

ONE MACHINE, MANY TASKS

Story: Hayley Leibowitz

IN THE CURRENT ECONOMIC CLIMATE there is a strong focus on production costs. A recent field demonstration at Loggabull's harvesting operation in Kinleith Forest, for forest management companies and logging contractors from both corporate and woodlot scenarios, showed how one machine and operator can do multiple tasks, including felling, shovel logging, log processing, sort and stack, truck loading,

tracking and road building. The Automated Quick Coupler system allows for increased utilisation of machinery while reducing costs, with a base machine changing attachments quickly and safely in just a few seconds without the operator leaving the cab.

Until now, hydraulic or manual hitches have been used for attaching buckets and the felling head but with the operator still

needing to get out to change messy hoses. The system is comprised of the Steelwrist SQ80 coupler and adapters, Sumitomo SH300-6 excavator base, a Waratah 624 HTH processor, Ensign 1770 fixed top grapple and a standard bucket.

This project and the field demonstration of the Automated Quick Coupler is part of the Automation & Robotics Primary Growth Partnership. In 2013, a group of New Zealand forest managers and harvesting contractors visited Elmia Wood, the Swedish forest harvesting machinery demonstration, where one of the highlights was the Fiberdrive quick coupler developed by Fiberpac AB of Sweden. The Fiberdrive allowed a forwarder to change quickly and safely from a Swedish sized processor head to a log loading grapple.

The system could handle a maximum attachment weight of 2200 kg, which would make it suitable for the smaller end of the New Zealand processor range (such as a Waratah model 616 or 618), but not the larger model processors common in clearfell.

The New Zealand contractors watching that demonstration saw the potential for reducing the number of logging machines required in steep country harvesting operations. However, further investigation showed the Fiberdrive system would need to be redesigned to handle the heavier weight, larger oil flow requirements and continuous rotation of New Zealand clearfell-sized processor heads.

Unfortunately, Fiberpac did not wish to build a coupler big enough for New Zealand sized processor heads. It was recommended that a quick coupler mechanism be developed in New Zealand better suited for the large processor heads commonly used in steep country harvesting operations.

The concept was investigated further to determine the economic advantages of

The Automated Quick Coupler with Ensign 1770 grapple.



introducing an automatic quick coupling mechanism into New Zealand. The resulting report in 2015 showed that such a mechanism would be to best advantage where production of a mechanised processor was constrained by operational factors such as limited landing size or low yarder production.

This work showed that for operations less than about 220 tonnes per day, using a quick coupler mechanism sharing a base machine cost \$2.86 per tonne less than a dedicated processor and loader.

The potential advantages of using one base machine with a processor head and

Forest management companies and logging contractors from both corporate and woodlot scenarios attended the demonstration.

Go greaseless with a LumberLIFT yarder grapple and take the hassle out of greasing your grapple every day.

Low maintenance | Easily refurbished

LumberLIFT
GREASELESS LOG GRAPPLE

For more information, or to request a quote, contact **Matt on 021 332 196**, email matt@3dindustrial.nz or visit www.lumberlift.nz

“As well as the greaseless bushes, the opening width and the way the grapple holds the wood without it slipping out is awesome. It's going well.”

Connor McCormick, McCormick Logging



a loading grapple was demonstrated at production levels between 150-240 tonnes per day, through improved machine utilisation. Therefore, for lower production operations (around the 200-240 tonnes per day range) having the ability to change attachments means the underutilised base machines can perform other functions such as truck loading, sorting, stacking or earthworks (if required).

At higher production levels there were few advantages in sharing base machines, as all machines in the logging system reached full utilisation (80%).

Positive results

At Mystery Creek Fielddays in 2021, Aptella, formally Synergy equipment, demonstrated a range of Steelwrist tilt rotators and quick couplers for earth moving operations. After observing the demonstration at Mystery Creek, Forest Growers Research (FGR) approached Aptella to supply a suitable quick coupler with sufficient capacity to handle the large processing heads used in New Zealand. The larger SQ80 series couplers were identified as having the required oil flow and load carrying capacity to operate these processing heads.

A joint venture project was set up to develop a prototype machine for the industry to test, encountering numerous setbacks, ranging from COVID to two log price slumps. The participants in this joint venture were:

- Aptella which supplied the Steelwrist SQ80 coupler and all of the necessary adaptors to connect attachments to the base machine.
- AB Equipment, Taupo which supplied a brand-new Sumitomo SH300-6 excavator, fully bush rigged, with a Waratah 624 HTH processing head, an Ensign 1770 fixed top grapple and a standard bucket.



- Total Hydraulic Solutions which installed the coupler to the base machine and the adaptors to the attachments and also programmed the computer/s to communicate with each other through the CAN bus communication system.
- FGR funded the purchase of the coupler and fittings, the installation and workshop trials and provided project management services to oversee the development.
- Brian Rutgers and Ivan Quin of Loggabull, who have been involved in the field testing and production trials of the Quick Coupler.

FGR funded the construction of a cradle to support the Waratah processor when it was not in use. The cradle was essential to hold the adaptor on the Waratah in position for ease of attachment and detachment and to prevent the ingress of contamination to the hydraulic manifolds.

The Steelwrist Quick Coupler has worked flawlessly throughout the project to date. The Quick Coupler on the Sumitomo achieved high utilisation during the 160 odd hours it spent at Loggabull's operation.

Extra guarding of hydraulic piping and fittings was necessary for the machine to be able to fell trees without machine damage. In addition, during tree felling, a minor change in technique (approach from the side), was used to minimise coupler contact with the standing tree. The fixed top grapple worked well when shovelling stems but was a bit harder to use when shovelling smaller pieces.

The Quick Coupler machine spent 70 hours in a windthrow operation at Fast Logging, and in that time, a volume of over 900 tonnes of logs was produced.

Above: The Automated Qick Coupler with the Waratah 624 HTH processor.

Left: The SH300-6 with processor working in East Taupo.



During the first few days, in the space of 4.5 hours of productive time, the Quick Coupler machine processed, sorted, and stacked 120m³ of logs, or around 27m³ per productive machine hour (PMH).

Accurate data on felling performance was constrained by the windthrow situation. Records showed 174 stems or part stems were felled and bunched in 3.3 hours (over 50 stems per productive machine hour (PMH)).

Bunching with the grapple was also influenced by the windthrow situation. During 3.5 hours, 140 stems and part stems were bunched from a maximum distance of 160m.

During continuous time study, the Quick Coupler machine processed, sorted and stacked 260m³ in 5.65 hours, or around 46m³/PMH, or 298m³/day (6.5 productive machine hours). Production levels between 150-240 tonnes per day have been identified as its key potential.

A bigger hitch could be supplied to fit a bigger processor. The unit is commercially available for excavator base sizes up to 70-tonne, so able to run the bigger processing heads as well if required.



Trialling the system without the cradle.

The way forward

Kinleith Forest, where the recent demonstration took place, is owned by Taumata Plantations and managed by Manulife Forest Management (NZ) which manages over 220,870 hectares (545,790 acres) of plantation forests located in Northland, Auckland, Waikato, Bay of Plenty, Manawatu-Wanganui, and Hawke's Bay regions.

The demonstration was well received with close to 60 attendees and such comments as "wish we could have had this years ago".

Since the demonstration, the attachment and removal of the processing head without the cradle has been trialled. This worked well with just the coupler part of the head being elevated on a log. This means the head can be moved with the base on the transporter and the bucket and grapple can be moved on a trailer.

All interested parties have now finished their commitment to the project and say realistically they are now waiting for log prices to lift to make it viable for someone to purchase. (NZ)

ENSIGN®

Made for NZ's Toughest Harvesters.

GB harvester bars, are manufactured to exacting tolerances, to maintain precision clearances for sprocket rotation, providing less sprocket heating. Ultra high strength material, ensures trouble free performance in all cutting conditions.

Now fitted with the new GB9BC nose tip.

EXCLUSIVE NEW ZEALAND DISTRIBUTOR OF GB FORESTRY PRODUCTS

ENGINERING SERVICES ROTORUA LTD
73 Biak St, Waterford Park, Rotorua, New Zealand.
P. +64 7 348 1286 | E. INFO@ENSIGN.CO.NZ

PERFORMANCE Forestry EQUIPMENT

GB Forestry