

Fire science funding at risk
- research advances slowed

Rogue extinguisher sales
putting businesses at risk

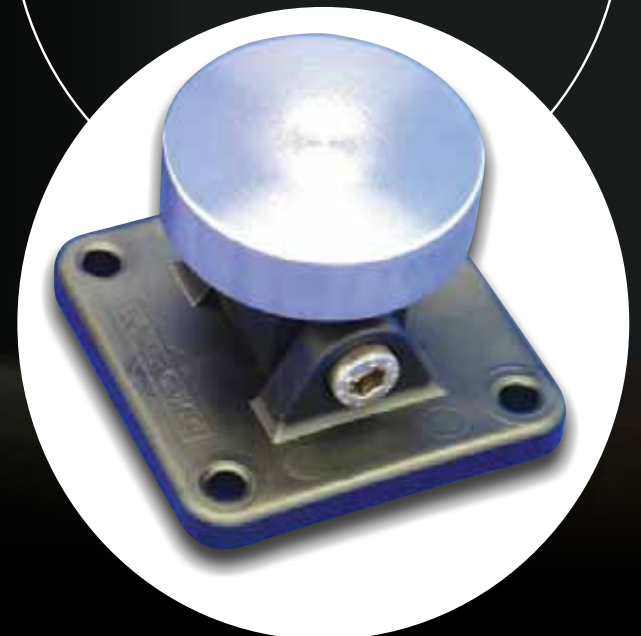
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Themes for the upcoming magazine production will be promoted in advance of editorial committee deadlines to ensure all contributors are able to meet the final magazine delivery timelines.

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Fire NZ Magazine is published on behalf of Fire Protection Association New Zealand, Society of Fire Protection Engineers (NZ Chapter), Institution of Fire Engineers (NZ Branch) by T&T Publishing Limited.

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From the Desk

Fire Protection Association New Zealand



On behalf of the Fire protection Association I would like to welcome readers to this first edition of FireNZ.

This magazine is a new publication for the fire industry as an alliance with T and T publishing and is the result of the work done by previous FPANZ groups to get a magazine that is relevant and material that compliments what our membership base is looking for. It will be published on a regular basis and delivered to a much wider audience than was previously achieved.



Keith Blind
Executive Director
FPANZ

The fire industry in New Zealand has a real opportunity now to plan and invest for its future and make the most of a buoyant NZ economy.

It is evident that we have a large appetite for a skilled workforce of over 3700 which needs investment in training and resources to ensure the associated disciplines are suitably catered for.

We are making headway with the review of the Fire trade qualifications and the need to refresh the material that has now been in place for many years. With the potential release of new qualifications we will see a steep change in the makeup of on job versus off job components. We are also looking to industry to support a variety of training initiatives to help with the on job aspect of the qualifications and make the facilitation of this an easier pathway.

The association is now well engaged in preparing for the FIRE NZ annual conference which is now in its 17th year.

For the very first time the conference will be held in Wellington on October 15th-16th at the TSB arena and shed 6 precinct. Once again we are pleased to be partnering with the IFE and SFPE to make this a world class event. The theme this year is "Transforming the Fire Triangle" through design, safety and innovation. The key components of any Fire protection engineering used to protect people, property and the environment. This

will attract a variety of industry stakeholders who are interested in showcasing and promoting their cutting edge products and expertise.

We are also engaged in working on a number of codes of practice which we, as the association, are leading as the industry voice. These codes are a mechanism to enable industry standards to be lifted and a way of promoting a professional body and a professional outcome. We expect these to be delivered to industry over the next 12 months.

The current suite consists of:

- FPANZ Evacuation consultants code of practise in collaboration with the NZ Fire Service.
- FPANZ Hand operated fire fighting equipment code of practise and certification regime.
- Passive Fire protection code of practise in conjunction with BRANZ and MBIE.
- We will be updating progress and releasing some of these at our conference this year.
- FPANZ and its members have also been involved in the strategic review undertaken by MBIE on the Fire safety and engineering regulatory framework. It is expected that the summary report will be complete in mid 2015.

With these and other issues, it promises to be a busy year ahead within the fire protection community in New Zealand.

From the Desk

Institution of Fire Engineers (NZ Branch)

IFE our Vision

"A global organisation of fire professionals striving to build a society safer from fire."

Greetings to all

As the Institution of Fire Engineers (IFE) approaches its 100 year centenary in 2018 the Board and the International General Assembly have been working together to produce an updated strategic plan. As forward thinking as our founders were 100 years ago we are looking ahead to ensure the IFE develops to meet the changing

dynamics of the fire industry in the next 100 years. Our vision statement that introduced this article sets the direction we as an organisation want to head. This coupled with our mission "to promote, encourage and improve the science, practice and professionalism of fire engineering" will ensure we continue the intent of our original charter document and maintain our standards.

The Institution wants to facilitate awareness, foster professionalism and increase knowledge and be part of technical leadership.

Leadership Roles within the IFE

July this year will see our very own Brian Davey (NZFS Ret) take his position as International President elect. The branch is very proud of this recognition of service to the Institution. Brian has the support of the board and branch members from all around the world. 2016/17 will be a very busy 12 months for Brian as he meets his obligations and we as a branch council will support him as much as possible. Coinciding with this period will see me take on the position of Leader of the International General assembly and Trent Fearnley will become the NZ President. We continue to build on the fine work of previous representatives' and the NZ reputation which ensures we remain leaders within the international organisation.

NZFS National Training Centre Training Package handover

This fantastic training aid was officially handed over to Training Manager Ian Pickard on the 16 April at a function hosted by the NZFS. Trainers are already praising the package that included the completion of the sprinkler system to allow instructors full control of sprinkler head activation by means of a hand remote and a fully interactive lecture room fire alarm panel. The IFE was pleased to be part of this joint venture with Pertronic and Fire Security Systems, companies with a shared passion for developing people professional knowledge and skills.

FireNZ AGM and Conference

Wellington 14, 15 and 16 October- Finally can I invite you all to Wellington to be part of another great event. Place the dates in your planners and book early. See you there for my last AGM as President of this historic Branch. That was a quick 3 years!



Graeme Quensell
FIFireE, Grad.Dip. Building Fire Safety
and Risk Engineering, FNZFBFI, NCAET

President of the Institution of Fire Engineers New Zealand Branch
Vice Leader of the Institution of Fire Engineers International General Assembly



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From the Desk

New Zealand Chapter of the Society of Fire Protection Engineers



On behalf of the NZ Chapter of the Society of Fire Protection Engineers, I would like to welcome readers to this edition of FireNZ. I am writing this editorial on behalf of the SFPE President as Claire is busy dealing with a new born baby girl as this article goes to press.

The fire engineering area in New Zealand has undergone significant changes in the last 2 years, with new building codes and compliance documents. These changes are probably equivalent in impact to

the 1991 Building Act changes that introduced the performance based building code, and by introducing performance criteria to a performance based building code, NZ is again leading change in the world, and other countries are watching how it works in practice.

This could be seen when SFPE members attended the 10th International Conference on Performance Based Codes and Fire Safety Design Methods held on the Gold Coast of Australia in November 2014. One of the presentations looked at what acceptance criteria are used around the world for tenability, such as visibility during evacuation, allowable temperatures, limitations for fire spread to boundaries etc.

While some of these are well established, there is large variation between building codes or standard practice from country to country which lead to a wide range of outcomes for fire safety and a building that is "safe" in one country, is "unsafe" in another country. This variation is one reason behind the development of the New Zealand Verification Method C/VM2, which provides a prescriptive set of rules to provide a consistent set of inputs and acceptance criteria between projects in New Zealand.

The issue arises in interpretation of the requirements - or does the fact that no mention is of a scenario or requirement mean that it is not required? It cannot remove the necessity for expertise, judgement

and ethics amongst engineers of whether the design is correct from both good engineering practice as well a legal perspective of ticking a "deemed to comply" box.

Beyond building codes, an ongoing issue that has come into focus in recent years is the coordination and implementation of fire requirements in all areas of the building design, particularly the integration of alarm systems, architectural requirements and other services. As an example, it is a common problem that no allowance has been made for fire protection of steel structure in the drawings or tender, as that is by "someone else".

The SFPE is involved in the working group to review and revise IPENZ Practice Note 22 on documenting fire designs (<https://www.ipenz.org.nz/ipenz/forms/pdfs/PN22-DocumentingFireSafetyDesigns.pdf>). It is early days and it will be a slow process, due to the number of industry groups involved and getting them to agree on which documentation requirements fall under which discipline. Done correctly, it should improve consent processing times, reduce contract variations and remedial works, and the liability of those involved in the industry.

With these and other issues, it promises to be a busy year ahead with an ever changing set of challenges to fire engineers in New Zealand.



Geoff Merryweather
BA MEFE MBA CPEng MIPENZ

Vice President
New Zealand Chapter of the Society
of Fire Protection Engineers

Fire science funding at risk - research advances slowed

Keith Newman believes the world-leading group tasked with research and development of tools to assist with the science of rural firefighting could have achieved far more than it has, if it wasn't so cash strapped.

Scion Rural Fire Research Group's leading edge work on fire modelling and smart decision support tools to improve firefighting capabilities, faces uncertainty following a shift in the way the Government allocates science funding.

Scion RFRG will have to contend with much larger science providers to even retain its meagre \$750,000 baseline annual budget in an area that has been redefined as less relevant, under Government policy changes.



Scion Rural Fire Research Group senior scientist, Grant Pearce

The fire science group was already struggling to achieve stable funding in order to pay two full time and three part time fire researchers, as well as advancing critical research projects.

Senior fire scientist Grant Pearce says he has 16-months to build a convincing case to retain or grow its existing funding or risk losing most of it when its 4-year contract with the Ministry of Business Innovation and Employment (MOBIE) expires in 2016.

"The money we get through the contestable process will go into a larger pot and the news to date is that we might not necessarily get it back. That's not great news for us."

Scion Rural Fire Research is a minnow alongside other contenders including universities, NIWA and earth sciences agency GNS. The National Science Challenges money includes cash, as yet unallocated from the 2012-13 budget totalling \$153.5 million, plus \$30.5m annually thereafter.

Public good outcomes

Scion RFRG is tasked with public good outcomes based on the science of predictive fire modelling and prevention, and has developed a range of support tools to monitor weather and wind, increased fire risk and technology that can indicate likely fire spread.

The group, based at Canterbury University, is currently trialling technology that monitors the

"The money we get through the contestable process will go into a larger pot and the news to date is that we might not necessarily get it back. That's not great news for us."

Scion RFRG senior scientist, Grant Pearce

health and location of firefighters and is exploring robotics to reduce the risk to firefighters in steep or difficult country along with drone technology to assist operations and detect hot spots.

Proposals to automate and integrate some of its fire modelling and predictive tools and improve communications could further transform rural fire prevention and firefighting but funding is already an issue.

Pearce says MOBIE wants greater collaboration between research providers and is refocussing on the big questions facing New Zealand including 'Resilience toward nature's challenges', where Scion RFRG is proving an ill fit.

The category is all about natural hazards and the general feeling is, that's around "social and community resilience to earthquakes and floods". While there's room for fire, it's effectively been pushed to the outer.

Scion tried to argue for the value of its contribution when it submitted its proposal in December but the feedback was that fire-related science came under the broader umbrella of risk assessment. The irony says Pearce is that "you need to be able to do work on assessing risk to deliver resilient solutions."

Scion RFRG has a proven track record and respect from

stakeholders including the NZ Fire Services Commission, the National Rural Fire Authority, forestry companies, the Department of Conservation and local government.

Only its social scientists working with communities on fire event responses, are likely to be supported under the new approach proposed by the consortia of research providers. Discussions are underway with MOBIE to have the criteria re-evaluated.

Ideally Pearce wants funding set aside from the pool or alternatives to be arranged to ensure the fire science researcher has a future.

Scion's growing fire toolkit has proven track record

Grant Pearce is one of New Zealand's leading fire specialists whose research is embedded in the nation's fire behaviour models, including calculating a fire's rate of spread, intensity and flame length.

These models help determine how many people should be on stand-by over a long weekend, what equipment might be needed on a call out and how rural fires in different locations might play out.

Scion RFRP's Fire Behaviour Toolkit, a smartphone-based calculator is now used across the country by fire fighters and fire managers and farmers planning controlled burn-offs, alerting them to a raft of conditions and the potential spread path of fire.

The kit evolved from a basic field manual with a series of look-up tables that ultimately evolved into a PC-based calculator and then moved to mobile. Weather and wind conditions still need to be manually input.

Work on automatically pulling in essential data from field weather stations stalled two years ago when the New Zealand Fire Service, National Rural Fire Authority and

NIWA began developing a new fire weather system.

Meanwhile Scion began developing the Fire Danger Today cellphone smart app, now in its early release stages, designed to alert people about fire risk based on their location. Some of the research is being done in collaboration with Tait Communications

Reducing rural risk

A prototype, in the process of getting a final sign off, is geared for campers, travellers and holiday makers who may not know the fire risk in the environment they find themselves.

The app connects into NIWA's new fire weather system extracting real time information from the closest weather station, based on the GPS position of the smartphone, providing fire danger alerts and appropriate advice to users.

Pearce would like to see the capabilities of Fire Danger Today merged with the Fire Behaviour Toolkit with automated data

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collection. "Ultimately it would be really nice to bring the two applications together."

Scion provides the science then outsources to other specialists to develop the apps. "The real objective of our research is having accurate models that underpin these predictive relationships for fire and packaging them up into tools to make that information useful," says Pearce.

Another tool in the mix is the Prometheus Fire Growth Simulation Model, a 2D version of the fire behaviour calculator which helps determine the likely spread of a fire over time based on geographical information systems (GIS).

Behaviour model refined

Prometheus, a tool for fire managers and specialists, originated in Canada and was first deployed here about five years ago, with local fire behaviour models, types of fuels and other developments added over time.

It was used in the wildfires at Onamalutu, on the outskirts of Blenheim, at the height of this summer's fire season, where a blaze ripped through a pine plantation and threatened a number of homes.

"If you know the location of the fire, and the fuel types it's burning in you can combine that with information on terrain and weather conditions, particularly wind speed and direction," says Pearce.

"The software runs a bunch of scenarios, based on those sort of conditions, allowing you to change wind direction and speed, to see the impact on fire perimeters at maybe 30 minute, one hour or three hour intervals."

A few fire managers have experimented with it, including the 'what if' scenarios, and it's been tested against the data from a range of historic fires and proved fairly accurate. "It's definitely proved its worth," says Pearce.

Veronica Clifford from Scion's Rural Fire Research Group, an expert at predicting fire behaviour and a rural volunteer firefighter was among those battling to bring the Onamalutu forest fire under control, as part of the National Incident Management Team (NIMT).

She used the latest weather forecasts and taking into account the lie of the land, vegetation and wind direction briefed management and fire crews about likely fire behaviour in what was described as "a complex fire with multiple fuel types on rough terrain".

The app connects into NIWA's new fire weather system extracting real time information from the closest weather station, based on the GPS position of the smartphone, providing fire danger alerts and appropriate advice to users.

Her real time advice, assisted by the mobile apps, was used to determine where to concentrate fire fighters and aerial support with a particular eye on if and when evacuations might be necessary.

"Our research focuses on understanding how fire behaves in various conditions, and the factors that affect public and firefighter safety. Using the tools we have developed in the field and seeing their positive effects is very satisfying," said Clifford about her first multi-day wildfire.

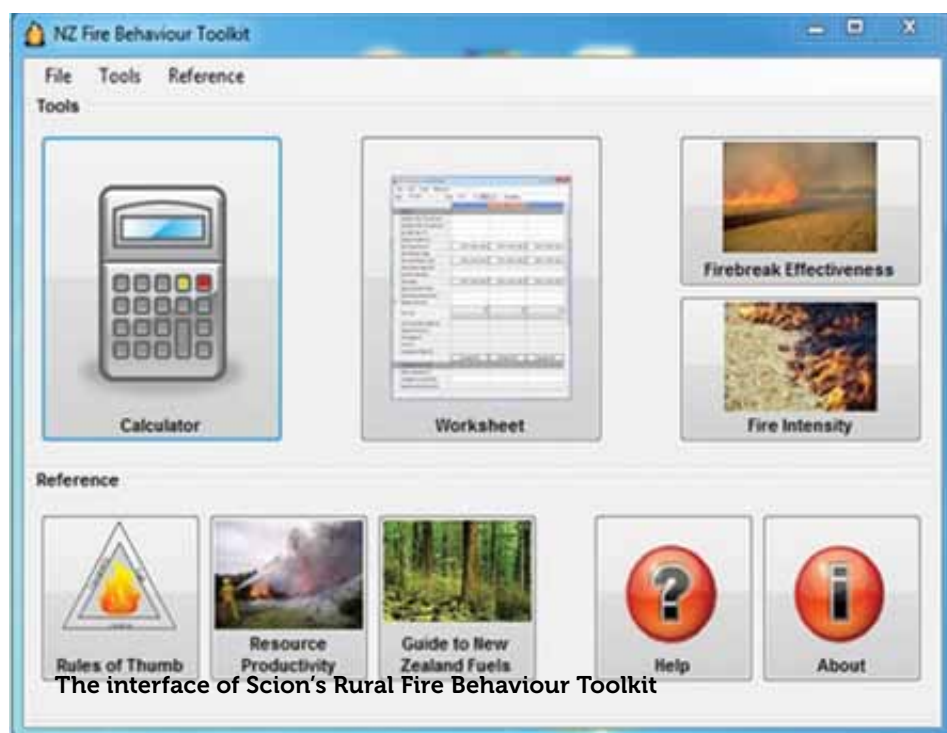
She continued to be involved with research to demonstrate what damage might have occurred without fire suppression as part of the operational review

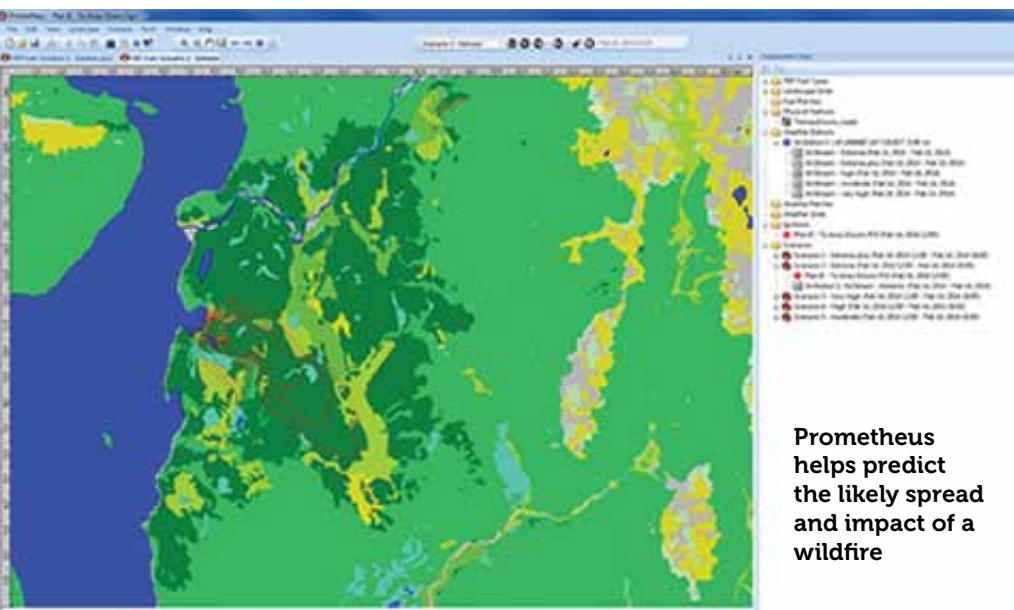
Looking for suite spot

Last year 45 New Zealand fire managers were trained up in the use of Prometheus, including firefighters from Canada, where it originated. "It's out there now and available for a much wider group of people to use."

Pearce says there's strong interest in these kinds of tools and the Canadians in particular are "definitely pleased with the enhancements that we've made."

Scion RFRP is keeping a close watch on an international evaluation of products, including Prometheus, to see which does a better job across a variety of circumstances and which is most





Prometheus helps predict the likely spread and impact of a wildfire

appropriate for wider deployment "All of them have good features and some negatives. Some have the ability to put in firefighting activities. Prometheus doesn't, although there's the possibility of creating a suite from the different models."

Scion RFRP will continue to enhance its own tools and benefit from the global open collaboration in fire prevention research. "Every-body is looking to find what the best approach is internationally."

Taking the extra steps toward automating existing tools and integrating others however is restrained by Scion's basic budget. "When you've got a limited resource you can only split it so many ways. We're committed to a programme of research at the moment, so that uses available funding."

While prevention can save a considerable amount of money in lost land, forest, buildings, tools, homes and even lives, Pearce says it's a continual struggle proving that when applying for funding.

Even undertaking a cost-benefit analysis of existing, enhanced or proposed tools in fire prevention and firefighting activities, requires investment.

He'd like to re-purpose Prometheus' predictive modelling for example to compare data to illustrate what could have happened and the value of what has been saved through the various Scion RFRP tools.

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Rogue extinguisher sales putting businesses at risk

The Fire Protection Association plans to weed out rogue operators

By Keith Newman

The Fire Protection Association plans to weed out rogue operators who take advantage of uninformed and vulnerable people by selling or exchanging old fire extinguishers as if they were new.

Chief executive Keith Blind says the industry needs to come down hard and "name and shame" those who continue to mislead the market.

While the practice has been going on for some years, he says it's up to the NZFPA's Hand Operated Fire Equipment (HOFPE) special interest group to raise the bar in administering standards and codes of practice.



FPANZ chief executive, Keith Blind

The HOFPE group is trying to get fire extinguishers back onto compliance schedules for commercial, public and industrial buildings after a loophole in the law resulted in many owners, including government and local government, remove them from service.

A survey of extinguisher suppliers, building owners and servicing companies is currently underway to try and prove their value, particularly in dousing smaller fires before they get out of hand.

The HOFPE survey, in conjunction with the New Zealand Fire Service, has been relatively slow with only 150 responses but aiming at 500 by June and 1000 by the end of the year.

"We're still struggling to get a lot of the smaller practitioners on board and educate them about the process," says Blind.

Part of HOFPE jigsaw

Meanwhile, he says culling "rogue operators" from the marketplace and establishing firm codes of practice and conduct is "part of the jigsaw" for getting hand operated equipment back into compliance documentation.

Blind says the Police aren't interested and mostly the offenders aren't members of the NZFPA, so the HOFPE group, must implement a more rigorous process of vetting members and practitioners or rogue behaviour will continue.

"You have to raise the profile, name and shame them and convince suppliers they shouldn't be providing product to these idiots."

FPANZ chief executive,
Keith Blind

"You have to raise the profile, name and shame them and convince suppliers they shouldn't be providing product to these idiots."

The industry practice is that after a five year lifespan, an extinguisher must be taken out of service, and pressure tested and checked before being refilled.

The process became more complex with the introduction of "swap and go" operators which reduced the incentive for extinguisher owners to refill and test or invest in new extinguishers.

Although each cylinder is hard stamped on the metal with the date of manufacture so owners and testers know when it's due for testing, Blind says some providers are ignoring this.

He says legitimate practitioners should be informing customers when the pressure test and refill is due or offering to replace them with a new extinguisher.



Conning the vulnerable

His concern is that unscrupulous practitioners are taking advantage of vulnerable members of the community including the elderly, those who aren't particularly well off or have language difficulties.

"They're out there going around the small fish and chip and takeaway shops, the Indian and Asian communities."

He says, some people may not be aware of the legal, technical and safety requirements. While it may be a cheaper option, a "four to eight year old extinguisher" would place business owners at risk.

Blind is confident extinguishers will eventually end up back on compliance schedules. "The UK has gone through the process of proving the value of having appropriate firefighting equipment on site in buildings. The insurance industry sees a requirement and building and occupant safety is another driver."

He insists "the pressure will come on, not just from the value-

add, in terms of saving property and business, but health and safety."

Blind believes there will always be a case for a hand-operated device to put out a fire and changes in technology may help make that clearer. "You might get smarter monitoring of the extinguisher... location, weight and consistency and maybe live data back into a reporting model."

He recently viewed a portable unit that enabled data to be recorded on passive componentry in a building, photographically and electronically with the capability of printing labels.

He could see the potential for software on a smartphone for example, to be used by council inspectors, IQPs, designers and engineers on their rounds and that may include easier monitoring of extinguishers.

Meanwhile Blind is encouraging anyone who knows of suppliers providing older, untested equipment or passing second hand extinguishers off as new, to contact FPANZ.



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fireNZ

Rocky road to UN classification

New Zealand has become the 28th Urban Search and Rescue (USAR) team in the world to be granted a United Nations heavy-capacity classification, qualifying its crack team to be deployed into disaster situations anywhere in the world.

The achievement of the classification came almost a year to the day since a damning Coroner's report highlighted strategy and communications issues during the NZ Fire Service-led rescue attempts at the collapsed CTV Building during the 2011 earthquake.

Improving and confirming the capabilities of the nation's elite 200 strong search and rescue taskforce was one of the eight recommendations of the report, which have since been met and in many cases exceeded.

The heavy capacity classification, which must be renewed every five years, is the highest possible UN search and rescue qualification.

It recognises that response teams have the equipment and personnel to carry out self-sufficient incident management, search, rescue, medical and logistics activities at two disaster sites simultaneously for up to 10 days. This includes hazardous substance identification and dog search capability.

National USAR manager Gavin Travers, says achieving a heavy team capability based on International Search and Rescue Advisory Group guidelines for both domestic and international response, comes with a significant level of pride.

"This is win-win...This is another tool in the tool box, another asset for New Zealand Inc, our Taskforce New Zealand Emergency Response to international calls for help."

At the time of writing the team was on high alert, eventually deploying 14 members to Vanuatu in the wake of Cyclone Pam. This included 10 people sent to the island of Epi, north of Port Villa to assist with water production, hazardous materials and helping to repair and make safe community and government buildings.

Another four from the USAR logistics team were seconded to the medical assistance team (NZMAT). Within weeks they were almost deployed to Nepal.

Kiwi can-do attitude

If there's one thing that the New Zealand team brings to the worldwide USAR community, says

The Kiwi team gained a green in 129 of the 136 categories, although some areas showed room for improvement, a single red or fail would have disqualified them.

Travers it's the Kiwi can-do attitude. "We'll take any challenge on head first...We will always give it our best shot.

Being a member of the UN's International Search and Rescue Advisory Group, means New Zealand will now increase its commitment to mentoring and training with other countries in the Asia-Pacific region.

The decision to grant the coveted UN classification followed the March Kia Kaha (Be Strong) exercise at the old Longburn Freezing Works near Palmerston North where a representative team was put through a gruelling 36-hour exercise.

They were observed by an international panel of eight UN classifiers, as they responded to the aftermath of a simulated 8.3 magnitude earthquake in the Fijian city of Suva.



**National USAR manager
Gavin Travers**

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The team of 71, including 57 professional and volunteer firefighters, were drawn from 210 skilled USAR personnel based in Christchurch, Auckland and Wellington.

The team including communications and other technical experts, engineers, dog handlers from the Search Dog Association, doctors and paramedics from St John, gathered in Auckland before being flown down to the site along with a 20 tonne cache of equipment.

Taskforces who can call on external support and expertise including construction, heavy machinery and specialist equipment.

The New Zealand Defence Force is a key emergency response partner along with Air New Zealand and there's a memorandum of understanding (MoU) to deploy heavy aircraft, for example, to move people and equipment.

At the simulation site, rescuers found two real life amputees who had been placed "trapped and bloodied" among the rubble.

The Kiwi team gained a green for go in 129 of the 136 categories, although some areas showed room for improvement, a single red or fail would have disqualified them.

The classifiers concluded the team demonstrated strong competency in all aspects of urban search and rescue including logistical and management expertise, reconnaissance, the use of search dogs, technical rescue skills and medical treatment.

Trial by fire

The New Zealand USAR team has been through a rough rite of passage, with hard lessons learned from the February 2011 Christchurch earthquake, and subsequent deployment to Japan in response to the devastating April tsunami.

Both postings raised a number of shortcomings that needed to be addressed. "With every deployment and exercise there is a period of reflection, where we look at opportunities to learn or improve. That's just normal business for us," says Travers.

Team members worked for two years building up to the United Nations examination, including a trial run in August 2014 at the Longburn location, under the watchful eye of mentors, the Queensland Fire and Rescue USAR.

"We're continually addressing and affirming that the group is primarily made up of people from the NZ Fire Service, both career and volunteer staff."

National USAR manager, Gavin Travers

The team drew on the Australian's experience and capability. "They certainly helped us refine certain key areas around mobilisation and some functional areas within the USAR capability, which we had a think about and put into practice," says Travers.

Fire Service Commander Baxter said the March 2015 exercise was designed to be as realistic as possible.

"Urban search and rescue teams need specialist skills as their work focuses on the most difficult rescues after earthquakes, landslides and similar disasters."

He says the classification confirms New Zealand meets international best practice for responding to calls for help from neighbouring countries; it was about "pulling our weight on the international stage".

He said the UN was keen to increase the number of classified teams in the Asia-Pacific region, including the earthquake-prone Pacific Rim where there are now seven teams. Of the 40 teams now classified, New Zealand is among the 28 that have a heavy classification.

Coroner's challenge

Coroner Gordon Matenga in his March 2014 report had outlined eight recommendations to improve New Zealand's response in search and rescue operations including joint training exercises and specialist training for search and rescue technicians.

These arose from his inquiry into the collapse of the six-storey CTV Building where 115 people died, including eight who survived but died before being rescued.

Since the 2011 quakes the New Zealand Fire Service has purchased new high-tech gear, including core drills, search cameras, listening devices, and cutting equipment, all used in the USAR training exercises.



From Left: Arden Stan, Netherlands, lead UN classifier, Paul McGill, NZFS Deputy National Commander and Ben Negus, Geneva, the United Nations Office for the Coordination of Humanitarian Affairs (OCHA)



The New Zealand Urban Search and Rescue (USAR) team now among the world's elite

As part of the communications capability, incident management staff used a search and rescue decision support tool designed for the NZ Fire Service, in conjunction with the Ministry of Civil Defence & Emergency Management.

It converts data from portable field devices to provide a real time picture of events and can easily share this across agencies, for display at national headquarters or for transmission overseas if needed.

Leadership not clear

Travers says in the past, command and control issues have arisen through a failure of other parties to recognise that the New Zealand USAR team was under the oversight of, and indeed a function of, the NZ Fire Service.

He says the Christchurch earthquakes “highlighted some areas where we needed to refine that chain of command, so people knew it wasn’t a stand-alone entity” or separate to the NZ Fire Service.

“We’re continually addressing and affirming that the group is primarily made up of people from the NZ Fire Service, both career and volunteer staff,” says Travers.

Having the highest level of UN classification has been a confidence booster all round, ensuring everything is done to International Search and Rescue Advisory Group guidelines.

“Should we ever have another event in New Zealand, any international team responding can expect a certain level of standards when they arrive...They’ll know what to expect. That’s the bottom line,” says Travers.

While there are always differences between countries, he says processes are similar and “they should be able



A ‘victim’ is pulled from the rubble

to plug straight into our systems if we go overseas to work with a classified team we should have the same expectations of their system,” says Travers.

Costing remains complex

Travers says changes proposed through the New Zealand Fire Service Review, which will ultimately create a mandate for search and rescue work already being done by the New Zealand Fire Service, won’t have much of an impact on the USAR crew.

“The New Zealand government and Cabinet have already mandated New Zealand USAR to respond internationally.”

Although funding for deployments is rather more complex. That still comes from within the New Zealand Fire Service budget, international deployment can be funded by the Government, depending on which country is affected.

Lessons from the collapse of the CTV Building in Christchurch during the 2011 earthquake contributed to a massive shake-up of the New Zealand Fire Service operations and procedures and scathing criticism of communications failure.

Although the March 2014 Coroner’s Report cleared the New Zealand Fire Service of any part in causing the death of the eight survivors who died before they could be rescued, the service was handed a list of challenges to lift its game.

The inquiry into the building collapse in which 115 people died, was critical of the failure to set up a proper chain of command and incident control point, which resulted in a breakdown of communication. Rescuers weren’t told about essential equipment including listening devices and concrete cutting tools, key equipment wasn’t mobilised and firefighters weren’t fed or supplied with drinking water during their efforts.

Based on these revelations, the New Zealand Fire Service commissioned two independent reviews of its performance in the CTV rescue, and was part of a wider Civil Defence and Emergency Management review.

Anyone would be stretched

A 2012 review by English fire chief Simon Pilling stated the scale of the disaster would have “stretched any fire service in the world” and made 15 recommendations, which were referenced by Coroner, Gordon Matenga in his March 2014 report.

Leading up to the release of the report, the New Zealand Fire Service faced what has been described as the biggest shake-up of its operations since the 1947 Royal Commission of Inquiry into the Ballantynes department store fire in Christchurch.

In response to the report, Fire Service national commander Paul Baxter confirmed all the recommendations had been addressed or were being addressed.

Senior fire officials had been on strategic training courses at the Australasian Fire Authorities Council in Sydney, executives were taking tactical command courses and there was a closer working relationship with other agencies, including joint training exercises.

The recent United Nations USAR certification of the nation’s search and rescue task force was part of ensuring everything was up to international standards.

Proof of value needed

Pearce says it's been a constant battle to prove the value of what might have been saved in the rural fire sector through having predictive tools or smarter firefighting technology. "We're up against earthquakes and flooding and all of those sorts of things, for our research funding, and have to put a value proposition."

Scion, continues to refine its case. "We need to show the benefits that could accrue from research if there was more money, and even convince them to continue providing the existing level of funding."

In an ideal world Scion Rural Fire Research would put more effort into new or improved tools for fire warnings or messaging to alert people to fire dangers along with guidance about the level of risk.



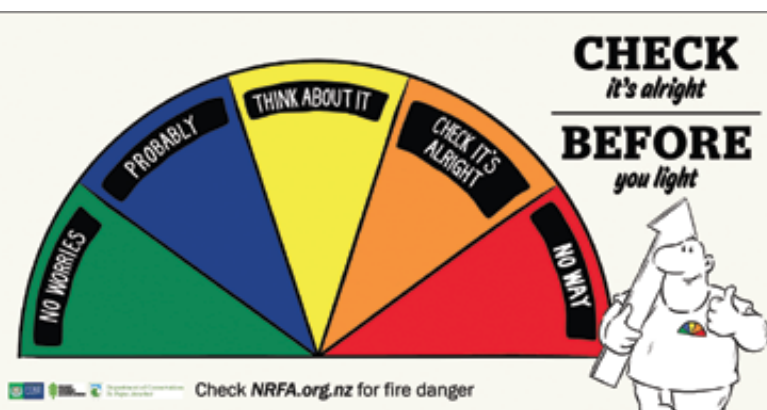
Veronica Clifford, a Scion RFRG's fire prediction specialist is testing health and safety sensors on fire crews around the country

With the right information flowing to the rural sector he believes communities would take greater ownership of risk "rather than being so reliant on emergency services agencies to do that for them."

That might include greater awareness of when it's not appropriate to operate an incinerator, start burn offs, use cutting and welding equipment in the open or operate a 4-wheel drive vehicle with a hot exhaust in dry grass.

"Those sorts of things that are not classed as an open flame aren't covered by normal fire restrictions but are a common cause of fires that people might not think about," says Pearce.

Current research suggests there's still limited understanding by the general public on what roadside fire rating signs mean, "and the differences in behaviour required as you move from one rating to the next."



Health and safety tool imminent

After five years of field testing, Scion Rural Fire Research Group (RFRG) is preparing to release a mobile application designed to improve the health and safety of rural fire crews.

The smartphone-based Fire Suppression Productivity Calculator can be used by fire managers to determine how long fire crew can operate safely under adverse conditions and how many "fire line metres" people can be expected to work per hour based on temperature, slope, rate of fire spread and other factors.

"I've got fire managers kicking me up the arse and saying, 'Hurry up, Parker' as they see real value in this but it's been a lot more difficult to complete than we first thought," says developer, Richard Parker.

After completing his PhD on wearable sensors in 2010, Parker migrated his research from primitive heart-rate sensors used in sport to more sophisticated and robust equipment including GPS locators, temperature and heart rate monitors and helmet video.

He and his Scion RFRG colleague Veronica Clifford, both active volunteers in the Canterbury High Country

Fire team, used the sensors on their own crews and others around the country. "We go to fires that are often on the DOC estate, so they could be in high country, or the bush, or river beds, normally quite isolated places."

He says crew often find themselves dragging 41mm thick water-filled hoses through burnt broom and gorse on hot days while wearing protective equipment, helmet and gloves which is physically demanding.


The software monitors the exact location of fire crew, tracks their health and wellbeing based on the physical workload and environment. "We can also combine hard numbers from our field research, telling us that under a certain temperature a person can be expected to do so much work before fatigue builds up."

The feedback can be used to redesign the job or identify how people are coping in real time by beaming data back to a base station.

Earlier research in this area, commissioned by the NZ Fire Services Commission, identified that carbon monoxide from the exhausts of water pumps can at times have a greater impact on firefighters than the colourless, odourless toxic gas does when emitted from fires.

"Firefighters are often standing over them moving valves to get the water flowing down different hoses and making sure everything's working right and breathing in the fumes."

That data is now available to fire services around the world through the resulting report produced by Scion RFRG, and says Parker, has hopefully resulted in changed practices at fire scenes.



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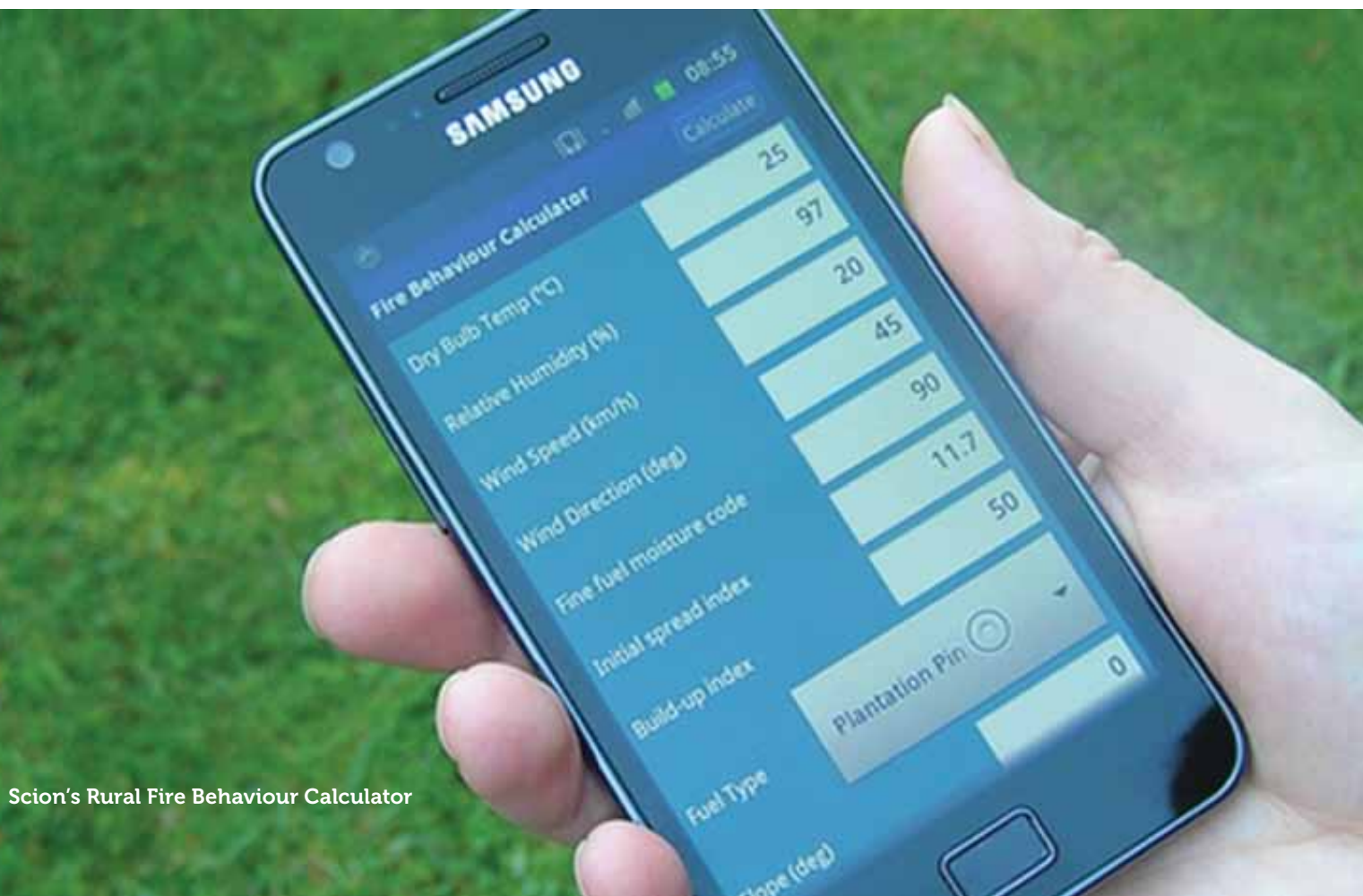
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Scion's Rural Fire Behaviour Calculator

Product integrity and personal integrity go hand in hand

Loktronic Limited is one of New Zealand's leading of fire safety, protection and prevention related products

As we all know, security and integrity are vital components to products and services in the fire management, protection and prevention sector. In that light it is perhaps fitting that one of the major New Zealand distributors of fire safety related products is also a leading supplier of a wide range of security and access control equipment.

Auckland-based Loktronic Ltd specialises in electric locking hardware and accessories and has

become universally known as New Zealand's leading port of call for advice, sales, service and repairs to a wide range of products in this market category. The company stocks all the leading brands and some less well known ones too.

Just as importantly for the fire services industry, this wide range of specialist products includes a number under the ViTECH, STI and Loktronic brand names that perform important functions around fire protection and prevention.

Products in these ranges generally come under the purview of the company's ViTECH division manager, Peter Sheehan. Peter will be well known to many in the fire services sector. He specialises in the design and development of the highly innovative range of fire protection products and has been instrumental in the development of fire brigade alarms and battery load testers that have become benchmarks for quality and reliability.

An electrician by trade, Peter first became interested in fire safety through early employment by Wormald and then fire alarm monitoring for AFA Monitoring in Christchurch; generally involved in commissioning fire systems for the NZ Fire Service. Peter saw the need for better equipment in the fire sprinkler area which led in part to the development of the fire brigade alarm (FBA) which evolved into the products marketed by Loktronic under the ViTECH brand today.

Loktronic are New Zealand's only manufacturer of electromagnetic locks and fire door holding electromagnets which are backed with a 10 year warranty when used indoors.

When AFA lost its fire services contracts, Peter established ViTECH which later merged with Loktronic, then managed by Peter Calvert, another security industry stalwart. At that time ViTECH was also importing the huge range of STI stoppers, protective cages, alarmed housings, wireless transmitters and strobes and this led to Loktronic becoming a New Zealand agent for this range. While the STI products are imported from the States, ViTECH products are New Zealand designed and made. This also references a product Peter Sheehan first saw a need for back in his Wormald days; a portable battery testing device suitable for testing the full range of batteries, up to 40 a/h rating, used in security and fire systems.



Peter Sheehan outside the Loktronic offices with the benchmark battery load tester he designed and developed

fired up protection

ViTECH

LOKTRONIC's expansive product range has just become even wider with these first class **EGRESS** and **FIRE PROTECTION DEVICES** and **PROTECTIVE COVERS**.



STI-1130 Ref. 720-102
Surface mount with horn and spacer
255mm H x 183mm W x 135mm D

STI-13000-NC Ref. 720-090
Flush mount, no horn
200mm H x 135mm W x 65mm D



STI-13510-NN Ref. 720-092
Surface mount, horn and label optional
200mm H x 135mm W x 100mm D

STI-1100 Ref. 720-054
Flush mount with horn
255mm H x 183mm W x 84mm D



STI-6518 Ref. 720-060
Flush mount, no horn
170mm H x 95mm W x 49mm D

STI-13210-NG Ref. 720-094
Surface mount, horn and label optional
200mm H x 135mm W x 100mm D



All **STI 'Stoppers'** are made of tough, UV stabilised polycarbonate. Many can be supplied with or without a 105 dB horn. Other models and sizes available including weather resistant options.

STI-WRP-R-11 Ref. 720-059R

Resettable call point surface mount, DPDT. Positive activation mimics the feel of breaking glass. Visible warning flag confirms activation. Simple key to reset operating element - no broken glass. **IP 67**



STI-RP-WS-11/CN Ref. 720-052W

Resettable call point surface mount and flush, DPDT. Positive activation mimics the feel of breaking glass. Visible warning flag confirms activation. Simple key to reset operating element - no broken glass.

STI-RP-GF-11/CN Ref. 720-051G

Resettable call point surface mount and flush, DPDT. Positive activation mimics the feel of breaking glass. Visible warning flag (pictured) confirms activation. Simple key to reset operating element - no broken glass.



STI-RP-RS-02/CN Ref. 720-058

Resettable call point surface mount and flush, SPDT. Positive activation mimics the feel of breaking glass. Visible warning flag confirms activation. Simple key to reset operating element - no broken glass.

STI-6255 Ref. 720-042

Mini Theft Stopper discourages inappropriate use of equipment. Sounds a powerful 105 dB warning horn when activated. Tough, ABS construction. Reed switch activation for cabinets and display cases or unique clip activation for freestanding equipment. Does not interfere with use of protected fire fighting equipment. Compact design 85mm H x 85mm W x 25mm D.



STI-6720 Ref. 720-047

Break Glass Stopper. Keys under plexiglas. Protects emergency keys from inappropriate use. Keys remain visible. Fast, easy installation. Simple, inexpensive plexiglas. 3 year guarantee against breakage of the ABS housing within normal use.



Battery Tester Ref. 730-100

ViTech rugged steel case 5, 15 and 30 amp battery tester for fire and alarm use.



Fire Brigade Alarm: (Closed/Open) Ref. 730-201

ViTech branded Type X and Type Y models with temperature compensated pressure transducers with digital display showing pressures for defect, fire and pump start.



Anti-Interference Device

Ref. 730-400 series

ViTech AID for sprinkler valve monitoring; fits all ball valve sizes.



ViTech products are designed and produced in New Zealand.

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Today the ViTECH T51530 12V battery load tester is a flagship product for the brand. It combines 5, 15 and 30 amp testing in the one unit. Easy to use and built to handle the knocks it is ideal for anyone using 12volt sealed lead acid batteries. Simple to use, these testers give direct indication of the battery voltage during the load test. Just push the 'test' button and the test will start, release the button and the test stops. Push the 'Display Lowest Voltage' button after the test and the display will show the lowest voltage obtained during the test. These testers are reverse polarity and over voltage protected and come with a carry handle for ease of transportation. With a steel case, they are robust enough for any service vehicle or workshop. These testers are suitable for testing the full range of batteries, up to 40 a/h rating, used in security, fire, access control, emergency lighting, uninterruptable power supplies, or any area where stand-by batteries are required.

Also in the ViTECH catalogue is a range of anti-interference devices, also known as Anti Interference Gear (AIG), used as added protection in a wide variety of applications but ideal for use with fire alarms, sprinklers and other fire protection and prevention products. All ViTECH anti-interference devices are approved by the Insurance Council of New Zealand.

The range of FBAs mentioned previously offer the most up to date technology available providing additional features not found on any other manufacturers' FBAs. They combine the functions of Type X and Type Y FBAs in one package. Features include a digital display showing standing pressure, defect, fire, and pump start pressure. LEDs indicate normal state, defect, drop in pressure, rise in pressure, flow switch and activation of an anti-interference device. Any of the following will cause a fire output: drop in pressure, rise in pressure, activation of flow switch and or an anti-interference device. Evacuation alarms are triggered by either a drop or rise in pressure. A pressure drop triggers a pump start output to



start a diesel or electric fire pump, a feature unique to the ViTECH product. There are additional inputs for external defect and pump run alarm. Auxiliary relay output, strobe light output and connection of a signal generating device (SGD) for connection to the New Zealand Fire Service are also provided.

A pressure transducer now replaces pressure switches; no wandering pressure settings, no changes due to temperature changes. The transducer has built in temperature compensation.

Stopping interference with fire monitoring devices is obviously a major issue that Loktronic has aimed to address with its STI agency. Safety Technology International is a family owned and operated business headquartered in Waterford, Michigan that began thirty years ago with the invention of the Stopper Pull Station Protector. It now markets more than 1000 products throughout the world. These products help prevent false fire alarms, theft and vandalism of the things that protect us all.

Loktronic stocks a huge range mainly oriented to the fire sector but with multiple derivatives applying to different applications across access control and security markets. The 'hero' product is the Stopper II which has been helping to stop false fire alarms around the world for more than 30 years without restricting legitimate alarms. All models offer excellent protection against physical damage (both accidental and intentional) and several against severe environments both inside



and out. The Stopper II is ideal for schools, colleges, hospitals, nursing homes, stores, hotels and public buildings of almost every kind where there is a threat of false alarms. It consists of a clear, tamperproof, tough polycarbonate shield and frame, and the line also includes models with the option of a piezo horn, spacer, SPDT (Form 'C') dry relay contact and weather proofing gaskets. The Stopper II accommodates most manual call points.

When the Stopper II with horn is lifted to gain access to the protected alarm, a piercing self-contained 95 or 105 dB warning horn is activated. Immediate attention is drawn to the area and a prankster will either run or be caught. The cover is connected to the frame by a cable. When the cover is lifted, it drops off of the frame and a horn will sound (models with horn) until the cover is snapped back onto the frame or for the life of the battery.

Another fire-sector-related product the company manufactures locally and distributes is its own Loktronic-branded range of universal mounted fire door holding electromagnets. With a 10 year guarantee, these products are available in 12 and 24 volt DC and have low power consumption for lower operating temperature. One product suits floor and wall mounting and the universal armature offsets to 55 degrees to suit doors opening past 90 degrees. Wall mount extensions are available and can be cut to any length. They are designed, tested and produced in New Zealand to AS 4178.

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Integrity matters at Loktronic

The first iteration of the Loktronic name and brand goes back to 1989 when Peter Calvert formed Loktronic Industries Ltd to cater for a dearth of products in this market sector and to develop a catalogue system to source and sell from. But like many good operators he had tried a couple of other paths before arriving at his final destination.

An area of special interest for him was in the area of mechanics and engineering. It had become clear in discussions with experts and locksmiths that there was a strong move towards electronic locking solutions, particularly in large construction and commercial applications. He was the co-developer of some locking concepts that would help turn a range of technical inspirations into reality.

Loktronic are New Zealand's only manufacturer of electromagnetic locks and fire door holding

electromagnets which they back with a 10 year warranty when used indoors. As an expert supplier to the security, access control and fire safety industries, Loktronic distributes these products nationwide from its Mt Eden showroom, offices and warehousing facility. Between the four members of the highly motivated team they can boast decades of experience.

In addition to the 'two Peters', Sandi Hewlett has 26 years of service with Loktronic and manages the day to day office and accounting functions; as the daughter of the late Sid Pemberton, one of Auckland's pioneer locksmiths, she came to Loktronic with a wealth of practical knowledge. Eilish O'Brien fills the demanding technical sales and support roles and her two degrees in marketing and business management equip her well for the additional support that she gives. Together the team see their

role as supplying and supporting installation companies and systems integrators.

Their task is to help in the selection of the most appropriate products to fulfil the needs of a diverse range of clients initially at the design level but also through to commissioning and on-going after sales support. Their philosophy is never to sell anything to anybody knowing that if you gave them 100 percent of the information, they wouldn't buy the product.

"If we do not have the most suitable product in stock for a customer's needs we will do our best to obtain it for them," says Peter Calvert. "If we cannot source it we will advise them where they can obtain it. We are trade suppliers only and do not sell to the public or undertake installations; however we can arrange installation through partner companies."

As Peter Calvert will tell you, the range really is exhausting! But you can generally rest assured that whatever your problem, they will have a solution or be able to find it and have it delivered the next business day anywhere in New Zealand.

Some time ago Peter came to the realisation that the supply of these types of product had to come with the highest levels of professionalism and integrity. Loktronic's products provide security and safe access in the busiest airports and the biggest hospitals in the country along with banks, schools and other major institutions.

To this end in 2012 Loktronic applied for and gained ISO 9001:2008, the world's leading ISO management system standard. This independently audited standard has been implemented by over one million companies and organisations in over 170 countries.

The principles upon which ISO 9001:2008 are based are crucial to Loktronic and include: customer focus, leadership, involvement of people, process approach, system approach to management, continual improvement, factual approach to decision making and a mutually beneficial supplier relationship.

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Wildfire outbreaks costly to contain

The Marlborough fire is at the “upper end” and will cost close to one and a half million dollars in suppression costs

By Keith Newman

Record temperatures in the long hot summer of 2014-15 saw an end to 24-years of large rural fires trending downward with some of the most costly blazes in decades decimating bush, forest and farmland.

Fire restrictions were in place across the country in January and February with large fires damaging thousands of hectares in Huntly, Bulls, Wainuiomata and across North Canterbury and Marlborough.

John Rasmussen, the National Rural Fire Authority's manager for rural fire, says the Marlborough fire is at the “upper end” and will

cost close to one and a half million dollars in suppression costs.

Rasmussen says both the Canterbury and Marlborough fires would have been a lot worse if the fire service hadn't done such a thorough job. “What we concentrate on it's the cost of putting the fires out and the loss. In Marlborough it was around 600 hectares of mostly commercial forest lost.”

New Zealand Fire Service chief executive and national commander, Paul Baxter, said the number of large rural fires taking more than a day to extinguish or requiring assistance from outside agencies were up 50% on the 2013-2014 quarter.

Between October 2014 and January 2015 there were 130 large-scale fires, compared with 87 the previous year, and that was before the spate of blazes that kept rural and urban firefighters working overtime in both islands during February.

Along the east coast of the South Island a drought was declared and fires destroyed productive farmland and forests triggering a ‘medium scale adverse event’ with Government support offered for hard hit farmers and growers.

The South Island fires at Flock Hill in Canterbury and at Onamalutu near Blenheim were among the worst the country has seen, lasting a week or more, with ongoing monitoring for hot spots and flare ups required.

Depending on the origin of the fire, a claim can be made on the Rural Firefighting Fund (RFF) for 95% of suppression costs, less the first \$1000.

Cost of containment

The Onamalutu forest fire burned 600 hectares within a 17km perimeter and was the biggest fire to impact the region since the Boxing Day fires of 2000.

It destroyed forest and pasture lands but the combined force which included 180 rural and urban and forestry firefighters as well as NZ Police, pilots and members of the community, meant there was no loss of life or homes.

Over the 12-day period it took to bring things under control, 16 aircraft were involved along with dip trailers and heavy water tankers, bulldozers and excavators. The total suppression cost was \$1.3 million, a third of which was the cost of aircraft.

The question of who pays for the cost of containment and clean-up can be a thorny one. Depending on the origin of the fire, a claim can be made on the Rural Firefighting Fund (RFF) for 95% of suppression costs, less the first \$1000.



John Rasmussen, National Rural Fire Authority's rural fire manager



Large fires in the South Island in February overwhelmed local resources requiring national incident management teams to be deployed

That claim may be challenged if NRFA standards aren't complied with. If the outbreak occurs in a commercial forest, Government funding is unavailable and the NRFA has the ability to levy costs from forest owners under Section 46 of the Forest and Rural Fires Act.

That decision was made back in 1990 when the RFF was first established and the forestry industry opted to self-insure and look after their own fire suppression costs. "They didn't want to be part of the scheme."

Rasmussen says some forestry owners have regretted that decision and he believes more will do so in the future.

And if "a person or persons are deemed responsible for causing the fire" through negligence or any

other reason, they have to foot the bill. "It's pretty strict".

Arsonists can be made to pay if the fire is not in a commercial forest. If the culprit can't be identified then the RFF will cover it.

Protection and standards

The NRFA was formed in 1990, replacing the role of the NZ Forest Service, in protecting the rural landscape by reducing the incidence of rural wildfires and their social, economic and environmental impact.

The NZ Forest Service had sold millions of hectares of Government-owned forests to private owners in 1987 and there was a need for an independent body to coordinate and set standards across the rural fire industry and underwrite the cost of rural fires.

The NRFA is responsible for protecting 1.7 million hectares of plantation forests, 13 million hectares of indigenous forest and 10 million hectares of other rural land — in other words the majority of the country.

It has nine front line staff in the regions, providing leadership and coordinating and managing around 60 Rural Fire Authorities (RFAs) from its Wellington headquarters.

The number of RFAs has been halved in the past six years and there's a plan to get this down to around 20 by enlarging existing districts to regions with full time professional fire managers.

All up, the NRFA co-ordinates about 3000 volunteers and 100 or so people employed as full-time fire managers within different agencies, including DOC and various forestry companies.

"Fire response is only one end of the spectrum, we put a lot of effort into fire prevention, fire mitigation and...fire as a land management tool," says Rasmussen

Escalating responsibilities

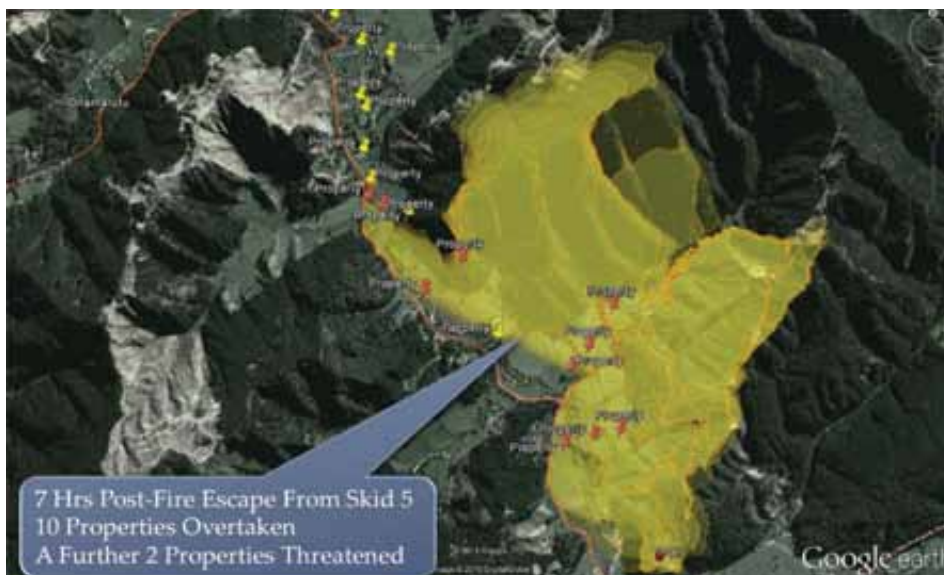
The initial response to a rural fire is often from the New Zealand Fire Service, followed up by the Rural Fire Authority which takes over if it's outside the urban fire district boundaries. New Zealand Fire Response teams and a number of outside crews are available if things escalate.

RFA principal fire officers, often working for a local authority or DOC, monitor fire danger through the national system.

Depending on the time of year and fire season status; 'open', 'restricted' or 'prohibited', they might have volunteer or part time crews on stand-by.

When large fires took hold in the South Island in February it overwhelmed, and national incident management teams were deployed to work in shifts and give the locals "a bit of a spell".

The Flock Hill Fire in Canterbury, for example, resulted in 10 crews, about 50 people being sent in from other parts of the country for about a week.



Area of Onamalutu fire which destroyed 600Ha of forest and farmland

"Fire response is only one end of the spectrum, we put a lot of effort into fire prevention, fire mitigation and... fire as a land management tool."

John Rasmussen, National Rural Fire Authority's manager for rural fire.

Territorial challenges ahead

There's some uncertainty about how proposed changes in NZ Fire Service legislation, covering search and rescue, roadside response and medical emergencies, will impact the rural fire service.

Although volunteer rural fire forces in smaller towns are community focussed; there are about 16 in the Hastings District alone, that operate under the RFAs. "They're there to protect their communities in emergencies, whether it's a rural fire, a tsunami, a motor vehicle accident or a farm accident."

Geographic locations and "territorial stuff" are being re-examined with a view to changing where some of those

responsibilities lie, says Rasmussen.

He cites Waimarama, a remote Hawke's Bay beachside community with a voluntary rural fire force.

"There's a community there and some quite expensive real estate. It may well be that the Fire Service ends up being responsible for that."

Each RFA has a fire plan written to standard criteria including water access points, response processes, suppliers for tankers and other equipment and resources.

This needs to include resources needed in a crisis such as private sector contractors for helicopters, water buckets, tankers, bulldozers, catering services..."you name it".

"Obviously the likes of the helicopter companies are trained and geared and have the right equipment for firefighting, and have a history of firefighting with rural fire authorities," says Rasmussen.

Firefighters can legally take water from rivers, lakes and even private dams if needed in an emergency.

"In Marlborough they had high sided trucks and trailers filled with water and in some areas they'll build water supplies."

Rasmussen describes the scene at Santoft Rd in the west of Manawatu where a trench was dug near a bore outlet being used by large irrigators; a temporary dam was dug and lined with bailage wrap then filled at high volume from the bore.



Performance assessment

The NRFA undertakes overall performance assessment of training, standards, weather stations, protective clothing and timely response and management of fires.

It's developing contracts and standards for firefighting with aircraft. "Currently it's up to the individual rural fire authority; some already have semi-contracts with DOC, but this will become more formalised."

Rural firefighters are trained to specific standards from basic level requirements to guidelines for higher level requirements, with planning underway for greater alignment to standards and qualifications.

There are level 5 diplomas in vegetation firefighting and a framework for training and qualification. The Assessing Fire Hazards standard for example is around mitigation and fire prevention.

This requires RFAs to identify risk and threat areas with plans to follow through and change to more effective response processes, "in high risk or high threat areas".

Rasmussen says it's a challenge to keep the training levels up, particularly when there's a high turnover of forest crews, contractors and volunteers in rural areas. "We have to keep on training the new people as they come in."

And the question arises, as a rural economy with so much land and forestry involved, are we well enough resourced to deal with increasing drought periods and the impacts of climate change?



Rural firefighters are being called to work on a growing number of larger fires and are in demand when things get out of hand across the Tasman



Emergency services swap notes on the road perimeter of the Onamalutu fire

"It's a risk management issue for each rural fire authority. We could always have more, there's no question of that, but you have to work within your means. Obviously we can't employ a whole lot more people and have the Rolls Royce of appliances

waiting on every corner in case there's a fire."

Rasmussen believes the existing approach is fairly robust and cost effective. "We coordinate and support each other, and have a process of support during escalation and it works quite well."

Reading the conditions

A raft of weather-related data is crunched daily to assist forestry and rural fire services around the country help determine the level of fire risk so they can be prepared for the worst.

A key component of the overall data set are daily readings from around 150 regional weather stations owned and monitored by Rural Fire Authorities (RFAs). This data is fed into the National Rural Fire Authority (NRFA) system each day at 1pm, to give an indication of the likely fire danger by the afternoon peak of 2.30-3pm.

The NRFA uses algorithms to convert that data into codes and indices relating to seasonal drought, fuel availability, potential fire behaviour and mop-up difficulty.

Three fuel moisture codes and three fire behaviour codes are transferred in real-time to on-line maps (www.nrfa.fire.org.nz) with breakouts for each region and individual weather station.

All this information is processed using NIWA's EcoConnect system which also gives site specific tracking of relative humidity,



A portable rural weather station

temperature, wind direction and speed, rainfall and grassland curing.

NIWA computers also crunch weather reports from around the world to forecast six days ahead, and assist with daily forecasts and fire danger reports.

If there's a focus on a specific fire, forecasts can be updated hourly by MetService meteorologists with finer detail for specific sites.

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Waterview tunnel fire safety tightly meshed with security

Keith Newman looks into the Waterview tunnel project and finds that every fire life and safety precaution is being taken including comprehensive surveillance, automated incident detection and zone-based response.

The country's largest roading undertaking, embracing twin tunnels that by-pass Auckland city, has every fire, life and safety system imaginable and required significantly greater fire engineering design and consultation than most building or infrastructure projects.

The \$1.4 billion Waterview Connection is one of six related projects that will complete the 47km Western Ring Route between Albany on the North Shore and Manukau in the south, linking the Northwestern and Southwestern motorways (SH16 & SH20).

The underground section, expected to open in early 2017, will supplant the 1.94km long Lyttelton tunnel which opened in 1964, as the longest road tunnel in the county.

Ed Claridge, senior fire, life and safety engineer for the Waterview Connection project, says tunnels are complex infrastructure and require all aspects of fire safety to be comprehensively detailed.

In the design phase every potential kind of incident and the knock-on impacts on the rest of the traffic network needs to be taken into consideration, whether that's a smouldering car fire or major incidents that can significantly damage the tunnel.

"We try to design for everything we can foresee, making sure the tunnels can cope and we can operate them to deal with fires and a whole raft of other incidences," says Claridge.

The project used internationally recognised tunnel design guidance

The greatest focus will be on minor incidents such as vehicles stopping in the tunnel, breakdowns and debris on the road that prevent traffic from flowing. "Fires are a very rare occurrence in tunnels."

Ed Claridge, senior engineer, Fire Life Safety

and involved a vast array of stakeholders, "substantially more than you would ever see on any other type of infrastructure project".

He says Australia and New Zealand lead the world in their use of a full complement of tunnel systems; and Waterview includes "pretty much every system you could put inside a tunnel" including tightly integrated automated fire and security systems.

Claridge worked with about 13 different stakeholder groups in the fire engineering design, which went through the hands of 44 different people, including Civil Defence, St John, the NZ Fire Service and all the emergency services.

The big challenges says Claridge, are major incidents such as earthquakes or tunnel collapse which are "rare but of very high consequence".



The dawn of construction of The Southern Vent Building at the entrance to the southern tunnel portals, which will house much of the emergency equipment



A multi service vehicle delivering another load of concrete segments to line the tunnels



A view inside the tunnel that will eventually carry three lanes of southbound traffic

The biggest focus will be on minor incidents such as vehicles stopping in the tunnel, breakdowns and debris on the road that prevent traffic from flowing. "Fires are a very rare occurrence in tunnels."

Ring to route them all

The alternative route to and through the city is one of the Governments Seven Roads of National Significance providing a direct link between Auckland International Airport, the CBD and points north and south.

The completed motorway with twin, three-lane tunnels is expected to bolster economic growth in Auckland and neighbouring regions and bring a collective sigh of relief to those who have struggled for decades with growing congestion, even outside of peak hours.

About 800 people are being employed across three sites, including the purpose-built pre-cast factory in East Tamaki and the disused Wiri Quarry where 800,000 cubic metres of rubble is being deposited from the excavation of the tunnels.

Tunnel operations manager Emilio Marquez says his team has to be on point with everything. "There's a saying that if there's anything you haven't done in the first five minutes of a tunnel incident then you're too late to do anything."

No chances are being taken; the total budget for fire and security and mechanical and electrical systems is around \$140 million,

including some "very substantial packages for fire and safety".

Marquez, who was operations and maintenance manager for 21 tunnels in Navarra, Spain, says there's nothing leading edge that hasn't been tested in similar tunnel's around the world. "We wouldn't want to experiment with newer things...we are relying on proven technologies that have a good track record."

He and his team have worked closely with operators of the existing tunnels, Victoria Park and Johnstone's Hill tunnels "to make sure that we get the whole operational aspect of it right."

Alliance advantages

The contract to build, manage and maintain the tunnel was awarded to the Well-Connected Alliance, a collaboration between the Transport Agency, Fletcher Construction, McConnell Dowell, Parsons Brinckerhoff, Beca Infrastructure, Tonkin & Taylor and Japanese construction company, Obayashi Corporation.

Other partners are Auckland-based Wilson Tunnelling and Spanish tunnel controls specialists SICE.

Ed Claridge says the Alliance brings together a wealth of experience from across New Zealand and internationally, including the design and construction of major tunnel operations offshore.

The Alliance, which will be maintaining and overseeing operations for the first 10 years, was seen as the most efficient way of

delivering New Zealand's biggest single roading project and achieving the best whole-of-life cost.

"If it was purely a design and construct project, you simply go for the cheapest. But if you are involved in operation and maintenance, you have that flexibility of things costing more but knowing in the long term, 10-30 years, you have newer systems that will be more efficient to run and operate," says Marquez.

The majority of systems we are installing are manufactured or made overseas, although the preference has been for suppliers or representatives who can provide local support.

Passive fire protection

Once the physical tunnels are finished, it's expected to take 12 months to complete the mechanical and electrical fit-out, including building 16 cross passages, connecting both tunnels for evacuation egress, regress and access by emergency service.

The longest distance between any two of these passages, considered a place of safety during an incident, is 150 metres.

Each cross passage separation is rated for at least two hours passive fire protection with sprayed fire protection under the ventilation buildings and the tunnel sliding egress doors. Fire suppression systems include zoned deluge systems, hydrant systems with outlets at 50m spacing and inlets at portals with onsite tank and mains connection.



Inside one of the cross passages that will connect the two tunnels at Waterview

The water supply volume is sufficient to supply the deluge system for four hours. A foam deluge system is being installed in three sumps.

Managing emissions and ensuring appropriate air quality through a complex ventilation and fan system is imperative to the operation of the tunnels. Vehicle emissions will be continually extracted through ventilation stacks at each end of the tunnel.

Claridge says getting the ventilation system right was a big task. There's a complex longitudinal system where jet fans can be used to control the movement of air and blow smoke along the tunnel in the event of an emergency.

The 62 jet fans, 32 in the northbound and 30 in the southbound tunnels and tunnel exhaust fans at each end of the tunnel, are capable of expelling 150m³ per second or 500m³ at each vent building.



Emilio Marquez, operations manager for the Waterview tunnel project

Tankers carrying petrol, toxic substances or hazardous chemicals are forbidden from using the tunnels which reduces the potential threats, although there are systems in place to deal with any kind of spill.

The tunnel drainage system has catch pits and flame traps based in each deluge zone. "Any liquids on the roadway will go into the drainage system which can then cope with hazardous goods."

Flame traps are there to mitigate, "any explosions or fire travelling through the pipes of the drainage system," which has three sumps at each portal with a catch pit and a hydrocarbon trap to catch any fluids that are lighter than water, says Claridge.

Each sump, as well as having ventilation systems to remove flammable atmospheres, has foam deluge systems in case there's a build-up of hydrocarbons in those spaces.



Ed Claridge, senior engineer, Fire Life Safety

"There's a saying that if there's anything you haven't done in the first five minutes of a tunnel incident then you're too late to do anything."

Emilio Marquez, tunnel operations manager

Instant incident awareness

While the Alliance has made considerable progress in systems procurement, from a mechanical and electrical perspective there's much to do.

Clearly the installation of cabling, sensors and smart systems can't go ahead until the tunnel is nearer completion; at that point everything will be on a dual uninterruptible power supply with special fire resistant cabling.

To make surveillance, incident detection and emergency response as effective as possible, the tunnels are broken down into 178 zones so the multiple integrated systems can respond in a targeted way.

At the heart of the emergency services is CCTV monitoring and an automatic video incident detection system (AVIDS), linear heat detection, smoke detection and deluge systems.

The AVIDS system contract was awarded to European company Citilog, which has systems installed in locations including the Lincoln and Holland tunnels in New York and the Mont-Blanc tunnel spanning France and Italy.

"This technology is in constant evolution and I've installed it in plenty of tunnels. Each time there's a new version, so it's being updated all the time," says operation's manager Marquez.

He says it's an impossible task to expect a couple of tunnel operators to be constantly looking at each camera, that's why AVIDS will send an alert within seconds, giving operators as much time as possible to react.

Video smoke detectors

As well as AVIDS activating when it observes pedestrians, stopped or reversing vehicles or those going in the wrong direction, it can also detect smoke or loss of visibility through its video-based smoke detection (VSD).

And digital eyes will be on all the time in the tunnels. There are two types of CCTV cameras; a number of point and tilt and zoom cameras that operators can use and there are about 90 fixed cameras, one every 60 metres with computerised monitoring.

Images are processed through a system that looks for everything from stopped traffic to debris on the road, smoke and anything else that might bring up alarms or warnings for the tunnel operators, "if for whatever reason they weren't seeing whatever was unfolding."

A linear heat detection system throughout both tunnels forms a back-up system for the automatic incident and smoke detection systems enabling trained operators to activate multiple zones if an incident impacts overlapping areas.

The fire alarm system for the tunnel and both ventilation buildings will be networked to a single overarching interconnected system via the Tunnel Control Centre. This is linked to the Auckland Transport Operations Centre run by both the New Zealand Transport Agency (NZTA) and Auckland Transport. Next level applications like number plate recognition are being evaluated.

"There are systems and procedures in place for tunnel operators to be communicating live in real time with the Police and the Fire Service so they can identify the location of incidents any where on the network," says Claridge.

Alarms systems are automatically connected to the NZ Fire Service and Police through the Emergency Services Communications Centre.

Driver confidence essential

Every effort has been made in the design process to ensure people can feel safe and comfortable in the

KCS TraceME expands Internet of Things era by integrating LoRa™



KCS BV, based in Dordrecht (NL) has extended their successful TraceME product line with an advanced module, targeted for worldwide mobility in the Internet of Things era.

The latest development of the TraceME GPS/GPRS Track and Trace module will combine the RF location based positioning solution with the LoRa™ technology. This combination offers 'smart objects' being even smarter, since LoRa™ enables long range, battery friendly communication in a wide variety of (M2M) applications.

Supporting GPRS/SMS and optional 3G, Wi-Fi, Bluetooth LE, ANT/ANT+ and iBeacon™ provides easy integration with existing wireless networks and mobile apps. The module will be available in Q2/2015 and other variants in the high/mid-range and budget-line will follow shortly after.

Please visit www.trace.me for more information.

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tunnels, including an awareness of the technology and equipment to deal with incidents including stand-by breakdown and emergency crew.

Claridge says fire, safety and life issues start with driver education so people know what to expect. "In Auckland, we don't have big tunnels...The majority of drivers aren't that experienced...they can feel claustrophobic... being underground (and) have different feelings and perceptions of that."

Lighting, for example, is a major operational and capital expenditure with a large safety component, designed to ensure a percentage of overhead lights remain active in an emergency along with flashing beacons and low level lights to support evacuation.

"From an evacuation perspective, we would bring the tunnel lighting up to full illuminance, and a percentage of those lights are designed specifically to continue operation for a set period of time in fire conditions," says Claridge.

Variable message signs and lane usage signs will provide messages

and guidance and there'll be a public address system, direction sounders above exit doors and, says Marquez, a radio rebroadcast system that overrides radio stations in the tunnel to announce messages.

There's no reception of normal radio in the tunnels but the proposed system will capture all stations at the tunnel portals, "so we can insert our own message and re-broadcast it", says Marquez, providing of course that you have your radio on.

Contracts have so far been let for fire detection, deluge, fire pump systems, water tanks, CCTV, process logic controller (PLC) smart software-based systems, PA systems, electrical power systems and management, IP phones and emergency telephone systems.

Contracts were yet to be let for radio rebroadcasting, tunnel lighting and dynamic signage. Marquez says fire protection installation will be done by the Alliance with tenders for some equipment and materials still out to tender at the time of publication.

Kiwis leading the way with drone-based fire research

While innovators around the world are toying with applications that could be integrated with unmanned aerial vehicles (UAVs) several projects in Christchurch are already leading the world in research and development for emergency services decision support.

Drone technology with a payload of hi-tech cameras, smart analytical software and leading edge wireless communications has the potential to revolutionise emergency services including search and rescue and rural and urban firefighting.

While innovators around the world are toying with applications that could be integrated with unmanned aerial vehicles (UAVs) several projects in Christchurch are already leading the world in research and development for emergency services decision support.

A number of field trials for search and rescue purposes have been conducted and there's a strong emphasis on proving the capabilities of UAVs to assist with surveying rural fire scenes and identifying hot spots after bush or forest fires have been extinguished.

In conjunction with the Civil Aviation Authority (CAA), dedicated airspace has been set aside at



Richard Parker,
Scion RFRG Senior Scientist

Canterbury University, where at least three departments are working on aerial applications, to test UAVs.

The University's Wireless and Spatial Engineering Research Centres (WSERC) and the NZ Fire

Canterbury University is becoming the UAV research centre for New Zealand, not only advising CAA on impending legislation but creating the right environment for global collaborative research.

WSERC director Fred Samandari

Service are working with the CAA to determine parameters for the operational use of drones, which have until recently been placed under strong flying restrictions.

WSERC director Fred Samandari says the university is quickly becoming the UAV research centre for New Zealand, not only advising CAA on impending legislation but creating the right environment for global collaborative research.

In a first for New Zealand, WSERC has been granted the first of two restricted airspaces on campus for testing UAVs. "We have not advertised the existence of this site yet, although we have been receiving enquiries both nationally and internationally," says Samandari.

WSERC has a range of applications in mind as it looks to improve multispectral imaging for use in hi-tech agriculture, rural fire control and forestry and delves into more effective wireless



Scion RFRG's hot spotter, a UAV prototype



"We definitely see the benefits to assist commanders at the scene and for situational awareness, particularly in the rural sector where you might prevent firefighters being put at risk."

NZ Fire Service operations manager, Ken Cooper

communications for public safety first responders, including next generation 5G mobile systems.

World-respected critical communications developer Tait Communications, which is also based in Christchurch, sees Canterbury University as an important part of its "research eco-system" and is working closely with WSERC, the Computer Science Department and Scion Rural Fire Research Group (RFRG) which is also on campus.

Professional platform

There's clearly a growing hobbyist and experimental community deploying UAVs for a range of moving and still photographic purposes, including real estate.

They're being deployed to help farmers track livestock, and in the US law enforcement is looking at their use in pursuing criminals, and Amazon and others are trialling GPS guided drones for parcel delivery.

What's often missing is the right mix of purpose built software and control and communications capability to deliver a practical and cost effective solution, robust enough for example for fire, life and safety situations.

NZ Fire Service national operations manager, Ken Cooper, says a drone with a camera and communications capabilities has

been purchased and is currently being used in trials in Christchurch to assess its capabilities.

"We definitely see the benefits to assist commanders at the scene and for situational awareness, particularly in the rural sector where you might prevent firefighters being put at risk."

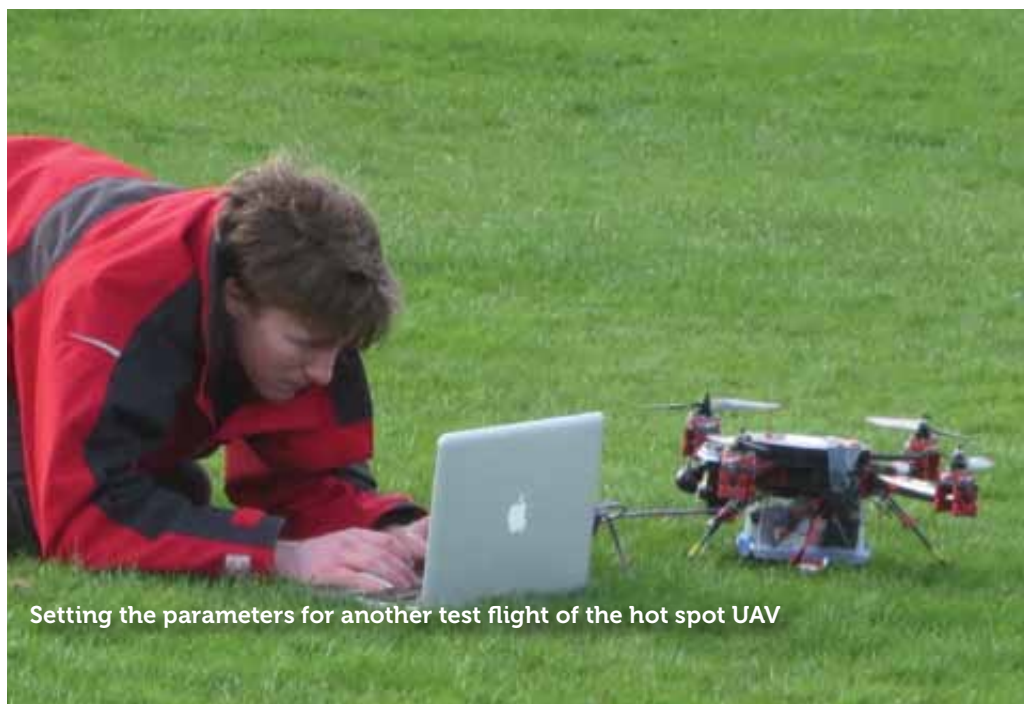
He says initial concerns about coming into conflict with helicopters at a fire scene have been worked through and a much closer working arrangement is now in place with the Civil Aviation Authority.

Previously private individuals who flew drones over fire scenes created issues. "Newer technology

which allows them to be GPS operated so you can restrict their working height and the use of a trained operator, means Civil Aviation regulations are no longer a barrier to us," says Cooper.

Deployment not imminent

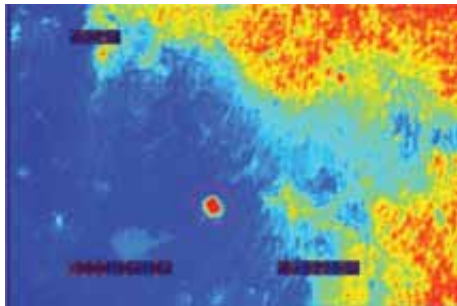
Driving the Christchurch trial is Michael Yates, a fireman working in operations, who Cooper says "is quite fanatical" about the new technology. However, he says, that shouldn't create any expectation that "we're going to bring drones into everyday operational use anytime soon."



Setting the parameters for another test flight of the hot spot UAV

The technology would be helpful in tactical support through the use of real time cameras and GPS co-ordinates to help firefighters know what they're walking into. "What's the fire doing? How is it behaving? What's the potential fuel if you fly past the fire?"

He says this data, through on board communications capability, could be used to not only inform the commander on the scene in Christchurch, but potentially share this with operations in Wellington.

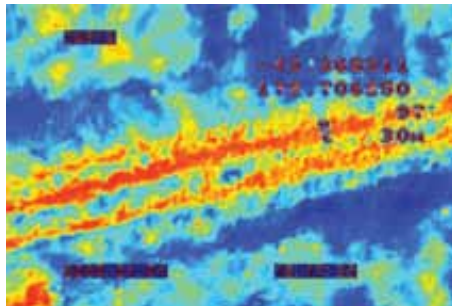


Detecting a warm water bowl at 20 metres from a drone

He also sees value in an urban situation where "time is not on your side" and quick assessment is important. "Potentially drones could help with that".

NZ Fire Service Urban Search and Rescue (USAR) national manager Grant Travers says UAVs are being looked at for future deployment as part of an ongoing review of best practice.

The 200 strong New Zealand USAR team, recently been awarded United Nations "heavy" international



Infrared image of burning fence-posts from the experimental drone

accreditation, is always looking at new technologies "as they arise" but Travers won't be drawn on specific plans.

The New Zealand Coastguard and LandSAR (Land Search and Rescue) are both working with third party developers to determine how UAVs might help with operational support and training.

Eye in the sky trial

A combined large scale North Canterbury-Marlborough search and rescue trial took place just over a year ago at Molesworth Station with seven teams working with UAVs.

Three different scenarios were explored using battery powered multi-rotor 'mini-helicopter' and larger fixed-wing 'planes' programmed with set flight paths. Search teams sent the UAVs to look for vehicles and quad bikes,

Robotic fire assistants need research incentive

An award winning robot that can swing from tree to tree with the potential to revolutionise forestry management in steep and remote areas could morph into a series of mechanical assistants to make life safer for rural firefighters.

Scion Rural Fire Research Group (RFRP), scientist Richard Parker believes with a little tweaking

the robots he's developed for the forestry sector could drag fire hoses and packs into rough and remote areas for firefighting purposes.

He suggests firefighters would save a lot of energy if there was "a tug that drags equipment around; a little machine that walks the hose down to the riverbed or can run the pumps by remote control".

His prototype radio controlled device that can move from tree to tree without touching the ground won the national Ray Meyer Medal award from the Institution of Professional Engineers New Zealand (IPENZ) in March last year.

The Tree Robot, also known as the Stick Insect has provided the knowledge and the contacts for



The 'Stick Insect' could pave the way for other technology to assist rural fire fighters



Robotics could save firefighter's energy by pulling hoses in tough terrain

delivering what was described as "impressive footage and a high level of stability and control".

LandSAR staff believe the rapidly changing technology could be a useful addition to the search and rescue tool kit.

Meanwhile Scion Rural Fire Research Group has been working with WSERC and Tait Communications for the past three years developing cheaper, lighter, infra-red camera technology with spatially aware heat detection software.

Ideally this equipment hosted on UAV platform would fly a fire perimeter, distinguish between burnt and unburned ground and transmit video, still images, data and GPS coordinates.

The UAVs can fly as high as 30 metres but the battery life is typically only 10-15 minutes and the weight of the payload, including batteries is among the issues being

worked through.

Scion RFRP is convinced the right combination of technologies has the potential to improve decision support through "general situational awareness" in rural fires.

They could also be a safer, more effective and affordable way to identify heat in organic matter and soil which can burn undetected for weeks after a main fire has been extinguished.

Mopping up hot spots

Scion RFRP researcher Richard Parker imagines using UAVs in "mopping up" hot spots situations, preferably early in the morning when there are no other aircraft about with a particular focus on smaller fires.

"You might bring in helicopters and all the expensive stuff for relatively big fires but it would be good to have a cheap UAV that

could fly a one or two hectare area."

The other alternative is to manually walk a fire zone in what is known as cold trailing, where a member of the fire crew listens for the sound of an underground fire or takes a glove off and feels around for hot spots, an often slow and laborious process.

Parker says hot spots are often in tricky places putting firefighters at risk. "The undergrowth may have been burned but you're trying to scramble through burnt broom and blackberry which seems to keep its prickles."

Getting drones to map the perimeter of a fire is proving a little more complex because river beds, dark shadows, tree trunks and patches of sand or gorse can confuse the technology.

As a fire fighter Parker can understand the eagerness for fire managers to have the technology as soon as possible but as a

developing robots that could be built for the rural fire sector.

"They might climb from tree to tree to prune or to cut down trees on very steep slopes, which is an area where there's a lot of danger involved and where there have been fatalities," says Parker.

The Stick Insect, literally modelled on the way stick insects and spider monkeys manoeuvre themselves was developed with funding support from Future Forests Research and the Ministry for Primary Industries.

He believes the idea of robotic assistants for the fire sector has the potential to succeed if further development funding can be found. "Fire is one of those things where there's no money to be made, so any new process is not going to make a fortune like a new drug."

Even growing the existing amount of collaboration between science and research groups would still require Scion RFRG to hold its end up with financial contributions. The challenge remains in convincing funders of the public good value of putting out fires.

— Keith Newman

KCS TraceME launches indoor and anti-theft location based positioning solution



KCS BV, based in Dordrecht (NL) has extended their successful TraceME product line with an intelligent location based positioning solution for indoor and anti-theft applications.

The solution is based on RF with an intelligent algorithm of measuring the propagation time of transmitted (proprietary protocol) signals. Unique features are: minimum size (46x21x6.5mm), weight (7 grams for fully equipped PCB) and a standby battery lifespan of more than 10 years.

'Listen before talk' algorithm makes it practically impossible to locate the module, which secures the valuable vehicle or asset. Supporting GPRS/SMS and optional 3G, Wi-Fi, Bluetooth LE, ANT/ANT+ and iBeacon provides easy integration with existing wireless networks and mobile apps.

Please visit www.trace.me for more information.

KCS TraceME

scientist he's aware of the need for more testing before practical deployment.

Outstanding in their field

Tait Communication, research leader Dr Clive Horn, isn't aware of anyone else in the world engaged in the kind of work Scion RFRG is doing bringing the appropriate technology together with UAVs for hot spot detection. "The guys from Scion are absolutely expert; they know everything about the hot spot problem."

While there's been a lot of talk about using UAVs for emergency services he says any application needs to be proven from a practical and business point of view.

After early discussions with Scion RFRG, Tait Communications supported and resourced several undergraduate students looking at how thermal imaging and processing could detect rural fire hot spots.

Initially Dr Horn could see UAV technology wasn't mature and there were a lot of systems and business questions. "We just started supporting this and knocking some of these problems off one at a time."

He was impressed with a UAV prototype demonstrated in one of the playing fields at Canterbury University and Tait made a further investment to assist Richard Parker at Scion and Kelvin Barnsdale at WSERC to create a more robust solution that could be put through its paces in a real world situation.

The value Tait brings to the project, says Dr Horn, is "a very mature pedigree of engineering and understanding of what's possible." While the company creates innovations all the time, "we don't just assess those for technical feasibility, it's also practicality, business viability and relevance to clients."

The next challenge will be establish the business case for either Tait Communications or its partners. Deciding the way forward will be up to Scion RFRG researcher Richard Parker and his team.

While Dr Horn is excited at the

advances made, he still considers UAV rural fire hot spotting as being in the research phase.

"The application of these sorts of platforms in the professional space is still quite young although it has great potential."

Ready for business case

Scion RFRG senior scientist Grant Pearce says the rural fire drone is already at a stage where a business case could be proven but that will require investment.

DoC, New Zealand Forest Owners Association, the Department of Defence and Local Government New Zealand are all end users of Scion's research efforts and help fund part of the programme through MBIE. "Without their support MBIE would give us nothing".

Pearce is confident drones could be a highly effective part of an incident management team; flying over fires to determine the type of fuel, the risks and value of what is ahead, saving many thousands, maybe millions of dollars.

For example helicopters cost anywhere from \$1000 to over \$3000 an hour, and spotting requires "very expensive" infra-red cameras. There's also the cost of a trained camera operator, pilot and spotter and the risk involved in flying over fires, says Pearce.

Un-manned machines only require a single person to control them and view the images; in many cases, the drone is on a controlled path.

Pearce says UAVs are already being used for situational awareness overseas. "Once we've tested it at a couple of wildfires, we'll run it in conjunction with the normal helicopter procedure for exactly the same scenario, then calibrate whether they're seeing the same things."

Another test scenario will use three different types of camera technology on the same incident "so we can see the pros and cons of the different methods".

Being able to mark hot spots so firefighters can know exactly where to deploy their efforts would be a bonus, says Pearce. "A fire like the one in Marlborough (in February)



Dr Clive Horn,
Tait Communication research leader

might have an area of 5000 hectares so how do you actually pinpoint that down to the couple of metres on the ground where the fire is?"

He says there's plenty of scope for different technologies to work together to create a more efficient way of detecting, isolating and extinguishing areas that are still burning. For example a list of GPS hotspots locations on a map could be sent to fire fighters.

Hard graft pays off

Tait research head Dr Clive Horn says a lot of hard graft has gone into getting the rural fire solution to this point, "not just technical graft but the effort of pushing an idea forward when you're not even sure if it's practical."

He says New Zealand research and development teams are often small and work on limited budgets but push through and create innovations, often in collaboration with others. Scion RFRG, he says, "is an extremely valuable collaborator".

Horn reiterates, they're world leaders in the rural fire domain. "I think it's incredibly impressive that a small group in the corner of New Zealand can actually do stuff that is respected around the world."

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