

IFF

INTERNATIONAL FIRE FIGHTER MAGAZINE

REPORTING TO MUNICIPAL, INDUSTRIAL AND FIRE TRAINING PROFESSIONALS



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Issue 47 • September 2015

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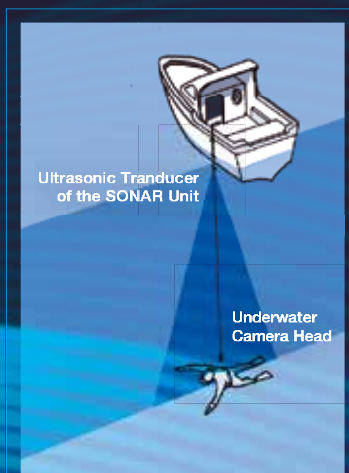
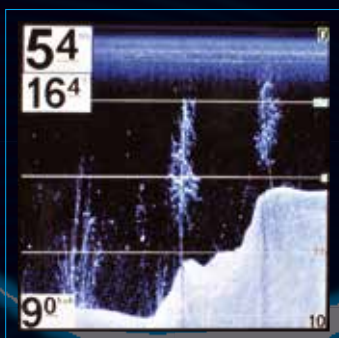
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we are at our best.

THINKING AHEAD

firefighting series



Counting the Uncountable...



Deborah Keeler

Executive Director, IAAI

Walking around the exhibition halls at several large fire service conferences this summer reminded me of how big ‘fire’ is and the number of dollars spent every year protecting lives and property from fire loss. Fire trucks and hoses, pumps and sprinkler systems, alarms and detectors...the expos showcased hundreds of companies and organizations who were there to share information on their products and services that ‘save lives and reduce loss’ to thousands of individuals from around the world. The industry has come a long way in preparing for fire and fire suppression, documenting the fires responded to, and tallying up the annual cost of fire in respect to deaths, injuries and property loss. But we still have far to go in regard to counting the value of fire safety and prevention.

There is a perceived need to devote more resources to fire prevention, but the lack of effectively measuring what ‘didn’t happen’ limits our ability to know if allocating more resources will save more lives, prevent more injuries and protect our property better. And while fire deaths, injuries and dollar loss should be the dominant criteria for evaluating fire prevention success, fire problems vary country to country and region to region. They are impacted variations such as climate, economic status, education, and demographics to name a few. Just counting the problem gets very complicated.

There is plenty of data documenting the fire problem, but little showing that prevention is successful in reducing fires. Without defining the cost-benefits of prevention, additional resources are unlikely to ever be allocated. Measuring results is important, but quantitative measurement isn’t the only way to solve a problem. A qualitative understanding of why fires happen is perhaps even more important in the realm of fire safety and prevention.

Chief J. Robert Ray writes in his whitepaper on *Fire Prevention Effectiveness: Can We Measure What Did Not Happen?* that, “Fire prevention programs are intended to reduce the fire problem proactively by attacking the root causes of fire, thereby reducing fire deaths, injuries and property loss. To measure fire prevention effectiveness, the fire service needs to distinguish between fires that were the result of preventable causes and those with causes not likely to be prevented...”

Investigating how fires start and how to prevent them from destroying property and life is a crucial science; one that’s been evolving for hundreds of years. The science of fire investigation is beneficial for many reasons beyond identifying arson and ensuring that responsible parties be

held accountable. Determining the cause of even accidental fires is the surest way of improving safety practices and practices that could benefit everyone.

An anomaly within the fire investigation industry is that fire investigation is a role for which responsibility and impact is shared by many industries: the fire service, law enforcement and insurance. Whether it’s fire safety and prevention, fire loss claims and litigation, or arson enforcement and prosecution, the fire investigator plays an important role in determining “where” and “how,” and sometimes even the “why.” It gets complicated because there are many different stakeholders involved in the process and more often than not, the first responder (the fire department) is tasked with making the initial determination. Being first on the scene of a fire loss also carries the responsibility and burden of providing the necessary resources to competently discharge that duty. A weight many departments and communities are unable to shoulder.

Our fire departments and city leadership may understand the impact of the determination of origin and cause, but everyday are forced to make difficult budgetary decisions. The arduous task of defining priorities and aligning resources to critical needs and services may even be the responsibility of someone who doesn’t fully understand the importance and role of safety and prevention. If it’s difficult to count how many fires didn’t occur, it makes sense that fire prevention and associated roles would be some of the easier items to reduce or cut from a tight budget. With the economic crises many of our towns and cities are facing, it’s not even an option.

Another factor may be the ‘it’s not my job’ mentality. Having a clear understanding of prevention and understanding that public safety isn’t limited to only putting the fire out. Seeing the big picture of all of the working parts and how everyone – all of the products and service providers – work together, helps us better understand our individual roles in fire safety and prevention and fire loss. Everyone has a part and important role.

Understanding the importance of fire investigation and determining origin and cause of a fire is a key piece of the fire safety and prevention puzzle. Without understanding where, how and why a fire started, how can it be possible to prevent a similar fire from happening again? Whether natural, unknown, accidental or incendiary, all fires need to be investigated. Working together and making continued improvements in the field of fire safety and prevention is our surest path to protecting our families and communities from one of the most destructive forces on earth...fire.



Old Style Beer Salutes Chicago Heroes with Commemorative Can

After a successful debut last fall, Old Style will salute Chicago's heroes once again with the limited-release commemorative can. Old Style is proud to support those who heroically defend this great city and their families. Proceeds from each case sold will benefit Ende, Menzer, Walsh and Quinn (EMWQ) Retirees', Widows' and Children's Assistance Fund, a local organization that provides annual financial assistance to the neediest widows and orphans of members of the Chicago Fire Department.

This is the second year of the commemorative can, after having a successful debut last fall for a limited-time only and becoming an instant collectable



Image courtesy of Old Style

for Chicagoans, Old Style enthusiasts and those who work for or honor the Chicago Fire Department. New this year, the limited run (July through early September or while supplies last) commemorative can will now be available in 24-packs, 12-packs and 16 ounce cans, with Old Style donating a minimum of \$10,000 and up to \$20,000 to the organization.

Old Style has a long and storied history with the city of Chicago. Showing its dedication to the community that has generously supported the brand throughout the years, Old Style launched the Chicago Heroes program to pay tribute to the hard-working men and women who keep Chicago safe and protected every day. The commemorative can, adorned with an image of a firefighter and details about the organization, is available at retailers throughout Chicagoland.

"When we launched the Chicago Heroes program last year, it was a unique way for us to pay tribute to the everyday heroes who don't get thanked enough for all of their courageous work," said Dan McHugh, CMO for Pabst Brewing Co. "We selected EMWQ Assistance Fund as our partner for this initiative because we've been so impressed with their work and the tremendous support they

provide to Chicago firefighters and their families. The funds raised from last year's commemorative can made a significant impact on those who received donations, and it's such an honor that we can do something truly meaningful. We look forward to re-launching the can, and once again seeing Chicagoans embrace it and the cause."

The final donation from last year's limited run went on to assist several Chicagoland families, helping those who received contributions put money toward their children's education, pay off outstanding bills, and in general continue to be able to afford day-to-day necessities. This year, Old Style hopes to help even more families with the program expanding to the 12- and 24-pack Old Style 12 oz. cases.

"We are very grateful to Old Style for their salute to men and women of the Chicago Fire Department," said Lt. Anthony Martin, President of the EMWQ Fund. "On behalf of the families we serve, I'd like to thank Old Style for its continued generosity, reminding our widows and children that the community remembers and honors the service of their loved ones."



For more information, go to
www.widowsandchildren.org

Leader Develop the BATfan

LEADER continues to be a major player in the PPV world having recently developed the BATfan. The BATfan is powerful and light weight for completely self-contained operation which allows fast implementation and maximum flexibility during response, while requiring little storage space.

There are two versions available; BATfan with a 20-minute runtime weighing 23.5 kg and BATfan 45-minute weighing 27.5 kg. Both models can also run on mains electricity if required.

The BATfan is both compact and mobile, it folds up and stows easily in the trunk of a vehicle. Two BATfans can fit in the space of one conventional fan! It is quicker to set up than conventional fans as there is no time wasted searching for a power socket!

BATfan is multi-functional equipment for PPV attack, PPV combined ventilation, etc.



For more information, go to
www.leader-group.eu



Image courtesy of Leader Group



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The New Carmichael Cobra 3 Airport Firefighting and Rescue Vehicle

The United Kingdom's most diverse manufacturer of firefighting and rescue vehicles Amdac Carmichael Limited was established from humble beginnings in Worcester (UK) in 1849. In 1947 it supplied its first fire-engine and under the leadership of various international companies Carmichael has established itself as a major force in the manufacture,

supply and support of firefighting and crash rescue vehicles world-wide. Today the company continues to boast worldwide sales with its core fire-engine design, research and manufacturing facilities remaining in the City of Worcester UK.

Carmichael supplied their first major airport crash tender in 1962 and they have been at the forefront of ARFF vehicle

design for over 50 years. For 30 years it used Jet Ranger as its ARFF vehicle brand but In 1992 it dropped the name with the introduction of a new range of airport firefighting vehicles each with a separate trading name: the 4x4 Condor, the 6x6 Cobra and the 8x8 Cougar.

Carmichael first introduced the prototype Cobra airport rescue and firefighting vehicle in 1992. Built exclusively on a Unipower RE6P 6x6 airfield firefighting vehicle chassis the prototype delivered to Glasgow Airport featured a unique Carmichael crew cab manufactured in steel which was superseded by a clean flowing purpose built crew safety cab design with wide opening doors; a modular steel and GRP top deck hamper, easy engine access and integrated high level emergency warning lights. The Cobra airport rescue and firefighting vehicle saw success in the UK, North Africa and the Middle East.

Building on the success of the Cobra 6x6 concept, in 1998 Carmichael launched the Cobra 2 which was available in 4x4, 6x6 and 8x8 configurations. The Cobra 2 introduced a new standard in crash tender design with its large crew safety cab, wide opening doors, low step entry, flat floor and multiple seating options. The Cobra 2 offered a variety of base chassis options which included the low profile Carmichael Cobra C2 chassis; plus a vast array of chassis options to meet individual customer specific requirements. The custom built Cobra C2 chassis available in 4x4, 6x6 and 8x8 configuration permitted individually tailored tenders with wide bodied options, extended wheel bases and a twin engines. It comes as no surprise to learn that the Cobra 2 went on to establish itself as one of the most successful airport crash tender designs of the 21st century with deliveries to date exceeding 120 units to customers as widespread as China, Kazakhstan and the Caribbean.

Carmichael chose the prestigious Interschutz 2015 international trade fair for fire prevention, protection, rescue and safety in Hannover Germany to show-

▼ The new Amdac Carmichael Cobra 3 featuring the new Carmichael Jetranger high reach extendable turret seen here in the high attack position.



Image courtesy of Gary Parkinson



Images courtesy of Gary Parkinson

▲ The stunning clean lines of the prototype Amdac Carmichael Cobra 3 (above) and in the 'attack' position (right).

case their stunning all new aerodynamic Cobra 3 major aerodrome firefighting and crash rescue vehicle. This prototype of the third generation of the Cobra ARFF vehicle has recently completed an extensive period of proof testing in the United Kingdom and is now being marketed in 4x4, 6x6 and 8x8 configuration. This stunning example of British fire-engineering is based on an all new purpose built Carmichael 6x6 low profile chassis, incorporating a Volvo Penta Euro 5 diesel engine, Twin Disc automatic transmission and ABS disc brakes. The Cobra 3 features this stunning and extremely spacious air-conditioned crew safety cab design approved to UNECE R29 standard. It has an unrestricted interior, flat floor and a light and airy interior. The large hinged crew cab doors and pneumatically operated steps permit easy crew access with various seating configurations for a driver and up to 5 crew plus sliding roof hatch access to the top deck. The British built top-hamper manufactured in polypropylene with GRP profiles has integral tanks carrying up to 12,000 litres of water and 1,700 litres of foam. The Cobra 3 can accommodate up to four spacious and useable lockers per



side in a variety of layouts enclosed via a combination of either roller shutters, hinged or pantograph locker doors plus fixed or demountable dry chemical powder systems. The 3 continues to boasts easy engine access, an important feature for scheduled maintenance. The prototype illustrated has a GVW of 36,000 kg and acceleration of 0-80 kph within 30 seconds. The new 3 comes with a long list of chassis and fire engineering options including wide bodied, short width, extended wheel base and twin engine – to meet all customer requirements.

Another first for Carmichael at

Interschutz 2015 was the launch of the British designed and manufactured High Reach Extendable Turret (HRET) as fitted to the prototype Cobra 3. The Jet Ranger resurrects a brand name formerly used by the company for all its major airport fire tender products. The Jet Ranger has a working height of 15.24 metres, reach of 11.40 metres and a monitor capable of delivering 6,000 lpm in the stowed position and 3,785 litres per minute deployed. A 20 metre option is also available.



For more information, go to
www.amdac-carmichael.com

PATeye Technology from Solarbright helps Combat Black Ice Danger

As if their job wasn't dangerous enough, during the winter months many firefighters around the world have to contend with the dangers of black ice at their own station-houses BEFORE answering emergency calls.

Areas of black ice can pose a real danger to firefighting crews as they rush to respond, especially on cold, dark winter nights. In an effort to help minimise this risk to their firefighters the New Zealand Fire Service have been installing a unique and innovative ice warning device at a number of their sites throughout the country's South Island.

The New Zealand Fire Services' interest in the product came as a result of a donation of several ice-detecting pavement markers made to a local station by the device's manufacturer, SolarBright Limited, after a member of their staff had to call on emergency services late one night. Following an off the cuff remark by a first responder, and a couple of in-house "water-cooler" meetings, the SolarBright team decided that the company would offer to donate

and install their award-winning PATeye at the ice-prone station as a small token of appreciation and as a way of helping the community-based fire crews avoid slips and falls caused by black ice.

The PATeye is a self-contained solar-powered reflective marker and warning system that is triggered when ground temperature and moisture levels indicate the very high likelihood of ice formation, illuminating the road/pavement and drawing attention to hidden patches of 'black ice'. Once triggered the onboard LEDs flash blue and provide an active, real-time warning alerting to the high probability of surface ice.

PATeye is ideal for walkways, steps, paving areas, car parks and general access areas in and around any premises, wherever ice may be present. In addition to providing an active warning to personnel on foot, the flashing PATeye also serves as an indication of the road conditions that drivers are likely to find on the roads leaving the station thereby further enhancing the safety of both fire crews and the public.

The initial install was soon followed by several enquiries and orders from individual regional stations and it wasn't long before Solarbright were approached by the New Zealand Fire Service (NZFS) with a view to rolling out the PATeye across all their ice-affected properties.

As a result of these conversations NZFS are now starting an installation programme which, beginning with their 24

hour-manned "Career Stations" in and around Canterbury, will ultimately see the deployment of the award-winning PATeye at all South Island NZFS facilities which are prone to the formation of black ice.

Commenting on the NZFS adoption of the PATeye as a health and safety tool at their stations Nicola Martin, SolarBright's MD said "It's fantastic for us to be able to work with and help the NZFS in protecting their crews from the hazards of black ice at their stations, after all, their work is dangerous and difficult enough on a bright sunny day let alone in the middle of a cold winter's night. It's also nice to see that the idea of "paying forward" to the brave men and women of our local emergency services has had such a great, and unexpected, outcome for our business".

The PATeye is proving to be a valuable Health and Safety asset across all sectors of the emergency services in New Zealand and is now used, not only by the Fire Service, but also by the New Zealand Police Service and the New Zealand Defence Force to help protect their personnel, visitors and contractors from the risks of slips, falls and personal injury caused by ice at their facilities.

The PATeye is manufactured and patented world-wide by Solarbright Limited.

 For more information, go to www.solarbright.co.nz



Image courtesy of SolarBright Limited

UK First for Blackpool Airport

Blackpool Airport Fire Service has received the first Iturri Group Isuzu D-Max 4x4 Civil Aviation Authority Cat 2 rapid intervention vehicle supplied within the United Kingdom.

This clean flowing light airport fire tender features:

- 2.5 litre diesel engine,
- Two man King Cab with rear half doors accessing additional stowage space;

- A one piece Ecopolyfire polypropylene body with a three locker configuration
- 700 litre integrated water tank;
- 42 litre integrated foam tank;
- Rear mounted Hale HPX100B18 pump.

The body has ample shelved stowage space and an upgraded rear suspension approved by Isuzu UK. An identical Isuzu D-Max 4x4/Iturri RIV is also operational at Lee-on-Solent Airport in Hampshire.



Image courtesy of Nigel Crosswell - Iturri

 For more information, go to www.iturri.com

Sishen Mine's one-of-a-kind Firefighting Vehicle

Following an extensive planning and execution period Cobra Petro Projects of Johannesburg in South Africa have delivered this 'one-of-a-kind' mine firefighting vehicle to Kumba Iron Ore's Sishen Mine in the Western Cape.

This state of the art firefighting and aerial rescue vehicle was specifically designed for the mining industry by a working group consisting of Sishen Iron Ore, Barloworld; Cobra Petro Projects; Fire Raiders (Pty) Limited and Bronto Skylift Oy Ab – under the project leadership of Scharika Ludk (photographed).



Image courtesy of Cobra Petro Projects

This unique firefighting vehicle is based on a Caterpillar 740 Articulated Dump Truck chassis (CAT 740 ADT) which is ideally suited for the rugged environment in which it will operate. This 6x6 chassis features a CAT C15 ACERT 361kw diesel engine, a 7 speed manual gearbox and a cab for a driver and one crew member. The specially shaped body with its integrated water tank carries 23,000 litres of water and is recessed to permit the 28 metre Bronto Skylift F28 ALR aerial ladder platform to snugly stow between.

The fire truck also features a front mounted bump-bar and electric winch, two generous equipment lockers, a rear mounted 5kVA generator, two stabilisation jacks per side, AFFF foam induction plus three firefighting monitors which can be operated by remote control.

➔ For more information, go to www.cobraprojects.com

FireStorm for Melbourne

Melbourne Fire Brigade (MFB), Australia has recently taken delivery of their new FireStorm 40 from MetalCraft Marine (MCM). MFB has unveiled the newest member of its marine fleet – Fireboat 2 – a world-class, firefighting vessel that will protect Melbourne's waterways and marinas.

Measuring 12 metres long, the water-jet powered craft, christened Prometheus, was purpose-built in Canada and can travel at speeds in excess of 34 knots.

With an innovative style MCM creates one of the World's fastest and highest pumping fire/rescue boats. Essentially the boat is equipped to fight ship board fires, as well as used as a fire hydrant (non-stop water supply) for shore based fires. The boat is also equipped with EMS stations along with equipment for dive recovery operations.

Model: FireStorm 40
Hull Number: 597
Displacement: 35,600lbs
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Fire Pump: (2) Darley 1750gpm
Engines: (2) Cummins 11L@610hp

➔ For more information, go to www.metalcraftmarine.com



Image courtesy of MetalCraft Marine



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The BADAXX

Innovation Ensures the Advancement of Fire and Rescue Service

It seems almost every aspect of this industry has kept pace with changing technology, from breathing apparatus and bunker gear, to communication equipment and incident management systems. But what about the most common tools we depend on? Firefighters have used the same traditional axe design for over 150 years. It is time for a new tradition!

The BADAXX was created by Scott McCann, a Fire Lieutenant with the Spokane Fire Department for the past 23 years. McCann saw the need to lighten his load by combining multiple tools into one. "I had been contemplating redesigning the fire axe for a few years," said McCann, "I have always struggled with which hand tool to take to the roof with me in emergency situations. I liked the pick head axe to provide an extra foothold but the blade has a tendency to become pinched when set into building materials. For years, we have taught

▼ Beautiful machined finish with seven color options.

firefighters to use the back side of a flat head axe to eliminate the struggle of a pinched blade. There had to be a way to incorporate both the pick and the blunt face into a single axe head. Once my department purchased the bailout kits, I decided it was time to design something that had all of these features and included a solid bailout anchor point in case I needed to rappel to safety."

Like most good ideas, it took a significant amount of capital to get the BADAXX from a concept to production. McCann turned to "crowd funding" via kickstarter.com and raised 150% of the necessary funding needed to begin production. Many other first responders rallied behind McCann's idea as they too saw a need for innovation to help take their equipment to the next level.

Like most fire axes on the market today, the BADAXX weighs 8 Lbs. but the similarities end there. The head is designed with a pick on one end and the blunt face on the other. The pick is designed to provide a good solid set and not wobble loose like other pick head axes. Set at an angle,



Images courtesy of BADAXX

▲ Marries tight to a halligan style bar, fits up to a 3" adz blade.

the pick can also be used for lifting and prying. On the other side is a flat surface for striking, making it an ideal tool for forcible entry when paired with a halligan style bar. The rectangular hole in the side of the head receives the adz blade of a halligan style bar, allowing the handles to mate closer than any other tool currently on the market. The striking surface is flanked by two beveled edges that aid in "chopping" while preventing the blade from becoming pinched. Other features include a notch for gas line shut off and knurling on the top of the axe head to increase traction when used as a foothold and to prevent the tool from slipping when forcing doors. The beard of the BADAXX head is made to create a rock solid bailout anchor for rappelling.

The handle is precision machined from aerospace-grade billet aluminum, and is both beautiful and functional. The ergonomic design makes for a well-balanced and easily manipulated tool. Incorporated features include; two styles of hydrant wrenches, a notch to receive the optional carrying strap, and a rope/hook attachment point at the end. The BADAXX is also offered in a number of custom anodized colors.

We look forward to seeing the BADAXX perform and believe this is one tool that will stand the test of time.



➔ For more information, go to www.thebadaxx.com



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EN16471:2012*, EN16473:2012*, EN397:2012, ANSI Z89.1:2014

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FlareAlert Introduces Emergency Beacon

Designed for professional firefighters, law enforcement, and military, as well as personal emergency use. Unlike incendiary strike flares, FlareAlert LED Beacons are personally and environmentally safe to use. No more risk of inhaling toxic fumes, starting brush fires, igniting spilled fuel/oil, or burning equipment or yourself.

FlareAlert's Large Bag Public Safety Emergency Kit comes with either 4, 6 or 8 beacons in the colors of your choice, 8 Cone Adaptors (for beacon placement atop traffic cones), 8 Weighted Bases (anchors beacon in high winds or helicopter landing), and 32 AA batteries. Additionally, the Cone Adaptor and Weighted Base can be threaded together to make a Ground Stand. The large storage bag pockets keep your

Beacons and accessories separated, keeping your kit organized.

The Small Bag Roadside Kit is FlareAlert's more basic roadside kit. The kit bag is designed to hold 3 Beacon/Beacon Pros and 12 AA batteries. The Small Storage Bag contains 3 separate pockets that neatly hold the lights securely in place.

The FlareAlert LED Beacon Flare Kits are the perfect size for every public safety vehicle's trunk, motorcycle patrol or personal use. The FlareAlert is lightweight and compact leaving your trunk more space for additional important equipment.

FlareAlert's Beacon and Beacon Pro contain 2 modes: flash and steady. These modes can be controlled by a small power button located on top of the light. These LED road flares are very tough and durable. They can withstand the weight of a 20,000 lbs. vehicle! With the Beacon and Beacon Pro's rounded edges and low profile, a vehicle running over the light will not be a problem. Each Beacon has a magnetic base, making it easy to securely mount to a vehicle, metal object, or the included ground stand for increased visibility. The 4 rubber feet on the Beacon prevent vehicle scratching.

FlareAlert's LED road flares have a few



Images courtesy of FlareAlert

lens color options. The standard Beacon has two (2) color options: Red (Red Beacon-RB.2) and Yellow (Yellow Beacon-YB.2). The brighter version, or the Beacon Pro, has 5 color options available: Red (Red Beacon Pro-RBP.2), Yellow (Yellow Beacon Pro-YBP.2), Blue (Blue Beacon Pro-BBP.2), Green (Green Beacon Pro-GBP.2), and White (White Beacon Pro-WBP.2). FlareAlert's various lens options allow the user to have the appropriate colored flare depending on the situation at hand.

Simply twist open to install/change batteries and twist to close. Just put it down and turn it on. No tools necessary.

 For more information, go to www.flarealert.com



Technology Update: Drones

Unmanned Aerial Vehicles are becoming increasingly popular for a range of industries, with everyone from construction to agriculture wrestling to get their hands on the technology. However, with UAVs yet to fully make the transition into the fire service, does the technology have a future within the sector?

The benefits of using UAVs within the fire service are becoming increasingly evident. UAVs add vital intelligence to situational awareness of incidents, serving as both a safety and a communication tool. Quick and easy to deploy, able to assess large areas in a very short period of time and relay real-time footage, UAVs can provide critical information to the team on the ground and facilitate an assessment of the entire incident area. UAVs can thus play a key role in determining the course

of action taken and improve the safety of personnel by enabling potential hazard identification before they enter a site. The array of sensors that can be fitted to UAV platforms, including visible light and infrared, mean that the technology can also aid informed decision making for a range of incidents such as forest and wildfires, search and rescue, chemical spills and large-scale industrial fires. Aside from initially assessing a site upon arrival, UAVs can also be used to monitor live progress of an incident as it develops, enabling continual assessment of fire movement, alerting personnel when conditions change and aiding evacuation decisions.

With UAVs designed specifically for the fire service coming onto the market the technology is certainly one to watch over the coming year. For more information

about utilizing UAVs within the fire service visit SkyTech 2016, a UAV conference and exhibition showcasing the latest innovations and applications in drone technology, taking place 27th and 28th January 2016.

 For more information, go to www.skytechevent.com



Image courtesy of SkyTech

Hammond Drysuits supply to UK Fire Services

Hammond Drysuits has supplied further SR140R drysuits to the Fire and Rescue Services in the UK.

The SR140R drysuit is part of the commercial search and rescue range from Hammond Drysuits. The fire services use the suits for water safety call outs. The wearers can be in the water for prolonged periods of time and the suits keep them warm and dry, which can help maintain their focus and concentration. For this reason, the suit itself is robust and hard-wearing and designed to stand up to extreme varying situations faced by the fire services on a daily basis.

Made of durable Nylon N140, all the seams are single stitched and hand tapered for a longer lasting watertight seam. The seat, knee and shin areas include a double layer of material aiding longevity in these sections that are prone to more abrasion than others.

All suits are made to order with the option, like the fire services, of having the suit made to measure rather than a standard size. In addition to achieving the ultimate in comfort and protection, the made to measure suit comes with optional extras such as neoprene seals, braces, and Bekina® safety boots.

The fire and rescue services opted for a rear zip, which goes just across the shoulder blades, this allows greater manoeuvrability and does not cause any discomfort across the chest area or restrict movement when potentially in tight search and rescue situations.

"We supply our suits for a number of different purposes and uses. Suits such as these for the fire services are particularly bespoke as comfort and performance are vitally important." Commented Chris Hammond, Managing Director at Hammond Drysuits. "We have a good relationship with a number of different regions within the services and we are delighted they are happy with our product and service and that they continue to use us."

In addition to providing the new bespoke suits for the service, Hammond Drysuits carry out repair work as and when required to make sure the suits maintain their robustness and remain watertight for when they are next required.



Image courtesy of Hammond Drysuits



The Smart Choice for PPE



Vimpex's Gloves, Helmets, Boots and PPE accessories provide high quality products to Fire & Rescue, Police and Ambulance users. All products are tested and approved to the most recent EN norms and can be trusted by users to keep them safe from harm whilst they carry out their difficult and often dangerous tasks.

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VIMPEX

Advancing Rescue Technology

See us at the Emergency Services Show - Stand C6



For more information, go to

www.hammond-drysuits.co.uk/search-rescue-dry-suits.html

Krusepak

Innovative and Proactive in Increasing Firefighter Safety

The fire service has always prided itself on attempting to be proactive versus reactive. So many issues are still being evaluated and trained on that sometimes it seems impossible to remember everything. One of the areas that we must continue to be proactive in the fire service is staging equipment for the prolonged incident. That is why the KrusePak was created.

The KrusePak is an innovative, patent pending piece of firefighting equipment, or essentially a transport sling, for SCBA air tanks and various small tools used in the fire service. Although it was originally created to assist specifically in high rise fires, the Krusepak has expanded its usage to residential, commercial, rural and industrial fires, extrication, water rescue, technical rescue, haz-mat and various other emergency operations. The Krusepak allows each firefighter the ability to carry two spare SCBA bottles and other various small tools completely hands free.

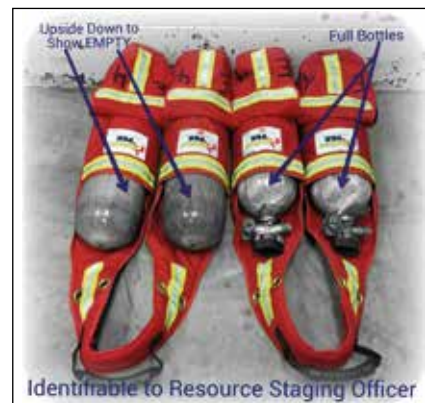
Depending on each individual's strength, comfort and/or preference, it may be carried several ways – hung over your air pack, on your shoulder, or cross-body to distribute weight most evenly. All methods offer hands-free movement for easy spare bottle transport and increased safety for the firefighter. The KrusePak is highly durable, water resistant and boasts a handle, padded strap, grommets to attach various tools by use of carabineers and two pockets for small rescue tools such as



▲ The KrusePak can be utilized in multiple operations on the fire ground including Rescue/Extrication operations when utilizing air bags or an air chisel.

wedges, wire cutters, window punches, etc. Additionally, the KrusePak allows for easy identification of “full” bottles vs “empty” bottles while at the fire scenes resource/staging areas and also identifies each department/companies bottles in a mutual aid situation.

High rise incidents are probably one of the most complex incidents we will face in the fire service. Carrying spare equipment to upper floors has always been a challenge. Placing two SCBA bottles in your KrusePak and carrying those bottles hands free will allow yourself to use the handrails if necessary when ascending the stairwell. Also, preloading your KrusePak pockets with chocks, spanner wrenches, sprinkler tongs or any other hand tools



▲ The KrusePak is also useful to clearly identify full vs empty bottles. Flipping bottles upside down will easily identify depletion of your resources.

will make you more proactive if the need for those tools should arise.

Although the KrusePak was initially designed to carry spare bottles to replace the ones we utilize in our air packs, the KrusePak can also be utilized in incidents using air bags or air chisels. Carrying the bottles for these tools will also keep the bottles confined so they won't roll around and also allows for quick deployment when the incident you may be using these tools are off the roadway and a distance from your apparatus. Again utilizing the grommets, and carrying your spare hose and regulator for your air bags or chisel will allow you to carry everything you need for this incident in one complete pack.

Haz-mat, technical rescue, rural fires, commercial/industrial fires and even residential house fires are all incidents where your apparatus can't always be parked next to the incident. Hauling spare equipment to your incident, specifically spare SCBA bottles, is not easy and is sometimes not even being done. Utilizing the KrusePak will make your department more proactive by hauling your necessary equipment closer to the incident and staging that equipment ready for deployment or replenishment.



For more information, go to www.krusepak.com

Where **collaboration** meets **innovation**



THE EMERGENCY SERVICES SHOW

NEC | BIRMINGHAM | 23-24 SEPTEMBER 2015

A unique event for anyone who works in the emergency services

Come along to the Show on 23rd and 24th September at the NEC, Birmingham to:

- See and handle the latest equipment, kit, vehicles and technology
- Receive training in the latest rescue and lifesaving techniques
- Network with other blue light services and rescue organisations
- Gain a deeper understanding of the support available from voluntary sector partners

Free seminars include

- The WMFS R&D Team discuss 'Bluelighthinking' and the future for multi-agency interoperable firefighters
- Peter O'Reilly, Greater Manchester FRS discusses the Community Risk Intervention Team
- Operational teams will present an overview of the multi-agency response to the Alton Towers incident
- Matt Wroughton and his team from WMFS talk about the use of drones in response incidents and body worn video use
- Lincolnshire FRS, EMAS and LIVES present their experiences of the Joint Ambulance Conveyance Project – Fire Ambulances – Is now the time?

Register for free entry today at www.emergencyuk.com

IF YOU HELP OTHERS IN AN EMERGENCY YOU SHOULD BE AT THE EMERGENCY SERVICES SHOW

Thanks to our Show supporters



Future of Fire & Rescue Showcased at the Emergency Services Show

See the latest firefighting technology and hear examples of successful multi-agency working from the UK's most forward-thinking fire and rescue services by visiting The Emergency Services Show this year. Taking place at the NEC in Birmingham, UK on 23rd and 24th September, this free event is open to all ranks throughout the fire and rescue service and industrial brigades, including overseas visitors.

Source New and Innovative Equipment

Featuring over 400 companies and organisations, the impressive indoor and outdoor exhibition is a one-stop shop for sourcing all the latest services and equipment required for fighting fires and keep the public safe from threats such as floods, road traffic accidents and terrorist attacks. Exhibiting companies include leading names in firefighting equipment, search and rescue, extrication, communications, IT, protective clothing and uniforms, outsourcing, training, community safety, station facilities, and water rescue.

Visitors with an interest in vehicles will find leading names such as Rosenbauer and Volvo Trucks, as well as Incident Command Units and welfare units, all types of in and on-vehicle ancillary equipment, including communications and IT, from providers like Primetech and Excelerate Technology. Exhibiting for the first time is NLG Wholesale, Europe's leading supplier of 4 X 4 accessories.

Other new exhibitors include Halo Thermal Imaging, International Safety Products and respiratory experts Sundström Safety.

Drones and Body Worn Video on the Agenda

This year's event will feature three seminar programmes covering training, innovation and collaboration. In the Innovation Theatre delegates can hear how West Midlands Fire Service has employed technological advancements such as Unmanned Aerial Vehicles (drones) and body worn video, and members of its team will lead a panel discussion on the future of multi-agency emergency response. Ben Clark, Inspector, Metropolitan Police Service will also talk about body worn video and discuss the implications for partner agencies.

Focus on Vital Role of Voluntary Sector

In an era of austerity cuts there has never been more reason to increase the dialogue and co-operation between the emergency services and the voluntary sector. British charity SARAIID for example has an international search and rescue team, which was deployed to the Nepal Earthquake this year. It will be exhibiting in the Emergency Response Zone alongside 80 other organisations which could support you in preparing for and responding to future incidents.

Update Your Skills

The Royal Life Saving Society will be holding a Throwline Challenge and a team of specialist firefighters will be demonstrating Safe Working at Height and rope rescue techniques on the Crofton Engineering training tower and confined space cage. Visitors can also speak to companies such as Serco about the international fire training courses they offer and Rescue 3 Europe training provider, Cardiff International White Water, about its Swift Water and Flood First Responder courses.

PPE: New Launches

Many protective clothing manufacturers and suppliers are launching new products at The Emergency Services Show.

Bollé Safety will be launching the new Backdraft heat resistant goggle while on show for the first time on the Vimpex stand will be the new F10 MKV and F15 firefighting helmets. Bennett Safetywear Ltd will launch the latest additions to its well-known Blazemaster range of structural firefighting gloves. MAGNUM will show the new Vulcan Pro fireboot, which weighs in at around 1kg per boot, whilst Skellerup Footwear will also display its range of rubber fire boots including the Firefighter Extreme. Ilasco with Keela will launch two new clothing ranges; the FR Range and the Water Rescue range, and UK-based Technical Absorbents Ltd (TAL) will officially launch its K-Sorb™ fabric. Meanwhile Bristol Uniforms will display new products including the company's layered PPE solution, LayerFlex™. Exhibiting at The Emergency Services show for the first time is Visijax which specialises in embedding washable electronics (LEDs, sensors, cameras and communications equipment) into clothing.

Getting There

The NEC is next to Birmingham International Station and Birmingham Airport and directly accessible from the UK motorway network. Entry and parking at The Emergency Services Show are free.



**For more information, go to
www.emergencyuk.com**



Image courtesy of the Emergency Services Show

PBI Performance Products

 Stand L5

PBI Performance Products protect thousands of firefighters around the world in Europe, Scandinavia, Australasia, USA and UK. They place their trust in PBI fabrics to deliver the necessary high performance that keeps them safe.

PBI fabrics are internationally renowned for their exceptional flame resistance and thermal protection from radiant heat, built on a 30-year heritage of technical excellence and innovation.

PBI will demonstrate the full range of its protective fabrics at Emergency Services Show this

year, including PBI Gold, PBI Matrix, PBI Max, Gemini XTL and Titan 1260.

The company's specialist 'next to skin' fabrics will also be on display. PBI TriGuard fabric delivers excellent protection against heat, flash fire and arc flash. PBI BaseGuard is a flame resistant, no melt, no drip economical moisture wicking base layer.

All PBI fabrics are lightweight and strong and achieve a high standard of flame resistance. They will not become brittle, shrink or break open when

exposed to flame and high temperatures. This also means that the integrity of the internal layers of the garment is protected and the transfer of any radiant heat is slower, allowing more time for firefighters to escape to safety in a situation such as a flashover.

The variety and flexibility of the PBI range is testament to their ability to create strong partnerships that result in products that meet the different needs of the end user.

 www.pbiproducs.com



Delta Fire

 Stand E38

Delta Fire, is delighted to announce their attendance at this year's Emergency Services Show. Coinciding with their 25 year anniversary Delta will be celebrating a quarter of a century in the fire industry.



Delta are proud to fly the flag for British Manufacturers and will be showcasing their highly acclaimed range of cutting-edge firefighting products now widely distributed across six continents.

Already the main provider of fire nozzles to professional firefighters in the UK, Delta's exemplary reputation in this field is well known. The Attack 100, 500 and 750 series of mainline nozzles represents state-of-the-art nozzle design incorporating computer aided design technology with high quality UK manufacturing.

The H500ST is now in service with many UK Fire & Rescue Services making it the number one hose reel nozzle in this sector. Combining automatic pressure and flow controls, through a hydro-dynamically assisted slide valve, provides for a low maintenance, high performance branch tried and tested in front line service over many years. Both Delta's mainline and hose reel nozzle ranges incorporate stainless steel spinning turbine teeth producing uniform, dense spray patterns with optimum droplet

size for efficient heat absorption. Delta will also be presenting their Specialist range of nozzles including the new Floor Below Nozzle, CAF branch, Shockless Nozzle, Smooth Bore and High Rise Nozzles plus an insight into the 'Generation 2' range of Fire Nozzles on the horizon at Delta in the near future. Delta will also be showcasing their highly acclaimed Fog Spike System, now adopted by a growing number of UK FRS as a staple in dealing with compartment fires.

 www.deltafire.co.uk

Ballyclare

 Stand J11

Visitors to Ballyclare's stand will be able to see a number of exciting products and developments covering the fire, police, prisons, ambulance and military sectors. 2015 has seen further growth and expansion for the company – new customers, new staff and a new, modern HQ in Stockport all form a great base for our exciting future expansion.

Of particular note is our newly-launched range of ambulance safetywear: a full ensemble of ambulance uniforms and workwear for paramedics and emergency workers. The

range is part of a layering system which means they are versatile, functional and durable. High visibility jackets and vests, shirts, fleeces and trousers provide a uniform range that keeps employees safe and protected at work and enables them to present a consistent image.

Visitors will also get the chance to discuss our managed services offering, encompassing garment supply, leasing, repair and laundering as we will have our specialist partner Berendsen on hand to explain the process in detail.

Ballyclare supplies the Ministry of Defence with highly complex aircrew flying suits, the Ministry of Justice with public order suits for the prison service and the police with a range of technical PPE, clothing, hi-vis flame-retardant vests and public order garments. It also supplies hi-vis technical clothing to the rail, aggregates and highways sectors and is one of the main suppliers of structural firefighting and rescue kit to the UK fire service.

 www.ballyclarelimited.com



Armadillo Merino

Stand L12

The clothes you wear may be slowly poisoning you. Your skin is the body's largest organ and is a vital protective barrier against the environment while also cleansing your body of certain wastes but it needs protection.

Petro-chemical based clothing (synthetics) are manufactured using thousands of synthetic chemicals and with specialist finishes for flame resistance, insect repellency, shrink resistance, easy iron and water repellency. It has been proven that the chemicals

associated with synthetic clothing are readily absorbed through the skin, avoiding the liver before entering the bloodstream. When you are hot and sweating your pores open up making the skin even more receptive to chemical absorption. The build up of chemicals in the body especially the combination with other toxic chemicals can lead to minor and major health ailments.

How to protect yourself?

Your first line of defense is your choice of next-to-skin clothing.

With better protection from the "inside-out" you can start to defend yourself from developing short and long-term health issues.

Armadillo Merino® specializes in next-to-skin protective clothing. The range of head to toe clothing creates a natural buffer zone around your body allowing the skin to function naturally, keeping you cooler in summer and warmer in winter – 'Saving your skin.'

www.armadillomerino.com



Scott Safety

Stand H32

Scott Safety, a global leader in the design, manufacture and supply of respiratory protective equipment, gas detection and thermal imaging technology, will be on Stand H32 at this year's



Show, demonstrating how it meets today's firefighting needs. With over one million firefighters across the world trusting in Scott Safety's products, the company has developed a portfolio of innovative and reliable products that will reduce user burden and incorporate real-time telemetry, situational intelligence and communications in hazardous environments.

With the recent acquisition of two companies whose design, technology and product creation capabilities complement and enhance Scott's existing

product range – thermal imaging company ISG and gas detection specialist IST Group – innovation will be very much on show

As well as demonstrating the Propak Self Contained Breathing Apparatus (SCBA) range, which offers one of the highest levels of respiratory protection and comfort available, Scott Safety will also be showcasing some highly anticipated new products:

- The innovative 379 Bar cylinder, which provides 25% more air in situations when you need it most.

- An exciting new range of portable gas detection products from GMI and Oldham (part of the IST Group), which provide greater accuracy, portability and adaptability in hazardous environments.
- The X380N thermal imager with ISG Technology – the world's only camera with hot-spot and cold-spot tracking – enabling firefighters to obtain better situational awareness in a fire scene.

www.scottsafety.com

Red One

Stand M40

The importance of regular, professional, experiential fire and rescue training for fire and rescue service staff and industrial fire teams should never be under-estimated. Only through consistent, thorough and accredited training, delivered by experts in each discipline, can the safety, security and competence of emergency services staff be assured.

Red One is the UK's leading fire and rescue training provider. Our success is based upon the fact that our training is delivered

by our expert practitioners, fire officers and firefighters with current experience and the highest qualifications who regularly attend real emergency incidents.

Our training is always immersive and experiential, meaning that for example, unlike other providers; we don't use gas in our fire training. We train using carbonaceous burns, as this is the only way that our students can truly experience the heat, smoke, flame and noise of an actual fire. We believe that your training experience should

realistically reflect what you are likely to face in real life, so that you are ready and prepared.

Based in Exeter, Devon and with additional training centres in Plymouth and Taunton, Red One offers more than 130 different courses covering all aspects of fire, rescue and safety and is constantly innovating new techniques for training delivery to meet changing operational standards and to ensure that students remain compliant, competent and confident.

www.red1ltd.com



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PBI Around The World!



Every day, firefighters around the world risk their lives to protect the property and lives of others. As these brave men and women place their lives in harm's way, PBI fibres play an integral role in firefighter safety. High performance outer shell fabrics with PBI fibres provide essential protection from heat and flame. PBI outer shell fabrics are EN and NFPA approved, and will not shrink or become brittle when exposed to high temperatures. PBI fabrics deliver high levels of comfort and durability. Choose from PBI Gold®, PBI Matrix® or our newest arrival, PBI Max™. For detailed technical information regarding PBI products, contact us directly at international@pbiproducs.com.

PBI Gold PBI Matrix PBI TRIGUARD PBI BaseGuard



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Automatically disconnects
mains cable and seals off
air-supply air when
vehicle is started

- Heavy duty pin and sleeve contacts provide reliable connection over years of insertion/ejection cycles
- No Arcing: Plug detector senses plug and automatically connects and disconnects loads



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Fireblast Global

Stand B31

For nearly two decades, Fireblast Global has specialized in the design and production of fire training equipment for the Civil Aviation, Municipal, Oil and Gas, Industrial, Institutional, and Civil Defense sectors. Utilizing staff engineers experienced in worldwide projects, inclusive of architectural design and facilities engineering, our staff designs, engineers, manufactures, and supports the broadest range of fire training products available today. Our goal is to be the

first choice for customers, by developing training equipment that is recognized for quality and performance, and to produce fire training products that set industry standards for safety.

At Fireblast Global, our commitment to Innovation is reflected in each and every installation, exceeding customer expectations by delivering the most realistic and technically advanced training environments available. We believe the design of outstanding training equipment, with proven reliability, backed by top-rated

product support, gives "value" a whole new meaning – and year after year our customers agree. Our recently introduced Quick-Burner™ technology is revolutionizing the fire training

systems industry, delivering a system design that is designed for maintenance and provided unparalleled system reliability.

www.fireblast.com



Holmatro

Stand M62, OS449

Come and see the new range of Holmatro 5000 Series Cutters and Spreaders on stand M62.



New 5000 Series Cutters

The most important factors in the development of these cutters were weight reduction and improved ergonomics, while maintaining an optimal cutting performance on modern cars. This has been achieved through a combination of new materials, component integration and innovative design. Being much lighter than the previous generation, the new 5000 series cutters significantly reduce the physical burden on the operator. All models are available with Greenline battery technology.

Inclined Cutter

The burden is even further reduced by one special model, the Inclined Cutter. Designed for more ergonomic cutting high and low on the car, this cutter with its inclined jaw eliminates the need to lift the tool high up for a roof cut or to bend over deeply to cut the rocker panel. Working with the Inclined Cutter also means there's more space for the tool to move towards the car when you cut a pillar from the side. The CU 5050 i too has been tested extensively on the latest vehicles.

New 5000 Series Spreaders

The most important factor in the development of this series was weight reduction, without compromising spreading force and spreading distance. This has been achieved through a combination of new materials, component integration and innovative design. The result is five new spreaders with an outstanding performance-to-weight ratio that significantly reduce the physical burden on the operator.

www.holmatro.com

FireWare

Stand OS03

At FireWare it is all about creating realistic training environments.

We enable emergency response teams all over the world to train as realistically as possible. Stimulating as many senses as possible from our technical theatre origins differentiates us from others. This is how we help emergency response team members to become and stay professionally skilled. We combine creativity with proven techniques and come up with innovative solutions which make all the difference in the training experience.

Our FireSales products fit seamlessly with the manikin range from Ruth Lee. This synergy makes Ruth Lee our perfect distributor for the United Kingdom and Ireland. FireWare itself is based in the Netherlands.

Please let us welcome you at our booth OS03. We are outside and love to demonstrate to you:

- Different smoke generators Cirrus, Cumulus, Stratus and Nimbo;
- Tango Safety software;
- Neptune practice extinguisher refilling system;

- Vesta Fire trainer series;
- Sound effects;
- Smell effects
- Mini PPV trainer;
- Easy package and storage solutions.
- And much more.

Curious about how we can help you with your training issues? Find more inspiration in realized projects, information about design of training facilities or our product range on our websites.

www.fireware.nl
www.ruthlee.co.uk



Sky-Futures



Sky-Futures, the global Unmanned Aerial Vehicle (UAV) inspection specialists for the Oil and Gas industry, have launched the new Sky-Futures Training Academy



offering UAV training to the Rescue, Response and Resilience sector.

In partnership with Capita, the Sky-Futures Training Academy is based at the Fire Service College, Gloucestershire which provides a realistic training environment. This CAA approved UAV training is conducted on a large controlled site which offers a variety of operational scenarios designed specifically for Emergency Services. Basic, Intermediate and Advanced courses will train Remote Pilots to fly safely, procedurally and

competently in operational environments.

UAV training is delivered by Sky-Futures highly experienced Remote Pilot Instructors who maintain their currency through 8,500 hours of operational and commercial UAV flying experience offshore, in some of the most demanding conditions. Specialist Sky-Futures staff from the Emergency Services sector ensure that the courses are suitably tailored, relevant and demanding.

David Hunkin, Sky-Futures Operations Director commented:

'Sky-Futures clients believe that UAV operations should be approached with the same uncompromising manner to safety as response driving, firearms training and manned aviation. Located at a world-class emergency service training facility, we are delighted to be able to offer training to a level that has previously been unavailable in the market. Demand has been high and we are very much looking forward to delivering our first courses in September.'

www.sky-futures.com

Excelerate Technology



Excelerate Technology is the leading provider of data, video, voice and Internet via satellite and wireless solutions on board incident command vehicles and across incident grounds. At ESS 2015 we will be showcasing

our latest integrated resilient communications solutions.

See our satellite and wireless based communications technologies integrated into new generation command and control vehicles. NEW for ESS

2015 – for a fully immersive experience of our on-board integrated communications technology visit our virtual reality suite.

Take a look at our innovative Command Pod – a portable central communications hub, operating independently of a vehicle, enabling users to rapidly deploy a resilient data network for the transfer of data, video and voice to and from the incident ground. Also 'Reflex' – our rapid response resilient communications solution for first responders. This vehicle

mounted communications pod allows personnel to access and share information in real time.

Learn more about the benefits of UAV's for achieving 360-degree aerial views at incidents and video streaming to required locations. We will also be demonstrating body-worn video, and 'Sherpa' – our automatic pole climbing camera and communications system providing a rapid deploy CCTV surveillance and data relay solution.

www.excelerate-group.com



Crofton Engineering



Crofton Engineering Ltd have been delivering training structures to the British Fire Service for more than 60 years, with their steel fire training towers and buildings in service at over 450 fire stations and training centres in the UK and abroad.

With the modern fire service operational activity developing towards USAR, SWAH and rope rescue work, in conjunction with brigades, Crofton has evolved bespoke training towers specifically designed to facilitate a variety of realistic rope rescue training scenarios.

At the 2015 Emergency Services Show, Crofton Engineering's prominent stand will feature a training tower with a sloping roof, a crane jib, and a confined space cage. During the Show a specialist team of experienced firefighters will demonstrate SWAH and rope rescue techniques to demonstrate the versatility of Crofton's cost-effective training structures.

In addition to supplying carbonaceous fire behaviour training units, Crofton Engineering can now also

offer LPG FBTU's that deliver a new standard of repeatable firefighter training experience and outcomes.

Leading the Crofton team on the stand will be Director Glen Godfrey, along with Wayne Porter (also a Director and ex-Lincolnshire FRS); Andy Barker (ex- Greater Manchester FRS); and former CFO Neil Wallington. Crofton's gas engineering partner company will also be present.

www.crofton-eng.co.uk



Floodsax

Stand G40

A pioneering sandless sandbag has proved itself in action with the emergency services worldwide. The innovative FloodSax has been deployed to stop raging torrents of water, soaked up fuel at road accidents, cleared up the mess inside flooded homes and businesses and has even mitigated the effects of a bomb blast.

FloodSax at first look like pillowcases and weigh just 200 grams (7 ounces) before they are activated. But simply add water and in around three minutes they expand to weigh 20 kilos (44lbs)

to become more effective than traditional sandbags.

A World War Two bomb was discovered in a London garden and taken to Clissold Park in Hackney to be blown up safely. The Metropolitan Police surrounded it with FloodSax to lessen the blast as a special gelling polymer inside the FloodSax helped to absorb the shrapnel generated by the explosion. The drama can now be seen on YouTube. FloodSax are now regularly used to surround suspect packages in public places.

FloodSax were used to protect homes in the USA when it was battered by a hurricane and also saved countless thousands of dollars in damage when they soaked up a massive leak inside a hospital.

FloodSax are exceptionally space-saving to store and deploy. One box of 20 that can easily be carried by one person is equivalent to 20 sandbags on a pallet. Around two million FloodSax have now been sold worldwide.

www.floodsax.com



Dräger UK

Stand R37

Leading manufacturer in safety solutions, Dräger, is at this year's Emergency Services Show, so come and see us at

stand R37 to discover more about our innovative products and services.

We'll be showcasing

our expertise across the emergency services industry, with specialists on hand to discuss product features, service, training and maintenance options.

Visitors to our stand can look forward to seeing innovative breathing apparatus and mask communication technologies which ensure firefighters are protected and prepared for every situation they find themselves in.

Among the technology on display will be our new fire ground communications range of products, the Dräger FPR-

COM 5000, FPS-COM 7000, HPS 7000 firefighters' helmet and HPS 3500 tactical rescue helmet.

Visitors will also be able to see the PSS integrated safety belt for use in unstable environments or working at height, PSS 7000 breathing apparatus with telemetry, Merlin entry control board and FPS 7000 facemask.

There will also be hands-on demonstrations of Dräger applications during the two-day event.

www.draeger.com



Godiva

Stand F2

At this year's Emergency Services Show Godiva will be displaying their brand new vehicle pump, the KP pump.

The KP pump is an innovative new pump that covers the lower end of the pumping range. With the demand for smaller more cost effective fire appliances, Godiva considered the user requirements and set to designing a new pump for discharge flows of up to 1500 l/min at 10 bar. This being a Godiva pump, there is a single pressure version the KP1 1510, and a multi-pressure option the

KP2 1510, which will provide a high pressure discharge of 250 l/min at 40 bar, simultaneously with the low pressure discharge of 1500 l/min.

The multi-pressure version has inherited the unique Godiva design of two impellers on a single shaft, a design that always reduces space demands, and nowhere more significant than with the KP pump.

The KP single pressure pump is on average 40% smaller in cubic volume than the competition and the multi-pressure pump is on average

30% smaller in cubic volume than the comparable multi-pressure pumps. This frees up space on the vehicle to carry more equipment or reduce the overall payload of the vehicle.

Also on display the Godiva Powerflow 8/5 and 12/10 pumps, lightweight portables with a powerful performance.

Come and visit us on stand F2 and discuss the benefits of the KP and other pumps for your fire pump needs.

www.godiva.co.uk



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Bollé Safety

Stand G33

Bollé Safety revolutionizes eye protection with an innovation that exceeds the requirements of all international standards, especially the EN166 K (anti-scratch) and N (anti-fog) option. The new and exclusive anti-fog and anti-scratch Platinum coating is now available on the Rush+, Silium+, Slam+, Contour, Cobra (foam versions) IRI-s, B808 plus Atom, Tracker and Backdraft goggles. It also guarantees greater safety, reliability and comfort. This permanent coating on both sides of the

lens gives them a high resistance to scratching, to the most aggressive chemicals and delays the onset of fogging. In all circumstances and at all times the Platinum lens innovation guarantees your eyes improved protection. Unlike other manufacturers Bolle Safety apply the new Platinum coating to both sides of the lens providing even greater levels of protection.

Bolle Safety are also the first company in the world to supply all their polycarbonate



prescription lenses with the Platinum anti-scratch and anti-fog coating as standard and at no extra charge. With a wide range of styles, including the unique Contour prescription eyeshield, Bollé Safety have the answer to all your eye protection

requirements. Don't take our word for it, try them for yourself, visit us on stand G33 and claim your free pair of Platinum.

www.bolle-safety.com

www.bolle-tactical.com

National Chemical Emergency Centre (NCEC)

Stand R14

The Chief Fire Officer's Association (CFOA) has selected NCEC's Head of Emergency Response, Dan Haggarty, to help produce new national guidance for firefighters responding to incidents involving hazardous



materials. Dan Haggarty will join CFOA's project board and will draw on his experience working for Ricardo-AEA's National Chemical Emergency Centre (NCEC) to fulfil a governance role in preparation of in-depth advice on the risks associated with hazardous materials and how to respond to them during an emergency.

The work builds on the 24/7 emergency telephone advice that the NCEC provides to its clients around the world, enabling organisations to safely respond to chemical incidents and

provide accurate information to emergency services.

Dan Haggarty commented: "I'm very happy to be joining the project board for the National Operational Guidance Programme. NCEC is in a unique position to support the development of this advice thanks to our experience operating the UK's chemical emergency centre for over 40 years and our work globally, advising business and industry on chemical emergencies."

CFOA's hazardous materials guidance is expected

to be added to its National Operational Guidance Programme during 2016.

Dan and other members of the NCEC team will be available on stand R14 at the Emergency Services Show, providing information on Chemsafe – the 24/7/365 national advice service freely available to the emergency services in dealing with chemical incidents, and Chemdata – the industry leading hazardous chemical database.

www.the-ncec.com/emergency-response/

Kongsberg GeoAcoustics

Stand M37

Norfolk, UK based Kongsberg GeoAcoustics will be unveiling their latest Search and Rescue side scan system at the Emergency Services Show.

The side scan represents the very latest in technology aimed at finding recoverable submerged items. Its sonar technology operates at frequencies that enable high definition images to be captured and pinpointed using the built in satellite receiver.

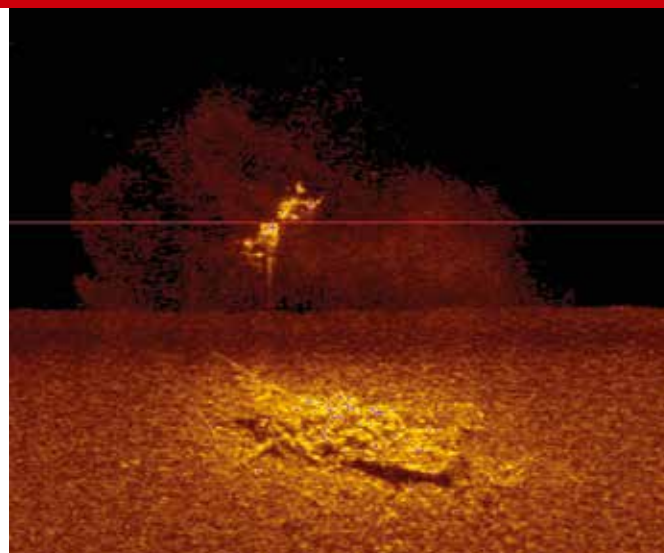
The system has already been quickly snapped up by the Swiss police force for lake recovery

operations. Data courtesy of Kantonspolizei Zuerich

Here you can see a diver returning to the surface, after inspecting a boat wreck on the lake bed. The resolution of the data is sufficient that missing persons can easily be spotted.

The system is easy to deploy and light enough to be carried by one person and can be used on the smallest of vessels. It needs only a car battery for power and uses a laptop to display the data.

www.km.kongsberg.com



Bristol Uniforms

 Stand J3

Understanding, and meeting, the changing needs of customers drives Bristol's innovative approach to new product development. The focus this year will be on a number of major new products to come to market in 2015.

The completion of the mid-term Technical Refresh of the CPCC (Central PPE and Clothing Contract) sees the introduction of a new, comprehensive range of firefighter protective garments for structural, technical rescue and wildland use. The extension of the previous (ICP) range creates an ideal opportunity for fire and rescue services to consider taking advantage of this no tendering costs, no joining fees national PPE procurement scheme. It offers the most flexible range of procurement options

available by including Purchase Only (PO), Purchase Managed Service (PMS) and Fully Managed Service (FMS), the latter offering the full flexibility of a lease contract.

Other new products will be our layered PPE solution, LayerFlex™, in a range which now offers a number of variants including a yellow under jacket with navy outer jacket. Also new this year will be two alternative structural garment constructions incorporating Gore Parallon, which offers enhanced wicking and breathability combined with improved thermal performance. XFlex™ structural and RescueFlex™ USAR garments will also feature prominently.

 www.bristoluniforms.com

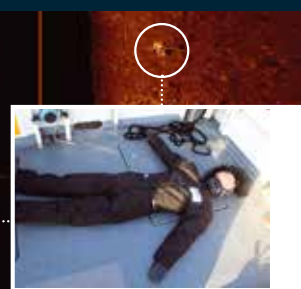
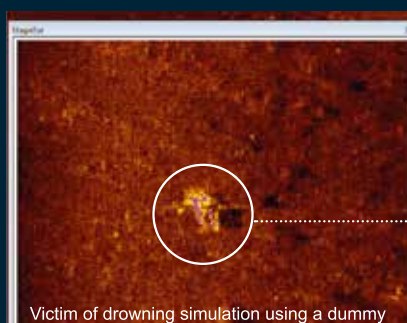


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Fire Apparatus Crashes Involving Firefighter Fatalities

Fire apparatus are designed to get equipment and firefighters safely to a blaze so that firefighters can help put out a fire and deal with other life-saving situations. While, according to National Fire protection Association (NFPA) statistics, fire apparatus crashed peaked in 2006, the fire service is still experiencing more than 12,000 vehicle crashes every year and this problem continues to cause many types of injuries, fatalities, and other problems.



William Peterson



Michael A. King

William Peterson is currently a Senior Vice President for Strategic Government Resources with lead executive search responsibilities for Fire, Emergency Medical, and Emergency Management related executive searches.

Michael King retired from the Ohio State Highway Patrol after twenty-five years of service. During his tenure with the Patrol, Michael received specialized training in traffic crash investigation/reconstruction.

Fire apparatus crashes also injure and kill passengers of other vehicles as well as pedestrians. They tap limited resources which need to be spent on emergencies. Worse, a fire apparatus that has been in an accident is slowed down, so that the persons waiting for a fire department response may suffer fatalities or serious injuries because a vehicle did not arrive in time. Each year, fire apparatus crashes also take many fire vehicles off the roads, stretching limited resources thin and making it harder for firefighters to respond to emergencies in a timely manner.

▼ On July 26, 2010, a 59-year-old male volunteer fire chief (victim 1) and a 67-year-old male volunteer firefighter (victim 2) died from injuries sustained after they were ejected when their engine was involved in a crash and rolled over.

Both volunteer and career fire departments in the United States have been experiencing fire apparatus crashes like these for many years. The NFPA has data that indicates that, between 1977 and 2013, 244 firefighters were killed in apparatus crashes (engine/pump, ladder, tanker, and ambulance/rescue) and between 1990 and 2013, 23,290 firefighters were injured.

The majority of fatal fire apparatus crashes, particularly in the last 15 years, were single-fatality incidents. The leading causes for these crashes are shown to consistently be:

- Excessive speed,
- Failure to stop at traffic control devices,
- Lack of caution at intersections.

Fire department vehicle operations that exhibit any of the above causes will, sooner or later, predictably result in a fire apparatus



Image courtesy of William Peterson

crash and potential injuries and fatalities to firefighters and/or the public.

As recently as 2003, it has been shown that firefighters are more likely to die travelling to and from an emergency than actually fighting a fire. In addition to these firefighter fatalities, countless other firefighters and civilians are seriously injured in motor vehicle crashes involving fire apparatus, ambulances and personal vehicles. While many fire departments participate in some type of driver training program, these programs often fail to properly address the issues of vehicle dynamics and large truck behavior.

Firefighter fatalities from apparatus crashes have consistently been the second highest area of risk for firefighters and as much as 32% of fatalities experienced in a given year. Generally, the fatality numbers have consistently fallen between 15 and 25% of fatalities experienced in any given year. The fire service has been aware of these dreadful statistics for many years.

Over the past 20 or more years, the fire service and fire apparatus manufacturers, working together, have made changes and additions to NFPA 1901, *Standard for Automotive Fire Apparatus*, to incorporate the latest safety features and state-of-the-art design criteria in order to ensure the provision of safe fire apparatus, designed to meet the critical needs of fire departments, all over the country.

Yet after the implementation of new and improved safety features in fire apparatus designed to meet the requirements of NFPA 1901, the following questions still remain:

- Why are firefighter fatalities continuing to occur during responding and returning activities?
- What are the factors that continue to result in a record of unnecessary numbers of fatalities from apparatus crashes? and,
- Is there a pattern in fire apparatus crashes over the last 10 years that would seem to indicate that specific types of vehicles or types of chassis (e.g. custom or commercial) are more prone to crashes that will result in firefighter fatalities?

In an attempt to answer these, and other, pertinent questions relating to nature and factors of firefighter fatalities resulting from fire apparatus crashes, data obtained from



Images courtesy of William Peterson

the NFPA for fire apparatus crashes that have occurred in the last 10 years was examined. The data included incidents involving apparatus (engine/pumpers, ladders, and brush trucks, as well as certain special purpose fire department vehicles. The data included a total of 51 fatal incidents, resulting in 55 deaths. Thirty-three of these incidents were subsequently investigated by the National Institute for Occupational Safety and Health (NIOSH).

A crash analysis was performed from the 33 NIOSH reports included in the data from the 51 incidents in the NFPA crash data. This method of analysis is not as exact as an on-site investigation, but due to the nature and content of the NIOSH Investigation reports, this approach fulfilled the needs to examine factors that were determined to be the primary cause(s) of the fire apparatus crashes identified in the NFPA data.

Fire apparatus Crashes are extremely confusing events. How they occur, who or what caused them, and why they occurred are facts that crash investigators must determine. Each of the NIOSH reports clearly showed that NIOSH investigation team know the fundamentals of traffic accident investigation and know how to prepare thorough fire apparatus crash reports.

Analysis of the 33 NIOSH reports which were available on the 51 incidents reported by the NFPA, clearly showed that the NIOSH reports contained the



essential investigative elements who, what, when, where, why, and how the accident happened. As such, it is fairly easy to determine the cause(s) of the crash and whether any consistent trends can be identified, across the complete data set, to arrive at logical and objective conclusions.

The NIOSH reports were reviewed and analyzed to identify common elements that were identified in the 33 NIOSH reports that were examined. The results of the review and analysis of these investigations identified seven operational issues that were repeatedly identified as major contributing factors in the crashes. In most fatal fire apparatus crashes, more than one operational issue was present.

From the information contained in the 33 reviewed reports completed by NIOSH, it has been determined that the four leading causes of firefighter crash fatalities were:

- "Failure to Control" was a factor in 27 (81.8%) of the incidents examined,
- "Rollover" was a factor in 17 (51.5%) of the incidents examined,
- "Firefighters not wearing seatbelts" was a factor in 20 (57.1%) of the incidents,
- "Occupant ejection" was a factor in 15 (42.8%) of the incidents, and in 75% of incidents where occupants were not restrained by seat belts,
- The "Total number of firefighter fatalities" in the 33 incidents was 36.



◀ On December 2, 2005, a male career Captain (the victim) died, and a male driver/operator and a male firefighter suffered severe injuries when their apparatus struck a passenger van at a four-way intersection, left the road and overturned 1¼ times.

appropriate procedures which should be in place within the fire department. It clearly should be the responsibility of the employer to have in place a comprehensive Fire Department Occupational Safety Program which contains the following elements:

- a risk management plan,
- a safety and health policy,
- an accident prevention and review process,
- departmental standard operating procedures for the safe operation of apparatus and vehicles, and
- an ongoing training program for all firefighters on the risks and hazards likely to be encountered in emergency vehicle operations.

The US Fire Service, individually, departmentally, and collectively, needs to place as much emphasis on changing firefighter behavior as they did in improving apparatus safety. Until we are much more adept at improving and universally instilling a “safety culture” in the US fire departments, we are likely to continue to see needless and preventable fire apparatus crash fatalities take the lives of firefighters.

The responsibility for establishing and enforcing safety rules and regulations rests solely with the management of the fire department, including the company officers of apparatus crews. An effective fire apparatus crash prevention program requires compliance, commitment, and support from all ranks within the fire department. And while the responsibility for safe driving rests ultimately with the fire chief and all members of his or her management team. Daily accountability rests with the individual company officer. If it is determined that a clear violation of the emergency safe driving procedure has occurred, prompt and appropriate corrective action must be accomplished to reinforce the mandatory compliance with safe driving procedures.

➡ For more information, go to
www.cdc.gov/niosh/topics/emergency.html
www.nfpa.org/research

From the information contained in the 33 NIOSH reports, it has also been determined that:

- “Custom” apparatus were involved in 11 (33%) of the incidents,
- “Commercial” apparatus were involved in 10 (30.3%) of the incidents,
- “Non-compliant” apparatus were involved in 10 (30.3%) of the incidents,
- “No determination” could be made in 2 (6.1%) of the incidents.

Note: “non-compliant” refers to fire apparatus that were re-purposed (old oil tankers, military surplus, etc.) and used as fire apparatus, or vehicles that were “home built” that do not meet any standards, including NFPA 1901.

Information contained in the 33 NIOSH reports, it has also been determined that:

- 54% of Apparatus were 1990 and older models (23+ years old)
- 87% of Apparatus were 2000 and older models (13+ years old)

Conclusions and Recommendations

From an examination of the subject NIOSH reports we conclude that:

- There have been quantum improvements in fire apparatus crash performance starting in 2000, and the performance requirements

implemented in NFPA 1901 since 2000 have had significant positive influence on Fire Apparatus Safety and performance when fire apparatus are involved in a major crash incident. These efforts should be continued.

- Crash data examined in this study appears to show that fire apparatus designed to be compliant with NFPA 1901 editions after 2000 may be less likely to be involved in a crash that would result in a firefighter fatality.
- The current edition of NFPA 1901, contains “state of the art” design concepts to achieve the highest possible level of safety to the occupants of the fire apparatus that are currently available in the industry.
- Human factors continue to be a major cause of firefighter and public fatalities when fire apparatus are involved in a crash incident. The leading causes for these crashes are shown to consistently be:
 - Excessive speed,
 - Failure to stop at traffic control devices, and
 - Lack of caution at intersections.

Since the year 2000, or before, the US Fire Service has understood, very clearly, that if a fire apparatus crash is predictable, it is also preventable. Any problem with operational safety that might exist can be easily and effectively dealt with by

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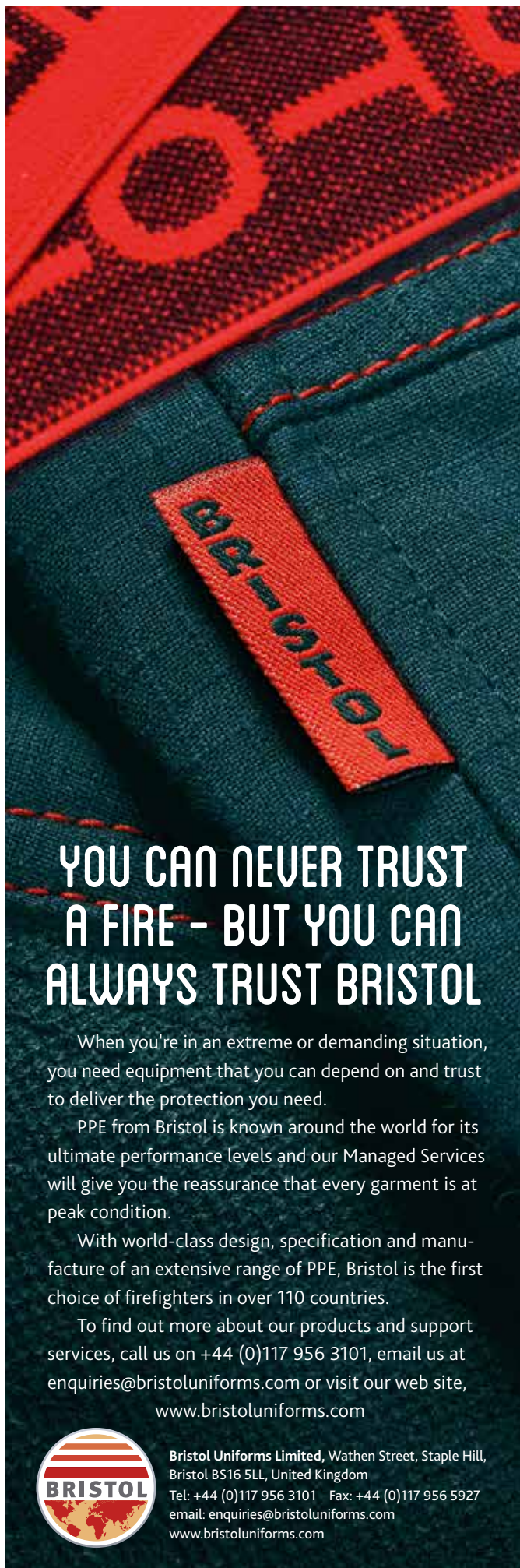
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Innovation In Early Wildfire Detection: Robots That Monitor The Forest 24/7

As governments and firefighters attempt to switch spending and efforts from wildfire suppression to prevention, the often overlooked detection stage is seeing a technology revolution that is making a difference.



Megan Pillsbury

Megan Pillsbury is Director of Business Development at Insight Robotics. She is responsible for expanding the business outside China.

The economic, social and human costs of wildfire are staggering and getting worse. In the US for example, annual suppression costs alone have hit nearly US\$1 billion in three of the past 15 years, and some predict that number will double in the next 15 years. Accounting for the loss of assets, property and human lives and livelihoods further magnifies this number.

The risk and frequency of wildfire is increasing due to climate change and poor land management allowing fuel to accumulate. On top of that, many of these fires happen in or near the wildland urban interface (WUI) – areas where forests intersect with urban development – increasing the cost of wildfire suppression and also damage.

With the costs of wildfire suppression rising so quickly, governments regularly spend significantly more than their budgets allow, often borrowing from

funding intended for fire prevention. Wildfire prevention methods including public education, prescribed burning and better land management are proving to be effective in reducing wildfire risk, particularly in WUI areas. Research shows that each dollar spent on wildfire prevention can save several dollars in wildfire suppression, yet prevention continues to be underfunded.

Even if budgets allowed for comprehensive wildfire prevention, fires will continue to be a problem, and the little discussed step between prevention and suppression is detection. Early detection is crucial to effective fire suppression. The larger a fire grows before it is detected, the more expensive it is to suppress the fire, and fires allowed to grow beyond a certain size can't be fought at all in some cases. The fire suppression community commonly supports the idea that a fire should be detected within five to 15 minutes after ignition depending on weather conditions. In any case, once a fire starts, the single greatest determination of the success of fire suppression is detection and response time.

▼ **Once a fire starts, the single greatest determination of the success of fire suppression is detection and response time.**



Methods of wildfire detection

Most parts of the world with high risk of wildfire employ some method of detection. The traditional method is manned watchtowers. Humans in towers can scan an area with up to 30km radius and identify fires by the smoke columns they create. At a distance of 13km, a human can reliably spot a fire 22m² in size, though this method is severely limited by weather conditions such as fog, clouds, reflection by sun and objects, and time of day. Manned watchtowers can be expensive, especially in regions with high cost of employment, and humans fatigue very easily when doing visual surveillance.

There are technologies that automate wildfire detection so as to minimise the human factors:

- CCTV can reduce the number of humans required to survey an area by centralising multiple views in one area. However, laying cable can be expensive, and surveillance is still subject to human fatigue.
- Satellite imagery can be used for wildfire detection, but only if there is no cloud cover. The fire size required to identify it from satellite is at least 100m², and the scan time is at least three hours (though this is improving). At present, satellite is better suited for monitoring remote fires or fires with low risk of becoming disasters.
- Automated smoke detection algorithms based on CCTV or a series of photos can also be used to identify fires. These algorithms look for smoke behaviour by analysing multiple frames of images taken of an area. Automated smoke detection can identify a fire 100m² in size at 10km distance, and in testing is shown to have a similar detection rate to manned watchtowers.

However, the most recent of these technologies was introduced 15 years ago, and there has been little innovation in wildfire detection since... until now.

Thermal detection

Just last year Insight Robotics introduced a new wildfire detection technology that enables the use of thermal sensors over long distances to effectively detect and locate wildfires. This invention, which won the Entrepreneurship of the Year Award from IBM in 2014, is the first in the world



Images courtesy of Insight Robotics

to spot an emerging wildfire as small as a single 2 sq m tree within a 5km radius.

The problem with simple and affordable thermal sensors is their limited range. A simple thermal sensor can be combined with basic software to trigger an alarm when a heat 'signal' above a certain intensity level is received. The heat 'signal' emitted by a fire at 5km distance from the sensor would degrade significantly by the time it reaches the sensor. In order to trigger an alarm, the threshold level needs to be set very low. However, nearby objects that are not necessarily on fire but are hot (for example rocks or leaves in the sun) may exceed the low threshold level and trigger a false alarm. If the threshold level is increased to reduce false alarms, distant fires will not be detected.

The latest innovation in wildfire detection includes a wildfire detection robot that uses a Geospatial Intelligence System (GIS) in combination with patented algorithms to dynamically set the threshold level of the thermal sensor based on the distance of the fire, overcoming the range limitation of a simple thermal sensor. It can identify a fire 2m² in size at 5km distance, and 20m² at 8km distance. The robot can calculate the distance of the fire because it works with the GIS to first identify the location of the fire, and the single robot can report the location of the fire to the response team.

The limitation of thermal detection is that the sensor must have line of sight to the fire. Smoke detection makes it possible to identify fires behind a hill that a robot would not identify.

Unlike smoke detection, thermal

▲ The Insight Robotics wildfire detection robot uses smart algorithms and a Geospatial Intelligence System (GIS) to locate a fire and alert the response team.

detection is not limited by weather conditions or time of day. These robots monitor for wildfire 24/7 and will identify fires when they are very small and manageable. Insight Robotics has more than 60 robots operating in China with 100% effectiveness in detecting wildfires per the specification to date. In Jinan City in 2014, eight robots identified 173 of 173 fires, none of which grew larger than 20m² by the time they were suppressed.

Prevention, detection, suppression

Minimising wildfire disaster requires a comprehensive strategy for preventing, detecting and suppressing wildfire effectively. The already high and continually growing costs of suppression can be drastically reduced if prevention and detection mechanisms are properly employed. By increasing investment in prevention and early detection, overall spending will be reduced, and those funds can be used for other public and government spending. Furthermore, the impact of wildfire on assets, society and humans will also be reduced. Fire managers won't be able to stop building in the WUI or oncoming climate change, but they will be better able to prevent disasters caused by wildfire.



For more information, go to
www.insightrobotics.com

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One of the primary objectives in basic firefighter training is the development of knowledge and proficiencies associated with various types of forcible entry techniques and building access as well as search and rescue/victim removal techniques during a structure fire incident. In many fire schools, nearly half the allotted time is spent on these fire ground activities. In the structural firefighting world, one must continuously train to maintain proficiency in forcible entry, ladder deployment and search and rescue so that time is not lost during that critical period of survival.



Jason Graber

Jason Graber is a member of the ARFF Working Group Board of Directors and currently serves as the secretary and education and training affairs officer for the organization. He has spent the last 12 years in ARFF with the Metropolitan Washington Airports Authority Fire and Rescue Department. In his current assignment, he is the Battalion Fire Chief of Safety and Training.

Collectively, these skills are often brought together and help to make the difference in a successful or unsuccessful outcome of any incident.

When we switch gears and talk about Aircraft Rescue and Firefighting (ARFF), these tasks (access to aircraft and search and rescue/victim removal) are also taught, but sometimes take a back seat to mass application of extinguishing agent activities from the foam units that are assigned to our airfields. Additionally, minimum staffing at many airfields may make entry into the aircraft during the initial minutes of the event impractical or impossible. The time prior to arrival of mutual aid assets will largely be consumed by extinguishing agent

application and ensuring that a rescue path has been established and maintained until additional help arrives or all of the passengers have self-evacuated from the aircraft.

In recent years, newer versions of large frame aircraft have given rise to the concerns of the sheer size of aircraft and the quantities of passengers that are being carried on them. The ARFF world has not only embraced the modern marvels that these aircraft have brought to the world of air travel but also the potential ramifications that exist when one of these or any aircraft is involved in an accident. Additionally, the explosion of social media and a twenty-four hour real time news media cycle has on nearly a weekly basis demonstrated how frequent aircraft emergencies are becoming. It is expected that local airport fire departments be prepared to handle and successfully mitigate any aircraft emergency regardless of the size.

▼ An evacuation of a Boeing 757 in September of 2011 at Washington Dulles following an engine fire.



Image courtesy of Jason Graber



Image courtesy of Jason Graber

The best case scenario for passenger survival is for ARFF personnel to arrive immediately after the accident and begin critical functions that often do make the difference in the survivability. Gaining access to the aircraft cabin may be increasingly more difficult if passengers are already evacuating from the aircraft. This can be further complicated by the condition and position of the aircraft upon arrival at the scene. Aircraft accidents rarely occur in ideal conditions and it is incumbent upon first arriving ARFF personnel to adapt and overcome with the mindset of making the situation better than we found it. Evacuating passengers from an aircraft is certainly a good sign for us on the outside, but conversely creates access problems for us, as our entry points are now potentially even more limited.

Gaining access and rescuing passengers from an aircraft is about attitude as much as it is about ability and skill. Certainly a risk management decision must take place before making the decision to enter an aircraft, but ultimately the will and desire to enter the aircraft wreckage is based upon "this risk management decision"? In aircraft rescue, we know the survival clock begins ticking the moment that fire breaks

out or a crash occurs. Our mindset, our pre-plan and team training need to launch instantaneously upon notification of the event. This is where the attitude, ability and skill come together and the mindset of maximizing survival drives the end result.

Preparing for routine and difficult access scenarios is an essential element of emergency planning. Early on in my career, I was taught that the ideal place to access the aircraft is via an over wing exit or an exit near the wing, as this is pretty much the center point of the aircraft. I still believe in this tactic for obvious reasons but I also understand that it's not an absolute and we need to train for every possibility. Once inside, we have the ability to go forward or aft and access almost the entire aircraft (regardless of size) to initiate an interior fire attack provided we have hose lines that are long enough. The final determination as to whether or not to make entry (and/or where to make entry) and initiate a fire attack will be made during size up and will be driven by a number of factors, including passenger evacuation routes and interior/exterior fires.

ARFF personnel need to have a thorough understanding of aircraft construction and be proficient in the operation of the various aircraft entry doors and over wing exits,

▲ Crews practicing on laddering the Airbus 380 – in this case three ladder towers are set up and working on making access to the aircraft.

as well as the "quirks" that are associated with them. From the perspective of gaining access to the aircraft, this knowledge base is essential, not just on the operation of the door, but also contributory factors, such as what happens if a particular door does not disarm from the outside and the slide deploys or if the door was damaged in the accident and thus inoperable. The slide deployment will not only cover the entire opening of the door, but also possibly 10" to 12" on either side of the door and puts advancing crews in harm's way, as the slides deploy.

Victim Search and Rescue and Removal

One of the most challenging tasks performed by ARFF personnel is the search and rescue and ultimate removal of passengers that are trapped on a damaged aircraft. As the images from the Continental (Denver, Colorado-2008) and Asiana (San Francisco, California- 2013) accidents and countless others have demonstrated,



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Images courtesy of Jason Graber



▲ The Boeing 747 – the sheer size of large frame aircraft requires personnel and organizations to have definitive plans and procedures on how to make access to these and all sizes of aircraft that frequent (and don't) your airports.

◀ The IL-62 is an aircraft that normally doesn't frequent either of our airports but appears from time to time and depicts the need to be familiar with all kinds of aircraft.

making access to the aircraft may be the easy part of this process. One of the things that may be encountered on the interior of an aircraft accident is the possibility of passengers still buckled into their seats, or severely entangled with the remainder of the seats or components of the cabin. It is important for incident commanders to determine how many personnel will be needed for the tasks of interior rescue. These personnel are not included in any fire attack group that may be needed to extinguish an interior fire, or at least hold it in check long enough to get the aircraft evacuated. When deploying personnel to the interior, the incident commander must weigh heavily how many people may be needed to affect a rescue versus how much room is on the inside for rescue personnel and any tools that may be needed. Personnel must also keep in mind that moving wreckage on the inside of the aircraft is not considered destruction of evidence if it means getting to a viable victim.

Once victims are disentangled from the wreckage, they must be moved to the exits and removed from the aircraft. It is important for interior group or division supervisors to be communicating with the exterior supervision regarding status of the evacuation or rescue and location(s) to which victims are being transferred. Effective victim management is essential to ensure that all crew are on the same page so that rescued passengers are handed off in a safe and efficient manner. This hand off includes not only removing victims from the wreckage, but also getting them to the casualty collection point. A staffing task analysis should be conducted which identifies the critical tasks required for the worst case scenario, the number of personnel required to complete the task, and the number of minutes into the incident that crews should be available to execute it. If the staffing does not exist "on airport", mutual aid must be trained and their efforts coordinated to understand the responsibilities.

Closing

It is not assumed that the tactics discussed will work for every airport. An airport fire department must establish plans that will work for them. If the resources at an airport do not include a readily available ladder truck or stair truck, the fire department should be training mutual aid personnel in these skills. Bringing them onto the airport during an emergency and asking them to complete a critical task, such as laddering an aircraft, may be disastrous without previous training. When mutual aid response is depended upon for gaining access or other tasks critical to survival, formal mutual aid agreements must include the expectations of the airport, as well as the capabilities of the mutual aid department.

Preparation after the fact is not preparation at all.



For more information, go to www.arffwg.org

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The Bulletproof Spirit – Part 1:

Emotional Survival Training to Insure Wellness

What was the worst call you have ever been on? How many different ways did that call and so many others adversely affect your health and wellness, your relationships at home, how you perceive your job and the community, and the quality of your life? Could you have been better prepared before and after, to more constructively process the acute stress and trauma of a professional firefighter?



Dan Willis

Captain (ret) Dan Willis served with the La Mesa Police Department for 26 years. He is a former crimes of violence, child molest, homicide detective and SWAT commander, and La Mesa's Wellness Coordinator.

Consistently being immersed in death, tragedies, danger, heartache, and suffering can often scar the spirit of any first responder – particularly firefighters and EMT personnel. Tragically, first responders are more likely to kill themselves than die in the line of duty. There are more than twice as many problem drinkers within the first responder professions than the general public. An estimated 15-18% suffer from PTSD, with an estimated 20-25% who will suffer at least one life-altering addiction during their career. It is essential for fire personnel to incorporate proactive emotional survival and wellness

▼ **A firefighter rushes an injured boy to a waiting ambulance after being injured in a house fire.**

practices that nurture, protect, and heal their spirit—to bulletproof their spirit to prevent them from becoming victims of their profession.

The inherent adverse effects of a career as a firefighter or medic are poisonous and cumulative. Like a cancer, dedicated yet unsuspecting first responders have the potential to slowly succumb to the toxic, debilitating effects of acute stress and trauma with little training on how to effectively process the internal damage. The job has an inherent ability to turn us into someone our loved ones no longer recognize. Following is emotional survival strategies based upon the award-winning book, “Bulletproof Spirit: The First Responders Essential Resource for Protecting and Healing Mind and Heart,” (firstresponderwellness.com).



Image courtesy of www.firstresponderwellness.com



Image courtesy of www.firefighterwellness.com

The Warning Signs

Emotional survival means having the ability to process stress, overcome trauma, while serving with compassion without the job being crippling either mentally, emotionally, or physically. If you are doing nothing proactively to develop and promote emotional survival, then you are allowing the job to victimize you.

Our spirit is the foundation for our physical, mental, emotional wellness and the quality of our life. Our spirit consists of everything within that makes us resilient, able to cope with trauma; it is our motivation to compassionately serve and help others; our sense of aliveness; and it is what makes us human. And it is our spirit that suffers most from a career as a first responder. The first objective is to understand the several warning signs that a firefighter's spirit has been injured and not processing stress effectively.

1 Isolation

Over time there is a natural tendency to become increasingly isolated. This involves withdrawing—preferring the company of work colleagues or being alone over associating with other friends, family, and their related activities. One develops the tendency to disengage, not wanting to make decisions away from work, and preferring not to be involved with others, even spouses and children. Eventually, you can become distant and reclusive.

2 Irritability

When affected, you'll tend to develop a shorter-than-usual fuse, fly off the handle for seemingly insignificant reasons, respond to questions in one-word sentences, usually say you are "fine" just to stop any further conversation, and keep everyone near you walking on eggshells for fear of how you may react. You become increasingly more on edge, restless, and agitated.

3 Difficulty Sleeping

Having difficulty consistently getting a good night's sleep—either because of sleep interruptions several times each night or because of only being capable of sleeping for a few hours—is a significant sign that you are not effectively processing stress and are being adversely affected by the job.

4 Anger

When seriously affected, you begin to develop a pattern of taking out your stress and frustration on others, often those they care about most.

5 Emotional Numbness/ Feeling Dead Inside

Becoming emotionally numb or dead inside is inevitable, at least initially, and firefighters need to consistently work to prevent it from overwhelming them. The job will naturally tend to make you want to shut down emotionally

▲ August 22, 2011 El Cajon, California: SWAT Police officers and firefighters fight a house fire where a barricaded man had just shot and killed his baby daughter, mother-in-law, set his house on fire, and critically wounded an officer with a shot to the neck.

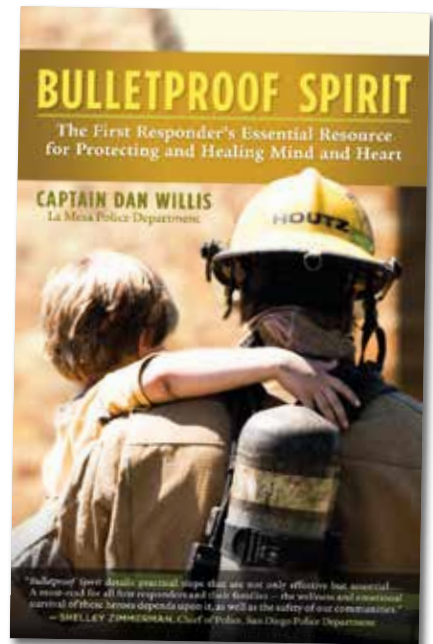
as a way to no longer feel the sense of helplessness, frustration, stress, trauma, and emotional pain of the job. As you shut down emotionally, you tend to become disassociated with others, indifferent, and disengaged with life. However, this inevitably leads to seriously damaged relationships at home.

6 Lack of Communication

As one increasingly withdraws, they will tend to make the serious mistake of keeping everything inside. This becomes serious because, as their communication skills diminish, they will refuse to talk about how work is affecting them. Feelings of depression, anxiety, helplessness, anger, fear, and other negative emotions will then tend to intensify.

7 Cynicism, Distrust, and Loss of Work Satisfaction

If any of these warning signs are not addressed, you will likely become highly dissatisfied at work, extremely cynical, and distrustful of most everyone. This cynicism and negative outlook can send you into a downward spiral that eventually could affect every aspect of your quality of life.



▲ Capt. Willis' *Bulletproof Spirit* is a unique emotional survival guidebook providing essential proactive wellness practices.

◀ Police funeral – another fallen hero. There are many more untold victims of the professions of first responders – their families.

8 Depression

Ignoring any of these warning signs eventually can lead to clinical depression. Left untreated, this may worsen and become potentially severe depression, resulting in substance abuse and addictions, broken families and lives, and a host of other debilitating problems, up to and including suicide.

9 Drinking as a Perceived Need or Habit

Drinking or consuming other substances because of a perceived need or by habit is a major warning sign. Alcohol abuse is a serious problem among firefighters and medics. Drinking because of a need or habit tends to only intensify already serious problems and emotional issues, as well as problems at work.

Self Awareness

The first step for a firefighter to bulletproof their spirit is to learn to become more self aware of not only how the job may be adversely affecting them, but what emotional survival methods may be effective to maintain their wellness. First responders should periodically seek opinions from their spouse and loved ones regarding whether they believe you have been changing in any

way, how the job has been affecting you, and what specifically the first responder can do to improve their relationships.

Periodically ask yourself how you cope and manage career stress, and whether what you have been doing is healthy. It's helpful to think about what positive things you can do that you enjoy, that will help to breathe life back into your spirit; how to become more engaged with family and life-enhancing activities, and how to promote your health and wellness more consistently.

PTSD – Unresolved Trauma

PTSD is not a weakness. It's not about what's wrong with you; it's all about what happened to you. PTSD is really an injury to the brain's ability to process a traumatic incident or acute stress. The brain's natural processing ability becomes injured, or stuck, which can cause a person to repeatedly re-live the experience while experiencing crippling emotional reactions.

Such was the case with a La Mesa (San Diego County) Firefighter who for whatever reason, after one particular fatal drunk driving accident, began seeing blood everywhere in his mind's eye – blood on his daughter's face, his wife, in the shower, and on his hands. He also kept having repeated

nightmares where the dead woman who he had recovered from the tangled debris, suddenly opened her eyes and said the firefighter had killed her. The more he tried not to see these images, the more often and more intensely he would see it.

A colleague told the firefighter about a PTSD therapy treatment called EMDR (Eye Movement Desensitization and Reprocessing). The officer tried this therapy with the Fire Department's psychologist and after only 2 sessions, never saw phantom blood again and never again had that nightmare. The therapy is specifically designed to heal the brain's ability to process the trauma and place it in its proper perspective. Although you will always remember the incident, with treatments such as this you can remember it without being emotionally crippled during those memories – trained EMDR psychologists can be found at www.emdr.org.

In the second and final part of The Bulletproof Spirit, we will explore Wellness Practices and look at several emotional-survival and wellness principles that can be developed by emergency first responders.



For more information, go to www.firstresponderwellness.com

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What's New with... Thermal Imaging Cameras

With the greatly increased use of thermal imaging technology, the leading manufacturers have boosted their research and development efforts to provide firefighters with the most efficient and reliable equipment. In this Buyer's Guide we highlight the latest offerings from the World's leading suppliers.

Bullard

Thermal imagers manufactured by Bullard are designed to endure the harshest environments to meet the demanding needs of firefighters. The Company introduced its first high-resolution thermal imager to the fire service market in 1998 with the innovative Bullard TI. Today, Bullard continues to lead the industry with innovative thermal imaging products and accessories with its newest line of thermal imagers...the X Factor Series.

Bullard's X Factor Series featuring the Eclipse® LDX, offers the latest state-of-the-art infrared engine technology and image processing techniques for the ultimate image performance in fire conditions. With the X Factor Series, firefighters are better equipped to capably address ever-changing fire conditions, identify egress points next to raging fire, and reveal potential victims in hot and smoky scenes.

The X Factor Series of thermal imagers includes the Eclipse LDX, T3X, T4X, and Eclipse X. Bullard plans to release the T3X and T4X in the third quarter of 2015, followed by the Eclipse X. All X Factor Thermal Imagers come standard with an industry leading five-year, full service warranty on parts and labor. In addition, all X Factor Thermal Imagers are eligible for Bullard's upgrade program available through December 31st 2015.

 For more information, go to
www.bullard.com



Scott Safety

As a world leading provider of advanced thermal imaging equipment to the fire industry, Scott Safety prides itself on its unique ability to enhance the performance and operability of its thermal imaging cameras well beyond their core and most basic function. Our cameras are well-known for providing firefighters with the ability to fully interpret a fire scene and make better, safer, tactical decisions.

Our X380 thermal imaging camera powered by ISG TECHNOLOGY, provide firefighters with an unrivalled level of situational intelligence, they provide unique hot spot tracking, an enhancement that enables firefighters to immediately identify high-risk areas in the floor or ceiling of a fire scene, its equally unique cold spot tracking enhancement, helps firefighters locate gas or chemical valve leaks and the cameras tactical colour, gives the user a true visual picture of rapid heat changes.

Scott Safety employs the largest and most comprehensive engineering teams of any dedicated firefighting TIC manufacturer in the world. Based across two continents in four separate facilities, our exceptional in-house development team are able to create and develop product enhancements that ensure our thermal imagers remain at the forefront of technological advancement.

Owning a Scott camera you'll be getting the most technologically advanced thermal imaging solution, designed specifically for your application in the most extreme environments, and you'll get total peace of mind and absolute support with our complete after-sale service throughout the life of your product.

 For more information, go to
www.scotsafety.com/emea





MSA Safety

MSA introduced one of the first firefighting thermal imaging cameras over a decade ago. In the years following, we've refined TIC design through innovation and expertise, delivering several successful generations of market-leading TICs. Our state-of-the-art cameras help you in various situations, such as fast and safe navigation in smoke filled rooms.

As our EVOLUTION® 5000 TIC series could not easily be upgraded to fulfill the new American standard NFPA 1801 (Standard on Thermal Imagers for the Fire Service) we decided to develop a new TIC. The EVOLUTION® 6000 TIC platform comprises three models to offer the best mix of features, including NFPA 1801 compliance, to support the thermal imaging needs of all first responders.

NFPA-compliant third-party certification, non-incendive equipment (UL Class 1, Div 2 which equates to ATEX equipment group II [industrial], zone 2, gas group IIB) for additional safety within combustible environments, fireground-tough product design provides waterproof shock resistance, and a Camera Configuration Application customize camera settings to meet customer needs.

EVOLUTION® 6000 Basic TIC provides easy to use performance – a simplified fireground tool. Standard flashlight provides extra visibility for firefighter proximity to enhance safety and situational awareness. Laser pointer pinpoints hot spots and other areas of interest to allow others to take fast, specific action.

EVOLUTION® 6000 Plus TIC adds additional tools to aid and improve fireground safety and decision making. 2x / 4x zoom gets a closer look at areas of interest. Six user-selectable colour palettes provide flexibility to view thermal images. A compass allows for faster rescues and improved situational awareness by displaying letters or icon for directional information. Optional integrated video transmitter enables remote monitoring for improved decision making.

Optional integrated range finder offers more usable information to enable faster, more precise action from a distance of 5 to 30 meters (replaces flashlight option).

 **For more information, go to**
www.msasafety.com

Halo Thermal Imaging

Halo Thermal Imaging, based at Durham Tees Valley Airport recently launched the first true, hands-free thermal imaging camera at the Interschutz tradeshow in Hannover, Germany. The Halo is a game changer for the industry, providing firefighters and first responders with the freedom for versatility required in hostile environments. With its patentable technology; it's the future of firefighting.

The Halo is the world's smallest and lightest camera built for firefighting and search and rescue. Attaching the camera to a firefighters helmet, in the same manner as a torch, gives the user the ability to use both hands with The Halo providing crystal clear images. Weighing in at just 390g, The Halo also features a 10-hour battery life, 2.5" high definition display, snap shot function and superior dynamic range. When temperature is important to the wearer, spot temperature measurement and multi colour maps are available as standard with a single button configuration making for very simple operation.

Head of Innovation at Halo, James Brooks, says "Having been involved in thermal imaging for nearly two decades we know the importance of giving firefighters as much information as possible. To do this and to give them freedom of movement at the same time was a logical step." James went on to explain, "To design and build a compact camera at only 60mm x 70mm x 125mm and bring the weight below 400g was our target. To then give the wearer the ability to move the display was then another challenge knowing how difficult some of the environments are that they operate in. It has to be robust to withstand high temperatures and also the hard knocks that can happen on the fire ground. We are extremely proud of the result."



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These lifesaving pieces of equipment are valuable tools for essential orientation when fire, smoke and darkness make navigation difficult.

They are all equipped with an integrated laser pointer which enables team members to communicate effectively and warn each other of potential dangers.

The devices help firefighters to manage the challenges they are faced with, such as assessing situations, measuring the size and scale of fires, or searching and finding injured persons. Dräger's cameras generate an instant, clear picture of different heat signatures not visible to the naked eye, covering a wide temperature range of 40 °C to 1000 °C.

The Dräger range of thermal imaging cameras

- **UCF 6000** – delivering excellent image quality even under the most extreme conditions, characterised by its ease-of-use and essential, innovative functions.
- **UCF 7000** – users can see more and make better decisions with the optimal display options. The camera is intrinsically safe (ATEX zone 1) and offers the maximum level of reliability.
- **UCF 9000** – thermal imaging and digital camera in one, ensuring firefighters are well equipped for every task.



For more information, go to
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FLIR Systems

FLIR Systems is adding the K2 and K65 to its industry-leading lineup of K-Series thermal imaging cameras that provide firefighters with the capability to see through smoke, locate and rescue victims, identify hot spots, navigate safely, and stay better oriented during response missions.

Extremely affordable thermal imaging for firefighters

The K2 brings FLIR's powerful life-saving thermal technology to a broader base of firefighters at a breakthrough price point. Powered by FLIR's Lepton® camera core, the compact K2 delivers detailed thermal images at 160 x 120 resolution and is equipped with FLIR's patented Multi-Spectral Dynamic Imaging (MSX®) technology that significantly enhances image quality, allowing firefighters to see key structural details in a variety of environments.

NFPA-compliant FLIR K65

The K65 is a feature-rich thermal imaging camera that is fully compliant with the NFPA 1801-2013 Standard for Thermal Imagers covering usability, image quality, and durability for firefighting. The K65 offers crisp 320 x 240 thermal resolution and features onboard video recording and playback, which is useful for debriefing and training.

The K65 also features FLIR's revolutionary Flexible Scene Enhancement™ (FSX) technology which significantly enhances scene detail and contrast in total darkness and smoke-filled rooms. FSX™ will extract image details, like edges and corners, from the original image. These details are weighted and combined with the original image to create an image with enhanced details, making them visible to the user, even in those scenes with extreme temperature dynamics that are typical for a firefighter's job.



For more information, go to
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Work-related Stress and Mental Health Issues in the Fire Service

Once upon a time the leading cause of absence from work was musculoskeletal complaints: bad backs, bad joints and the like. Not any longer. Although still number one, musculoskeletal impairments are closely followed by mental health problems, many but not all of them arising from work-related stress. The cause of the stress is largely an irrelevance for employers, the big issue is what can be done about the prevalence of stress-related illness in the Fire service?



Karen Jackson

Karen Jackson is Director and Senior Solicitor at didlaw and a leading authority on mental health disability and discrimination.

Life is a long-term health condition. All of us are subjected to varying degrees of stress both inside and outside of work. Common causes include relationship issues, financial worries, general concerns about the future, family, you name it, it can cause stress. Stress is in itself not an illness. Some people enjoy a healthy amount of stress and thrive on it. For others it quickly spirals out of control and can cause physical as well as mental symptoms: headaches, rapid heart rate, increased blood pressure. The threshold at which stress becomes a problem to health is different for everyone: two people subjected to the same stress will not necessarily respond alike. But left unchecked stress can become common mental health conditions like depression and anxiety.

There is plenty of evidence to show that the threshold for unhealthy stress is actually much higher in the emergency services because people who do this kind of work acknowledge when they enter the profession that it is a stressful one. Some are even drawn to it. Workers can also freely discuss stress in an environment which is inherently stressful if they so choose. Sometimes however that is not an easy discussion which is one reason why it can go unchecked.

So how can employers know who is at risk of unhealthy stress? Men are notoriously poor at expressing when they need help. Mental issues are seen as weakness. Men do not want to let on that they are struggling. The Mental Health Foundation is doing work specifically around how to engage men at work to be more mentally healthy and that begins with being open. And recognition that mental ill

health is every bit as real and as serious as physical ill health.

Mental illness can amount to a disability under the Equality Act 2010 if it is long-term and has a substantial adverse impact on daily function. The emphasis is on function not the label given to a health impairment. If there is a substantial impact in or out of work mental ill health can be a disability. If disabilities are present employers must by law make reasonable adjustments that can help the affected employee stay at work, return to work after ill health, aim for promotion, etc. Even if disability is not 100% established employers are advised to consult with affected staff to see what, if anything, can be done to retain talented people in the workplace.

So what does a reasonable adjustment for mental ill health look like? The legislation offers no prescription. The sky's the limit! A good dose of creative thinking may be called for. Starting by consulting the employee who is struggling or who feels they cannot return to work is always the best place. And remember: it's not a blanket "do everything" the employee asks. The starting point is for the employee to identify what practice, provision or criteria of the workplace is causing disadvantage. What is the thing making life difficult? Is it the hours? Is it the place of work? Is it the team he/she is in? Next: is the thing having a major impact? If the impact is minor or trivial the law does not require an employer to do anything. A sensible approach is advised however: if it seems trivial to an employer but is a big deal to an employee, and provided it is not too costly or too disruptive, why not give it a whirl? Many of the legal complaints I see on my desk arise from something simple being ignored. And remember too: treat

people like you do care. There's no faster way to a grievance and long-term disruption than to ignore a complaint whether you think it is legitimate or not. I never cease to be amazed at the lack of common sense and basic human consideration around reasonable adjustments and mental ill health at work. It isn't rocket science. Simple steps like allowing a late arrival or early departure so the employee can go to counselling is an obvious example. If you want to make sure the system is not abused ask to see an appointment card. Moving someone to short-term alternative duties while they get back in the swing of things after a period of mental illness is another obvious example of a simple and reasonable adjustment.

All too often I hear employers saying they cannot offer any adjustments. I doubt that is true in the vast majority of cases. Another thing I hear is "But I don't think it will make any difference". The solution is obvious: if it's a simple adjustment that you can make why not just try it out? If it doesn't work you can say I told you so and try again. If there is nothing that can be done you have discharged the legal duty and need do no more. Of course that doesn't mean you will avoid a tribunal but as long as a proper process is followed you will manage risk. If an adjustment does work you have a happier employee who will be back to work sooner and hopefully for longer. And also an employee who believes he/she is being looked after and who should give greater engagement. What's more, trying a possible adjustment that fails can only be insurance against potential Employment Tribunal proceedings. At least you tried.

I'm often asked "What is a reasonable adjustment?" Exactly what it says on the tin! Essentially it's any adjustment which might help a person with a disability, making it easier for them to stay in work or return to work after time off or making it easier for them to access promotion without unnecessary hindrance. But it must be reasonable. What is reasonable? I hear you ask. There is no hard and fast rule. It will depend on the size and resources of the organisation. The Fire service will have budgetary limits but probably more importantly it will have health limits in place to safeguard the public and other team members. If a mental illness causes a firefighter to undergo, for example, difficulty in making decisions, it might be advisable

Image courtesy of Andrew Rich 2012



for that person not to lead in an emergency situation until his/her condition has stabilised and/or resolved. As always there will be a balance to strike between the best interests of the individual concerned and the organisation. In a field intricately linked with safety and team work safeguards on safety may be a legitimate reason for an adjustment to be declined.

There is no right or wrong answer to reasonable adjustments. It is, like many areas of law, a grey area. What you need to know is that if an adjustment is reasonable and you won't allow it you may be breaking the law. And if you decline to make an adjustment for whatever reason you must document the steps taken to reach that decision if you want to be able to justify your decision to not make the adjustment and avoid liability.

So where do you go for more help? I am an expert in disability discrimination in the work context and with a particular emphasis on mental health. There's not much I have not seen or advised on. I'm only ever a phone call away. For free resources the Occupational Health adviser for your workplace may be able to come up with some excellent proposals for adjustments. Ask the employee who is asking for adjustments what might help. It seems like a no-brainer but it's one that often falls between the cracks.

Check out the free resources on disability online at the Equality and Human Rights Commission website

<http://www.equalityhumanrights.com/>. Their Employment Statutory Code of Practice provides an invaluable source of free advice and guidance in plain English and contains lots of practical examples. It can be downloaded and saved as a PDF for future reference here: <http://www.equalityhumanrights.com/sites/default/files/documents/EqualityAct/employercode.pdf>.

And if its mental health advice you are after look no further than the excellent website of the Mental Health Foundation (MHF) <http://www.mentalhealth.org.uk/>. The MHF leads on research around common and serious mental health conditions. Their website and guides offer a wealth of free guidance and advice to help dispel a lot of the unhelpful myths around mental illness.

If an all-round education on the subject is what you really want you can do no better than to come to one of our didlaw EDUCATION conferences. Visit www.didlaw.com/education.

Our next event, a one day course, Mental Health Disabilities and Stress at Work 2015, will take place in London on 21 October 2015. If you are a manager of people it will give you all the tricks and tools you need to successfully manage a mentally healthy workforce and reasonable adjustments around it. We promise not to let you leave until you are fully enlightened!



**For more information, go to
www.mentalhealth.org.uk**

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The Strategic And Operational Benefits Of Personal Emergency ID

After saying goodbye to his wife that damp, cloudy Tuesday, Bob got into his truck, sipped his coffee, and started to drive to work in a neighboring town about half an hour away. To Bob, it seemed like a pretty average, normal working day, but it was far from it.



Dr Treive Nicholas

He had recently started a contract job on a fairly large construction site with a range of essential building / infra-structure tasks and with colleagues he hardly knew. Bob sort of knew their names and their favorite football team, but not a great deal else. All in all, though, they were not a bad crew and they had the construction project on schedule.

At 11 a.m., without warning, an on-site electrical fault occurred, generating both fire and a large amount of hazardous smoke near to where Bob was working. Quickly overcome by the fumes, Bob tried to move away, but collapsed near-by.

The firefighters were first to the incident and located the source of the fire and Bob, who remained unconscious.

At this point, Bob's supervisor and co-workers realised how little they actually knew about him in order to help the paramedics when they arrived.

▼ A Personal Emergency ID regime immediately makes information available to first responders.

Fortunately for Bob, his site health and safety manager had implemented a Personal Emergency ID regime on site. When the firefighters moved Bob to a safe place the paramedics quickly assessed him and accessed his ID. They learned a lot very quickly.

This told them that Bob already had an underlying respiratory condition likely to have been severely exacerbated by the fire fumes. In addition, they learned his full name, what medication he took, and how to contact his family in the event of an incident like this.

I'm pleased to report that this incident had a happy outcome and that Bob returned to the site a few weeks later, fitter and holding down his job well. It illustrates very clearly how little is often known about employees and contractors in the event of an accident or medical condition arising.

In addition, we can see how small amounts of information about a person at the right time can have a very positive bearing on management of the situation by medics, first responders, and other professional incident managers.



Image courtesy of Vital ID

**Dr Treive Nicholas is
Director at Vital ID.**

Knowing a few simple things about a person at an accident or when a medical condition arises can have a significant impact:

- Who is he/she?
- How do we contact his/her boss or supervisor?
- How do we contact his/her family?
- Does he/she have any significant underlying medical conditions that could help paramedics when managing the situation?
- Is he/she taking any medication?

As we know, efficient and effective management at the start of an accident or when a medical condition arises, promotes the possibility of a positive outcome in the longer term.

Incidents like Bob's are happening worldwide in construction, on industrial plants, in factories, offices, railways, oil/gas sites, anywhere in fact. They can involve employees, contractors, lone workers, and teams. It's a pretty ubiquitous situation.

The Risk Management Toolbox

As I have illustrated, Personal Emergency ID should be viewed as an important component in the risk management toolbox, both operational and strategic for health and safety professionals in the Construction industry. At one level, ID is a low-cost tactical operational tool helping first responders at an incident, as well as simply helping with identification of workers day to day. In addition, use of Personal Emergency ID can be used to



Images courtesy of Vial ID

demonstrate best practice and proactive safety management when negotiating insurance premiums. Where the ID adheres to PPE, this can promote greater ownership of their equipment.

Implementing Personal Emergency ID also has a strategic benefit. In particular, it helps raise the bar, raising the standard of health and safety expected in a workplace. Used to augment training and enhance procedures, it can help to reinforce the workplace safety culture.

Following on from this, workers can start to take greater personal responsibility for their health and safety as they have promote the use of Personal Emergency ID themselves, without the intervention or coercion of the health and safety team. As a simple and effective part of the risk management toolbox, Personal Emergency ID can help to deliver a win-win for workers and their organizations – protect their people and their reputations.

Types of Personal Emergency ID

While there are many types of Personal Emergency ID, the main division is between those that are low tech and those employing some form of electrical device, scanner, telecommunications device, or chip. Outlined below is a cursory look at the options and some of the principal constraints you need to be aware of when weighing up which might work best for your health and safety regime.

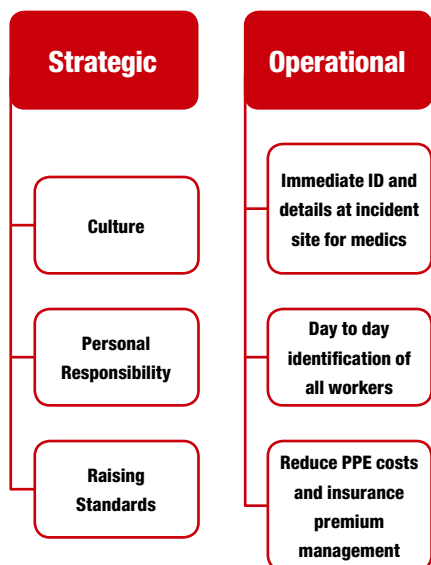


▲ Use of specifically manufactured paper prevents ink running when it gets wet.

Low tech

If we consider for one moment the low-tech Personal Emergency ID options, they cover a spectrum of devices, from dog tags to hand-written ID cards, wrist bags, and ID that adheres to hard hats and other PPE apparel. Their principal benefits are that they are low cost and can be accessed without the need for a computer, a bar scanner, or access to a cellular network.

Simplicity is key here. In the event of an incident, first responders can quickly see a few key pieces of information about the incapacitated person. These options are independent of any technology. While these devices are simple and low cost, they must adhere to the C.A.R.R. principle to be effective:



- **Conspicuous** – Visible and clear what it is and where it is.
- **Accessible** – The information has to be retrievable and readable.
- **Relevant** – The information needs to be accurate, not necessarily voluminous.
- **Resilient** – It is resilient both to the weather and to a person's demanding work regime.

We need to take a balanced assessment of any potential downsides or negative perceptions associated with all risk management tools. Some of the most frequently asked questions or statements include these:

"I only need provide Personal Emergency ID for workers who have a medical condition or those who take medication."

- Personal Emergency ID is not just for people with a medical condition, but for anyone who may be incapacitated following an accident. You do not know who has a medical condition. Many workers choose not to reveal their medical condition or medication to employers or co-workers. Workers often are prepared to write their medical condition and personal information on an ID when they know it will be useful in case of an incident or emergency.

"What about my data security liability?"

- Ensure it is the workers' choice if and what information they to supply. Employers can reasonably insist that an ID includes a worker's name and contact details for their boss. Leave it up to individuals to supply what other information they want on the ID for use at the time of an emergency.
- This has to be the individual's choice, and it encourages their ownership of their own health and safety. A softer approach will achieve greater worker participation without compromising your compliance status.
- Most products have tamper-proof seals or a similar device to ensure the data is contained securely, keeping private data private. This way, it is seen only by the right people in the event of an accident or medical emergency.

"Where the ID adheres to a helmet, does the glue damage the helmet?"



- In the past this may have been an issue, but today, mainstream manufacturers have specifically formulated adhesives to eliminate this potential problem. Many helmet Personal Emergency IDs now stick to hard hats for long periods without compromising their strength.

"Where the ID uses ink and paper to hold information, how do I stop it getting wet and losing the information?"

Look for a Personal Emergency ID system that is waterproof. In the first instance, go for a product that prevents water entering the ID. In addition, check to see that the paper or card used inside the ID is specifically manufactured to prevent ink running if it does get wet. Use of a permanent marker pen/ink can help a lot, too.

High tech

Having Personal Emergency ID in the form of a memory card or chip means that quite detailed personal information can be stored and read, but is conditional on first responders and incident managers having access to a device that can read it.

Some products use bar and QR codes, which once scanned enable first responders and paramedics to access the breadth of relevant medical and non-medical information. Like the use of memory cards, this is very effective at providing detailed information, but it does

rely on people at the scene of an incident, or nearby, being able to use devices to do the scanning and reading.

Particularly for lone workers and those working in the field, some Personal Emergency ID include a tracking device so the workers can be easily located in the event of an incident. Many rely on the cellular network, so the race is on to find low-cost global solutions that use satellite networks to pinpoint someone's remote location and allow them voice contact using adapted smartphones.

Back to Bob

While this is by no means a comprehensive review, it should provide you with an introduction to Personal Emergency ID in the workplace, along with the strategic and tactical benefits you can expect to leverage and some of the solutions available to you for more detailed consideration. But, in the end, it comes down to our people and our teams.

When fire broke out that fateful Tuesday Bob didn't know that the decision of his health and safety manager only a few weeks earlier to implement Personal Emergency ID at his site would have such a decisive and positive impact on him and his family – which, I suggest, gives us all food for thought.



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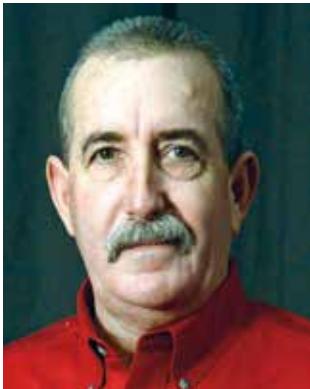
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Confined Space Rescue Operations

Rescue operations place special demands on the Emergency Response Team (ERT). The ERT must balance the complexities of site management with the intricacies of victim management to stabilize an effective and efficient manner while maintaining the safety of responding personnel.



James Hyles

Every situation presents unique challenges that can be overwhelming without a methodical, pre-determined series of response actions designed to guide the officers' thought processes and decision-making. The environment and victim condition(s) demand different strategies, and the first arriving officer's responsibilities include staging, size-up, and identifying response options. Officers must survey the scene by assessing the scope of needed rescue operations and safety precautions, while identifying available resources such as personnel, equipment, mutual aid, and agreements with private sector entities that include construction and demolition companies and hardware or lumber suppliers. Faced with this array of information, priorities, and options, officers must rely on incident management systems to direct their thought processes and guide their decisions.

▼ Various internal configurations and hazards.

Size up at any scene is the first step of evaluation that will determine the response action, and will continue throughout the response as changes in the environment, personnel, equipment, and victims evolve. Life safety is always the first priority to ensure minimal risk to the officer, response team members, and victims at the site. The first series of decisions is to identify the goals for the operation and the tasks required to accomplish those goals. The ultimate goals are rescue and life safety, but to determine the specific goals to accomplish rescue, information must first be collected about the location of victims and hazards in the environment, the nature of the victim's injuries, and the ever-changing nature of these mitigating factors. Information gathering includes observing the scene, talking to witnesses (and victims when possible), and determining their validity. Witnesses can provide crucial information, and officers will have a better understanding of the challenges they face, such as hazards or victims injuries, if they understand from witnesses how the scene came to its current configuration.

James Hyles is the Rescue Training Director for the Emergency Services Training Institute, a division of the Texas A&M Engineering Extension Service of Texas A&M University in College Station, Texas.



Image courtesy of James Hyles



Image courtesy of James Hyles

▲ Limited egress and vertical vessel.

Confined spaces present a variety of hazards to rescuers, many of which are obvious. The space may have limited entry and exit; there may be equipment such as motors, gears or agitators that hinder movement and could cause physical harm; it could contain grain, water, or other material that could shift and engulf the rescuer (the second-leading cause of death in confined space); or it may be poorly lit, have slippery surfaces, or impede communication between rescuers. But it's the hidden dangers that are the most threatening and the easiest to forget or ignore.

Every confined space should be considered dangerous until proven otherwise and precautions are taken to mitigate the potential hazards. Asphyxiation is the leading cause of death in confined spaces because the atmosphere is easily corrupted and atmospheric hazards are impossible to detect without monitoring equipment.

Rescuers often rely on their senses to

evaluate and identify hazards, a practice that is fundamentally flawed. Even when the physical senses may detect atmospheric hazards, the contact necessary for detection alone is often fatal. The only safe and reliable means for testing the atmosphere of a confined space is to use equipment designed for that purpose, and training rescuers to use the device.

Proper atmospheric testing requires deliberation and care. Approximately one-third of all confined-space fatalities occur after the space has been tested and determined safe for entry. Quick tests at the point of ingress are insufficient.

Above all, proper and regular training equips rescuers with the presence of mind to apply calm mental calculation to any rescue incident. Rescue scenes often are cluttered and confusing, and can present responders with a rush of information that can be overwhelming without a clearly established plan. Rescuers often fall prey to the idea that time taken to think through the operation is lost time, but without adequate understanding of the dangers imperiling the victim, the rescuer risks becoming a victim.

Confined space incidents demand a

systematic approach from rescuers, who must proceed carefully through the phases of recognition, evaluation, and control. This involves not only rescuers interviewing witnesses about the equipment and conditions that led to the situation at hand, but assessing the perimeter to determine which hazardous conditions can become immediately dangerous, identifying which conditions may be deteriorating or capable of deteriorating, and taking steps to secure the area against all of these threats.

Once the area around the confined space is secured, rescuers can begin to assess the space itself by analyzing the configuration of the confines; identifying products that may be stored in the space, as well as any mechanical or structural hazards the space presents; and locating important documentation such as entry permits and checklists, hot work permits, Material Safety Data Sheets (MSDS), and a diagram of the space. As with the perimeter, the stability of the confined space must be ensured, and the responders must make sure the proper personnel and equipment are on scene for the operation.

After all of these efforts to secure the scene and protect rescuers, responders must finally stop and determine if their precautions and risk mitigation are enough. If not — and this is a decision responders are reluctant to make — operations may need to shift from rescue to recovery.

A successful rescue operation depends first on the degree to which the rescuers have been trained to recognize on-scene hazards, to evaluate them and their impact on ensuing operations, and to control the scene's variables for the protection of all personnel. All of this precedes the actual efforts to gain access and stabilize, package, and extricate the victim.

Only training can equip the rescuer with the mental tools that enable methodical, careful analysis of the scene to override rash action. Only training can equip the rescuer with the knowledge to take full advantage of the life-saving monitors and equipment available to them. And only training can provide the rescuer the patience necessary to remember that the conditions that overcame the victim can, and will, overcome the rescuer without diligent attention to life safety.



For more information, go to
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To this end, one focus of the DSTO research program is to provide protection for individuals from unavoidable CBRN hazards. Current CBRN individual protective equipment (IPE) provides high levels of protection for long periods of time, having been designed to meet requirements originally perceived for military cold war threats. These garments impose a high thermal burden on the wearer, and can constrain user functionality and mobility. As such, user workloads are reduced and mission completion times are increased.

Reducing the burden associated with CBRN protective clothing would improve mission outcomes in a CBRN environment. As such the DSTO focus is to provide greater operational ability, to optimise the balance between protection and burden.

What do we mean by low burden? Burden can mean ergonomic/system integration/thermal/situational awareness. All are affected by CBRN IPE and there is traditionally a trade-off between protection and burden. For example,

high protection is relatively easily achieved in Level A Self Contained Breathing Apparatus (SCBA) equipment, but users can only operate for a short period of time. Current military CBRN IPE allows users to work for longer than Level A equipment; however CBRN ensembles still provide significant impediments to operational capability when compared to standard uniforms. Particular issues include reduced heat transfer ability through wearing heavy, bulky over garments, over boots which are cumbersome, bulky gloves which reduce tactility for fine motor tasks, and respirators which reduce field of view and communication ability. Functional requirements for low burden IPE garments can be defined as: light weight, low thermal burden, ease of movement and low bulk materials.

Modelling of current scenarios shows that high challenge levels are still possible, however exposure to these high concentrations is likely to be for short periods of time, for both military and civil response users. Longer term protection,

if required, will be against much lower concentrations. Additionally, CBRN IPE has historically focussed on liquid and vapour threats, and the inclusion of aerosol protection would improve protection for users.

These changes in scenarios have caused DSTO to reflect on user requirements for IPE and to articulate what low burden IPE means in the current and future environment. This has allowed DSTO to develop a clearer understanding of the requirements for modern IPE and to develop innovative programs for delivering low burden IPE through the application of novel materials. This two pronged attack allows DSTO to focus on the delivery of low burden IPE with both a requirements focus: what does the user need to be able to do their job effectively; as well as from a science perspective: what is achievable and possible from IPE fabric and materials systems. Combining this holistic approach

▼ Decontamination training,
Royal Australian Air Force, Amberley.



Image courtesy of the Defense Services photo gallery

► Training preparation for military engineers with basic personal protective kit.



Image courtesy of the Defense Services photo gallery

with high value test and evaluation capabilities allows DSTO to deliver high quality research into low burden IPE solutions for the ADF, an approach easily transferred to civilian first responders.

To produce effective low burden IPE that provides a significant improvement on current ensembles in terms of thermal and operational performance, fundamental questions need to be answered:

1 What are the likely dermally relevant challenges that users might experience?

Using plume dispersion models, like the US-developed Hazard Prediction and Assessment Capability (HPAC), with inputs from meteorological data, urban models and terrain models DSTO can predict the results from specific outdoor CBRN releases. The data generated includes the extent and spread of the challenge, how it spreads in the environment, what proportion of the contaminated area has “high” or “low” concentrations and how long the hazard remains in the environment. The HPAC plume modeling provides a predicted average value for outdoor releases.

Dispersion modeling can also be used to predict challenge levels for indoor releases. The models used generate a timeline, which demonstrates that concentrations experienced at a single

location are often highly variable. The maximum concentration achieved and the length of time that high concentrations persist are more important than simple average values when it comes to determining the protection required for people exposed to that environment. Using time resolved protection requirements allows DSTO to tailor the protection provided by the protective materials, optimizing protection.

2 Concept of operations: how long must users remain in IPE, endurance requirements, and work rate requirements

By combining the CBRN challenge predictive capability with war gaming (operations research) detailed effects on the user population can be determined. This is extremely useful for performing trade-off studies such as determining appropriate protection levels required, and what levels of heat stress might cause missions to fail. This allows DSTO to test

scenarios which are difficult or impractical to assess with field trials, and feeds back valuable information about protection requirements and thermal burden trade-offs in scenarios that users could be expected to experience on the ground. It also allows DSTO to target physiological experiments to provide the best data available with minimal resources.

Once these questions have been answered, this defines what the users need or desire. Within the limitations of current technology DSTO (and more broadly Defence) then has a clear basis from which to develop requirements for low burden IPE that can provide a significant improvement in capability for users.

A parallel approach is to take scientific concepts and determine how effective they are at providing protection; this allows scientists to take innovative approaches to solve the problem. For example for IPE material concepts: if we make a fabric with particular properties what would it look like? How well will it provide protection? How well will it perform in an operational

Science driven concepts allow us to determine where the knowledge gaps are. With specific designs, how would we make them work, what future investigations for different components are needed?



◀ CBRN training exercise debrief, military engineers.

New evaluation systems

Being able to effectively measure the protection and performance provided by low burden IPE is critical to its success. To that end, DSTO has a suite of tests available to measure the performance of IPE. We can effectively measure the relative thermal performance of different IPE systems through fabric swatch testing, and thermal manikin testing to evaluate expected thermal burden and translate this information into the loss of capability or functionality for the user. Chemical protection capabilities of the materials can be tested in purpose built facilities against target chemicals of interest. However fabric swatches only provide part of the story, as extremely effective fabrics do not make extremely effective suits unless the design is right and closures and seams minimise leakage gaps. DSTO's manikin test facility is currently being validated and will provide system level detail on the protection capabilities of suit systems and integration of IPE.

Current international best practice systems testing of this type measures end point skin exposure values, which provides the cumulative results of leakage under the suit at different points on the body across the entire program of manikin movements. DSTO has developed real time breakthrough measurement capability that allows scientists to monitor vapour challenges breaking through the suit, and to correlate the break through events with particular movements or exercises. This capability will add to the available data to determine causes of suit failures from either fabric, suit design or system integration issues.

The combination of fabric swatch testing and manikin testing for chemical and thermal performance provides DSTO with the ability to assess different IPE suit systems in detail, and to determine if IPE systems meet requirements. These results, combined with modelling of use scenarios allows DSTO to deliver advice on the most effective equipment combinations to optimise the trade-off between protection and thermal burden effects of CBRN IPE.

➔ For more information, go to www.dsto.defence.gov.au

environment? DSTO can evaluate the gain in performance versus the protection and how this compares to those options generated from the requirements studies.

Science driven concepts also allow us to determine where the knowledge gaps are. With specific designs, how would we make them work, what future investigations for different components are needed? What is possible, what is improbable/too far-fetched?

Two different developments at DSTO highlight laboratory work which showcase the requirements driven (systems testing) and science driven (novel materials development) aspects of our work.

Novel Adsorbent Fabric

DSTO is investigating an innovative nanofibre membrane concept as an alternative to activated carbon

cloth/skrims in protective clothing. In current technology suits, combined aerosol and vapour protection can only be delivered through air impermeable membrane materials which cause significant thermal burden. DSTO is investigating a lightweight aerosol filtration membrane made from nanofibers. These nanofibers are generated with adsorbent media inherently embedded in the fibres, to provide protection against vapour challenges.

Proof of concept work has shown that this composite membrane can successfully remove vapour and aerosol challenges from the airstream, while providing some air permeability. DSTO is now advising the Defence Materiel Technology Centre on the progression of this technology from the research concept stage.

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Inside Task Force Tips

The month of June saw a very busy trade show schedule for the team at MDM Publishing. The “silly season” of events started with Interschutz in Germany followed immediately with Firex in London and then straight across to Chicago, USA for the NFPA Conference.



Mark Bathard

Indiana based Task Force Tips made their presence known in Germany and in Chicago with their range of firefighting equipment. Following the NFPA Conference I decided to see for myself how this family orientated business has grown from strength to strength by visiting their offices and factory in Valparaiso near Chicago.

Task Force Tips Inc. was conceived by founder Clyde McMillan in 1968 who was a fire chief with the Gary Task Force Civil Defense Fire Department in Indiana. He came up with the idea of an automatic nozzle and made the first design on a napkin, this was the birth of TFT and manufacturing began in the basement of the family home.

Fast forward to 2015 and Clyde's son Stewart is at the helm of the company and along with the 300 plus workforce,

◀ The original napkin with Clyde McMillan's drawing.

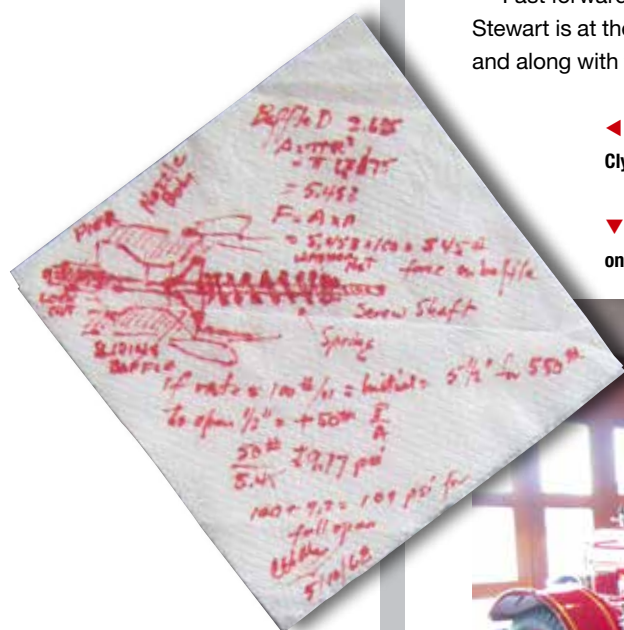
▼ One of three vintage fire apparatus on display in the TFT museum.



▲ The impressive facade ensures visitors are left in no doubt about TFT's heritage.

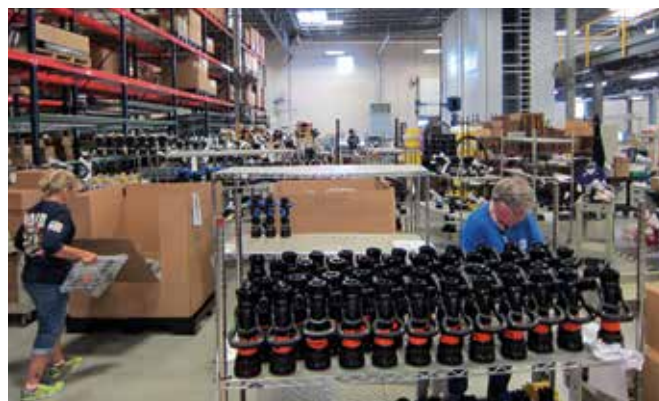
has been instrumental in making Task Force Tips one of the world's leading manufacturers of firefighting equipment.

This was my second visit to TFT, the last visit being in 2002 when the company was at its previous premises at Evans Avenue, Valparaiso. The sheer difference in size to Evans Avenue compared to the new facility is truly astonishing and just proves how innovative TFT are as a company.



Mark Bathard is International Sales Manager for MDM Publishing. Mark has been involved with the fire publishing industry for over 21 years.





▲ Clockwise from above: State of the art robotic technology ensures TFT remain at the forefront of quality and innovation. TFT fly the national flag of visitors to the plant at the front of the facility. Following thorough testing and inspection TFT products are carefully packaged prior to dispatch.

The first thing you see on entering the TFT facility is the facade of a firehouse which is where the company's own museum is located. This has been pieced together meticulously and offers visitors the chance to see items of firefighting memorabilia throughout the decades.

This is all overseen by TFT's own curator and is definitely a worthwhile visit.

The facility on the rather aptly named, Innovation Way is considerably larger than the previous plant on Evans Avenue and there are already plans in place to increase and utilise floor space so as to increase output and make TFT more efficient. One of the current projects is a new mezzanine flooring area which when completed, will add hundreds of square feet in the despatch area to make loading and unloading, packing and mailing more efficient. This new area has been fitted with the latest in lighting technology which

is controlled by movement so that lights only stay on for a designated period of time when required thus saving energy.

Keeping the workplace clean is a very important part of TFT's ethos, every Friday the workforce down tools and spend an hour before the end of their shift to ensure that the factory floor and workstations are in pristine condition. From the initial delivery of raw materials to the final stages of manufacture the process is so incredibly efficient. TFT's ongoing investment in their workforce, machinery and research and development just proves that they will remain the market leaders for decades to come and firefighters all around the World will feel safe in the knowledge that the equipment they are using has been tried and tested and will get the job done.

The welcome and hospitality shown by the team during my visit was incredible and I would like to thank TFT for making this possible.



For more information, go to www.tft.com

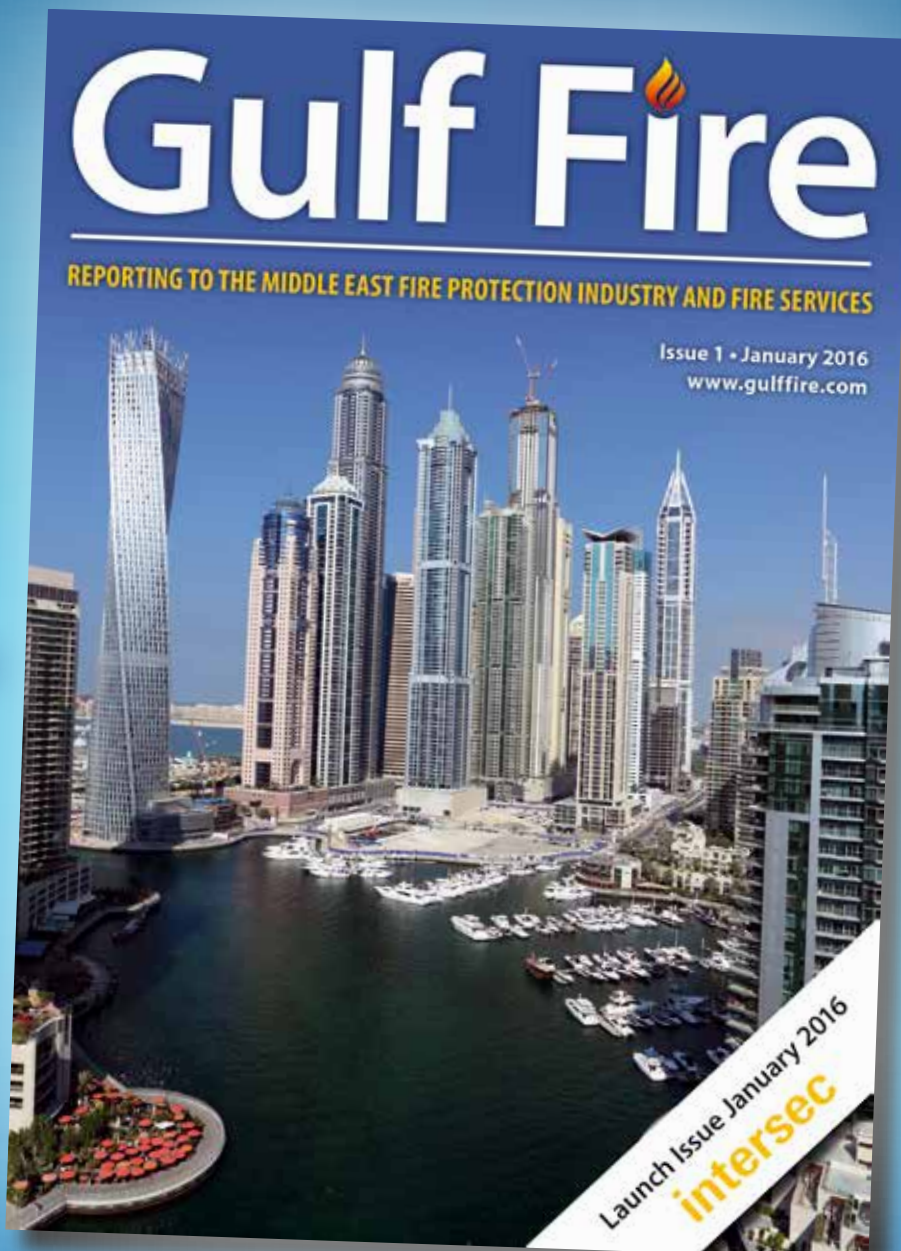


◀ The ultra modern and spotlessly clean facility is a credit to the company and its dedicated workforce – the new mezzanine can be seen on the right of the image.

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Introduction

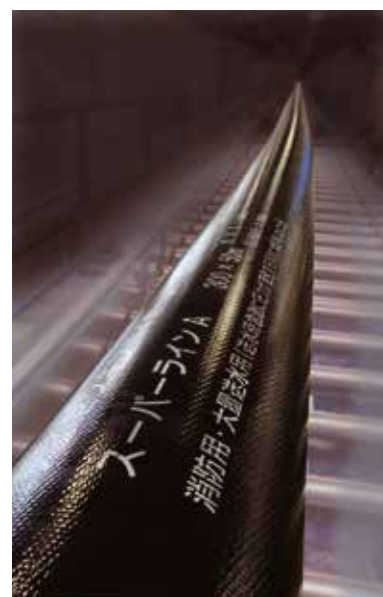
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	inch	4.0	6.0	8.0	10.0	12.0
Color		orange	orange	orange	black	black
Wall thickness	mm	3.5	3.5	4.0	4.6	5.0
Weight	kg/m	1.1	1.6	2.8	4.0	4.8
Burst pressure	MPa	4.2	4.4	3.6	3.0	2.8
Maximum working pressure	MPa	1.6	1.6	1.4	1.4	1.4
Temperature range	°C	-20°C ~ 50°C				



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Biogas-powered Buses and Decision Making During Incidents

All over the world, new alternative fuels are emerging to replace fossil fuels such as gasoline and diesel. The overall benefits are great but with new fuels and technical solutions, new risks emerge.



Johan Lindström

Peder Lindström
Petter Backlund

Johan Lindström is a Project Leader at SP Fire Research. He gained his Fire Protection Engineer degree in 2010 at Luleå Technical University, Sweden.

Johan's main interest field is First Responders, extinguishing systems and operational collaboration at large accidents.

Peder Lindström of SP Fire Research.

Petter Backlund of Fire and Rescue Greater Gothenburg.

The first responders face new situations that they are not familiar with and have to make decisions that they are not trained for. The lack of education and experience may have consequences on the society due to which kind of decision that was taken.

On today's biogas-powered buses, the gas tanks are equipped with temperature fuses to ensure that the vessels do not explode due to the increased pressure resulting from heating of the vessels. The temperature fuses activate when the temperature passes about 110 degrees Celsius. This means that all of the gas is released at a high pressure out to the surroundings. In most of the known cases where CNG buses has caught fire the temperature fuses has worked in a correct way and the gas has been ignited when leaving the vessel causing a massive jet flame. However, Lionel Perrette and Helmut K. Wiedemann describe in their article Safe Storage of Natural Gas on Urban Buses: Case Early Investigation and Learnings three different fire incidents where the fire has led to explosions of vessels. The reason for these explosions was not the failure of the temperature fuse. The vessels exploded when they were heated on a single spot that did not affect the temperature fuse. One question that has to be raised is if the only problem with biogas-powered busses is fire in the vehicle with risk of explosions or massive jet flames? What happens for example if the bus is involved in traffic incidents where the gas system in some way has been damage and a leakage has occurred? For the last years in Sweden, several traffic incidents has happened where the gas system on the bus has been damaged and the rescue leader has been afraid that leakage has occurred. Then a decision needs to be taken, but it is not always obvious what decision would be the correct to take.

Biogas-powered bus traffic incident in Gothenburg

In June 2013 a traffic incident occurred in the central parts of Gothenburg. Involved in the incident were one personal vehicle and the CNG (Compressed Natural Gas) bus shown in Figure 2. As shown in Figure 2 the personal vehicle had only touched the bus in the front. The damage on the bus could only be seen as small buckles and discoloration under the front window. What differed this incident from an "ordinary" traffic incident was that the bus had its CNG fuelling nozzle and a manometer placed in the front, and the manometer had been damaged in the collision, causing a small leakage of natural gas. The risk with leaking natural gas is that the gas is easy to ignite and have a flammable range from 4 to 16 vol %, causing a large explosive area if leakage occurs.

The rescue leader from Greater Gothenburg Fire & Rescue Services gave initial orders to close all the nozzles on each gas cylinder to stop the flow of gas. After one hour the gas flow had not stopped. The rescue leader was thinking about following three choices:

- 1** Keep the closures (150 m) and wait until the cylinders are empty. This would take about 4 days. High risks with the central location in Gothenburg, all surrounding buildings and the infrastructure.
- 2** Empty the cylinders by removing each nozzle. Also high risks with the central location in Gothenburg, all surrounding buildings and the infrastructure.
- 3** Towing away the bus to a safer area and then empty the cylinders. High risk to ignite the leaking gas with sparks from the tow truck.

Due to high risks with all these three choices the decision was to disconnect as much electrical device in the bus as

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Image courtesy of Fire and Rescue Greater Cölnburg

possible and drive the bus with the ongoing leakage in the front out of the city to a safe place and then empty all cylinders. This decision had effects on the society by having a closure of 150 m in the city for a few hours, and the traffic was stopped for a short time when the bus was driven out of the city. The incident commander was thinking in terms of following events due to the nature of each decision alternative. Other decisions could have had huge consequences on both the infrastructure and the general public. Due to the complexity in the society and in technical systems (in this case biogas-powered bus), it is more and more important to think in terms of escalating consequences when the incident commander selects what kind of decision he/she will make. This kind of escalating consequences can be called cascading effects, i.e. one incident starts and a chain of subsequent events follows. Depending on what kind of decision the incident commander makes, the chain of subsequent events can take different turns. One simple example of explaining this is a fire at a car repair company. In the building gas cylinders are stored for welding equipment. The rescue leader takes the decision to evacuate the area

and keep the enclosure for 24 hours according to recommendations where gas cylinders are involved in a fire. Next to the car repair company is the highway and railway; these are also closed for 24 hours. The stop in the railway and highway system has huge consequences on the society.

Cascading effects

Modern socio-technical systems are increasingly characterised by high degrees of interdependencies. Whereas these interdependencies generally make systems more efficient under normal operations, they contribute to cascading effects in times of crises. Therefore, challenges for emergency preparedness and response are growing significantly – challenges which are more and more relevant to both natural and manmade emergencies and are reinforced by the risks for cascading effects in complex emergency management environments. In particular complex environments which lack adequate resilience to certain initiators will be prone to cascading effects. An escalating incident in such an environment can lead to severe cascading effects and quickly become extremely difficult for emergency services to handle. The incident can

▲ Driving the bus with ongoing leakage to a place of safety.

ultimately have enormous consequences with respect to life, property and the environment and for both infrastructure and the general public. These consequences can in many situations have both direct and indirect effects, not only in the immediate surrounding geographical area but also across very large areas, potentially extending across borders.

The EU-project CascEff

SP Fire Research is coordinating the EU-project CascEff and performs the work together with 10 other partners from Europe. In CascEff four of the main objectives are:

- 1 Better understanding of the cascading effect in crisis situations.
- 2 Develop an Incident Evolution Tool for predicting past, present and future crisis evolution leading to cascading effects.
- 3 Identification of human activities in the crisis.
- 4 Improved incident management for present and future threats.



Images courtesy of Fire and Rescue Greater Gothenburg

▲ CNG bus involved in the accident. Orange arrow showing the position of leakage.

▼ Leakage of gas from the manometer.



CascEff will improve our understanding of cascading effects in crisis situations through the identification of initiators, dependencies and key decision points. These will be developed in the methodological framework of an Incident Evolution Tool which will enable improved decision support, contributing to the reduction of collateral damages and other unfortunate consequences associated with large crises. Use of the Incident Evolution Tool will be validated through its implementation into different incident management and training platforms representing different end users in the project (e.g. NoKeos, iCrisis, RIB, WIS and XVR). A roadmap for similar implementation in other incident management and training platforms throughout Europe will be defined to allow broad acceptance of the Incident Evolution Tool.

For more information, go to www.casceff.eu

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Innovations in Breathing Apparatus – Fit for Operational Effectiveness

Breathing apparatus (BA) has come a long way over the years. Some things however never change. Without breathable air, the danger to life is extreme and immediate. The use of self-contained breathing apparatus (SCBA) is therefore absolutely essential when it comes to keeping firefighters safe.



Martyn Lamb

Martyn Lamb specialises in the fire service segment at Dräger. Based between Dräger's Blyth and Hemel Hemstead sites, he has responsibility for UK product portfolio management on new products and services for the fire and rescue sector.

Before it, early firefighters – often referred to as ‘smoke eaters’ – had to face the deadly effects of inhaling smoke and carbon monoxide with little or no protection, risking their lives every single day.

Safety specialist, Dräger, has been at the forefront of breathing apparatus innovations for the past 125 years and continues to pioneer advances in technology designed to protect firefighters around the world.

This article looks at some of the key moments in the development of SCBA through the ages and considers the future of this vital piece of safety equipment.

An essential piece of kit

Without a doubt, SCBA is one of the most important pieces of personal protective equipment a firefighter on the front line wears. The equipment has the ability to protect against serious injury across the variety of different hazardous scenarios a firefighter faces on a daily basis.

Its overall purpose is to protect the wearer and ensure they breathe safely in an otherwise irrespirable environment – and it is one of the main risk control measures employed by brigades around the world.

As a result, through time, there has been a need to constantly innovate and develop in line with shifting Health and Safety regulations and increasing user expectations.

When it comes to breathing apparatus and the systems behind them, innovation never stops. New developments continue to be made as the fire industry moves forward; incidents require new tactics and firefighting procedures change.

Innovations through the ages – putting the user first

Breathing apparatus has a history of innovation which takes into account the many considerations around firefighter safety. As a safety manufacturer which upholds ‘Technology for Life’ as its guiding philosophy, Dräger has been at the forefront of many of these changes.

Fire service folklore recalls the days of firefighters growing long beards to help them breathe in smoke and thankfully, BA innovations have come a long way since then.

The history of breathing apparatus is long and varied – from the 1904 introduction of the first reliable BA set, with a service life of up to two and a half hours, to the modern day launch of the telemetry in 2001.

The needs of the wearer have always played an important part in BA innovations, as it is vital safety is never compromised. Comfort remains a key requirement as this can have a major impact on a firefighters’ ability to work safely and effectively.

As a result, comfort has been recognised through innovation for many years. For example, the Dräger model 1924 breathing apparatus was designed to be worn with a face mask, replacing the uncomfortable method of breathing inside a helmet.

Because of its weight, SCBA can put strain on the individual user causing fatigue, and, depending on cylinder capacity and the accessories used, SCBA has the potential to be heavy. As firefighters are regularly involved in strenuous activity, developments in lightweight equipment are particularly important.

In 1929, Dräger developed light metal cylinders for respiratory protection and by 1998, technology had advanced to launch the lightest weight carbon composite

cylinders, manufactured out of its Blyth, Northumberland plant – itself becoming the centre for excellence in BA manufacturing in 1980.

Wear and tear is another key consideration – particularly when thinking about the life-span of the equipment and cost implications for fire brigades. The introduction of state-of-the-art harness materials, moving from textile covered foam to a closed-cell rubber harness – specially designed to withstand the high level of impact on a daily basis – means today's equipment is more suited to extended wear and frequent use.

Resistance to chemicals found today is also very important, meaning less time away from being decontaminated by specialist cleaning service providers.

Pioneering new ground

Dräger breathing apparatus has also played a big part in ground-breaking historical milestones over the years, including the 1913 world altitude record for aeroplanes, set with the help of Dräger high-altitude breathing apparatus.

In 1931, oxygen devices developed by Dräger allowed Dr. Auguste Piccard to become the first person to fly into the atmosphere using a gas balloon.

And, Dräger BA sets helped the first men to reach the summit of Mount Everest in 1953. Sir Edmund Hillary and Tenzing Norgay reached the top of the world's highest mountain, with the support the company's breathing technology.

State-of-the-art solutions for a new era of firefighting

The BA of today is now more advanced than ever before and there are more options available to firefighters, according to their individual needs.

Technological advancements have enabled companies like Dräger to invest in state-of-the-art new techniques. The innovative pressure mapping technique for example, has created an optimised design which works around the human form. It identifies key pressure points and uses advanced motion analysis techniques to help visualise how objects move in relation to each other, improving the harness positioning on the latest Dräger designs and giving the wearer comfort and stability.

One of the biggest issues faced by firefighters wearing breathing apparatus is communicating effectively whilst in

Timeline of Dräger BA innovation

1889 – Patent for Lubeca valve delivered to Johann Heinrich Dräger, making it possible to control the removal of carbon dioxide from high pressure cylinders.

1900 – Oxygen supply device for high-altitude flights developed.

1904 – Model 1904/09 is the first reliable long-term BA kit, with service life of two hours.

1913 – World altitude record for airplanes is set with the help of Dräger high-altitude BA.

1915 – Dräger goes into mass production of respiratory protection masks in Germany.

1924 – The model 1924 BA can now be worn with a mask, replacing the uncomfortable method of breathing inside a helmet.

1929 – Dräger light metal cylinders for respiratory protection are developed.

1931 – Oxygen devices developed by Dräger allows Dr. Auguste Piccard to be the first person to fly into the atmosphere using a gas balloon.

1953 – Summit of Mount Everest is reached for the first time by Sir Edmund Hillary and Tenzing Norgay with the support of Dräger breathing technology.

1953 – The PA 34 and DA 59 self-contained breathing apparatuses are developed.

1965 – Breathing apparatus manufacture moved from Germany to Blyth, Northumberland, UK.

1965 – Plastic high pressure gas cylinders are developed.

1966 – BG 174 BA using 200 bar cylinder pressure is made possible by the use of high alloy steels.

1969 – Dräger is the first company to use 300 bar technology self-contained breathing apparatus.

1969 – The Model PA 54 becomes the European standard.

1975 – PA 80 becomes SCBA international standard and the Panorama Nova full facemask is developed, combining comfort and quality. This is still one of Dräger's most popular respiratory protection masks.

1980 – Dräger in Blyth, Northumberland, becomes the centre of excellence for BA manufacturing.

1992 – PA 94 SCBA and Futura respiratory protective masks are launched.

1997 – Draegerman PSS 500 SCBA is launched and the PA 93 Plus, developed in Blyth, Northumberland.

1998 – Draegerman PSS 100 SCBA is launched. Carbon composite cylinders developed in Blyth.

2000 – The first Merlin telemetry prototype and LDV developed in Blyth, Northumberland.

2001 – PSS Merlin telemetry board is launched which provides an overview of those wearing respiratory protective devices, thereby increasing safety.

2006 – Bodyguard 7000 is developed in Blyth, Northumberland.

2008 – Bodyguard 1000 and PSS 7000 developed in Blyth, Northumberland.

2010 – PSS 3000 and PSS 5000 SCBA are launched and the Merlin telemetry modem is developed in Blyth, Northumberland.

2013 – The integrated wireless variant of the Bodyguard 1000 ADSU, the Bodyguard 1500 launches to the market.



which has been welcomed by brigades, who trust that their workforce is well looked after. Remote monitoring through the telemetry system means teams can react immediately in the event of an emergency.

One of the key aims for Dräger within the context of the fire service, is offering Fire Authorities a total system solution where the total sum of the parts equates to the safest possible solution for firefighters. All the elements need to fit together with precision giving firefighters the ultimate protection in every situation, whilst demonstrating cost efficiencies.

The breathing apparatus of tomorrow will continue to be driven by technological advancements, user needs and regulatory changes. With chemical, biological, radiological and nuclear concerns in today's society, firefighters must be equipped to face a range of different hazards. New standards are being implemented regularly around the world.

As the sector continues to face new challenges, continuous innovation means that whatever the future holds, firefighters will be fully prepared for any situation they may face.

 For more information, go to www.draeger.com

a hazardous situation – heightened by the number of well-documented communication failures through the years and missed messages contributing to firefighter fatalities. Often, a fire scenario will take a firefighter out of sight and communication and monitoring plays a vital role in protecting teams on the front line.

With many years' technology behind it, Dräger has developed the advanced PSS Merlin System to support the needs of firefighters and it is currently the only telemetry system in operation within the UK fire sector. The system is a fully automatic, electronic breathing apparatus monitoring system, designed to enhance the safety of the firefighter during active firefighting duties, maintaining a disciplined entry control procedure and the accountability of all team members.

The system goes hand in hand with its Bodyguard 7000 – an electronic monitoring unit which provides continuous monitoring of personal information and operational status, including most importantly an accurate calculation of remaining air time which is updated every second and is based on current air consumption. An integrated system, designed with optimum comfort at the forefront, is then shared and monitored via the Entry Control Board, allowing the BA Entry Control Officer to monitor the exact status of up to 12 individual team members. Used alongside the new Merlin PC Modem, user monitoring has advanced from single Entry Control Point to the monitoring of an entire incident.

As a result of innovations like these, the concept of improved safety is one



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Training Simulators: Risk-Free, Realistic and Programmable

Today, simulators are being used in an ever-increasing number of areas, particularly when real-life training would be overcomplicated, excessively expensive, ecologically untenable, or simply too dangerous. Emergency responses by the fire services most definitely fall into this category.



Markus Zellinger

With this in mind, Rosenbauer is an example of a company that has considerably expanded its driver training range. Apart from the Panther tactic simulator for airport fire services, which has been in successful use for a number of years, a system for municipal firefighters called the Emergency Response Driving Simulator (ERDS) has now been put into operation.

Both systems facilitate the risk-free and highly authentic training of conduct in particularly problematic or unusually dangerous and stressful situations during the drive to an operational scene. Moreover, due to the latest technology, the simulators also offer absolutely realistic handling and surroundings that are accurately represented down to the smallest detail. This allows the training of widely divergent response drive scenarios in order that, above all, the correct reactions in critical traffic situations are learned. Simulator training enables fire truck equipment operators and drivers

to obtain routine in those situations, which for the reasons already mentioned cannot be practiced on the road.

Hundreds of Scenarios

Training drives using the ERDS can be designed in a highly individual manner. As soon as the driver switches on the blue light and the Martins horn, the rest of the traffic reacts to the special rights of the emergency vehicle. Every type of weather and sudden changes in conditions can all be emulated, as well as differing light levels and night driving in fog, for example, increasing danger of black ice, operations with differing payloads such as an outward trip with full extinguishing agent tanks and the return journey with empty tanks.

In addition, the reactions of other road users can be integrated into the training. A child that suddenly runs into the road; a cyclist, who when turning, disappears into the driver's blind spot; a bus that leaves a stop without indicating, as well as ill-disciplined drivers in front of a red light or in a jam who suddenly close the emergency corridor. Furthermore, the truck driver's own conduct can be analysed with regard to errors such as turning without indicating

▼ The system has the ability to provide multiple scenarios.



Image courtesy of Rosenbauer

Markus Zellinger is Head of Training at Rosenbauer.



Image courtesy of Rosenbauer

▲ **Student and instructor undertaking post-training review.**

because the vehicle is being driven with blue light. Simulator training represents special instruction, as the participants, who as a prerequisite must be able to drive a truck, learn how to react in exceptional circumstances.

Realistic Surroundings

The ERDS driver's cab is identical to a Mercedes Benz Actros with all the original controls and indicators, as well as automatic transmission. The imitation cabin is mounted on a moving platform fitted with three electrically driven spindle actuators, which means that the cab moves as if during a real drive. Jolting due to collisions with the pavement or vehicle movements, for example, due to lane changes are simulated accordingly and can be felt. The image of the roads and freeways, irrespective of whether in urban or rural surroundings, is projected onto the windshield and side windows, while TFT monitors replace the rear view mirrors.

At present, the ERDS offers 120 kilometres of rural roads with differing widths and gradients, bridges, underpasses and railway crossings. Another 60 kilometres, which run through various residential and industrial areas, are available along with 40 kilometres of freeway with access roads and exit slipways, tunnels, roadhouses and gas stations, as well as all the related signalling systems. These stretches can be combined at will along with the events/scenarios that have to be dealt with during the drive.

Driving and Extinguishing

While the ERDS serves operational response training, the Panther Tactical Simulator is used both for practicing the drive across the airport and the subsequent extinguishing attack. The grounds of the airport including the runways, access roads, apron, tower, arrival and departure lounges, and firehouses are shown in every detail. Any airport, complete with all its features, can be fed into the system along with various types of aircraft with the Airbus A380-800, Boeing 737, Boeing 747-400 and MD-11 available as standard.

As is the case with the ERDS, the road holding and handling of the Panther in the simulator alters in line with the payload and the surface. The extinguishing technology is guided by the original control elements and all the monitors (front, roof and extinguishing arm) are equipped for one-hand operation and able to emit all the extinguishing agents carried on board. First and foremost, the correct positioning of the vehicle for the extinguishing of a burning aircraft or engine is practiced, along with the choice of the correct extinguishing agent, the optimum throw distance and the precise manipulation of the piercing tool. The latter is employed to penetrate vehicle and container walls in order to extinguish fires from the inside. The operator can actuate a diversity of fire scenarios and smoke, flames, explosions and turbine re-ignition are all possible.

Cutting Edge Technology

The Panther simulator consists of an original cabin with an eight-metre diameter 210 degree projection surface in front

that has a height of four meters. The simulator also includes a separate instructor station from which the various operational situations can be programmed and the training guided. The projectors are fitted with edge blending software and produce a seamless and very bright panorama image measuring 56 square metres.

The driver is confronted head on by all the operational events on the huge projection surface. The two main mirrors are replaced by monitors and thus provide the driver with all-round vision. This means that when he or she looks out of the vehicle to the left, right or above, the surroundings are visible just as in a real operational response.

Stationary and Mobile Solutions

Rosenbauer offers simulator courses at both its training centre in Leonding in Austria and directly at fire services and other emergency organisations. The ERDS can be simply packed onto a swap body vehicle and then set up at the customer's premises. In addition to training from Rosenbauer's instructors, both simulators can be rented or purchased. For example, in June 2014, a Panther Tactical Simulator was put into operation at Kuala Lumpur Airport.

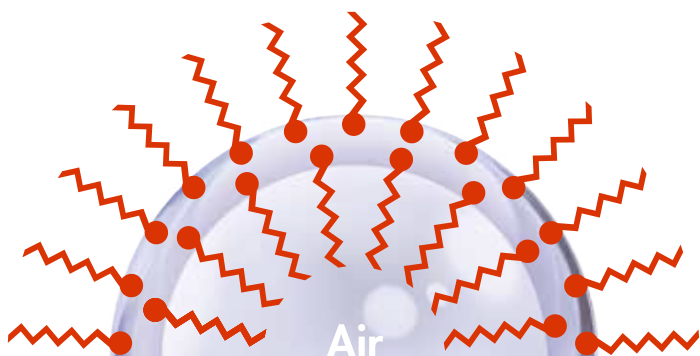
Basically, simulator training contributes to learning how to correctly assess dangerous situations and the rapid defusing of potential accident situations, the early recognition of the intentions of other road users and their accurate interpretation, the clearly recognisable expression of the driver's own intentions in traffic for others, the proper handling of stress during emergency responses and in the final analysis, a reduction in the number of blue light accidents.

The major advantage of simulator training lies in its lack of risk and capacity for reproducibility at limited cost. There is no wear and tear, extinguishing agent use, or vehicle damage even if accidents are frequent during the training phase. Moreover, most importantly, driving practice is obtained along with an intuitive ability to react quickly and correctly in situations, which as a rule can otherwise not be practiced.



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 **Hydrocarbon surfactant**
(Hydrocarbon tails are fuel-loving)

FORCEFUL F3 APPLICATION:

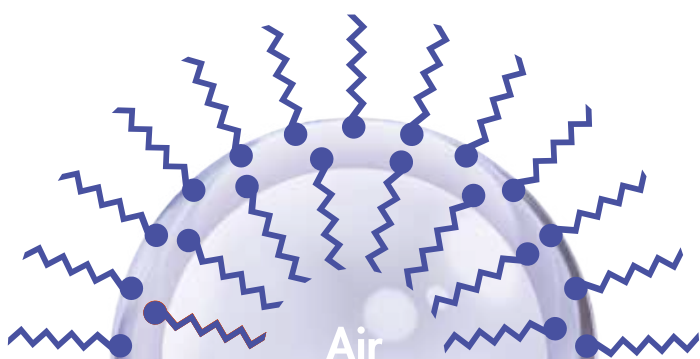
- Foam attracts fuel
- Foam becomes flammable
- Foam has reduced performance
- Foam use is increased

Need proof? See F3 foams on fire:



FORCEFUL AFFF APPLICATION:

- Foam repels fuel
- Foam is NOT flammable
- Foam has superior performance
- Foam use is reduced



Fluorinated foam bubble

AFFF Foam **repels** hydrocarbon fuels

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Uncovering the Chemistry Behind the Forty-Year Relationship

As any firefighter will know, understanding the cause of fire is a crucial factor in identifying potential improvements in fire safety and prevention. The UK's fire brigades are the primary responders to chemical, biological and radiation incidents across the country and a growing number of fire brigades are turning to independent, scientific expertise to provide them with fire investigation support and technical advice. This article looks at the science behind the relationship between the global leader in compliance and London Fire Brigade (LFB), and the role it is playing in fire prevention and mitigation.



Steve Day

Steve Day is Technical Director for Bureau Veritas and has worked as a scientific advisor to numerous UK Fire & Rescue Services since 1983. Within his role he has been closely involved with a huge variety of Fire Brigade incidents, providing expert advice in dealing with hazardous materials and also in investigating the causes and spread of fires.

The need to investigate and determine the exact causes of fire is greater than ever before. In 2013-2014, the UK's fire brigades attended approximately 170,000 fires nationally. These incidents resulted in 275 fatalities and some 3,600 casualties. Yet, the impact of a fire goes beyond even human loss. The economic impact can be enormous too, with the cost to property damage, lost business, fatalities, injuries and legal issues estimated to be in the region of £8.3bn in England alone. Developing a greater understanding of fire and the causes behind it will help our emergency services and the UK's businesses to develop preventative measures to safeguard

against human and financial loss. And it is here that science is providing so many fire services across the UK with the answer, with brigades such as Greater Manchester, Merseyside, Essex, Kent and Hertfordshire – to name just a handful – turning to Bureau Veritas for expertise and support.

The UK's emergency services first recognised the importance of utilising scientific expertise as far back as the late 1960s, when Bureau Veritas and its predecessors started attending both major and minor incidents across the capital alongside London Fire Brigade. What started off as infrequent, ad hoc assistance has grown, decades later, into a close collaborative contractual working relationship between the two organisations. Today, Bureau Veritas offers round-the-clock support and technical advice to LFB, the busiest fire service in the UK.

▼ Bureau Veritas Fire Science department helps LFB to better understand the causes of fire.



Image courtesy of Bureau Veritas

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Image courtesy of Bureau Veritas

Expertise On Hand

It is the scientific expertise that is the very essence of the service that Bureau Veritas offers LFB. Using an independent third party organisation gives LFB access to a team of highly skilled chemists, as well as state-of-the-art resources and laboratories across the country. It also means that Bureau Veritas's fire science team of specialists can attend an incident alongside the Brigade's own team, where they can begin to carry out a full scientific investigation by selecting and analysing samples on the scene for further investigation at one of our laboratories.

At our purpose-built forensic fire laboratories, Bureau Veritas specialists can also help LFB to accurately establish the cause of a fire by using methods such as analysing burning behaviour of materials and the latest x-ray techniques.

Using x-ray is a useful means of helping to understand the cause of electrical fires, allowing identification of metal components within a sample of debris. Importantly, this technique is non-destructive and so helps to preserve all evidence.

Using x-ray can also help LFB understand more about household

appliances. This can include, for example, identifying any common faults among manufacturers or among particular types of appliance and establishing any common patterns. Indeed, the reports that Bureau Veritas has provided to LFB have even, on occasion, led to behavioural change amongst manufacturers.

Each investigation is followed by a detailed report to LFB outlining our findings, as well as any recommendations for fire safety improvements. LFB can then use this information to develop fire prevention and safety strategies; we may also work in conjunction with government agencies and organisations such as Trading Standards, Health and Safety Executive and Her Majesty's Coroners.

Using a third party to provide this kind of expertise in the field of fire investigation means that LFB is utilising highly skilled and experienced forensic specialists to add value to their own Fire Investigation Teams, using the latest scientific innovations and methods. In addition, all of services and investigations provided are compliant with regulations, codes of practice and professional guidelines, providing LFB with professional assurance.

▲ Each Bureau Veritas investigation is followed by a detailed report to LFB with recommendations for fire safety improvements.

Qualified Support

Fire investigation accounts for a large proportion of the service that Bureau Veritas provides to the London Fire Brigade. Another important area of support is advising LFB on the handling of hazardous materials. With the use of chemicals increasingly widespread across business and homes, it is important that LFB can call upon qualified scientists who are able to provide expertise and support at chemical, radiation and asbestos-related incidents. These incidents can range from the everyday, such as a chemical leak in a swimming pool, to the more serious and potentially catastrophic which might include, for example, fires containing radioactive materials.

In this field, we are able to provide LFB with on-site and remote support in dealing with hazardous materials and environmental protection. Again, the service we offer LFB enables our specialists to be first on the scene alongside fire crew colleagues, providing end-to-end support

► Bureau Veritas has worked with LFB for more than 40 years, offering round-the-clock support and technical advice.

and helping to detect, identify and monitor any hazardous materials. This may include, for example, using methods such as sampling, spot testing or carrying out detailed chemical analysis with state-of-the-art equipment.

Bureau Veritas also provides London Fire Brigade with expert advice on the safe decontamination of a scene and works with fire service colleagues to develop a remediation strategy. We are also an important link between LFB and third party agencies, such as the Health and Safety Executive or Environment Agency. As is often the case with these incidents, several agencies may also be involved and our experts are able to liaise with their technical counterparts throughout the process to help determine a safe and swift resolution – keeping the time required from senior staff down to a minimum.

The final strand of the service that we offer is in the maintenance of skills of fire



officers. Much of this is scenario-based, where we will identify the latest emerging issues, such as new chemical hazards or the best methods used to manage asbestos and providing LFB colleagues with industry best-practice.

Having worked alongside the London Fire Brigade for more than forty years, we have come to be viewed as an essential resource and an integral part of its service.

By providing the London Fire Brigade with the scientific expertise and resources that it needs to help it understand, mitigate and prevent fire, we know that we are an important part of helping to enhance the professional capability of one of the largest fire services in the world.



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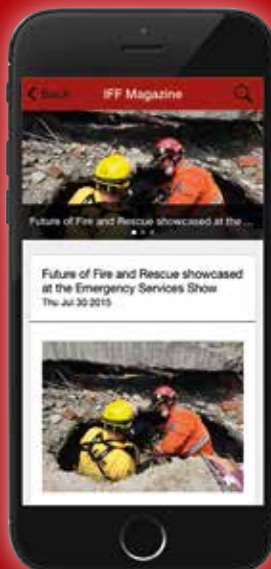
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