impact. Comprises technology, methods and organisation relating to all forestry operations and assortments.

“Our programme concerns areas that account for 80 percent of forestry costs. We need to streamline forestry practices using people as drivers and make full use of the opportunities afforded by technology”

PROGRAMME MANAGER **Gert Andersson**
ASSISTANT PROGRAMME MANAGER
Gunnar Svenson



Tree Breeding

Responsible for sustainable breeding of forest trees. Also carries out R&D to improve efficiency of operative tree breeding and for efficient seed production in seed nurseries.

“Our work is based on the national task to manage and develop the country’s forest tree breeding to improve growth and spread risks in the current and future climate.”

PROGRAMME MANAGER **Bo Karlsson**
ASSISTANT PROGRAMME MANAGER
Johan Westin



Digitalisation

The process utilises the opportunities afforded by digitalisation, and develops decision support tools, standards, remote sensing estimations, and more. for a sustainable forestry.

“Today’s large data flows will be converted into smart decision support.”

PROCESS LEADER: **Erik Willén**



Societal benefits

Within this process, research and communication are aimed at identifying the societal benefits of forest. The process involves personnel from all R&I programmes and the Communications Department.

“We must show how forestry can make an even greater contribution to societal benefits.”

PROCESS LEADER: **Marie Larsson-Stern**

CLIMATE WORK ACKNOWLEDGED

Claes Löfroth has been awarded the Guldkvisten prize by the Swedish Forestry Association. In the past decade, he has been a driving force in increasing the forest sector's contribution to a climate-adapted society.

■ A sustainable, biodriven and fossil-free society – that is the forest sector's vision. One important area for attaining the vision is to develop the extensive transports of forest products.

As a researcher at Skogforsk for more than a quarter of a century, Claes Löfroth has worked passionately on reducing environmental impact while also reducing the costs of forestry transports, mainly on roads but also in the forest.

"Claes Löfroth's research contributes to a climate-adapted society and shows the importance of driven initiators in attaining the forestry sector's vision. His achievements make a major contribution to the forestry sector's vision, and we therefore award him the Guldkvisten prize," says Bengt Ek, CEO of

the Swedish Forestry Association.

Claes Löfroth has been leading the work of testing and introducing 74-tonne trucks, which reduce emissions and transport costs, without compromising road safety. Claes has also been a leading light in ecodriving, most recently in the form of aerodynamic testing of trucks.

Claes was awarded the Golden Branch by the Swedish King on 25 April 2017 during Skogs-näringsveckan.



Claes Löfroth testing wind-smart trucks in a wind tunnel.



EVER-INCREASING COSTS OF SPARE PARTS

■ The price of spare parts and components for forest machines increased by around ten percent between 2014 and 2016. The biggest increase applies to forwarders, where prices rose by 15 percent.

These figures are revealed in a comparison made by the technical collaboration group for forestry, TSG.

The comparison showed that the price increase varied for different machine types. Prices of forwarder components increased

by 15 percent, but harvester components only increased by three percent.

The survey also included products such as antifreeze, engine and chain oil, marking paint and lubricating grease, where average price increases were seven percent. It is mainly propylene glycol, chain oil and central lubrication grease that account for the price increase, while products such as biohydraulic oil and marking paint have become cheaper.

NEW PhD IN LOGISTICS

Gunnar Svenson has further developed the Calibrated Route Finder system, which finds the best route and measures the distance from forest to industry, and in doing so completed his PhD.

■ In his thesis, Gunnar Svenson has further developed Calibrated Route Finder so that the system can now also consider hilliness, curvature and different types of road junctions when it calculates the best route.

"Time and fuel consumption account for two-thirds of the transport costs in forestry, which makes tackling these aspects extra interesting – both to

reduce environmental impact and improve profitability," says Gunnar Svenson.

His results show that truck speed is affected most by the road's curvature and surface roughness, while fuel consumption is mainly affected by the gradient of the road and the gross weight of the timber truck. Gunnar Svenson has also developed methods for describing road hilliness and curvature on the basis of data in the National Road Database, NVDB.

"Another innovation is a method for managing impossible and illegal turns at road junctions," explains Gunnar Svenson. "This enables the sys-

tem to also consider the extra time and fuel consumption caused by different types of junctions."

Gunnar Svenson successfully completed the formalities relating to his PhD, 'Optimized Route Selection for Logging Trucks – Improvements to Calibrated Route Finder' on 3 February at SLU in Uppsala. The opponent was Professor Karl Stampfer, Institute of Forest Engineering, BOKU, Vienna, Austria. Gunnar Svenson is a forest scientist and is Assistant Programme Manager of the Skogforsk research programme, Operational Systems.



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READ MORE:
The thesis Optimized Route Selection for Logging Trucks – Improvements to Calibrated Route Finder can be downloaded from skogforsk.se.



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skogforsk.se

SMARTER FORWARDING

■ Smarter Forwarding is an instruction film to help improve the efficiency of forwarding and cut down on time waste.

The film examines forwarding from a holistic perspective, and describes site preparations, preliminary work in the harvester, collaboration and communication, and planning and execution. The focus is on minimising the amount of unnecessary work.

Contents (32 minutes):

- Preparations and information
- Starting on a new site
- Idling and planning
- Loading
- Loading technology and driving with a load
- Landing layout
- Summary

The film is produced by Heurgren Film on behalf of Skogforsk in collaboration with Latvian Latvijas Valsts Meži and Norwegian Skogkurs.

SKOGFORSK CONTRIBUTES TO SECTOR RESEARCH AGENDA

■ Skogforsk has helped prepare the forestry part of the forestry sector's new research agenda.



The Swedish Forest Sector Research Agenda concludes its jointly identified over-all needs of research and development, targeting stronger competitiveness for increased supply of sustainable, bio-based products and services from the entire forest branch.

INCREASE TIMBER VALUE

*Reduce the amount
of manual cutting*



John Arlinger believes
in feedback in the field.

Skogforsk's new software, Timber Value, gives the forestry sector much more information on important performance indicators, such as measurement accuracy, degree of bucking and, not least, the proportion of manual cuts, which today is a cause of major losses in the value chain – up to SEK 8 per cubic metre!

Text: ANNA FRANCK & SVERKER JOHANSSON

Photo: EMIL GUSTAFSSON & SVERKER JOHANSSON

■ “There is little awareness about the cost of manual cutting in harvesters. But when the operators see the key data in front of them, it becomes very clear for almost all of them,” says John Arlinger, researcher at Skogforsk.

“In a normal stand, the proportion of manual cuts can be around ten percent,” he continues. “It can, of course, vary somewhat, depending on the stand and the tree species. In a stand with rot or crooked stems, the proportion of manual cuts will be considerably higher, but in fine stands, virtually no manual cuts are needed.”

Despite this, some operators make considerably more manual cuts than that – figures of up to 60 percent are not uncommon. Other operators are extreme in the other direction, even in the same type of forest. They follow the harvester computer’s proposal to the letter.

“Some operators see defects everywhere, while others never see any at all. With this program, we want to convince operators who never cut manually that it’s sometimes necessary, while those who do it too often must understand that the saw mill can cope with certain defects,” says John Arlinger.

Wrong lengths lead to major losses. This particularly applies to sawmills that do not sell large

quantities on the bulk market and instead plan and steer production towards precise customer orders. Defective timber causes big problems, as orders must sometimes be supplemented with finer qualities to fulfil customer requirements. Another problem is that unwanted lengths are left that are difficult to sell at the right price.

Big losses

An estimate from Skogforsk shows that losses in the value chain from forest to completed product may be as much as 8 SEK per cubic metre when there are too many manual cuts.

Portable

The Timber Measurement Associations (VMF) auditors and forestry officials incorporate Timber Value in their systems and conduct analyses in the office, but also take the program out on their field checks to go through key data with contractors and their operators.

The program is also very useful in everyday operation.

“It’s installed in the harvesters, so the operators themselves can go in and check their work. It will become increasingly common in the future,” believes John Arlinger. “And the interface could perhaps be developed so that the operator is given things



John Arlinger,
researcher at Skogforsk.

to think about, such as ‘Today you’ve done a lot of manual cutting’ or ‘Today you’ve had a great deal of pulpwood, have you been working correctly?’ We know from experience that there’s a tendency to go back to normal behaviour patterns after a few weeks.”

Supplement

But John is careful to point out that the program should not be seen as the only way to monitor quality – it should be used as a supplement to the field visits.

“We still need to go out in the forest and look. Some causes of errors are only seen in the field. Information and discussion about, for example, regulations about crooked stems and the actual demands of industry are necessary to ensure good quality in forest products. And such dis-

cussions should be held at least a couple of times per year out on the harvester.”

And now?

The program is ready to be used, but there are some ideas about how it can be improved further. To keep the development work alive, discussions are held a couple of times a year, where Skogforsk and the sector evaluate how the software is being used.

“It may be that the companies will want to add functions. Another scenario is that most parties choose to simply incorporate the functions in their existing IT systems and that’s enough for them. We’ll just have to wait and see,” says John Arlinger.



In the follow up, wood slices are also cut to examine for any bucking splits.

JONAS HEMMINGSSON, VMF SYD:

"A FINE TOOL"

■ “I think this is a fine tool,” says Jonas Hemmingsson of VMF Syd. “Today it’s very important that mills get the right lengths and dimensions. Previously there has been no way to analyse harvester data to find out about the bucking – it was mostly qualities we talked about. It was quite difficult to focus on length requirements and distribution when we had no software as support.”

No more guessing

For example, there was no way to go through the proportion of manual cuts in relation to the length outcomes. The only way

was to ask the operators, and their guesses did not always give a true picture of reality.

“Some operators had no idea of how much manual cutting they did. The Timber Value program is a good instructional tool to analyse this,” says Jonas Hemmingsson.

“Very interesting”

When he visits the harvester operators in the field and shows the program for the first time, the responses vary. Some find it exciting, but others are more sceptical.

“A typical first reaction is, ‘Oh

no, now they can keep an even closer check on what I’m doing’. But they usually change their views when they see what the program contains and see that it actually is very interesting.”

Taken onboard

The key data that Jonas Hemmingsson usually spends most time on during discussions with the operators is the timber proportion, manual cuts and stem-defect wood.

“Stand properties largely steer what possibilities there are to follow the pricelist,” he explains. “But sometimes the operator



Timber value

Follow up and measurement control are becoming increasingly important, particularly when the harvesters are often used for measurement on which payments are based. This speeds up reporting of the timber transaction and payment to the forest owner, but the harvester's measurement system must be checked and calibrated to ensure accuracy. The companies' own measurements are checked by an independent auditor.

A few years ago, the users posed the question about whether the VMF auditors could help even more, while they were

already on site. Skogforsk developed software that presented key data, based on the harvesters' production data, which the auditors could simply refer to.

A decision was also made to develop a program that could show key data in overview form, which the auditors could take with them out to the operators.

Since then, the program has been developed, evaluated and tested in many versions. Skogforsk sees

the program as an important tool for providing feedback to operators, but also as a way to demonstrate how harvester data can be used. Hopefully,

Timber Value gives a green, amber or red light for the key data that is important to monitor during operations.

much of the functionality will be built in to the companies' different systems, and certain parts are already incorporated in the SDC system.

Timber Value has been financed by most of the Skogforsk members and many of Norway's forestry companies. Today they are entitled to use the program. Other users must buy licences, and the revenue generated goes to further development.

shortens the logs for no real reason. I usually sit with the operator in the cab to see how the bucking computer works in relation to the pricelist. For logs that are close to the limit, we go out and check the measurements, and this helps the machine operator."

Jonas Hemmingsson also participated in the tests of Timber Value during the development phase.

"At that stage, it was mostly about testing how it worked and assessing what needed to be developed. It's been interesting, with much back and forth, but after many updates, it's now starting to look good. It's pretty much completed now.

"But it will take a while before the right level of key data



Leonard Hultgren, harvester operator at MKP-Dunberg, is instructed by Jonas Hemmingsson.

is found, because this varies quite a bit depending on geography and stand properties. At VMF Syd we've been using the program continually in

conjunction with field visits throughout 2016, and a growing number of machine teams have it installed in the harvesters.



ROBERT FRIES, SCA SKOG:

"MUCH GREATER AWARENESS"

Robert Fries, timber specialist at SCA, is sitting and working with the Skogforsk Timber Value programme when Vision/ShortCuts calls.

"I have it in front of me right now. I like it. It's a good analysis program and it's instructional. The program isn't really anything new. Skogforsk has taken parts from different programs and gathered them in a single interface, and they've also made it more user-friendly and easier to obtain an overview. It's much easier when you have everything in one program.

'Stenkoll'

He does not feel that the software in its present form is aimed at forest machine operators. Instead, it is more of an analysis program for team leaders and contractors. So that machine operators can also benefit from the key data, SCA is currently developing a new application called Stenkoll, which includes much of the functionality from the Timber Value program.

"You could say it's an extension of the program. Stenkoll will give us a much greater awareness of how all the machines are doing, and it will definitely increase the timber value.

Important tool

When the new system is launched, the operators can sit in the machines and use their mobile phones to check their performance over a certain period.

"Previous evaluation programmes have been aimed at people like me, sitting in the office. I don't think that's right. It's in the machines that the work is done. It's important that they have a good tool for evaluating how they've succeeded. Here, they can see at once if they've attained their goals and how they can improve even more," says Robert Fries.

Logging and scarification

MAJOR THREAT TO DEAD WOOD

In modern forestry, dead wood is retained at final felling. It appears however that a high proportion of this dead wood is harmed during logging and scarification.

Text & Photo: SVERKER JOHANSSON

■ Skogforsk has looked more closely at how old fallen trees are affected by logging and subsequent scarification. The study was carried out in pine stands within the research area "Effaråsen", located in the boreal zone in central Sweden. The pine stands in the research area near Effaråsen ridge west of Mora are affected by logging and subsequent scarification.

"It's an important study, because really there's only been one study so far," explains Jan Weslien, conservation expert at Skogforsk. "That was a Finnish study carried out on peatland, and received some criticism because the soil type is not representative of most of the clear-cuts that undergo scarification in Sweden."

Unique study

Until now, no studies have been carried out on fallen dead trees during the logging and regeneration phase on normal forest land. The study showed high

levels of damage, first after felling and forwarding, and increased even more after scarification, which was carried out with a harrow on the stony moraine.

The study assessed the proportion of damage on the surface of the old fallen trees in the old pine stands. The study was carried out on six permanent one-hectare plots. Of the 115 fallen trees, about half of them were undamaged after felling, but this proportion fell to one third after scarification.

Other measures needed

Thirty-two of the 115 fallen trees were protected by patches of retained living trees and remained largely undamaged both during logging and scarification. However, among the unprotected fallen trees outside the tree retention patches, approximately 80 percent were damaged, and among these damaged stems, generally more than 50 percent of the surface area was damaged.

"Our results clearly demon-



In retention areas, the dead wood is protected from both logging and scarification.

strate the problem of creating a sufficient number of good planting spots using a harrow, without damaging logs on this kind of rocky soils" says Jan Weslien. "The recommendation is to avoid harrowing on soils where there is a lot of dead trees. Clusters of dead trees can also be protected actively by placing retention trees or high stumps around them."



Jan Weslien: "The soil in this type of forest seems to be hard to scarify without causing damage."

"It was clear that the machine operators had tried to avoid damaging the fallen trees in many places," says Skogforsk's Per Westerfelt, who carried out the fieldwork. "But the old forests contain a lot of fallen trees, and it's hard to avoid damaging them while creating sufficient planting spots."

"Many fallen trees have lain in the same place for more than a hundred years, and are habitats for many threatened wood fungi that are often found on the underside of the trees, in contact with the soil. There's a lack of studies about how the fungi are affected when the wood is moved, but it's probably best to leave it lying in the same place it's occupied for many years."

Fewer and fewer?

"Old, resin-impregnated logs, like many found here, are not produced in the fast-growing forests of today. It is therefore important to protect them", says Jan Weslien.



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