

# innovate

**2 SkyMapper provides new digital insights for astronomers**

**3 Scientists on trail of squeaky hip mystery  
WYPNZ finalists**

**4 Markets, skills and attitude**  
– comment by Phil O'Reilly,  
CEO, Business NZ

## Automation **technology to transform** meat industry

The New Zealand meat production industry is set to benefit from a multi-million dollar investment in automation technology research and development.

Ovine Automation Ltd (OAL), which represents a significant majority of the New Zealand meat processing industry, was recently awarded \$7.4 million over five years by the Foundation for Research Science and Technology (FRST). This will be matched by an investment of \$7.4 million from the company.

IRL and Millers Mechanical will provide the R&D expertise for the project that is expected to provide significant productivity gains in lamb processing.

"New Zealand lamb is recognised the world over as a premium product but we need to do more than market well to extract and retain in New Zealand the true value from this iconic product," says IRL Chief Executive, Shaun Coffey.

He says local producers are faced with stiff competition from overseas where labour and land costs are much lower. "It is clear that the industry needs to compete not only on quality but also needs to continue to drive efficiencies in production.

"I am confident that this pan-industry approach will pay dividends. From the advent of refrigerated shipping to the invention of the electric fence, New Zealand has always been a leader in applying science and technology to improve productivity and open new markets.

"With the majority of ovine industry players on board in this project, the New Zealand meat processing industry will maintain its position at the cutting edge of sheep and lamb processing," he says.

The R&D programme will be focused on the further development of two experimental IRL technologies – gas de-pelting and a device known as the intelligent Y-cutter.



The programme will also investigate integrating an automatic brisket roller and other tasks into a Y-cut robot that also performs automated belly rip-down.

IRL Business Development Manager, Geoff Bates, says the key to the success of the R&D programme will be the inclusion of key technical people from the industry throughout the development process. This has been facilitated through a technical subcommittee, created by OAL, to work alongside IRL and Millers Mechanical.

"A fundamental concept of the development programme is the integration of various technologies and processes to maximise the benefits, yet minimise the costs. An example of this is the sharing of sensing and referencing information between the

**"...this pan-industry approach will pay dividends."**

The Y-cut is an industry term for the cut that opens the fleece on the front legs of the sheep from the hocks to the brisket in preparation for the removal of the pelt. It is a crucial but difficult part of the process with workers reporting a high incidence of repetitive strain injury.

Gas de-pelting involves using pressurised gas to remove pelts from carcasses in an automated process that is faster and more effective than traditional manual pelt removal.

various machines rather than duplicating sensors for each piece of equipment," he says.

Ovine Automation Limited Manager, Richard McColl, says the programme is a unique opportunity for the industry to work collaboratively to make a significant change to ovine processing.

"This would not have been possible without the goodwill of OAL shareholders, FRST, IRL and Millers Mechanical. Individually it would have almost been impossible to achieve but collectively it will happen."

# SkyMapper provides **new digital insights** for astronomers

Scientists worldwide are now closer to understanding the mysteries of the night skies with the recent unveiling of the multi-million dollar Australian National University (ANU) SkyMapper telescope.

Operated remotely via a 700-kilometre, optical-fibre link from Mount Stromlo in the ACT, SkyMapper is a new generation surveying telescope which is able to scan the skies more quickly and deeply than ever before.

Based at Siding Spring Observatory in New South Wales, it will be used to create a digital map of the entire southern sky using detailed pictures taken over the next five years. Information gathered from SkyMapper, about 400 Terabytes (or 100,000 DVDs worth) of data, will be shared globally among astronomers via the Internet.

Designed and built by ANU's industry partner, EOS Space Systems (EOS), SkyMapper has risen, phoenix-like, from the ashes of the Great Melbourne Telescope which was destroyed in the Canberra bushfires of 2003.

EOS Executive Director, Craig Smith, says that the new telescope is the result of meticulous planning over the last five years, and involved the commissioning of IRL and its subsidiaries, KiwiStar Optics and Measurement Standards Laboratory (MSL), to build one of the most critical components.



THE CORRECTOR LENS ASSEMBLY IS LOWERED INTO THE SKYMAPPER TELESCOPE.

**“It is crucial that the lenses are aligned correctly to extremely tight tolerances, which presented numerous challenges.”**

“SkyMapper’s Corrector Lens Assembly (CLA) is the complex lens system that is used to correct aberration and allows the extra-ordinarily large field of view to be accessed while retaining excellent image quality across the field. It is crucial that the lenses are aligned correctly to extremely tight tolerances, which presented numerous challenges.

“IRL’s combined capabilities meant that the entire process was able to be completed in one place; from grinding and polishing the lenses to our exact specifications, to the precision engineering required to build the anti-vibration housing in which to ship the system to Arizona for testing and assembly into the main telescope.”

Kiwistar Optics workshop manager, Dave Cochrane, says that the detailed planning, optimisation and optical tolerancing put into the design by EOS optics manager and ex-IRL scientist, Andrew Rakich, played a big part in the smooth running of the project.

“The tight tolerances did present challenges; however, with the use of interferometry, an extremely precise way of checking distortions on the lens surfaces, these challenges were successfully overcome. Using MSL’s three-axis co-ordinate measuring machine to carefully align the completed lenses in their individual lens cells and in turn align these to a common optical axis

in the CLA also helped considerably. The whole project took us six months to complete.”

Once the entire telescope had been through acceptance testing in Arizona, it was then disassembled and shipped to Siding Spring Observatory.

Craig Smith says that SkyMapper is also Australia’s most sensitive digital camera and can take images of a patch of sky 25 times larger than the moon.

“SkyMapper has been described as a ‘268 megapixel behemoth’. With sensitivity five million times greater than the human eye, that’s a pretty accurate description.”

# Scientists on trail of squeaky hip mystery

When an undercover police officer realised his squeaking hip implant was jeopardising covert surveillance work, his surgeon turned to IRL to help solve the problem.

Capital and Coast District Health Board's Professor Geoffrey Horne says the phenomenon of squeaking implants is not new. "They can be quite loud and in some cases the noise can be very disconcerting."

Professor Horne says that while some research has been conducted into the phenomenon, its cause has largely been the subject of speculation.



Modern hip transplants involve ceramic and titanium parts and it is thought that the squeaking noise occurs when the ceramic part slips against the titanium part. The slipping may occur due to the titanium part deforming during insertion.

It requires considerable force to implant the artificial cup into the pelvis and it is thought that this may deform the material which in turn makes the hip squeak.

**"[squeaking hip implants]...can be quite loud and in some cases the noise can be very disconcerting."**

Looking for a definitive answer, he approached IRL's Measurement Standards Laboratory scientist, Eleanor Howick.

She says acoustic research conducted recently in Australia suggests that the noise is generated by the ceramic material rubbing on titanium. "This implies that there is some slippage between the two surfaces caused by deformation of the materials."

To test the hypothesis that the implant became deformed during insertion, Eleanor performed several simulated hip replacements using titanium inserts, human bones used for medical research and IRL's 3-D coordinate measurement capability. The system provides very accurate measurement of three-dimensional shapes and can determine the axis along which the deformation occurs.

"By doing this we were able to prove that there was significant deformation of the implant as it was being inserted into the pelvis. We were also able to accurately measure the specific points subject to deformation."

The next step is to use a force measuring machine to confirm that this deformation is large enough to cause slippage between the parts of the artificial hip joint and result in the observed squeaking.



A HIP IMPLANT ON AN IMAGE OF A BODY SKELETON.

## What's your problem, New Zealand? finalists announced

The judging panel for IRL's R&D competition *What's your problem New Zealand?* recently announced it had chosen ten finalists from a field of more than 100 entries.



The competition seeks to raise the profile of R&D and encourage New Zealand firms to improve long term productivity and profitability through increased R&D investment. The winning entry will be awarded up to \$1 million in R&D services from IRL.

The ten finalists chosen by the judging panel are:

- **Dynamic Controls**
- **Fisher & Paykel Appliances**
- **Gallagher Group**
- **Glidepath**
- **Group3 Technology**
- **Mars Petcare NZ**
- **Pacific Edge Biotechnology**
- **PowerShield**
- **Pultron Composites**
- **Resene Paints**

Congratulations to all the finalists.

The judging panel will announce a competition winner in August.

# Markets, skills and attitude

Readers of this publication won't need convincing of the need for greater innovation. It's obvious that productivity, growth and living standards are all higher in countries that innovate.



PHIL O'REILLY  
CHIEF EXECUTIVE, BUSINESS NZ.

How can we achieve higher levels of innovation? My answer would include markets, skills and attitude.

It's a truism to say that markets are necessary for innovation, but it's also true that markets are easily threatened by unnecessary government intervention.

30 percent of GDP for example – and improving legislation that may be eroding property rights, like the Resource Management Act.

A second requirement is skills, since innovations arise out of highly skilled populations. A high skilled

I guess life is comparatively cruisy in New Zealand and it's tempting to stop striving once you've got the BMW, bach and boat.

One area where we satisfice rather than optimise is in commercialising the intellectual property related to our core competencies. While we are a leader in meat and dairy protein production, for example, we are not reaping all possible rewards from spin-off enterprises.

A comparison with Finland highlights this point. Just as New Zealand is a world leader in protein production, Finland is a world leader in wood fibre production – but Finland has taken an optimising approach by also becoming the world's largest producer of machinery for processing wood fibre.

The effort we put into efficiently producing protein needs to be matched by effort in developing downstream industries related to that protein production.

Processing machinery, processing techniques, licensing, royalties and consulting services are all avenues for us to build on our existing strengths in protein production. For that, we need an optimising attitude.

Safeguarding free markets and property rights, growing our skills base and getting an optimising attitude – these are some of the ways we could make a tangible difference to our ambition to be an innovative nation.

*Phil O'Reilly is Chief Executive of Business NZ.*

[www.businessnz.org.nz](http://www.businessnz.org.nz)

**“One area where we satisfice rather than optimise is in commercialising the intellectual property related to our core competencies.”**

Markets put a price on goods and services; their important role is in differentiating, placing a higher value on innovative goods and services. They have to be free markets – if the state controls too much of the economy it reduces the incentives for innovation.

You can see this in some African countries where governments control over 60 per cent of the economy and where productivity and innovation are consequently low.

A vital component of free markets is property rights. These matter because if there is doubt over your right to keep the proceeds of your work, then you will have less incentive to innovate.

In terms of New Zealand's innovation performance, we should safeguard our property rights and free market by resisting the creep towards bigger government – getting government spending below

population is not easy to achieve. You can't just pass a law to get skilled citizens. They are the product of well-governed educational institutions, of high expectations and of national culture.

It's interesting that even in a period of economic downturn employers are still finding it hard to get the right skills in the workforce.

I believe we need a national conversation on how good our schools are, how relevant our tertiary training is, how productive our workplaces are – that would be a good start along the road to greater innovation.

The third requirement I would point to is attitude – in particular, an optimising attitude. Kiwi entrepreneurs are apparently known for taking their foot off the pedal once their business reaches a certain size – 'satisficing rather than optimising'.

To suggest a topic you would like to hear more about, please email [t.heketa@irl.cri.nz](mailto:t.heketa@irl.cri.nz). Your feedback is always valued.

Editor: **Trish Heketa**, IRL, PO Box 31-310, Lower Hutt 5040, New Zealand

Business development managers: Auckland +64 9 920 3100

Wellington +64 4 931 3000

Christchurch +64 3 358 9189

Client services manager:

Auckland +64 9 920 3100

**Mark Ripma, Tony Cooper, Tom Rogers, Geoff Bates**

**Tom Nicolle, Vikki Smithem, Catherine Andrews, Rosanne Ellis**

**John Souter**

**Dee Nolan**

[www.irl.cri.nz](http://www.irl.cri.nz)

INDUSTRIALRESEARCH  
LIMITED  
Te Tauihu Pūtaiao

