HARVESTING PROGRAMME UPDATE

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Programme Manager: Keith Raymond

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Summary

This programme update summarises progress in the PGP Steep Land Harvesting Programme to end of the 2014/15 research year. The programme focus has been on the installation of the remote control system in the feller buncher and engineering developments in the innovative yarding system project. Research themes for a new harvesting and logistics research programme arising from the two research workshops have been summarised and industry input to prioritising the research themes is invited.

HARVESTING RESEARCH THEMES

Outputs from the two Harvesting and Logistics Research Forum workshops held in Rotorua and Balclutha have been consolidated into a series of common research themes which will be circulated out to industry for comment and for members to prioritise.

Over 100 industry members attended the two workshops and provided their views on:

- Current Industry Issues and Future Trends
- Industry Needs and Gaps
- Future Research Ideas

The ideas for new harvesting and logistics research projects have been 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)

Wider industry input is now required to determine industry priorities for research. If there is adequate alignment on priorities and sufficient support for a new harvesting and logistics research programme a funding application to the appropriate Government fund will be developed.

RESEARCH PROGRESS: Q4 2014/15

The last quarter of the FFR 2014/15 Harvesting Programme has been completed. Progress in the Research Plan to 30 June 2015 was presented at the Technical Steering Team Meeting on Wed 15th July, in Nelson.

1.1 Steep Slope Feller Buncher

The recent widespread uptake of winch-assisted machines (catalysed by the initial developments by Ross Wood and the ClimbMAX harvester) is being documented in a survey of these systems across New Zealand. To date there are at least 26 other winch-assisted machines in operation with a further 22 machines in development.

Extension to the wider forest industry of the HarvestNav software application has continued during the quarter. To date 30 licences have been issued, and 16 units implemented across the industry. Enhancements to Version 2 of the software includes: integration with mobile in-field communications; 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.

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1.2 Teleoperated Felling Machine

In Task A, the first prototype remote control system for the John Deere 909 feller buncher, owned by Ross Wood of Wood Contracting Nelson 2014 Limited, was installed and tested in July 2014. Stage 2 of this project, to commission the system in the feller buncher so that the operator can control all functions of the machine from within line of sight using video feedback from an in-cab camera system displayed on the portable remote-control unit, has now been completed, and the system was installed in late-May 2015.

A demonstration of the remote-controlled feller buncher was organised for the Harvesting TST at Ross Wood's operation in Nelson on 14th July.

Stage 3 of the project, to implement the full teleoperation system on the John Deere 909 feller buncher that allows the operator to operate the machine from a console (similar to a replica cab) at a distance, using audio and video feedback is now underway. This exciting development for the programme will be achieved in the final year of the programme.

In the other part of Task A of the teleoperation project, retrofitting a remote control system to a Volvo EC290 mobile tail hold machine is also underway.

In Task B of the teleoperation project, Scion researcher Dr Richard Parker is working with UC Mechatronics researcher Chris Meaclem in the further development of the prototype lightweight semi-autonomous tree-to-tree felling machine ("Stick Insect").

Richard attended the Robotics in the Forest Workshop hosted by FP Innovations at the Hotel Hyatt Regency in Montreal from April 21-23. This was attended by 60 experts in robotics and automation. A Technology Watch report (HTW-015) on relevant presentations at the Workshop is in preparation.

2.2 Improved Grapple Control

In the Cable Rigging Configurations Efficiency project, Dr Hunter Harrill has run a series of workshops to extend his work on cable rigging configurations to the industry. Five workshops have been run in Gisborne, Dunedin and Rotorua, with 86 participants.

Further development work on the dual-arm Scorpion grapple carriage has stalled. The development is not completed to a stage where production trials of the alpha prototype grapple can be undertaken. Resources in this project have been reallocated to other projects, and further work will not be undertaken until more progress is made.

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In the Felling Wedge project, aimed at improving directional felling of manually-felled trees for better grapple extraction, another type of felling wedge has been trialled as an alternative to the Jackson Beckham felling wedge. This is the Koller felling wedge which has been sourced from Koller in Austria. A side-by-side trial of the two wedges has been completed and a report is in preparation (Technical Report H022).

A Commercialisation Plan for the Jackson Beckham Lifting Wedge has been prepared (HDP-029).

2.3 Innovative Yarding System

The Development Plan for the beta prototype mobile tail hold carriage (full scale working version) has been revised to prioritise the completion of the twin winch tail hold carriage to pre-commercial stage by 30 June 2016.

The design of the full sized version of the tail hold carriage has been completed and approval for construction of the carriage was gained from the TST at the Q4 TST meeting.

A Commercialisation Plan for the twin winch tail hold carriage has been prepared (HDP-030).

3.2 Benchmarking Cost and Productivity and Harvesting Technology Watch

Analysis of data collected for the Benchmarking project from harvest areas logged in 2014 has been completed and a Technical Note on the 2014 data (HTN07-05) is in preparation. The FFR benchmarking project is now into its 7th year and the database currently holds 880 harvest areas dating back to 2008, with 150 entries submitted in 2014.

Cable logging productivity jumped up 10% in comparison to the previous two years, but cable logging rates also increased by an average of 2.5% per year over the last 5 years. Cable logging rates currently average $36.60/tonne with the highest cable logging rates exceeding $60/tonne.

Ground-based productivity also registered a significant jump of 15% in 2014, with a corresponding 8% drop in logging rate to $24.90/t from the previous year. This reduction was explained by increased average stand volume harvested, larger average piece size (2.2 tonnes/tree), and easier terrain (12% lower average slope) due to a larger proportion of entries from the Central North Island.

A Technical Note on the production study of the remote controlled Koller K602H yarder operating in Mangatu Forest has also been completed (HTN07-06).

Development of a Quick Coupler Attachment has advanced this Quarter. Discussions continued with Southstar Equipment Ltd on the design and a cost-benefit analysis has been undertaken showing benefits at different productivity levels averaging $1.40/tonne. A proposal for co-funding the development has been included in the 2015/16 Annual Plan.

At the University of Canterbury, School of Forestry, a review of international training systems in Europe and the Pacific Northwest has been completed and a Technical Note is in preparation (HTN07-07).

Work also continues on the integration of GPS/GNSS data with grapple harvester production data to provide opportunities for improved forest management. A Technical Note has been completed (HTN07-08).

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Managing Integrated Mechanised Harvesting and Transport Operations

Outside of the FFR programme, a three week training course for managing mechanised logging operations is being run in South Africa in November/December 2015.

The first International Forest Engineering Summer School on "Managing Integrated Mechanised Harvesting and Transport Operations" is being offered at the George Campus of the Nelson Mandela Metropolitan University, in South Africa from 23 November To 11 December 2015.

The course is being run by Professor Michal Brink and Andrew McEwan, forest engineering lecturers and researchers at Nelson Mandela Metropolitan University.
Other course lecturers include:

- Simon Shackleton, General Manager Forestry, Sales & Marketing, Asia-Pacific & Africa for John Deere.
- Norbert Schalkx, Area Director with Ponsse PLC, Asia-Pacific & Africa.
- Gary Olsen, Tigercat Industries Inc. based in Canada.

For more information on the International Forest Engineering Summer School, click on this link: international-forest-engineering-summer-school.

RESEARCH OUTPUTS TO Q4

The following research reports were completed this Quarter and are in the process of publication:

Technical Reports:

- Report H022: The Jackson Beckham Lifting Wedge and the Koller Mechanical Tree Feller: Comparison Trials – B. Vincent.

Harvesting Technical Notes:

- Harvesting Technical Note HTN07-05: Harvesting Cost and Productivity Benchmarking: 2014 Update – R. Visser.
- Harvesting Technical Note HTN07-06: The Koller K602H Yarding System – T. Evanson.
- Harvesting Technical Note HTN07-07: International Steep Terrain Training Programmes – H. Harrill and R. Visser.
- Harvesting Technical Note HTN07-08: Capture and Analysis of Data from Harvester On-Board Computers – A. Olivera and R. Visser.

Harvesting Technology Watch reports:

- HTW-015: Robotics in the Forest Workshop – R. Parker (June 2015).

These reports will soon be available to FFR members on the FFR website: http://www.ffr.co.nz/ (requires login and password).

In addition to these published reports, two development plans have been completed during the Quarter (unpublished):

Harvesting Development Plans:

- HDP029: Commercialisation Plan for the Jackson Beckham Lifting Wedge – B. Vincent, D. Jackson and M. Beckham (Unpublished).
- HDP030: Commercialisation Plan: Twin Winch Tail Hold Carriage – S. Hill and D. Scott (Unpublished).

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