

# e3k

Gilmore Engineers' e3k brand – for engineering 3000 – has a reputation for helping to bring some of Australia's most innovative ideas to reality. From industry-changing bonding systems such as *Joinlox* to green energy creations such as a tidal current power generation system, world leading engineering by e3k is helping to create the working reality.



Duncan Gilmore.



Tidal power: the Aquanator ready to generate electricity for the grid.

In engineering, success breeds success. Perhaps that is why Gilmore Engineers and its research brand e3k have enjoyed a year of positive growth even in spite of the Global Financial Crisis (GFC) and a general downturn in commercialisation activity in Australia.

Duncan Gilmore, director and president of e3k said even in spite of the economic downturn, the company had been “an unusual 25 percent up in revenues” – a result of working hard to minimise the downturn.

“And a lot of industries that we are doing research and development with are still doing well,” Dr Gilmore said. “It is perplexing that we increased turnover in that challenging year, but probably our diversity helped us there. We can turn our hands to many different industries and at a very high level.”

The two key areas of e3k's and Gilmore Engineers' businesses – design and investigate – build upon each other, Dr Gilmore said.

Failure analysis has been a mainstay for e3k in recent years, especially with motor vehicle and industrial incidents. There have been many studies for which Gilmore Engineers was commissioned, including incidents involving motorcycles, heavy vehicle and machinery related accidents well after the event.

A lot of the research conducted by e3k on Australian-manufactured home insulation systems came into its own in early 2009 with the industry rushing to capitalise on the Federal Government's home insulation grants.

The detailed calculation of R-values that e3k conducted over a period of years became highly valuable in assessing the true values of insulation types.

“We had been doing a lot of work for insulation companies,”

Dr Gilmore said, “assisting them to calculate R-values and R-values per dollar.” He said some insulation types proved more effective in summer and others more effective in winter.

“This information helped home owners and the construction sector to make better decisions.”

## CRITICAL EVALUATIONS

Industrial accidents have also been a focus for Gilmore Engineers' expertise, especially where these accidents may have been caused by component failure.

For example, Gilmore Engineers has been doing a considerable amount of work for a leading gold mining operation, conducting a review of the safety of its truck fleet and has also designed an educational unit on operational safety for the company. E3k engineers evaluated and re-designed certain mineral processing equipment, including research into some mechanical failures that had occurred in key equipment.

In one case, a massive 10m material processing drum failed and e3k engineering evaluations revealed the failure related to the drum being unable to handle the impact loads that were being placed upon it. They designed a relatively simple ‘fix’ and the mine's processing has not experienced such delays since.

Dr Gilmore said this case study was also indicative of the way Gilmore Engineers and e3k can operate extremely effectively, even in remote locations. Gilmore Engineers despatched an engineer to evaluate the situation and communicate details of the problem back to headquarters at Brisbane Technology Park at Eight Mile Plains, where most of the analysis was done.

“Distance is not a big problem these days, with access to the internet and

mobile phones etc," Dr Gilmore said. "Our engineers simply need to analyse it and then get the information back to us. The internet makes this easier than ever – especially with internet cameras and video conferencing."

Work with companies from Germany and the USA is now part of the regular e3k portfolio.

"The philosophy we've resolved is to interact internationally – we interact with the world through our clients," Dr Gilmore said.

**EXPERTISE IN DEMAND**

Gilmore Engineers has also played a significant role in national and international patent and copyright defence cases. Some work has involved defending designs that are being manufactured in China, Dr Gilmore said.

"The patent defence area is quite interesting," Dr Gilmore said. "And it can be very complicated. Protecting your intellectual property is a vital part of business these days."

His engineers have, for example, been used in design rights cases such as *Norm Engineering v Digga Australia*, covering copyright issues over industrial bobcat bucket designs.

E3k also conducts considerable work for US companies, for example its recent design engineering of fold-out canopy systems.

"We learn a lot about different industries too," Dr Gilmore said, "from innovative industrial machinery and processing equipment, to biotech, mining, electrical switching, power tools, internal combustion engine design, telecommunications, construction, domestic appliances and water conservation."

An example was the seminal work e3k did for the renewable energy industry. The patented designs allow electricity to be generated from tidal and ocean currents and have been commercialised and are now marketed worldwide.

"We see ourselves as getting new industries up and helping existing industries to grow," Dr Gilmore said.

A good example is the way e3k has helped Leighton Contractors develop its carbon mitigation scheme in ways that allow it to forecast its fleet cost in carbon and greenhouse gas benchmarking.



*Dean Cameron's Joinlox as presented on the ABC's The New Inventors.*

Leighton Contractors and e3k teamed up to create the *Leighton Energy Efficiency Equations*, or *Le3* method for short, for benchmarking the energy efficiency of material transportation. The idea for the research and development came from Leighton Contractors, operators of one of the largest fleet of bulk materials transport vehicles – known as haul trucks – in Australia and New Zealand.

Steve McDonald the general manager of Plant for Leighton Contractors, said the company needed a reliable measurement system that could be applied equally across all operations and within the operations, where the nature of the work undertaken varied frequently.

Dr Gilmore said it was important for companies that are aiming to improve the energy efficiency of their operations to have a way of knowing how well they are doing compared with what is realistically possible.

"It is of no use to aim for energy efficiencies that are just not physically possible and conversely it is not as beneficial to aim for energy efficiencies which are less than those already being achieved by best practice operations around the world," Dr Gilmore said.

Some of e3k's work is helping to

change certain industrial processes forever.

For example, e3k helped develop the first application for *Joinlox*, in creating segmented tanks for creator Dean Cameron's other award-winning invention, the *BioLytx* wastewater treatment system. This allowed stacking tanks into a compact form for shipping, and quick and easy assembly on site.

Engineers from e3k performed calculations and computerised Finite Element Analysis (FEA) simulations on the proposed design under various loading scenarios, including internal and external pressures, and lifting loads, to examine material stress. This specialised computer analysis performed by e3k helped optimise the *Joinlox* shape and size to meet the requirements of *Australian/New Zealand Standard AS/NZS 1546.1:1998 'On-site domestic wastewater treatment units'*.

The computerised FEA simulation performed by e3k showed that the technology is capable of creating a secure joint in a loaded structure, and possessed a sound scientific basis.

"The *Joinlox* technology is innovative and has significant advantages over more conventional joining



Leighton's trucking fleet goes carbon smart with e3k's help.



methods," Dr Gilmore said. "The difference between *Joinlox* and bolted flanges is similar to the difference between snap fits and screwed joints, or zips and buttons. That is, it represents a revolution in the speed at which pressurised joints can be attached and sealed. The use of mod-

ern manufacturing technologies such as plastic injection moulding means that the use of *Joinlox* is limited only by the imagination of designers. Immediate commercial potential will be with plastic and fibre-reinforced plastic components particularly with those requiring repeated joining, disassembly and rejoining."

Should *Joinlox* live up to its promise of revolutionising industrial fixings, it will have plenty to thank e3k for – which is sure to open new doors for Dr Gilmore's team.

"The business is maturing," Dr Gilmore said. "This is probably helped by the advertising we have done (including a long-term campaign with *Business Acumen* magazine).

"It's all about encouraging the bigger end of town to make greater use of our services. We are at the early stage of where they call you, because they have heard of your capabilities and expertise.

"We want to be recognised and visible as a significant force in the Australian industrial community. Every job is seen as a marketing tool and we keep our quality high in all we do."

[www.e3k.com](http://www.e3k.com) ■

## AUSTRALIA LAGGING?

Duncan Gilmore, director and president of leading engineering consultancy e3k is concerned about a general trend in Australia away from manufacturing original designs. Much of the work he does for innovative companies is destined to commercialise outside the Australian market and later imported by Australians.

What concerns Dr Gilmore most is the general trend in Australian industry to sell off many of the best new technologies and ideas.

"We have lots of ideas and our people are extremely entrepreneurial in Australia. But the political will is not there."

In many ways, he said, e3k is playing its part in beating the problem of Australia becoming "a one-trick economy" dominated by resources or agribusiness.

Innovation backed by sound and creative engineering was a vital part of securing the country's economic future, Dr Gilmore said.

A good example is the work e3k did

on the *Nereus* ocean current power generation systems from 2000 to 2005. Several variations were proven, prototyped and tested by tow testing in the Clarence River, Yamba, NSW, and later in Port Phillip Bay Victoria, but the project has been purchased by Atlantic Resources Corporation and is being commercialised out of Singapore.

"Yet this could be a real industry changer," Dr Gilmore said. "It's such a shame it could not continue here."

Dr Gilmore said from his engineers' research, while wind power is "fairly well developed", his team's considerable experience and research revealed tidal and underwater generators can generally be regarded as "more reliable".

"Governments try very hard with organisations like AusIndustry etc," he said, "but there is still no sustainable aerospace and auto industry here – really. The one-trick nation is a danger. I don't think we want to end up like that.

"(Prime Minister) Kevin Rudd is talking

about increasing productivity – and it must improve. It's about working smarter, making sure there is not so much dead time in the processes.

"But we probably haven't got the political will in this country now to truly develop entrepreneurial engineering programs ... The best ways we can we develop increased turnover is the way the Australian economy should go – beyond minerals and commodities. To diversify the economy, you need the best expertise available."

Dr Gilmore said a lot of faith had been placed in commercialising through the venture capital system in the 1980s and 90s – it was not successful.

"I don't think that's a good excuse for us to stop trying," Dr Gilmore said. "It's a global economy and we need to see ourselves as part of it – and we need to fit into it in a diverse number of ways.

"We have world beating ideas in this country," Dr Gilmore said. "We hold our own in terms of ideas and technology."

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