



# HARVESTING PROGRAMME UPDATE

Issue Number: 25

Date: Mar 2016

Programme Manager: Keith Raymond

## Summary

This programme update summarises progress to end of second quarter of the final year of the FFR Primary Growth Partnership Quarter 2 of 2015/16 in the PGP Steep Land Harvesting Programme. The programme focus has been on further development of the full teleoperation control system for the John Deere 909 feller buncher, and construction of the twin winch tail hold carriage in the Innovative Yarding System project. An independent review of FFR Commercialisation Plans was also commissioned which will be reported next Quarter. The wide industry consultation on priorities for new harvesting and logistics research has resulted in the development of a new funding bid to the Primary Growth Partnership.

## RESEARCH PROGRESS: Q2 2015/16

Quarter 2 of 2015/16 in the PGP Steep Land Harvesting Programme was completed on 31 December, 2015. Progress in the Annual Research Plan to 31 December 2015 was reviewed at the Technical Steering Team Meeting on Wed 17<sup>th</sup> February, 2016.

### 1.1 Step Slope Feller Buncher

There has been some recent success with commercialisation of the ClimbMAX steep slope harvester. Nine ClimbMAX harvesters have now been sold, 3 in New Zealand and six in Canada.

In the HarvestNav project, extension to the wider forest industry of the HarvestNav software application has continued during the quarter. To date 31 licences have been issued, and 18 units implemented across the industry. Version 2 of the software has been released which includes: ability to handle external GPS sensors to monitor all machines and crew positions on-screen; and integration of external tilt sensors for self-levelling machines. HarvestNav is available as a free download from the Interpine Forestry Ltd website: <http://www.interpine.co.nz/SitePages/HarvestNav.aspx>.

In the tension monitoring of winch-assisted machines project, capture of continuous cable tension data has commenced on four different cable-assisted machine operations under a range of conditions covering slopes and tasks such as moving, felling and shovelling. Results are

currently being analysed with a view to identifying any risks of overloading the winch cable. A set of guidelines for operators and planners to eliminate these risks will be developed.

### 1.2 Teleoperated Felling Machine

In Task A of the teleoperated felling machine project, a demonstration of the remote control system installed in the John Deere 909 feller buncher was held as part of the Forest Growers Research Conference in Nelson in October, 2015.

Further progress has been made in Stage 4 of the project to implement full teleoperation control system into the John Deere 909 feller buncher. A remote operated mobile operator console with John Deere seat and pedals and video monitors has been constructed. Cameras mounted on the boom and head of the feller buncher will feed live video stream to the operator in the console. A Technical Report summarising the concept design for teleoperation of the John Deere 909 feller buncher was published during the Quarter (Report H024).

In the other Task A project, further progress has been made in installation of a remote control system into a Volvo EC290 mobile tail hold machine. Hydraulics components and the Remote Control Unit (RCU) have been purchased and the installation of the RCU into the Volvo EC290 is underway. The tail hold camera was installed in Nelson at the end of November. The remote control components in the hauler



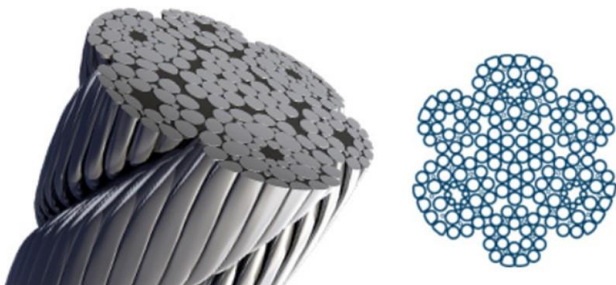
were also installed. The components to go into the tail hold machine were then tested and configured. The camera will be installed in the tail hold machine in the workshop next.

In Task B, UC Mechatronics researcher Chris Meaclem has completed his PhD thesis and Scion researcher Dr Richard Parker is organising some more resources to configure the tree-to-tree robot ready for field testing and demonstration in April 2016.

## 2.2 Improved Grapple Control

In the Skyline Tension Monitoring project to optimise yarding operations, Dr Hunter Harrill has completed the Work Plan and data has been collected from the Active 70 yarder operation. A prototype tension monitoring 'app' has also been developed.

The New Wire Rope Technology project is aimed at exploring the new-generation wire rope available for cable logging. This project will measure the rate of wear for a new type of wire rope called Constructex (supplied by Bridon Cookes) that has recently been installed on two different yarders. Constructex is a swaged rope with six strands of alternating size, has a synthetic centre wire in each strand and has a unique three strand parallel closed core to minimise internal friction with the outer strands.



In the Felling Wedge project, a Work Plan for further development has been completed. Further work has continued in designing a remote-controlled power pack for the felling wedge, so it can be operated remotely after the faller has moved out of the hazard zone. Base

torque requirements for operating the manual Koller Mechanical Tree Feller have been measured.

The evaluation of the skyline-suspended felling grapple carriage designed by Storm Logging Ltd of Gisborne has been completed. This was a technical evaluation undertaken by Hunter Harrill and Rien Visser of the University of Canterbury, School of Forestry. To assist FFR project funding decisions in this development The TST recommended an independent evaluation of the technical and economic feasibility of the concept. A report was completed for the TST (unpublished). Significant limitations were foreseen in this development in terms of carriage weight, payload, power, and operational implications. As such it was recommended that no further investment be made in this project.

## 2.3 Innovative Yarding System

The design of the full sized version of the tail hold carriage has been completed and a Technical Report covering design and economic analysis of the Twin Winch Tail Hold Carriage has been published (Report H025).



Purchasing of components and construction of the beta prototype mobile tail hold carriage (full scale working version) was completed during the Quarter. Hancock Engineering Ltd from Mosgiel has completed the fabrication of the carriage and fit out of hydraulics and electrics is underway.

## 3.2 Harvesting Technology Watch

The Quick Coupler Attachment project, to develop a remotely controlled coupler to rapidly



# HARVESTING PROGRAMME UPDATE

switch between a processor head and a loading grapple, made significant progress during the Quarter. A manufacturer of couplers for other attachments, Doherty Engineered Attachments Ltd of Mount Maunganui has agreed to be a partner in this project to develop a quick coupler for a processor head and a grapple.

Both Waratah and Southstar have given their support to assist Doherty in the project. A Technical Note summarising the economic viability of the quick coupler mechanism has been completed (HTN08-04).

Concept design and cost estimates for the build were completed by Doherty Engineered Attachments Ltd. The next steps are to complete the detailed design, peer review and finalise the quote to construct the Quick Coupler.

The production study of the Koller K602 yarder owned by Mr Christian Welte, of Waikura Joint Stations on the East Coast, will go ahead in Quarter 3. There was a delay until log prices improved, and the operation is now economically viable and harvesting has commenced. The study is scheduled to be undertaken during March.

The FORMEC forestry mechanisation conference, focussing on steep terrain, was held from 4-6 October in Linz, Austria. Associate Professor Rien Visser, from University of Canterbury School of Forestry, and Keith Raymond of FFR were both keynote speakers. Rien talked about the expansion of ground-based machinery onto steep terrain using winch-assisted systems. Keith Raymond gave a presentation on FFR's work developing teleoperated felling machines. The FFR research programme has been successful in developing some really innovative harvesting systems and forestry people around the world are starting to take notice of its success. The conference was partnered with the AustroFOMA equipment show which focussed on steep terrain harvesting systems.

A Harvesting Technology Watch report (HTW-016) has been published on the highlights of the AustroFOMA machinery demonstrations.

## NEW HARVESTING RESEARCH PROGRAMME

A funding bid to Sustainable Farming Fund (SFF) on small scale harvesting systems was submitted to MPI in August. Approval for industry co-funding received the recommendation of the sub-committee of the joint FOA/FFA Forest Research Committee for FGLT funding, subject to success of the SFF bid. A decision on the SFF bid was received in December 2015, and unfortunately the FFR project was not funded. It is now being considered whether to resubmit the SFF bid for funding in 2017/18.

Regarding the outputs from the two Harvesting and Logistics Research workshops held over the last year, a report consolidating the 45 research project ideas from the two workshops was circulated to the industry in early September.

The ideas for new harvesting and logistics research projects were grouped into six research themes:

- Imperative to improve safety (Health and Safety/Human Factors)
- Improve skills and attract people to industry (People/Training)
- Enabling industry expansion (Small Forest Growers)
- Reduce cost and improve profitability (Technology/Productivity)
- Increase efficiency across supply chain (Supply Chain Logistics)
- Reduce impact of harvesting (Environmental Management)

A survey of the industry was undertaken in Oct-Nov to determine industry priorities for a new research and development programme. The responses from this wide industry input were analysed.

The highest priority projects (as a result of the survey analysis) were:



- Development of the remote-controlled tree-to-tree harvesting machine
- Totally new felling technologies
- Log identification during processing
- Automate the log scaling method
- Create safe high productivity workplaces

These top ranking projects have formed the basis for the development of a new harvesting and logistics research funding application to the Primary Growth Partnership.

## RESEARCH OUTPUTS TO DECEMBER 2015

The following research reports were completed during Quarter 2:

### Technical Reports:

- Report H024: Concept Design for Teleoperation of a John Deere 909 Feller Buncher – P. Milliken, D. Lamborn and A. Keast.
- Report H025: Twin Winch Tail Hold Carriage: Design and Economic Analysis – D. Scott and S. Hill.

### Harvesting Technical Notes:

- Harvesting Technical Note HTN08-04: Economic Assessment of a Quick Coupler Mechanism – S. Hill

### Harvesting Technology Watch:

- HTW-016 (October 2015): New Cable Yarding Technology from Europe – R. Visser and K. Raymond.

These reports are available to FFR members on the FFR website: <http://www.ffr.co.nz/> (requires login and password).