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HARVESTING THEME UPDATE

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Summary

This update summarises the annual review of the Harvesting Theme progress presented at the Members Meeting in Wellington on 16th August 2011. This highlights the progress of the first year of the “Innovative Harvesting Solutions” PGP Harvesting Programme, and previews the 2011/12 Research Work Programme.

MEMBER MEETING: REVIEW OF 2010/11 RESEARCH RESULTS

The Harvesting Theme Members Meeting was held in Wellington on 16th August 2011. Despite adverse weather that week across the country, about 20 theme members participated in the meeting to review the results of the 2010/11 research programme.

All the members present gained value from the meeting with over 80% of participants rating the meeting “very good”. The presentations on the Hauler Vision System and the Grapple Control System were rated most useful. Valuable suggestions were also received from members on how FFR can improve the content and quality of the presentations and also ideas for other research not covered in the current programme.

PRIMARY GROWTH PARTNERSHIP (PGP) PROGRAMME UPDATE

Russell Dale, CEO, gave a brief summary of the progress with the PGP Harvesting Programme.

The individual Research Work Plans for 2010/11 with detailed milestones and budgets for the “Innovative Harvesting Solutions” programme were approved at the Harvesting Theme Technical Steering Team Q1 review in October 2010, and the contract for the overall PGP Harvesting Programme was signed by MAF and FFR in November 2010. This confirmed \$3.26 million of Government funding, alongside

matching industry funding, for this new programme over the next six year period.

The 2010/11 Research Plan detailed five projects for the year aimed at achieving a step-change improvement in steep country harvesting costs and productivity:

- Task 1.1 Steep Slope Feller Buncher
- Task 1.2 Teleoperated Felling Machine
- Task 2.1 Hauler Vision System
- Task 2.2 Grapple Control System
- Task 3.2 Forest Industry Benchmarking
- Task 3.2 New Hauler Technology

REVIEW OF COMPLETED 2010/11 RESEARCH

Mechanisation on Steep Terrain – Steep Slope Feller Buncher

Work on Task 1.1 commenced with a baseline measurement of productivity of the Kelly Logging System developed by Kelly Logging Co. and Trinder Engineers. A Technical Note on the Steep Slope Excavator Feller Buncher was published during the year (Technical Note Vol. 3 No. 2).

The economic feasibility analysis of the steep slope feller buncher development was presented. Kerry Hill also discussed details of the improvements being built into the “beta” prototype of the machine. A Business Plan for commercialisation of the Trinder Steep Slope Feller Buncher has also been completed.



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Further work is underway by Hamish Marshall of Interpine Forestry Ltd, looking at the application of LiDAR in improving machine stability on steep slopes with a view to developing a Decision Support System for machine operators.

Mechanisation on Steep Terrain – Teleoperated Felling Machine

As a result of meetings with Professor XiaoQi Chen of the Mechatronics programme at University of Canterbury in August 2010 and April 2011, detailed work plans were developed for two PhD students in this project to work on various teleoperation and robotic projects in 2012.

Paul Milliken of Scion presented the background to the project, a concept design for a teleoperated machine, an economic analysis of costs and benefits and the development plan for the project.

Increased Productivity of Cable Extraction – Hauler Vision System

The technology and learnings from the project using state-of-the-art body cameras on tree fallers and breaker outs has been applied to the Hauler Vision Project. The objective is to provide a system for improved vision for the hauler operator in order to enable faster outhaul and grapple positioning and loading times.

The project has two streams: one to develop a camera system on the hauler grapple (undertaken by Trinder Engineers); and the second part (undertaken by Scion) is to develop a system that could be mounted on the hauler, the tail hold or positioned in the cutover to provide a view across the hauler profile.

Increased Productivity of Cable Extraction – Improved Grapple Control System

The objective of this project is to develop a system for improved control of the grapple to reduce grapple positioning and loading times.

One stream of the project is to develop an improved control system whereby the grapple/carriage can be controlled by the “spotter” or breaker out (with EMS Ltd in Rotorua). This project did not commence during the year due to lack of resources and has been rolled over to 2011/12.

Other work proceeded during the year designing and developing a grapple restraint to control rotation of a grapple in a swing yarder operation.

A further stream of this project, undertaken by Hunter Harrill of University of Canterbury investigated the rigging systems commonly used and understood in New Zealand cable logging operations. A Technical Note was published on the rigging configurations (HTN03-11). This work will be followed up in 2011/12 with recommendations (from an expert panel) on which system is best for different terrain and stand conditions.

Development of Operational Efficiencies – Harvesting Cost and Productivity Benchmarking

Last year Rien Visser, from School of Forestry, University of Canterbury, completed analysis of 2010 harvest area production data and commenced 2011 data collection. There are now over 220 harvest areas in the Benchmarking database for 2009-2011.

The Technical Note HTN03-10 was published during the year on the analysis of 2010 data from the benchmarking database.

Trends over the 3 years of data now in the database were presented at the members meeting. Results showing extension of ground-based machinery onto steeper terrain justifies, from an economic perspective, the continued work in the programme in extending high production machinery, such as the Kelly Logging System, safely onto steep terrain.



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Development of Operational Efficiencies – Harvesting Technology Watch

Arising from an initial investigation last year into improving fuel consumption and fuel efficiency in logging operations, a Technical Note on Fuel Consumption in New Zealand Harvesting Operations was published during the year (HTN03-04).

Further work is underway by Hamish Marshall of Interpine Forestry Ltd looking at actual fuel usage, predicted fuel costs and the impact this may have in terms of trading off the cost benefits of future productivity improvements.

Other work in the Harvesting Technology Watch programme in 2010/11 has involved a feasibility study of mounting a boom/arm on a hauler (Dzhamal Amishev of Scion) and monitoring developments in European yarder technology (Rien Visser of University of Canterbury). Technical Notes on both these investigations are in preparation.

Forest Engineering Research Update – University of Canterbury

Hunter Harrill gave an interesting presentation on research work undertaken at the School of Forestry, University of Canterbury during the last year. This included projects on machine slope analysis, and forest roading design research.

RESEARCH OUTPUTS FROM 2010/11

The following reports have been published during the 2010/11 year:

- Technical Note Vol. 3 No. 1: Using GPS to Monitor Machine Performance.
- Technical Note Vol. 3 No. 2: A Steep Slope Excavator Feller Buncher.
- Technical Note Vol. 3 No. 3: Using Videos for Training – Breaking Out.

- Technical Note Vol. 3 No. 4: A Review of Fuel Consumption in New Zealand Harvesting Operations.
- Technical Note Vol. 3 No. 5: Landing Size and Characteristics.
- Technical Note Vol. 3 No. 6: Optimising Work Organisation for Maximum Performance.
- Technical Note Vol. 3 No. 7: Crew Best Practice – Costs and Productivity.
- Technical Note Vol. 3 No. 8: Valmet 445 EXL Self-levelling Feller Buncher.
- Technical Note Vol. 3 No. 9: “Walking Machines” in Forest Operations.
- Technical Note Vol. 3 No. 10: 2010 Benchmarking of Harvesting Cost and Productivity.
- Technical Note Vol. 3 No. 11: Rigging Configurations used in New Zealand Cable Logging.
- Harvesting Technology Watch Number 6 August 2010.
- Harvesting Technology Watch Number 7 April 2011.
- Report H003: Optimising Work Organisation for Maximum Performance.
- Report H004: International Grapple/Carriage Developments: A Review of the Literature
- Report H005: Development of an Improved Grapple/carriage Control System: A Feasibility Study (in draft).
- Report H006: Advanced Hauler Vision System: A Feasibility Study (in draft).
- Report H007: Steep Slope Feller Buncher: A Feasibility Study (in draft).
- Report H008: Concept Report: Proposed Introduction of Teleoperation to Steep Slope Harvesting (in draft).
- Report H009: Potential for Improved Productivity through Teleoperation in Harvesting: An Economic Feasibility Study (in draft).
- Report H010: Commercialisation Plan: The Trinder Steep Slope Harvester (in draft).

These reports are available on the FFR website:
www.ffr.co.nz/user/login