



## Summary

AustroFOMA is a large forestry machinery exhibition held every four years in Austria. It is recognised as one of the largest live machinery demonstrations focussing on steep terrain harvesting. In October 2015, it was held at Hochficht in the Bohemian forests close to the Czech Republic border. Despite poor weather, over 18,000 people attended the 3-day event, where 145 forestry equipment suppliers displayed a wide range of products. This issue of Harvesting Technology Watch presents the highlights of new technology developments seen at the show, in terms of equipment that may have application to New Zealand logging contractors and forest companies.

Rien Visser, University of Canterbury and Keith Raymond, Future Forests Research

## NEW CABLE YARDING TECHNOLOGY FROM EUROPE

### Koller Hybrid Tower Yarder

Koller Forsttechnik is a cable yarder manufacturer based in Kufstein, Austria. At AustroFOMA, Koller Forsttechnik displayed the first prototype hybrid tower yarder (Koller K507H-e). The yarder is still under development but is expected to be commercially available in the first half of next year. While the K507H is a very successful commercial model, the key difference is electric winches power-driven by a diesel-electric configuration with the ability to capture and store energy in battery packs. The 3-cylinder diesel engine is only 36 kW (49.5 hp) and will only use 3-5 litres of fuel per hour, but the mainline speed on inhaul is still 9 m/sec with 30 kN of pulling force.

During normal operations the engine will run only about 30% of the working day, and for most tasks it will work directly from the battery. For example, during set-up and take-down the engine does not need to run, and this makes communication among the crew that much easier. When uphill yarding, the engine needs to run only when pulling the load, and the battery will store the braking energy from slowing the carriage when returning.

In addition to fuel efficiency (multiple weeks between refuelling) and long service intervals (2000 hour service intervals requiring only 5 litres of oil and standard filters), the electric winches offer smooth variable continuous power to the drums (i.e. highest torque at lowest speed), and the pulling force remains constant over the full range of the drum layers. Operating the electric winches will also

be easier to configure for either automated or remote control operation. The yarder can also deliver 3-phase 400V (38kW) or single phase 230V (2.5kW) electrical power for other purposes.



Figure 1: Koller K507H-e Hybrid Cable Yarder

While this is an exciting development and likely to be the immediate future of yarder design for small to medium-sized yarders, it still has to prove itself in extended operation. Battery life is often questioned in these applications; however Koller is confident of



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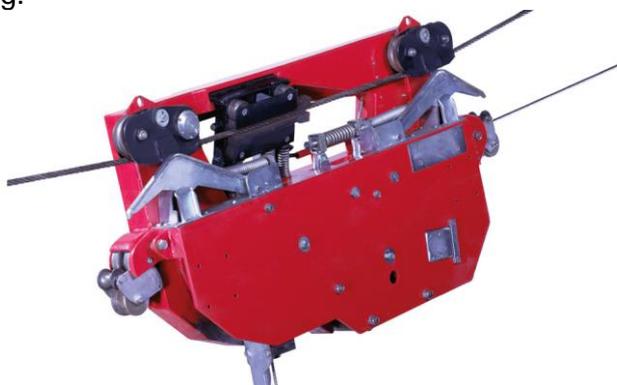
a minimum 15- to 20-year replacement interval, citing the use of similar systems in electric buses. The price indication is that it is likely to be 35% higher than the equivalent sized diesel-hydraulic version, so initially the new technology will come at a price premium.

More information is available on the Koller website ([www.kollergmbh.com](http://www.kollergmbh.com)) or email Roland Fürst at [roland.fuerst@kollergmbh.com](mailto:roland.fuerst@kollergmbh.com).

## Electric Slackpulling Carriages

Another European development demonstrated was the range of new and prototype electric slackpulling carriages. While battery powered carriages are not new (a battery powered grapple carriage was in operation in the USA in 1970s!), a range of battery powered slack-pulling carriages is now available on the market in Europe.

The Franz Hochleitner Bergwald 5000 carriage has been operating successfully for more than a year. It is rated for 5-tonne lift capability, and operates on skylines from 18-32 mm diameter. It has a diesel engine with a 3-litre fuel capacity, and a 48V Li-ion battery for energy storage which can be used continuously for 10-12 hours before recharging. The radio-controlled electric motor has three speed settings that allow an individual adjustment of the speed of the slackpuller. The carriage weighs 650 kg.



**Figure 2: Franz Hochleitner Bergwald 5000 hybrid carriage**

More information is available on the Franz Hochleitner website:

<http://www.franzhochleitner.com>

The 5000 Hybrid carriage is now joined by the Konrad E-Liner (3-tonne lift) manufactured by Konrad Forsttechnik GmbH of Austria, and the prototype Koller Forsttechnik ESK 2.0, which has 2.0-tonne lift (Figure 3). Weight is around 600 kg, and the pulley system is able to apply a force of 500 kg and pull out slack at a speed of 2 m/s.



**Figure 3: Koller ESK 2.0 electric carriage**

For all three carriages, the battery is used to operate the skyline and mainline clamps and drive the slack-pulling drive system. While all three units are slightly different, an alternator (or similar) is driven by the carriage sheaves as it moves along the skyline to charge the battery. Lift to the mainline, that is, raising the load up to the carriage, is driven by the mainline drum on the yarder.

As Europeans mainly work with standing skylines, there has been no market to expand this concept to other types of carriages, such as a grapple carriage. However, the lower weight characteristics in comparison to their motorised counterparts, and simplified servicing may prove successful to the point that the battery powered concept is extended to larger and different carriage types.

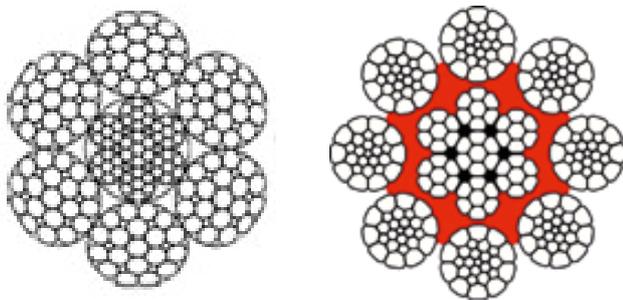


## New Wire Rope Technology

One innovation seen at AustroFOMA 2015 was the range of new-generation wire rope for cable logging. Tüfelberger is one of the main rope suppliers to the forest industry in central Europe. They have continued their development of specialised wire and synthetic ropes.

Two relatively new ropes that might be of interest include SUPERFILL® Compaction and PLASTFILL® Core.

In the SUPERFILL® Compaction wire rope, each strand of the rope is compacted in a special process. This results in a 30% greater breaking strength than conventional ropes (about 15% greater than standard swaged ropes), longer service life due to planar contact of the wires in the strands and less abrasion on the rope due to the smoother surface, and less wear on the rope drums. For contractors this means being able to either carry greater length of skyline, or higher payloads for the same diameter skyline.



**Figure 4: SUPERFILL® Compaction (left) and PLASTFILL® Core (right)**

PLASTFILL® Core is a lubricated steel core coated with a compact plastic sheath that ensures a better distribution of the load onto all strands and longer service life due to permanent lubrication. The positioning of strands results in an even strand gap for lower internal wear, as well as resistance to compression and lateral pressures. It was designed for skylines that are exposed to high levels of bending fatigue, which makes it the preferred rope for self-propelled carriages (such as the Konrad Woodliner).

Both ropes are made from higher strength steel (1960 N/mm<sup>2</sup>) so they are more susceptible to bending fractures if running around a small diameter sheave.

More information is available from the Tüfelberger website:

<http://www.teufelberger.com/>

## Cable Tiger Motorised Slackpulling Carriage

The recently released range of CableTiger carriages is produced by Gurndin OHG from Italy. These carriages are remote controlled motorised slack pulling carriages with a number of models available ranging from 3- to 5-tonne maximum lift capacity, however the potential exists for larger models. The focus is on a light weight robust design using high quality steel to minimise weight and maximise strength. The carriage software is provided by Valentini-cableways. Standard motors that can be easily serviced internationally power the unit.



**Figure 5: Cable Tiger slackpulling carriage**

Some unique features include the carriage being designed to survive heavy impacts, with the fuel tank located on the bottom to provide cushioning in the case of a fall, and the engine and the hydraulic system being mounted inside the frame to provide maximum protection. The tall thin main internal drum system allows the logs to be pulled right up



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the carriage, offering increased ground clearance and/or greater deflection. The carriage runs on two dual-sheaves (that is, weight and angle change is distributed over four sheaves on the skyline), decreasing pressure wear.

**Table 1: Cable Tiger Specifications**

Model	CT30S	CT30XL	CT50
Engine	33 hp	45 hp	75 hp
Max pull	3.0 t	3.6 t	5.0 t
Rope	120 m/11 mm	120 m/12 mm	130 m/13 mm
Weight	550 kg	720 kg	950 kg
Price	€43,000 / NZ75,250	€47,000 / NZ82,250	€51,000 / NZ89,250

The largest unit CT 50, weighs 950 kg and has a 5-tonne payload capability. The internal drum has a capacity to store 160 m of 12-mm rope or 130 m of 13-mm rope.

More information is available from the Cable Tiger website: <http://cabletiger.net> or from Helmut Gurndin (email: [cabletiger@gurndin.com](mailto:cabletiger@gurndin.com)).

## Ecoforst T-Winch Mobile Traction Winch

First developed in Austria in 2012 and seen at ElmiaWood in 2013, Ecoforst GmbH have now sold 12 units of the T-Winch remote-controlled mobile tracked winch around Europe and South America for use in tethered machine systems.

Normally a traction winch is mounted on either the machine that needs to use it – such as a feller buncher – or on a stationary anchor machine such as an excavator or a bulldozer. The disadvantages include the weight of the winch that is carried around even when the winch is not needed, and the size and cost of the winch machine.

With the T-Winch the winch is self-propelled and remotely-controlled from the harvester. The T-Winch machine is tethered at one end to a tree or stump, then driven across the slope, the blade at the front is dropped and the winch rope is then connected to the harvesting machine.

In its current format the T-Winch has a maximum tractive force of 8.0 tonnes, maximum speed of 4 km/hr and carries 500 m of 18-mm diameter cable, which is a little undersized for the New Zealand market. However, Eco-Forst are working on a version with a larger cable drum. The cost of the unit is approximately €100,000 (NZ\$175,000).



**Figure 6: Ecoforst T-Winch Mobile Traction Winch**

More information on the T-Winch is available on from the Ecoforst website: [www.ecoforst.at](http://www.ecoforst.at).

Koller also have plans to manufacture a mobile traction winch, similar in design to the Ecoforst T-Winch. The Koller winch design is larger than the T-Winch:

- Dry weight is 10.5 tonnes vs. 6.9 tonnes
- Engine power is 170 kW vs. 107 kW
- Winch max pull of 20 tonnes vs. 8 tonnes.

More information is available from Roland Fürst at Koller (email [roland.fuerst@kollergmbh.com](mailto:roland.fuerst@kollergmbh.com)).

## Felling Wedges

FFR members will be familiar with the Koller felling wedge that was brought into New Zealand by Ernslaw One Ltd and tested by FFR. The mechanical tree felling wedge is intended to give a faller specific advantages over the conventional



method. The ergonomics are improved in that the operator can kneel down and simply wind the level instead of bending over to hammer wedges in; control is improved through the smooth wedging (i.e. not the shocks generated by hammering); and most importantly, safety is improved in that the faller can look up to identify any “widow-makers” while wedging the tree over. Disadvantages include the weight of the wedge, and that the lifting force is applied at a single point.

Further evidence that the concept is successful is provided by another company (Forstreich Maschinenbau of Freiburg, Germany) which has designed and manufactured a new mechanical felling wedge which is very similar to the Koller model (Figure 7). The Forstreich TR30 model weighs 5.4 kg, is 50 cm long and 8 cm wide, and is able to generate 15 tonnes of lifting power, with a maximum 6 cm of lift stroke. It is marketed through EVG-Sulberg and the quoted cost is €829 (approx. NZ\$1450).



**Figure 7: The Forstreich felling wedges.**

More information is available from Stefan Reichenbach at the Forstreich Maschinenbau website: [www.forstreich.de](http://www.forstreich.de)

## Scorpion King Harvester

The Scandinavians continue to improve their line-up of purpose-built harvesters for steeper country. By its substantial size (22.5 tonnes, 8-m length and 65-cm ground clearance) and power (210 kW), one relatively new machine that will be of interest to New Zealand loggers is the Ponsse Scorpion King.



**Figure 8: Ponsse Scorpion King showing dual mounted boom for improved operator visibility**

A unique new design feature is the new two-arm boom moving over the cab to maintain 180 degree forward visibility for the operator (no boom blocking off right-side vision). The cab is mounted on the mid-section of the frame and is able to be kept level as the front and back bogies traverse undulating terrain. The four-axle design provides improved stability and traction, which makes it more suitable for steeper terrain. Additional stability is provided by an active stabilisation system that detects the position of the crane and presses the rear frame in the direction of work.

More information is available from the Ponsse website:

<http://www.ponsse.com/products/harvesters/scorpion>