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HARVESTING PROGRAMME UPDATE

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Summary

A field demonstration of the robotic tree-to-tree felling machine has been scheduled for Tuesday 27th September 2016 in Christchurch. Completing development and moving to commercialise the many products arising from the FFR Primary Growth Partnership Steep Land Harvesting Programme has been a key focus over the last quarter. This update summarises progress to the end of the 2015/16 year. Significant progress has been made in the teleoperation control system for the John Deere 909 feller buncher, which was successfully demonstrated to the industry in late July. The construction of the Awdon Skyshifter twin winch tail hold carriage has also been completed and production field trials have commenced.

The proposal for a one-year extension of the programme, focussing on commercialisation and technology transfer to accelerate uptake of the programme's outputs, has been approved by MPI and the FFR Board. A team of business development experts, led by Geoff Todd, Managing Director of Viclink, the commercialisation arm of Victoria University, has been brought together to provide support for the various technology developers in each project.

RESEARCH PROGRESS: Q4 2015/16

Quarter 4 of the 2015/16 research plan was completed on 30 June 2016. Progress in all the projects in the Annual Research Plan was reviewed at the Technical Steering Team Meeting on Wed 27th July, 2016 in Nelson.

1.1 Steep Slope Feller Buncher

In the tension monitoring of cable-assisted machines project, three different machine operations have been studied by School of Forestry, University of Canterbury. A report on the winch rope tensions measured over a range of conditions has been completed (Technical Report H028).

All the workshop material which has been presented at the tension monitoring workshops organised by the School of Forestry, has been published for wider industry use as "2016 Cable-Assist Workshop - Improving Operations" (Technical Report H029).

Further commercialisation of the HarvestNav on-board navigation application to provide a full "out of the box" system is planned as part of the 2016/17 Annual Plan.

1.2 Teleoperated Felling Machine

In Task A of the teleoperation project, the mobile operator console for the John Deere 909 feller buncher was installed at Ross Wood's operation in Moutere Forest in July.





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The full teleoperation control system for the John Deere 909 feller buncher and the remote control system for the Volvo EC290 mobile tail hold machine was successfully demonstrated on 25th July in Nelson. Commissioning of the system is continuing. Further commercialisation of the teleoperation control system is planned as part of the 2016/17 Annual Plan.

In the other teleoperation project, Task B, further development of the robotic tree-to-tree felling machine has continued during the Quarter with extra resources applied to the project to complete it ready for field testing.

A field demonstration of the robotic tree-to-tree felling machine has been scheduled for Tuesday 27th September 2016 in Christchurch.



2.2 Grapple Related Projects

In the Skyline Tension Monitoring project a report on measuring skyline deflection with the LineSmarts 'app' has been published (Harvesting Technical Note HTN08-07). A report on improving yarding productivity through the use of tension monitors has been completed by Dr Hunter Harrill.

The prototype tension monitoring 'app' has also been developed and a report has been completed. The next stage is to work with tension monitor manufacturers to enable tension data to be live-streamed from the tension monitor to the 'app'. Further commercialisation of the 'app' is included in the 2016/17 Annual Plan, including release of the 'app' to the forest industry.



The New Wire Rope Technology project, aimed at exploring a new-generation wire rope called Constructex, continues for the lifespan of the rope. An initial report, describing the setup of the Constructex wire rope trials, has been published (Harvesting Technical Note HTN08-08).

In the Felling Wedge project, the alpha prototype of the remote-controlled power pack for the manual felling wedge has been built and field testing is underway. It has been designed so it can be operated remotely after the feller has moved out of the hazard zone around the tree.



Modifications from the first field tests have been identified and the second (beta) prototype is currently under construction, with the following changes:

- * Using a higher quality driver rather than the 6mm output on the first prototype.
- * A different battery clip arrangement will be required as the more robust impact driver has a different battery.



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* A guard around the battery and the emergency stop button.

* A handle and facility for a shoulder strap for carrying in the field.

A commercialisation plan will be developed to address the introduction of wedges into the market and further commercialisation of the felling wedge is planned as part of the 2016/17 Annual Plan.

2.3 Innovative Yarding System

The working version of the Skyshifter twin winch tail hold carriage has been constructed.



Full field trials commenced at Skyline Harvesting Ltd in Kererutahi Forest in the eastern BOP in July.

The field trials will investigate the performance of the carriage in the following areas:

- Carriage setup
- Operational productivity
- Winch rope tensions
- Winch rope wear
- Line shifting
- Down rigging

Once field trials and modifications are completed the carriage will be available for lease to harvesting contractors as a first step towards commercialisation. Further commercialisation of the Skyshifter carriage will be undertaken as part of the 2016/17 Annual Plan.

3.2 Harvesting Technology Watch

In the Quick Coupler Attachment project, Doherty Engineered Attachments Ltd of Mount Maunganui has commenced construction of the remote controlled automatic quick coupler. This enables rapid switching between a processor head and a loading grapple.

Further commercialisation of the Doherty Quick Coupler will be undertaken as part of the 2016/17 Annual Plan.



The study of the Koller K602 yarder owned by Mr Christian Welte, of Waikura Joint Stations on the East Coast, was also completed in March and a report is in preparation.

2016/17 ANNUAL PLAN

The one-year extension to the Steep Land Harvesting Primary Growth Partnership (PGP) programme was approved by MPI and the FFR Board during the Quarter.

The programme extension will focus on commercialisation of the following technology products arising from the programme:

- HarvestNav on-board navigation system
- Teleoperation control system
- CutoverCam hauler vision system
- Remote-controlled felling wedge
- Awdon Skyshifter tail hold carriage
- Doherty quick coupler attachment



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The programme will engage the following business development experts to support the various technology developers in each project and finalise commercialisation plans for the projects:

- Geoff Todd, Managing Director of Viclink
- Dave Cochrane, founder of Waratah Group and consultant to Southstar Equipment Ltd
- Dr Sunil Vather, ex-IRL Ltd and consultant to Kiwinet

NEW PGP PROGRAMME

A new Primary Growth Partnership (PGP) programme proposal was submitted to MPI in March, for consideration by the PGP Investment Advisory Panel in April.

The programme focusses on Automation and Robotics in the forest industry, based on the highest priority projects identified as a result of the extensive industry consultation undertaken in 2014/15:

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

Industry co-funding from the Forest Grower Levy was recommended by the joint FOA/FFA Forest Research Committee.

The PGP Investment Panel requested significant changes to the structure of the new PGP proposal. FFR is currently working on addressing these issues prior to resubmitting the proposal.

RESEARCH OUTPUTS TO AUG 2016

The following research reports were published during the last Quarter:

Technical Reports:

- Report H028: Tension Monitoring of Cable-assisted Felling Machines – R. Schaare, H. Harrill, and R. Visser.
- Report H029: 2016 Cable-Assist Workshop - Improving Operations – R. Visser and H. Harrill.

Harvesting Technical Notes:

- Harvesting Technical Note HTN08-07: Measuring Skyline Deflection with the LineSmarts 'App' – H. Harrill and R. Visser.
- Harvesting Technical Note HTN08-08: Constructex Wire Rope: Initial Trials – H. Harrill and R. Visser.

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