



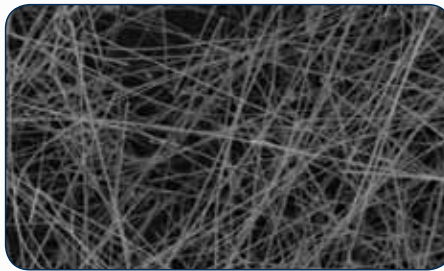
IRANZ Connections.

New nanofibre venture

CRL Energy and Viclink have formed a joint venture company, Pacific Nanofibres, to commercialise the development of an exciting new reinforcement material, silicon nitride nanofibres.

Silicon nitride nanofibres have excellent properties for use as reinforcing materials for a wide variety of hi-tech composite materials. Pacific Nanofibres will take these nanofibres out of the laboratory and into a billion dollar global composite material market.

Silicon nitrides are a class of advanced engineering ceramics characterised by high strength and hardness, with excellent chemical and thermal stability and low dielectric properties. They also have the advantages of single crystal structure and small size that amplify these beneficial properties significantly. Nanofibres offer a superior drop-in replacement for existing reinforcing applications and have great potential to enable a whole new paradigm



ELECTRON MICROGRAPH OF SILICON NITRIDE NANOFIBRES.

in composite materials.

CEO of Pacific Nanofibres, John Errington says "we are commissioning our proof of concept plant to produce kilogramme quantities, which will be available for characterisation and for R&D samples. We are keen to work with industry and research partners to develop composite materials using the nanofibres".

Dr Troy Dougherty the lead scientist on the project says "we are excited by the possibilities that this new reinforcing material offers to a wide range of composite materials. By using a low-cost and plentiful raw material such as coal, we

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have created high-value nanofibres that offer a better range of performance than any available reinforcing material used in manufacturing today."

This technological breakthrough is now the subject of New Zealand and US Provisional Patent applications. The project, which won \$300,000 of development investment from TechNZ, will help create a number of advanced industries for New Zealand.

www.crl.co.nz

Exciting prospects for merino skins

Much is known and prized about the wool attributes of merino sheep, but not so, their skin.

Merino skins have a unique pattern of raised ridges and mottled colour. Features which can be used to produce decorative leathers for high value fashion garments and accessories, in much the same way as ostrich and reptile leathers are used now.

Leather and Shoe Research Association (LASRA) scientists believe, that over time, greater value could be obtained from merino skins by eliminating common skin faults. They are beginning to investigate

the character and properties of skins from New Zealand merino strains, and to develop customised processing regimes to improve the leathers while retaining their unique character. Further work is needed to identify the genes responsible for the specific character of the merino skins, potentially leading to the ability to manipulate these features through breeding programmes without affecting wool production.

Dr Warren Bryson, LASRA Director, says this work will contribute towards making merino sheep a multipurpose animal, and provide opportunity to develop a New Zealand merino pelt and leather brand for high quality luxury leather products.

www.lasra.co.nz



MERINO LEATHER DYED DARK GREY SHOWING THE RAISED RIDGES



MERINO LAMBS SHOWING VISIBLE RIDGES ON THEIR SKINS AND MERINO RAMS SHOWING THEIR TYPICAL FOLDED SKIN PATTERN

ALTERNATIVE STAINLESS STEELS

Austenitic stainless steels account for more than 60% of the New Zealand market. Their popularity is due to a combination of fabrication properties, corrosion resistance and experience with different applications. In addition to about 18% chromium, these steels contain about 8% nickel that makes their structure austenitic.

In recent years, the price of nickel has increased dramatically, directly affecting their cost. Historically, each peak in nickel prices has triggered research into low-nickel alternatives that ideally would be cheaper and not compromise the qualities of the established austenitic grades. Typically, these alternatives are new ferritic, manganese bearing austenitic and duplex stainless steel grades.

Until now, there has not been sufficient experience with using these steel grades in the coastal New Zealand environment in welded conditions. Heavy Engineering Research Association in cooperation with New Zealand Stainless Steel Development Association and industry partners conducted a research project that involved welding trials to identify weldability aspects of these steels and a number of corrosion tests that also included 24 months coastal exposure test on a range of steel grades. The tests can be used to assess suitability of these grades for applications exposed to the sea spray such as architectural, dairy and wine tanks and other applications.

Preliminary results indicate that some of the low-nickel alternatives may be considered as an alternative to the established grades 304 and 316 for architectural applications. Further results will be presented at the 18th International Corrosion Congress - Perth 2011.

www.hera.org.nz



TEST RACK WITH STAINLESS STEEL SAMPLES

New Global Energy Scenarios

Dr Rob Whitney, CEO of CRL Energy and Chairman of the Energy Federation New Zealand, is to chair a new World Energy Council (WEC) Global Energy Policy Scenarios Study. The WEC mission is to promote the sustainable supply and use of all types of energy for the greatest benefit of all. WEC will draw on its global membership to develop energy scenarios or plausible stories of pathways into the future. The new scenarios will deal with all aspects of the energy future up to 2050, and will put special emphasis on issues and solutions around some of the most critical topics like mobility, energy efficiency and access to energy. It is the intention to build a web-accessible global energy model, which can be used by third parties like companies, governments, and experts. An immediate priority of the study group is to assess the impact of the Fukushima nuclear accident on the future supply of electricity globally.

www.crl.co.nz

Examining urban densification and liveability

The desire for space and its importance to our quality of living is reflected in a trend towards living in larger homes and the spread of cities and transportation networks. Recent research by Opus Central Laboratories has explored the tension between densification of urban living environments and liveability of homes to determine which characteristics are important to our decision-making processes when selecting a home and neighbourhood.

Arguments for sustainability encourage compact urban environments, placing people closer to amenities, providing better infrastructure resulting in improved energy efficiency and reduced vehicle emissions. On the other hand, the liveability characteristics such as home satisfaction, personal security, social interaction and feelings of community are improved in medium to low density environments.

Participants were presented with simulated scenarios where their current property and home were reduced in size and asked about the liveability of these situations. Perceived home liveability was significantly lower for the smaller replacement homes, and for land area reduction. The results did reveal that older home owners were more tolerant of a denser neighbourhood.

A second scenario examined participants' choices when they were asked to change the location of their home. Dr Jared Thomas, Opus Central Laboratories, explains that findings show that people optimise their location based on factors such as accessibility and transport distances to key locations. "When given the choice to relocate to different neighbourhoods, people trade away closer travel distances in order to maintain what they perceive is a friendly, safe, clean neighbourhood environment."

This research was conducted within a programme funded by the Foundation for Research, Science and Technology.

www.opus.co.nz

Many hands make light work of groundwater management

A 100-fold increase in productivity is now possible as a result of applying the 'many hands make light work' approach to groundwater modelling. Research by Aqualinc and University of Tokyo collaborators has parallelised the groundwater modelling software Aqualinc uses for predicting the response of Canterbury's aquifers to pumping and climate variation.

Parallelisation involved re-developing the software so that a groundwater simulation job is divided up and spread across multiple CPU's who each complete their part of the

job in parallel – an application of the 'many hands make light work' approach!

Testing of the new software shows that analyses that once took four weeks of computer time will now take about six hours when using 128 cpu's on a supercomputer, such as NIWA's new IBM. This makes it possible to finely tune the groundwater model to reduce uncertainty in predicted changes in groundwater levels and flows. It also makes it feasible to quantify the costs and benefits of a greater range of groundwater allocation policy options than previously.

www.aqualinc.co.nz

Fit for the Road

Fit for the Road is a programme designed by Transport Engineering Research New Zealand for log truck drivers to improve their health and wellbeing. Funded by the log transport industry and ACC, drivers participate in activities such as food diaries, a breakfast challenge and tailored exercise programmes to address exercise, fatigue and work-life balance issues.

At the inaugural programme's conclusion, drivers participated as either walkers or runners in Rotorua's Red Stag Relay. An evaluation of the programme found that it worked well for most drivers. Further refinements have been made and the programme is now being rolled out across the country. The research effort is now focused on driver sleep, fatigue and the effects of job demands, with the aim of making driver health and wellbeing an industry issue, rather than solely the responsibility of the driver.

www.ternz.co.nz



DRIVERS AS RED STAG RELAY PARTICIPANTS



WAVE OF INFORMATION

BRANZ's six-year Weathertightness, Air quality and Ventilation Engineering (WAVE) programme is entering its second year. WAVE aims to establish an engineering basis for decisions about moisture in buildings, and in turn support innovation in weathertight design and improve indoor environments.

A survey of ventilation in 40 homes built since 1990 is underway. The survey will help BRANZ to understand whether modern homes still have sufficient natural ventilation or whether a mix of natural, passive and mechanical ventilation may be a better option.

A laboratory has been constructed that allows BRANZ to benchmark computer models of roof spaces against experimental data. The aim is to understand some complex corrosion issues related to roof moisture.

New software, WALLDRY, has been developed that allows the user to quickly look at the effects of design choices on wall performance. WALLDRY is primarily an educational tool and will be updated as the WAVE programme progresses.

The ultimate technical aim of the WAVE programme is to develop a computer model that can describe how moisture and other contaminants behave in an entire building. Each individual task in the WAVE programme will help develop the capability to do this, and answer important questions from the building industry at the same time.

www.branz.co.nz

Fuel Efficient Driver Training

Transport Engineering Research New Zealand has undertaken case studies on the effectiveness of a Ministry of Transport sponsored Safe and Fuel Efficient Driving (SAFEDNZ) training package. A group of senior driving instructors were trained by a leading expert from the UK. These senior driving instructors are now training other driving instructors who in turn, train drivers.

Initial case studies show that even driving instructors with many years of driving experience markedly improve their fuel efficiency and driving performance with SAFEDNZ training. Results include 5% fuel saving, reduced trip times, reduced brake wear and increased the amount of time the engine was in the fuel efficient band during their SAFEDNZ training. A typical driver is expected to save at least twice as much because driving instructors already had a high level of knowledge and experience before they undertook SAFEDNZ training. This 5% fuel saving will result in an increase in a fleet's bottom line profit of between 5% and 15%, depending on fuel price.

www.ternz.co.nz

Thermal performance of light steel framing

Steel framing has many strengths in construction. It is lightweight, uniform, dimensionally stable, easy to install, cost competitive and resistant to fire and decay. A perceived drawback is thermal performance, as steel conducts heat over 300 times faster than timber, and over 20 times faster than concrete.

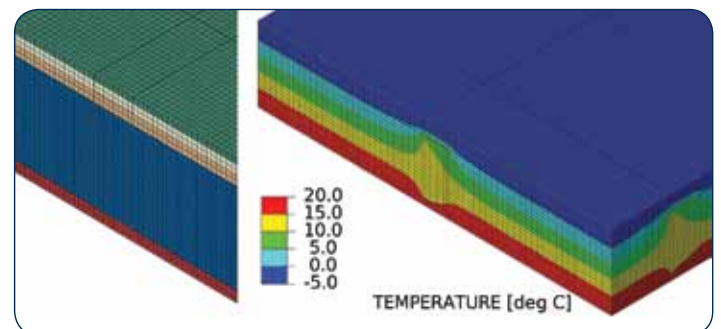
However recent investigation by the Heavy Engineering Research Association (HERA) has confirmed that for typical light steel framing with cladding, a thermal break with insulation possess similar R-values as traditional timber construction.

HERA calibrated three-dimensional finite element models against physical test data to enable accurate predictions to be made on the thermal performance of light steel framed walls on a variety of thermal break, insulation and cladding details.

For example, light steel framing with sheet cladding, a 10 mm thick XPS sheet thermal break together with R2.4 insulation, achieves

the minimum New Zealand Building Code compliance for energy efficient buildings, for all climate zones in New Zealand.

www.hera.org.nz



THREE-DIMENSIONAL TEMPERATURE DISTRIBUTION THROUGH THE CROSS-SECTION OF THE LIGHT STEEL FRAMED WALL WITH INSULATION, CLADDING AND THERMAL BREAK



Directing the Spray

Herbicide and pesticide sprays are an important tool for New Zealand's agricultural and horticultural industries. To improve the understanding of the science behind spray formation, deposition and drift, Lincoln Ventures is leading a six year \$5.4 million research programme in collaboration with industry and other research organisations.

Led by Dr Andrew Hewitt of Lincoln Ventures, the research aims to reduce off-target drift through developing models for spray decision support and drift management. Studies with drift reduction technologies are already underway and new models are demonstrating how to spray safely to protect crops. The research covers crops and forests, and at a time of increasing issues from

new pests and reports of spray drift damage, provides essential support to government and industry in New Zealand.

Dr Hewitt says the research is 'win-win' for everyone involved in spray application in New Zealand. "By showing how to better target spray applications, both more effective control of pests, weeds and diseases, and savings in chemical costs will be possible. Also costly drift damage to neighbouring crops or complaints from chemical exposure to humans and the environment will be avoided."

Other collaborators in the research programme include Scion, Plant Protection Chemistry New Zealand and the University of Otago.

www.lvl.co.nz

New Aquaculture R&D and Education facility

Almost a year ago, on a still, fine March morning a small group gathered at the Cawthron Aquaculture Park, at Glenhaven near Nelson. Staff from the Cawthron Institute and the Nelson Marlborough Institute of Technology (NMIT), along with their guests, stood together to celebrate an important step in the development of aquaculture research capability in New Zealand. Led by Kaumatua Reverend Harvey Ruru, the group participated in a 'laying of the stones' ceremony - observed before the building of a whareniui or meeting place.

On Friday 25 February 2011, the new building was opened by the Minister of Fisheries & Aquaculture, Hon Phil Heatley. It

will be a shared workspace for aquaculture research and education utilised by Cawthron Institute researchers, by industry and by the NMIT for its Aquaculture Diploma course.

The new building is a strategic investment, funded jointly by the Cawthron Institute and the Ministry of Economic Development. Cawthron CEO Gillian Wratt comments "that ultimately we are creating a meeting place, a place designed for collaboration, the sharing of ideas and the exchange of knowledge. Cawthron Institute has valued for a long time the synergies that result from collaboration between researchers and industry, and we have experienced first-hand, the value that education can add to transferring technology to industry for

commercial use."

It will be a showcase for aquaculture research, education and industry innovation in New Zealand.

www.cawthron.org.nz



HON PHIL HEATLEY AND DR ZOE HILTON UNVEIL A MEMORIAL PLAQUE. IMAGE COURTESY OF NELSON MAIL.

Who we are:

IRANZ is an association of independent research organisations. Its members undertake scientific research, development or technology transfer. Members include Aqualinc Research Ltd, BRANZ, Cawthron Institute, CRL Energy Ltd, Heavy Engineering Research Association (HERA), Leather & Shoe Research Association (LASRA), Lincoln Ventures Ltd, Opus Central Laboratories and Transport Engineering Research NZ Ltd (TERNZ).

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