

Scion connections

Issue One | September 2011

Welcome



I am delighted to welcome you to this first edition of Scion's quarterly newsletter.

Scion Connections encapsulates the intent of this publication - to strengthen relationships and communication with the forest industry and the central and local government agencies we work with. Through this forum we want to share with you the latest developments in Scion science and technology. Just as importantly we want to provide a means for you to establish contact with Scion staff and provide feedback on how we can improve the value of the research we do.

Strong relationships with forest industry, iwi partners, government and other key stakeholders are essential if we are to successfully fulfil our Statement of Core Purpose which is: "to drive innovation and growth from New Zealand's forestry, wood product and wood-derived material and other biomaterial sectors, to create economic value and contribute to beneficial environmental and social outcomes for New Zealand".

We greatly valued the input from more than 80 of you during the first half of this calendar year to help shape our 2011-16 Statement of Corporate Intent (the full version can be viewed or downloaded from www.scionresearch.com) and define the focus areas for Scion's future science and innovation.

These are to:

1. Maximise the value and productivity of commercial forestry.
2. Improve the competitiveness of the solid wood processing industry.
3. Expand opportunities in the wood pulp and fibre, biopolymer and biochemical industries.
4. Improve New Zealand's preparedness for biosecurity incursions, fire and climate change.
5. Ensure the New Zealand forest industry's licence to operate domestically and internationally and enhance environmental performance.
6. Increase New Zealand's energy security through the expanded utilisation of forest biomass for energy.

You also told us our brand could be more encompassing and inclusive of the forest industry. In July, in response to this, we launched Scion's new tagline - forests.products.innovation - to convey more clearly what we do and signal that our work to solve problems and add value through innovation spans the forest industry value chain.

Please enjoy this first edition of *Scion Connections*. I hope it helps to better connect you with what is going on at Scion. Feedback on any of the stories in this issue and how we can improve our communication with you will be welcomed.

A handwritten signature in blue ink that reads "Warren Parker". The signature is written in a cursive style and is positioned above a horizontal line.

Warren Parker
Chief Executive

> Scientists help to pave global pathways



Scion reaches out to the world.

International discussions on trade and policy used to be the domain of politicians and business people. As global issues become increasingly complex and interconnected, scientists have become important members of negotiating teams.

Senior scientists and executive managers from Scion are regular participants in a growing number of international delegations aimed at building strategic relationships overseas.

Scion's General Manager for Bioproduct Development, Dr Elspeth MacRae, has been part of several missions to Europe, Scandinavia, Canada and Brazil led by New Zealand government departments. The purpose of these trips was to explore opportunities associated with sustainable forestry, climate change and bioproducts, targeting countries with aligned interests.

"Scion gets involved in areas where we have the capability and the research to help facilitate useful connections and support the needs of policymakers," she explains.

"Scientists are part of the discussions because many of the issues, needs and solutions being negotiated at governmental level are science-based."

Government missions are frequently associated with free trade agreements, environmental collaboration agreements or the harmonisation of standards. Science-based information is often key to avoiding non-tariff trade barriers. Scion has contributed heavily

to negotiations ranging from timber building standards in Japan, to quarantine standards for forest products to India. Other missions aim to position New Zealand as a valued partner in science and business collaborations.

As a result of global networking, Scion is now working with VTT, a major science organisation in Finland. This research relates to lignin, an important by-product of bioenergy technologies and bioproduct development. This is one example of a growing number of collaborations between Scion and other international research organisations that help New Zealand to build science capability and leverage overseas research investment.

As innovation becomes an important driver of economic growth, scientists are increasingly called on to attend diplomatic missions of all kinds. Dr Trevor Stuthridge, the General Manager for Sustainable Design, sees this activity as part of Scion's role in helping the New Zealand forest industry to create new opportunities.

He recently joined industry representatives on a trip to Canada arranged by New Zealand Trade and Enterprise. The purpose of the mission was to learn about scale-up technologies for converting woody biomass into bioenergy. Similar missions sponsored by government departments have also been held with China, Chile, Korea and the USA.

"By participating in international missions we can provide technical context when needed to help people understand the potential of emerging technologies," Trevor says. "It also enables us to gain market intelligence that we can feed back to the industry."

"Many of the issues faced by the New Zealand forest industry are shared by other countries. While it is obviously important to protect our commercial interests, there is also benefit to be gained from building networks, sharing ideas and adopting technologies to suit."

Want to know more?

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➤ Making the grade globally



The ability for sawmillers to rapidly grade and segregate timber creates huge savings in wood processing costs. Grading technology developed jointly by Scion and Taranaki-based firm Falcon Engineering has proven its worth in New Zealand sawmills and is now being noticed in North America.

The A-grader is a stress grading machine that uses sound waves to measure timber stiffness at production speeds. This information allows sawmillers to sort timber prior to further processing.

Since the first A-grader was installed commercially five years ago, by Red Stag in Rotorua, most other major sawmills in New Zealand have adopted the technology. Saturation of the local market soon prompted Falcon Engineering to think global.

An important hurdle was cleared recently when the A-grader became certified by Canadian authorities as an approved method for grading structural lumber

in their country. This certification opens the door to a large and promising market. Falcon Engineering is entering this new market with an improved A-grader version.

Project manager, Les Wong, says the 2011 version has been upgraded specifically for North American sawmills, which have higher speeds and greater volumes than New Zealand mills.

“The new system is designed to run at 210 boards per minute, which is much faster than the top speed of the original A-grader at 180 boards per minute,” he explains. “This provides an opportunity to integrate directly into existing mill equipment both in the green and dry mills.”

Falcon Engineering has already sold the A-grader to manufacturers in the United States. Word is getting around about the improved grading efficiency that can be achieved with this technology compared to traditional mechanical graders. Falcon Engineering sees greater potential in Canada where there are a high number of mills and large capital expenditure budgets.

Meanwhile, Scion and Falcon Engineering continue to develop the A-grader, and trials are now being conducted on technology that includes the ability to measure stiffness more accurately along the entire length of a sawn board.

Scion Chief Executive Dr Warren Parker says the ongoing success of the A-grader demonstrates how local innovations in machinery development improve the profitability of domestic wood processors. They can also find lucrative markets overseas, earning valuable export revenue for the country.

“This example illustrates a spin-off benefit from the New Zealand forest industry that extends well beyond traditional forest products,” he says.

Scion developed the original A-grader with funding from New Zealand's former Foundation of Research, Science and Technology. Falcon Engineering received a Technology for Business Grant to assist them with commercialising the machine.

Want to know more?

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> Roll of the dice could make wood fibre a winner

A breakthrough technology in fibre processing, combined with an exciting new business partnership, is creating global opportunities for using long wood fibres in plastic products.

Scion has negotiated a licensing agreement with Sonae Indústria Group for the manufacture and sale of wood fibre "dice" that has the potential to be much more revolutionary than its humble appearance would suggest.

A major advantage of the wood fibre dice over agricultural fibres such as hemp, flax, and sisal is that they do what dice do best. They roll, behaving just like plastic pellets, when fed into processing machinery. This ease of handling means the dice can be fed directly into conventional extruders, then the compound can go into injection moulders for processing as fibre-reinforced plastics.

Sonae Indústria's Chief Marketing & Sales Officer, Christophe Chambonnet, sees the commercial decision by the multinational giant as an exciting prospect.

"I have no doubt that we are creating a new perspective on the use of renewable wood fibre," he says. "Scion is clearly a leader in research involving sustainably-derived bioproducts. Together with our expertise in both wood processing and commercialisation, we make a unique and powerful team."

Recognised as an innovation leader, Sonae Indústria is one of the largest global manufacturers of wood products, with 27 production sites in seven countries producing 10 million tons of products annually. The recently signed deal gives them an exclusive licence to commercialise the technology in Europe and create whole new markets for sustainably-produced wood fibres.

The main advantage of the wood fibre dice is the strength they give to traditional polymers via a highly consistent and cost effective route. So much so, that Sonae Indústria has named the technology's product 'WoodForce'. The new product will be marketed to

wood plastic composite manufacturers and compounders. Applications are wide-ranging and could include decking, fencing, pallets, furniture, automotive parts, appliance housings, computer peripherals and many common applications for plastics and fibreglass reinforced products.

"Wood fibre is a superior option with clear advantages over agricultural or glass fibres, so we will be working hard to promote the benefits of this product," Christophe says.

"We welcome this as a significant opportunity to redefine our business and expand our horizons. We reached an agreement with Scion to make WoodForce a unique global brand as the main compounders cover a large geographic area."

While the first commercial applications of the technology are likely to appear in Europe, the intellectual property is retained in New Zealand with Scion having filed international patent applications for the technology.

Scion Chief Executive Dr Warren Parker says the licence deal is likely to return royalties exceeding \$10 million over the next decade, if Sonae Indústria and the technology are successful in the market.

"Once the technology is de-risked in Europe we believe there will be opportunities for New Zealand manufacturers to enter new markets within our region, using established plant and equipment," Warren says.

With the advantage of being simple and relatively low cost, this technology is now poised to catch the global wave of plastic composite manufacturing that is predicted to roll in.

Want to know more?

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See the back page for information about our upcoming Bioplastics Workshop.



Jeremy Warnes pictured with Damien Even, a specialist in plastics production. Other members of Scion's wood fibre dice development team were Alan Fernyhough (co-inventor and plastics, composites and polymer specialist), Ross Anderson (co-inventor and composites and adhesives specialist) and Karl Murton (wood fibre and engineering specialist).

> The science behind the scenes

Every great commercial opportunity starts with a single good idea. For the wood fibre dice, this idea came from Scion Business Development Manager, Jeremy Warnes. After many years of working with medium density fibreboard (MDF) producers, Jeremy saw how MDF technology could be adapted to benefit plastics manufacturers.

"For several years now, people have been predicting a huge increase in using natural fibres to reinforce injection moulded plastics. One of the limiting factors has been the handling difficulties associated with these fibres," he explains. "Wood fibres are ideal for this purpose so we were keen to find a way of overcoming these challenges."

Jeremy saw the potential to bind wood fibres together so they could literally be poured into an extruder and then the reinforced compound into an injection moulding machine. Although the idea appears simple, it took several years of research and development to make it work with conventional manufacturing plant.

"The main challenge was to get the thermoplastic binder right so it would hold the wood fibres together during handling, then release them once they were mixed with the polymers," he says. "We also needed

to reduce the fire risk associated with manufacturing wood fibre products, so the successful formulation included components to address this."

The next challenge was to engage a commercial partner capable of creating a whole new global market for the product, which appeared to be beyond the scope of New Zealand manufacturers.

This is where the power of international networks came into play. Through a science connection that Jeremy had developed in France, he received an introduction to Sonae Indústria who immediately saw the market potential of this idea.

"With any new technology, there's both technical risk and business risk," Jeremy says. "We have removed the technical risks through our research programme and are delighted that Sonae Indústria was prepared to take on the business challenge. It is refreshing to deal with such a large company that is so innovative and willing to take this risk."

Scion developed and patented the wood fibre dice technology under its biofibre research programme funded by New Zealand's former Foundation of Research, Science and Technology (now Ministry of Science and Innovation).

> Science underpins industry success

Prizes awarded recently by Future Forests Research (FFR) highlight the ways in which science adds value to the forestry sector.

Among the recipients were three Scion scientists who have made significant contributions in their field of expertise, and who represent larger bodies of work that have helped to shape the forest growing industry.

Scion statistician Mark Kimberley received the 'Science of International Quality Award'. During his 34 year career in forest statistics, Mark has undertaken ground-breaking research to develop new techniques for modelling the growth of forests. In particular, he enabled the development of a new growth index, known as the 300 Index that predicts the productivity of radiata pine across New Zealand. He was also the architect of a similar model, the 500 Index, for Douglas-fir.

FFR Chief Executive Russell Dale says the 300 Index has replaced a series of regional growth models and is a major step forward for the forest industry.

"Mark has published this work in international journals and it is considered to be world leading research," he explains.

Behind this success is a long history of data collection and growth model development involving many people over several decades. Mark's role has been to take the large volumes of data and shape it into meaningful tools that forest managers can use to make planning decisions. And use them they do. Software built around the 300 Index has been adopted by most major forestry companies in New Zealand, and several in Australia.

A second award recognising science that enhances sector value went to Michael Watt and Carol Rolando. Their research has enabled the forest industry to continue weed control in newly planted forests, using chemicals that have not been viewed favourably by international accreditation agencies.

These achievements draw on research that began in the early 1980s when the industry recognised the need to use herbicides in a cost-effective and environmentally-responsible way.

"The work done to understand the fate of the chemicals after application and to find alternative chemical formulations that are more benign in the environment has been of significant value to the forest industry," Russell explains. "Without these chemicals, commercial plantation forestry would not be viable on many sites in New Zealand."

Scion's General Manager for Forest Science, Dr Brian Richardson, says the achievements highlighted by these awards illustrate how forest management practices are influenced by science that has gone on behind the scenes for decades.

"The FFR awards are a great way to acknowledge the importance of this contribution and it is very positive for the forestry sector to be recognising the value of science in this way," he says.

The achievements highlighted by these awards illustrate how forest management practices are influenced by science that has gone on behind the scenes for decades.

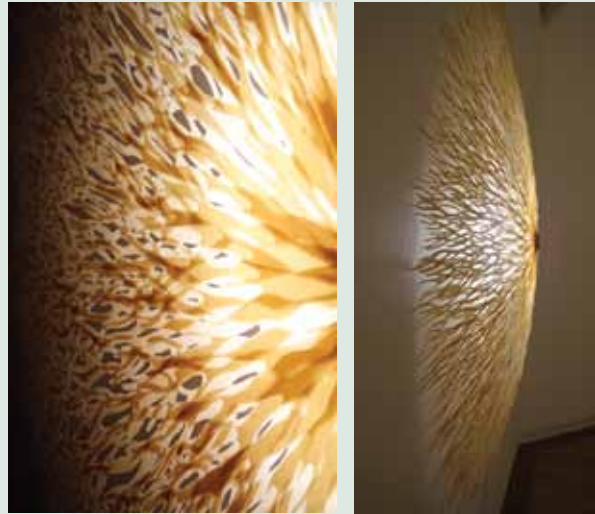


FFR award recipients from left Michael Watt and Carol Rolando (Scion), Rien Visser (University of Canterbury), Dave Lowry (Hancock Forest Management) and Mark Kimberley (Scion).

> New light on composites

An extraordinary lamp design by celebrated artist and furniture maker, David Trubridge, has drawn attention to the possibilities offered by new biomaterials. His lamp is constructed from a composite material developed specifically for this project using bioplastic (polylactic acid) and harakeke fibre (New Zealand flax).

The new material, developed in a partnership between Scion and the BioPolymer Network (www.biopolymernetwork.com) demonstrates the beauty and pliability of bioplastics combined with natural fibres. The lamp design, named Tipu, stands two metres in diameter. It was unveiled at the prestigious Hawke's Bay Invitational Art Exhibition and sold on the first night.



> Inside the huhu puku

Molecular biology is an approach that aims to figure out the molecular reasons why things appear or work the way they do in biology.



Scion scientist Nicola Reid and her colleagues in the biotransformation team recently used a DNA sequencing technique to estimate that a whopping 1800 types of bacteria are present in the gut of huhu larvae. Her paper, which has been accepted for print in the international journal *Applied and Environmental Microbiology* provides new information on the diversity and activity of gut-associated microorganisms that are essential for the digestion of wood.

This is significant because the breakdown of wood using enzymes and other mechanisms is an important focus of Scion's research into biofuel development and biorefinery technologies.

> New moisture meter under development

The long-standing partnership between Scion and the innovative engineering firm, Falcon Engineering (see page 3), has given rise to a microwave-based moisture meter that can be included as an add-on to the A-grader or run as a stand-alone unit.

The prototype technology gives accurate moisture content readings on every piece of green lumber that passes through the mill. This information is useful for structuring loads into kilns so wood can be dried more uniformly, reducing over and under drying, and energy can be conserved using optimised drying schedules.



> Is your company ready to benefit from bioplastics?

Join us to discuss the basics of bio-based plastics, and the most recent advances in exciting new technologies. Speakers from New Zealand industry, the Australasian Bioplastics Association, the University of Queensland and Scion will present on a range of topics including:

- New global developments and trends
- Opportunities for New Zealand resources in bioplastics
- Packaging research and case studies.

What: Bioplastics Workshop 2011

Where: Scion, 49 Sala St, Rotorua

When: 9:30am - 4:30pm,
Thursday 20 October 2011

Cost: \$85 excluding GST per person;
\$65 excluding GST per person
for 2010 attendees.

For a copy of the full programme and to register, visit www.scionresearch.com/bioplastics-workshop

> Interested in learning more about bioenergy opportunities?

Scion will be running a workshop to showcase research and opportunities in bioenergy. The date is yet to be confirmed, so keep an eye on our events calendar at www.scionresearch.com if you are interested in attending.

> Sign on for the New Zealand Journal of Forestry Science

The *New Zealand Journal of Forestry Science* is celebrating forty years of presenting science knowledge for the forest industry. Published by Scion, the journal has delivered over 1350 papers since it began in 1971, providing a permanent record of valuable forestry research. Many of these papers are still relevant for researchers today.

The *New Zealand Journal of Forestry Science* is now international and covers the breadth of forestry science. The Journal is freely accessible on-line at www.scionresearch.com/nzjfs. To receive notification of each article as it is published, sign up to the Journal's free alert service at:

<http://www.scionresearch.com/general/science-publications/science-publications/nzjfs/sign-up-here-for-journal-alerts>.

A printed copy of the entire volume is also available as a one-off purchase at the end of each calendar year.



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