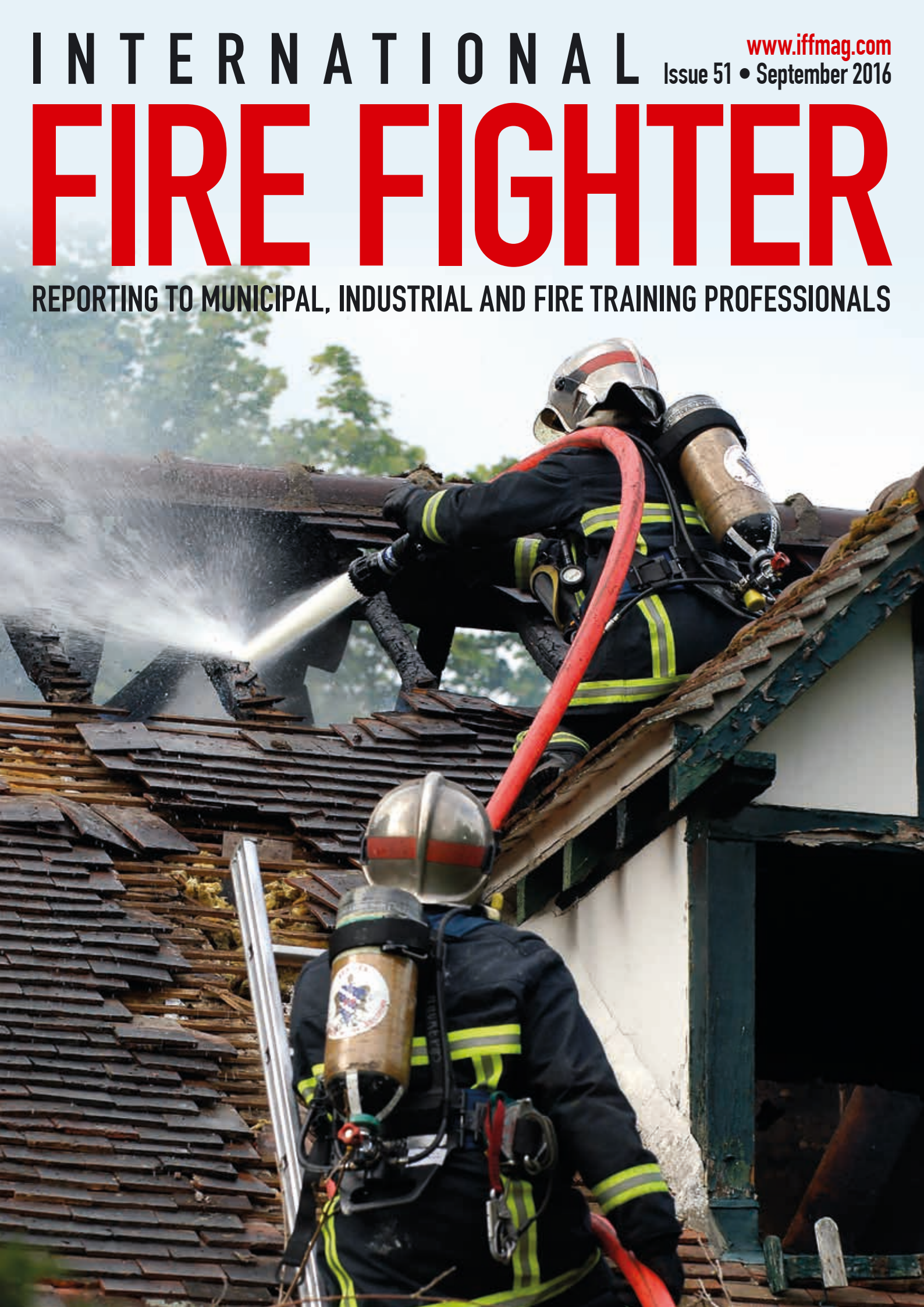
www.iffmag.com
Issue 51 • September 2016

INTERNATIONAL FIRE FIGHTER

REPORTING TO MUNICIPAL, INDUSTRIAL AND FIRE TRAINING PROFESSIONALS





Industrial Fire

FM APPROVED

NFPA #1964 Compliant



Wildland Fire



Water Supply



Handheld Nozzles



Fire Apparatus Equipment

TASK FORCE TIPS®
FIRE FIGHTING EQUIPMENT

G-Force™



Foam Equipment

MADE IN USA
3701 INNOVATION WAY
VALPARAISO, IN U.S.A.
+1.219.548.4000
www.tft.com • www.newforce.tft.com
by: TASK FORCE TIPS

YONE PROEYE 751-SNR
SONAR Plus™
PAT.P

Search out by SONAR and pinpoint with the Underwater Camera Head!
Great result in dark and cloudy waters!

Sonar Image Display
U/W Camera Image Display

With the unique PROEYE 751-SNR SONAR Plus , operators can see sonar images from the SONAR System and real-life images captured by the Underwater Camera Head at the same time. The forefront technologies built into SONAR provides clear images even when searching the dark or cloudy waters of lakes and rivers.
The system is designed compactly for optional use for various types of search & rescue operations.
GPS System indicates exact location on the display.

SONER Display image

Ultrasonic Tranducer of the SONAR Unit
Underwater Camera Head

YONE CORPORATION
www.yone-co.co.jp
23, Nishinakaaicho, Nishinokyo, Nakagyo-Ku, Kyoto, 604-8441 Japan
Tel : +81 75 821 1185 / Fax : +81 75 801 2263



SEPTEMBER 2016 • ISSUE 51

Cover image: Providing maximum fire suppression performance, automatic nozzles offer wide ranging flexibility in challenging firefighting conditions. Maintaining a constant nozzle pressure throughout a wide range of operational flows ensures a hard hitting straight stream and wide protective fog pattern. Image courtesy of Task Force Tips.

Publishers
David Staddon
Mark Seton

Sales Manager
Mark Bathard

Contributing Editors
Rob Beadle, Pablo Boj, Thomas Bowman, Becci Bryant, Javier Castro, Matt Chandler, Dr David Crouch, Professor Philipp Epple, Thomas Hennessy, Jason Hershcopf, David Hostler, Colonel Péter Jackovics, David Markland, Gary Parkinson, Mark Patrick, Joel Portice, Mark Roberts, Hans Rußwurm, Mikael Westerlund, Duncan J. White.

Senior Design Manager
Richard Parsons
richard.parsons@mdmpublishing.com

Web and IT Manager
Neil Spinney
neil.spinney@mdmpublishing.com

IFF is published quarterly by:
MDM Publishing Ltd
The Abbey Manor Business Centre,
The Abbey, Preston Road,
Yeovil, Somerset BA20 2EN, UK.
Tel: +44 (0) 1935 426 428
Fax: +44 (0) 1935 426 926
Email: mark.bathard@mdmpublishing.com
Website: www.mdmpublishing.com

©All rights reserved

ISSN – 1744-5841

DISCLAIMER: The views and opinions expressed in INTERNATIONAL FIRE FIGHTER are not necessarily those of MDM Publishing Ltd. The magazine and publishers are in no way responsible or legally liable for any errors or anomalies made within the editorial by our authors. All articles are protected by copyright and written permission must be sought from the publishers for reprinting or any form of duplication of any of the magazines content. Any queries should be addressed in writing to the publishers.

Reprints of articles are available on request. Prices on application to the Publishers.

Designed, Edited and Printed in the UK.

***FREE* Subscription**
To subscribe to IFF Magazine and for unlimited access to our digital resources, please register at www.iffmag.com

MDM PUBLISHING LTD
WORLDWIDE MEDIA

Contents

SEPTEMBER 2016

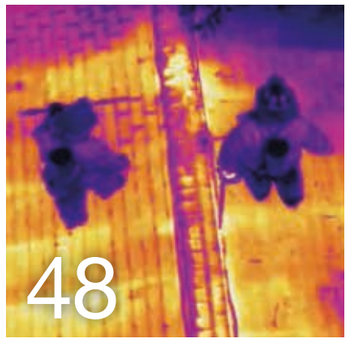
REGULARS

5 IFF Comment
6 News and Profiles
33 Buyers Guide

FEATURES

25 Firefighting foam concentrates – the constant evolution: Part 1
40 Offensive fire attack – Variables that interfere with the fire gases outlet: Part 2
44 A made in Canada solution for specialist off-road fire fighting
48 Unmanned Aerial Systems (sUAS) or drone training
54 1st UK Rosenbauer AT for Land's End Airport
56 The Emergency Services Show
62 Can lightweight PPE be truly safe?
67 Computational Fluid Dynamics Analysis of a PPV Fan
70 High speed in-vehicle networks for fire apparatus
74 A robust crisis response solution has never been more critical for first responders
78 A new era for incident control?
80 The physiologic effects of turnout gear
84 Standard of operation for cave rescue in Hungary
88 Fire fighting decontamination – long term leadership in occupational health
93 Streaming video and firefighting
96 How to Evacuate a Multi-Storey Building
98 Teamwork in rescue – fire, USAR and the right equipment
102 How the development of body armor has helped firefighters









facebook LinkedIn twitter Google+

"NEXT GENERATION TECHNOLOGY"

Cutters Edge®
An ISO-9001 Company
FIRE RESCUE SAWS

- More Power... More Torque ... Better Fuel Efficiency
- 75% Less Emissions

The new Dual-Air intake engine technology significantly improves overall cutting performance and meets all Air Quality Control standards at the same time.



MULTI-CUT® Fire Rescue Saw

New 2100 Series includes two engine sizes: 70.7cc and 87.9cc. Each engine is designed for use with Cutters Edge Carbide Tipped BULLET Chain® to cut the widest range of materials found at fireground and rescue scenes.



MULTI-CUT® H Series Rotary Rescue Saw

New H Series is engineered and powered to work harder and operate longer in the most extreme fire and rescue conditions anywhere. The new technology engine is available in three sizes: 74cc, 94cc and 119cc. The Cutters Edge Black Star and Black Diamond Blades offer long cutting life and high speed cutting of virtually all materials. The new ***BULLET BLADE***™ will be available soon.



CE94 Concrete Cutting Rescue Chainsaw

A new technology 94cc engine and a new style Diamond chain cuts reinforced concrete up to 16-inches thick. Features a lighter weight power head and full-wrap handle for high performance concrete cutting in any position.

All Cutters Edge NEXT GENERATION TECHNOLOGY Fire Rescue Saws are available in fully-equipped Field Kits designed for Rescue Cutting anywhere.



Cutters Edge®
An ISO-9001 Company
FIRE RESCUE SAWS
Division of Edge Industries

International Contact:

Tel: +1 541 524-9999 FAX: +1 541 524 9996
Email: info@cuttersedge.com www.cuttersedge.com

Why do people find diversity so difficult?



Becci Bryant
Chief Fire Officer/Chief Executive with Staffordshire Fire and Rescue Service

When I joined the Fire and Rescue Service as a firefighter in 1992 – 10 years after women started to do so – I was one of three women that had successfully completed the recruits' course in Bedfordshire and Luton Fire and Rescue Service that year.

In 1999 Her Majesty's Fire Service Inspectorate carried out a thematic review into 'Equality and Fairness in The Fire Service'. They concluded that, despite the efforts of many in the service, as of March 31 1998 there were only 436 women employed within the wholetime uniformed (excluding fire control) strength of 33,597 and a retained service of 14,483. This was less than 1% of these sections of the workforce.

Following the findings of this review, Fire Service Circular 1/2000 set a recruitment target that from 1 April 2002, 4% of uniformed staff (excluding fire control) should be women, by 2004 this should be 9% and by 2009 this should be 15%.

Now fast forward to then Home Secretary Teresa May's first speech on fire service reform on 23 May 2016 in which she explained that the operational workforce is currently comprised of 96% white and 95% male members of staff.

The latest data from the NJC Inclusive Fire Service Group shows, that of the 31,965 personnel operating in Firefighter to Area Manager roles, 1541 are women (4.8%) and of the 15,546 retained personnel, 559 are women (4%).

Despite the considerable efforts of committed and dedicated individuals, the operational workforce within Fire and Rescue Services is still not representative of our communities. The details of this reform speech have made it very clear that this is a position that needs to be improved significantly over the coming months and years.

The question we are faced with is this: how do we achieve these improvements at a time when recruitment to whole-time firefighter positions is limited, restricted or frozen in some cases, and recruitment to retained positions continues to be a challenge for many Services around the country?

Given the fact that women have served in the Fire Service since 1982, we have to ask ourselves if it is acceptable that it has taken so long for a woman who joined as a firefighter to become a Chief Fire Officer. I personally don't think it is and despite the challenges we face in ensuring our workforce is diverse, I do not believe it is acceptable that so few women occupy senior positions within Fire and Rescue Services.

Some will call for the reintroduction of targets and others for quotas, both of which have advantages and disadvantages. Numerous techniques are used by Services to attract women into the role of firefighter, all linked to positive action.

I have had numerous conversations up and down the country with a variety of people who seem to use the same language they would use when determining a business case for an item of equipment. Why are we using the same language in a conversation about people who we would like to join our organisations? For me there is no business case separate from our business. It is either the way we run our organisations, or it is not. We either value difference and develop our teams to the full or we don't.

It makes complete sense for our workforce to be as diverse as our communities.

Britain today is not only more diverse than ever but the diversity itself is growing even more diverse. Individual identities are more complex and fluid than ever before and as such, organisationally, we need to reflect that complexity to really connect with our communities and partners.

Diversity is not enough, however, without leaders creating a culture that embodies inclusion as a fundamental building block. Without this, the voices of our diverse workforce will not be heard and their contributions will not be as significant as they could be.

When we ask ourselves the difficult question – why have we not been successful at increasing the recruitment of women – is it because our cultures are not very accepting of difference?

It is a key responsibility of leaders in the Fire Service today to create an environment and a culture that encourages, embraces and is inclusive of diversity. This, in my opinion, is one of the most significant challenges facing Fire and Rescue Services today.

There is fantastic work going on around the UK and further afield and now is the time to harness the best practice and support each other in the challenge ahead. The Inclusive Fire Service work-stream operating under the NJC has a real opportunity to support this area of fire reform and I look forward to seeing the outcomes of this work over the next few months.

News

New Mi TIC E+ entry level camera from argus

For the past 35 years argus has been at the forefront of thermal camera technology and products, listening to customers and delivering durable and “battle proven” cameras to the frontline firefighters.

The tragic incident at Shirley Towers in the UK in 2010 highlighted the need for smaller, personal thermal imagery cameras specifically developed for the challengers and unique demands of firefighting. argus responded with the first of the Mini Thermal Imagery Camera (Mi-TIC) series, launched in 2012.

On-going discussions with European brigades and partners ensure we understand how firefighters use thermal imagery, and what firefighters want – which technology matters, what better usability looks like, and how we can make firefighting safer. And they told us that they wanted a modular, entry level camera to allow more brigades to access the argus products and technology. We have built our reputation on high performance thermal cameras, developed around the needs and safety of a firefighter. So our new entry level camera is of the same quality and has the same level of safety that customers expect from the argus brand. Just with less in the way of features.

The new Mi-TIC E+ is an entry level, cost effective camera, based on the proven technology of the Mi-TIC E. It keeps the superior build quality – marine grade stainless components, heat resistant displays, advanced aerospace grade plastics, safe battery technology, rapid start up and black-box recording – delivering industry leading robustness, increased flame protection, and exceptional heat resistance.

The Mi-TIC E+ has a large 3.5 inch screen and uses the argus DSE (Dynamic Scene Enhancement) image processing to ensure that even in the most extreme of temperatures, the firefighter is able to see and react to trip hazards, entry/exit points and casualties from the clutter of fire, smoke and building damage.



© Image courtesy of argus

The new Mi TIC E+ entry level camera – cost effective, with the trusted technology you demand from argus.

For more information, go to www.argusdirect.com

Magirus equips Hungary’s fire departments with 15 turntable ladders



© Image courtesy of Magirus

In 2014, Magirus delivered five M42L turntable ladders to Hungarian fire departments. The high level of satisfaction with these turntable ladders led to a follow-up order for 15 single-extension units.

The first five turntable ladders of the complete order – which consists of twelve M32L-AS Magirus turntable ladders and three M42L-AS – were officially presented to the National Directorate General for Disaster Management (NDGDM) in Budapest. Károly Kontrát, representative of the Ministry of the Interior, and Tibor Tollár, NDGDM General Major, officially accepted the four M32L-AS turntable ladders built on Iveco EuroCargo chassis as well as one Magirus M42L-AS turntable ladder.

In the future, the turntable ladders with a working height of 32 metres will support fire departments in the Hungarian cities of Kisvárda, Dombóvár, Pétfürdo and Gyor during fire-fighting operations. The Magirus M42L-AS will be stationed in the city of Nyíregyháza, a town with 120,000 residents.

With this follow-up order, which will be complete in 2019, Magirus highlights its turntable ladder competence and position as the market leader in Hungary as well as northern and eastern Europe in general.

With this order, Magirus highlights its turntable ladder competence and position as the market leader in Hungary as well as northern and eastern Europe at large.

For more information, go to www.magirusgroup.com

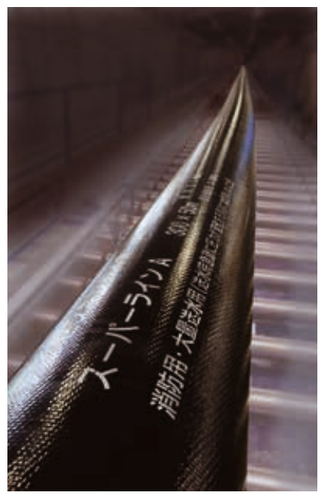


Introduction
TEISEN produced its first firefighting hose in 1903, and since then, it has been the most experienced and largest firefighting hose manufacturer in Japan.

Super Line Large Diameter Hoses
TEISEN offers the Super Line LDH with a diameter of up to 300mm. Super Line LDH is manufactured using a one-piece construction method, extruding the cover and lining in one step, with polyurethane through a polyester jacket.

Features
- Minimized pressure loss
- Compact storage through a new kind of rubber-like, polyurethane material
- Available in long lengths
- Excellent resistance to heat, fuel, chemicals, UV, ozone, weathering, etc.





Diameter	mm	100	150	200	250	300
	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	℃	-20℃～50℃				

Teisen
TEIKOKU SEN-I CO., LTD.
7F-Yanagiya-Bild, 1-10, 2-chome, Nihonbashi, Chuo-ku, Tokyo 103-0027, Japan
TEL:（81）3-3281-3031 FAX:（81）3-3274-6397
E-mail: teisen-tyo@teisen.co.jp **URL: http://www.teisen.co.jp**

Hampshire firefighter Nikki Bridges helps African school children

Nikki Bridges, a firefighter from Lyndhurst Fire Station in Hampshire, UK has worked as a volunteer for The African Adventure Foundation along with five other climbers, helped to raise £8,600.

Firefighter Bridges, who is 32, was in Kenya for 16 days and spent time at The Jubilee Academy School helping with renovation and improvement work. She was able to use her rope skills and fitness to improve the lives of school children in Kenya.

Nikki said: "The children loved hearing her stories about the fire service and seeing photographs of the engines.

"It was an emotional rollercoaster, it's overwhelming to see how happy the children are to have you there, but heartbreaking to see how little they have. I won't forget Donation Day when we gave the children clothes, books and skipping ropes amongst other things – a simple thing like a pencil each brought so many big smiles.

"I thought going to Africa was a once in a lifetime opportunity, but now I am feeling drawn to go back. "Maybe it's the bond I made with the children or the uplifting achievement of knowing that I've helped just a little to make a few lives better.

"I think that being a firefighter helped as you are used to dealing with challenging situations and I used rope skills to help make swings. The mountain climb was hard going and a little bit hazardous but again I think the job and experience in dealing with risk was of benefit."

Whilst in Kenya she also spent five days battling bad weather to reach the summit of Point Lenana, Mount Kenya - where she met the Saracens Rugby Team carrying their European Cup.



Image courtesy of www.hantsfire.gov.uk

Nikki is now hoping to get a team of 20 personnel from Hampshire Fire and Rescue Service to take on the 2017 Mount Kenya Challenge to raise money for The Firefighters Charity and The African Adventure Foundation.

For more information, go to www.hantsfire.gov.uk

Expansion to 9/11 Memorial Stair Climb

Pierce Manufacturing Inc., an Oshkosh Corporation company, hosts the fourth annual 9/11 Memorial Stair Climb at historic Lambeau Field, Green Bay, Wisconsin on Saturday on September 10th 2016. All funds raised will benefit the National Fallen Firefighters Foundation (NFFF) to assist the families of fallen firefighters. The 2016 Memorial Stair Climb is co-sponsored by the Green Bay Metro Fire Department. Organizers are hoping that 1,000 participants will come together this year to honor the firefighters who perished in the World Trade Center attacks fifteen years ago. Since forming a partnership with the NFFF, Pierce has raised more than $325,000 to assist the NFFF's mission to help the families of fallen firefighters rebuild their lives through support networks, conferences, workshops and scholarships.

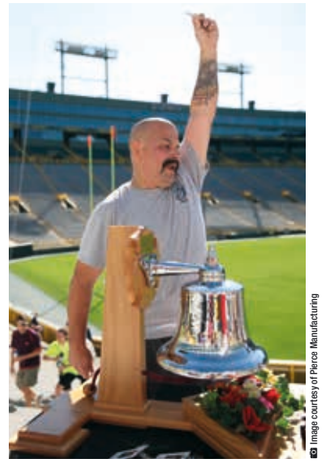


Image courtesy of Pierce Manufacturing

For more information, go to www.piercemfg.com/climb





Student receives $1000 scholarship

Storey County Professional Fire Fighters have announced the recipient of their "2016 Scholarship Award." This education-based donation is part of an annual effort for the firefighters to further education in their community. Jordyn Ballard of Virginia City High School was presented with a $1,000 scholarship, which will help with her tuition this year. Jordyn plans to attend the University of Nevada, Reno to study education.



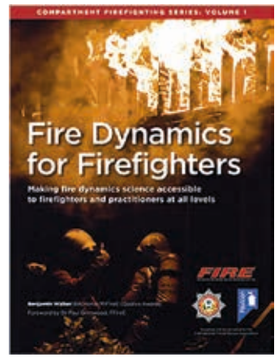
Image courtesy of Storey County Professional Fire Fighters

Auggie Arroyo of the Storey County Professional Fire Fighters, said, "It's important to continue to recognize and support the hard work of young adults in our community. We are proud of Jordyn and her dedication to higher education. We look forward to watching her success grow at the University of Nevada and into her career where she'll have a hand in educating future generations."

Award winning authors new book

Author Benjamin Walker BA(Hons), MIFireE is a globally acclaimed presenter and international compartment firefighting instructor. He has worked in both the UK and USA, and was recognised by the Institution of Fire Engineers in 2014 when he was the recipient of the Godiva Award.

His latest book, *Compartment Firefighting Series: Volume One* simplifies the science of fire dynamics for all frontline and trainee firefighters. Firefighter safety is an inherent part of the job and modern firefighters are accountable for keeping up with professional development and training through self-study. The book will help you;



- Understand the science and risk of fires in compartments to keep you, your colleagues and communities protected
- Save lives and make the right decisions quickly when armed with the crucial knowledge of fire dynamics science
- Progress your professional development and cement your understanding using the questions in this handy self-study tool.

The book is available at a special introductory rate of £20/$30 and can be ordered from

For more information, go to www.fire-magazine.com

Hainsworth Technology products selected for CPCC

Hainsworth Technology fabrics have been chosen to be part of the prestigious Central PPE and Clothing Contract (CPCC). The company's TITAN 1260 and ECO-DRY Active are the selected combination for structural garments, while its ECO-DRY Shield has been chosen for wildland garments.

The decision to include the fabrics as part of the CPCC follows the Technology Refresh programme, the most extensive independent PPE reassessment ever undertaken in the UK. The CPCC replaces the previous programme, Integrated Clothing Project (ICP), and is intended to take the procurement scheme well into the 2020s. The CPCC is available to any Fire and Rescue Service in England and Wales to join free-of-charge and membership gives access to a full range of best-in-class products and services.

Tom Hainsworth, Managing Director of Hainsworth Technology, said: "We are delighted that TITAN 1260, ECO-DRY Active and ECO-DRY Shield have been selected within the CPCC. As a business, we are committed to listening to firefighters about their requirements on the frontline as well as working closely with our industry partners. We are also continually looking for ways in which we can innovate and develop our products to ensure they keep pace with the changing and often complex needs of today's fire and rescue services both within the UK and globally."



Image courtesy of Hainsworth Technology

For more information, go to www.protectsyou.co.uk

www.pok.fr
Manufacturer of firefighting equipment
Become a distributor !



MONITORS portable, fixed, remote control
BRANCHES hose reel, main line, automatic, low pressure
FOAM inductors, branches, adaptors, variable & fixed
FITTINGS couplings, breechings, control valves, collecting heads

Meet with Sales Director
Pascal Cambournac
Book an appointment
POK FIREFIGHTING EQUIPMENT
+33 626427955
pascal.cambournac@pok.fr

Firefighters back ABI sprinkler call

With just one month until the commemoration of the Great Fire of London, more than a dozen organisations have so far confirmed their support for proposals to ensure sprinklers are installed in more high-risk buildings, put forward by the Association of British Insurers (ABI).

Several major fire brigades as well as the Chief Fire Officers Association and a number of fire prevention bodies have all added their names to a call for action on sprinkler regulations to help prevent major and potentially deadly fires.

The ABI has issued the following call to Government:

"As the three hundred and fiftieth anniversary of the Great Fire of London approaches we urge the Government to modernise fire prevention rules by legislating for compulsory sprinklers in all new schools and care homes, and warehouses over 2,000m2. Fires put lives at risk, cause disruption to our cities and transport networks and hurt the economy; failing to install sprinklers in schools and care homes is putting at risk the lives of the most vulnerable in our society."

For more information, go to www.abi.org.uk/News

Fire officer rescues swimmers



Image courtesy of WMFS

A West Midlands fire officer from the West Midlands Fire Service, UK has braved the Mexican waves to rescue four swimmers while on holiday. Lee Baker, who is Station Commander for Bournbrook and Woodgate Valley community fire stations, swam into action during his holiday in Puerto Vallarta on Mexico's North Pacific coast. He'd been taking a mid-afternoon walk along a beach with his wife when they were approached by a Mexican woman. She asked if Lee could swim because some of her family were in difficulties in the water.

Lee said: "My wife stayed with the woman while I went in and walked one lady out of the sea. She was struggling to stand because of the strong current. The waves were high and she said others were in trouble further out. I swam out and managed to grab a girl, aged around 17, who was struggling and screaming. I started to swim back, holding her, as I pushed a lad who looked a little younger in front of me.

"The boy seemed to be in a better state, so I focused on the girl. She went under a few times, then a man came out with a rescue float when I was close to the shore and the girl grabbed it. I then towed her in until others took her, then I went back to the boy and threw the float before pulling him in as well."

Two waiters who worked nearby came to help, as Lee put the girl in the recovery position and made sure she was comfortable. Lee, who also helped with the rescue of a fourth person, added: "The family were really thankful. I got hugs and handshakes, and I just said I hoped they would be OK and checked on the girl's condition before we headed off."

WMFRS Deputy Chief Fire Officer, Phil Hales, praised Lee's actions: "We're very proud of him for potentially saving the lives of these swimmers and preventing a tragedy. All of our firefighters and officers are highly trained to deal with emergency situations. Even when they're off duty, they're always ready to help the community."

Councillor John Edwards, Chair of West Midlands Fire and Rescue Authority, added: "We're all very proud of the life-saving action taken by Lee. He encapsulates everything that is great about the remarkable staff who work for West Midlands Fire Service."

For more information, go to www.wmfs.net



London Fire Brigade looks beyond the flames

Covering 1,587 square kilometres, London Fire Brigade is one of the largest fire and rescue services in the world. With 4,853 uniformed operational firefighters, it is one of the busiest fire and rescue services in the United Kingdom. Improving the performance of its teams in the areas of fire prevention, fighting and community safety are key drivers for London Fire Brigade in its overall vision to become recognised as a world class fire service.

As one of the UK's primary fire and rescue services, thermal imaging technology development has been at the forefront of London Fire Brigade's mind. Understanding that not all thermal imagers are the same and recognising the need to protect their front line crews, after rigorous testing, London Fire Brigade has selected Scott Safety as its chosen supplier of thermal imaging cameras.

London's firefighters are now equipped with the one of the most advanced thermal imaging cameras in the world, the X380. With its superior vision clarity, improving situational analysis in scenes when firefighters need it most, the X380 far outweighs its low cost competitors. The capabilities provided by the X380 will enable firefighters to interpret scenes faster and safer, making more tactical decisions, as they work to save lives in Britain's capital.



Image courtesy of Scott Safety

▲ **Andy Slater, Scott Safety (left) hands over the X380's to Gary Hopkins, LFB.**

The hot and cold spot tracking capabilities – unique to the X380 thermal imaging camera – will enable firefighters to detect the hottest and coldest points of a fire or scene. This new capability means they can now find a fire source quicker, detect casualties and also navigate the safest routes in and out of a fire.

Gary Hopkins, Head of Research and Development, London Fire Brigade (LFB) said: "Ensuring the safety of our frontline crews is paramount. London Fire Brigade's investment in thermal imaging cameras is risk critical in providing a robust response to all emergency incidents, and ultimately, aid to a speedier conclusion."

"Advanced thermal imaging from Scott Safety is now a dominant technology platform in the fight to save lives and property" informs Andy Slater, General Manager, Thermal Imaging, Scott Safety. "This is due in part to the greater level of situational awareness it provides Firefighters compared to other cameras available; for instance with it's hot and cold spot tracking capabilities. The X380 has continued to standout during rigorous testing set by UK Fire & Rescue Services and it has become the firm favourite for improved visual awareness and firefighter safety."

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



Lake Assault Fireboat to the rescue

A Lake Assault fireboat, owned and operated by the Lake Vermilion Fire Brigade, provided support for wildland firefighting efforts during the Foss Lake wildfire near Ely, Minnesota earlier this spring. The 33-foot craft was used to haul up to 20 person crews, and their canoes and equipment to staging areas to fight the blaze. The fire, located approximately 10 miles west of Ely, Minnesota in the Boundary Waters Canoe Area Wilderness, consumed a total of 936 acres and was contained and controlled on June 2nd.



For more information, go to www.lakeassault.com

Power on the go

Seddons Plant & Engineers Ltd will be showcasing two new Honda 110V Portable Generators on Stand E44 at this year's Emergency Services Show being held at the NEC in Birmingham, UK from 22nd – 24th September. The two new models – the Honda EU10i 110V and the Honda EU17i 110V – are specifically designed for use by the emergency services including Fire and Rescue Services, Police and Forensics, the Ministry of Defence and other organisations involved in emergency prevention, response and recovery. The 110V Portable Generators provide clean, quiet electricity to run and recharge equipment and are ideal for applications such as powering LED lights or recharging batteries in emergency situations where no mains power is available.



Honda's state-of-the-art Inverter technology allows the EU10i and EU17i to remain much smaller and lighter than alternative models, allowing them to be super portable and carried with ease. They can be stored on emergency vehicles and easily carried to built-up areas or remote locations by one person. Although they are highly portable, they still remain very powerful and deliver stable energy that's even cleaner than electricity for the mains. The power delivered is free of surges or 'spikes' that can be detrimental in emergency situations.

Both the Honda EU10i 110V and the Honda EU17i 110V will be available to purchase at the show.

For more information, go to www.seddonplant.co.uk



RESPONSE AIRPORTS NEED.
PERFORMANCE FIREFIGHTERS TRUST.

The Oshkosh® Striker® 6x6 delivers serious runway performance. Get industry-leading fire suppression, unmatched chassis response, wide-open visibility and top safety systems. All from a vehicle that was built with direct input from airport chiefs and firefighters around the globe.

CONGRATULATIONS, CARDIFF
ON YOUR DELIVERY OF THREE NEW STRIKERS.

OSHKOSH
AIRPORT PRODUCTS

oshkoshairport.com

©2016 Oshkosh Corporation. Oshkosh, the Oshkosh logo, Striker and the Striker logo are registered trademarks of Oshkosh Corporation, Oshkosh WI, USA.

Cardiff Airport celebrates delivery of three Oshkosh Strikers

Tuesday June 28th 2016 was a day the children of Rhws Primary School will never forget, in particular three of it's pupils who were picked from numerous entries to officially name the recent delivery of the three Oshkosh Strikers to Cardiff Airport. Guests from the press as well as from other airports in the UK including Belfast, Liverpool, Swansea and Southampton attended along with delegates from Terberg and Jim Johnson, the President of Oshkosh's Fire & Emergency Segment all the way from Wisconsin.

The decision to purchase three vehicles was made over a year ago, and was a joint decision by Cardiff Airport's Managing Director and Chief Operating Officer Debra Barber and Ray Imperato, Cardiff Airport's Fire Service Manager. The Oshkosh 6x6 Striker was identified as the vehicle of choice chosen primarily for its state of the art design as well as its functionality and the ability to carry 12,000 litres of water and 1,600 litres of foam. From it's forward-facing bumper monitor, each striker can produce 60,000 litres of finished foam per minute with a jet throw of over 90 metres. To accompany each of the three Strikers, mounted on the roof is a High Reaching Extending Turret (HRET) system better known as the SNOZZLE®.

The three Strikers were ordered some months ago to replace the aging Boughton vehicles which have given Cardiff Airport a sterling service. With passenger numbers constantly on the increase and with various expansion projects in the pipeline, vehicles were needed that could cope with the increase in demand should an incident occur. The Oshkosh Strikers have all the necessary acumen to attain and exceed the standards needed by a modern airport facility and some of the specifications these vehicles boast are truly impressive. These include but are not limited to, a top speed of over 70mph, independent suspension system with superior all-terrain mobility, and a turning diameter of just 23.8m.

Debra Barber Cardiff Airport's Managing Director and Chief Operating Officer spoke to the assembled guests and explained that the airport was

▼ **Teachers and pupils from Rhws Primary School.**



Image courtesy of Michael Hall Photography



Image courtesy of Michael Hall Photography

▲ ▶ **Old meets new the Barracuda and the new Striker.**



Image courtesy of Mark Bathard

constantly growing, and the need to protect the safety and integrity of it's passengers and staff as well as the firefighters themselves was paramount, and the Strikers ticked all the right boxes. Debra also went onto explain that with the size of investment the vehicles will be expected to last for a long number of years, which will be taken care of by Terberg Ltd, Oshkosh's UK dealer.

Jim Johnson President of Oshkosh's Fire & Rescue Segment also addressed the guests and explained that no Oshkosh fire truck is the same as every vehicle is 100% built by hand and tailored exactly to the customers requirements. Great pride as well as tradition goes into the construction of every vehicle that leaves their door and as part of the tendering process, Debra and Ray flew to the States to see firsthand, the progress of their soon to be new arrivals.

After a short demonstration of the Strikers capabilities a live burn prop was lit and then extinguished from the Strikers forward facing monitor. The HRET was also deployed piercing an aircraft fuselage and extinguishing the fire inside whilst keeping the crew a safe distance away from the fire.



Image courtesy of Michael Hall Photography

◀ **The three winners of the vehicle naming competition. The winning names were Merlin, Firefly and Y Ddraig Goch which when translated means The Red Dragon.**

After a spot of lunch, the three school children who had won the competition for naming of the three Strikers were presented prizes of model Strikers by Debra and Jim. The winning names were Merlin, Firefly and Y Ddraig Goch which when translated means The Red Dragon. Kelly Toshack who is the Deputy Headteacher at Rhws Primary School commented "The pupils thoroughly enjoyed the assembly the fire crew delivered which introduced the competition. It provided them with a real opportunity to learn more about fire safety and get creative by thinking and researching Welsh history, famous people and celtic icons. This helped them choose the new names for the fire vehicles."

For more information, go to www.cardiff-airport.com

intersec

SAVE THE DATE

22 – 24 January, 2017
Dubai, UAE

The world's leading trade fair for Security, Safety & Fire Protection

7 Show Sections
Commercial Security
Information Security
Fire & Rescue
Safety & Health
Homeland Security & Policing
Smart Home
Perimeter & Physical Security

www.intersecexpo.com



messe frankfurt

Fire Research Corporation

The inView Series of video products, powered by SEON

The inView Series provides video, recording and telematics systems which have been designed to offer apparatus maneuvering solutions for; Safety, Liability Protection and Asset Protection.

The inView Series of products address these real world problems by;

- Improved in-cab visibility
- Iron clad evidence recording including both video and telematic data such as speed, direction, impact, and breaking information
- Vehicle tracking – both where vehicles are now and where they have been

The inView product series also features powerful data management software allowing you to easily find the information you need and provides capability for proactive data searches to recognize and address potential problems before a major incident occurs.

The inView series features two primary packages;

- The inView 360™: a product focused on safety and accident avoidance with improved in-cab visibility
- The inView Guardian™: a product focused on liability protection and asset protection with video & data recording and vehicle tracking capabilities



Images courtesy of FRC

▲ Screen Shot of the inView 360 picture on the FRC- AVM 7.4" In Cab Monitor.

The inView 360™

The inView 360™ provides the apparatus driver with split screen view. The bird's-eye view is always visible providing a 360° view around the vehicle. This unique view allows the operator to see pedestrians and obstacles in close proximity to the apparatus or vehicle. The second view on the display switches between a front/left/right/rear view depending on the operational conditions. The system is networked between the turn signals and vehicle reverse so the screen automatically switches to left, right, and rear view when turning or backing up. An in-cab toggle switch allows the operator to override the default camera view for complete control over the system.

The inView 360™ video system has many options available to tailor the system for each apparatus in your fleet. All components incorporate durable design and construction suitable for emergency vehicle operations.

FRC

▼ Guardian Package DVR 5 channel and 500GB HDD.



The inView Guardian™

The inView Guardian™ captures both video and telematics data. Four long range cameras are used to provide a large area of video coverage of what is happening around the vehicle. The front camera is a HD camera providing excellent zoom capability to capture clear license plate information. This helps ensure you capture events leading up to any incident. In addition, video, speed, location and date/time information are captured through GPS and internal clock. The G-Force sensor captures impacts and hard braking information and all the data is stored on an internal memory which can be downloaded for PC viewing.

The inView Guardian™ video system has many options available to tailor the system for each apparatus in your fleet. All components incorporate durable design and construction suitable for emergency vehicle operations.

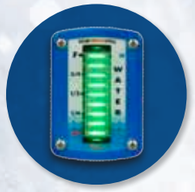
For more information, go to www.fireresearch.com

LIGHTS, CAMERA, ACTION...GOVERNORS, GAUGES AND MORE.



FRC
A Safe Fleet Brand

inView 360 Video System
Powered By Seon
Bird's-Eye View & Record



TankVision Pro
High visibility gauges



Spectra Lights
Brightest lights



TurboFoam 400
Simple to use, pinpoint accuracy foam solutions

Combining the most innovative and technologically advanced emergency companies into one single force offers you new solutions engineered to increase safety. The inView 360 video system from FRC, a Safe Fleet brand, is a new and exciting product which offers apparatus drivers a 360 "Bird's-Eye" view, plus it records all events and more. Check out the inView video system and other new FRC products and see how innovative engineering can add to your safety.

Contact your Safe Fleet representative to learn more about the many new technologies now available.

ELKHART BRASS · FOAMPRO · FRC · R·O·M
SAFE FLEET

YOUR SAFETY. OUR MISSION.

www.safefleet.net • +1.816.293.9040



Jolly Scarpe SpA
Professional footwear for over 30 years

Jolly Scarpe SpA has been working in the world of professional footwear for over 30 years in support of those who dedicate their lives to the safeguarding of their community's citizens.

As well as dominating the UK fire-fighting market for many years with their wide range of innovative and long wearing fire boots, Jolly is successfully exporting fire boots to more than 30 countries worldwide.

Extensive research, advanced manufacturing techniques, innovative materials, safety, comfort and excellent customer service are the fundamental values which make Jolly Scarpe a world leader and true reference point for professionals working in this sector.

As with all great products, the secret is in the fine design detail and this certainly the case in Jolly structural fire-fighting boots. So, what are the innovative details that we are keen to promote?

▼ The latest evolution of Jolly structural fire-fighting boots exceeds all the original performance expectations.

WBS – Wrap Band System – Prevents heel slippage

The new elasticated system is designed to allow a volume adjustment inside the foot area which creates a much improved fit for both feet and reduces the need for "special measures" or bespoke manufacture. The system is especially suitable for female firefighters and supersedes the old technology regarding heel grips.

Inner Air-Flow System

The EN15090 Standard clearly states that for fire-fighter's footwear the stringent testing is carried out on the full height of the boot, including tear resistance, radiant heat and flame resistance, water penetration and absorption. Jolly fire-fighting boots are designed to offer the highest protection and so our new aeration system allows the air between the upper and the GORE® linings to easily and naturally flow in and out through the air-mesh of the collar.



© Image courtesy of Jolly Scarpe

J-Morphic Last Features

In order to reach the highest level of SRC (slip resistance) Jolly has developed for all its fire-fighting and search & rescue boot collection a new outsole, shaped on the new J-Morphic last. The outline of this last offers a much more rounded profile offering a major improvement to most other boots on the market with their more traditional "flat" outsole systems that use metallic anti-perforation insoles. The benefits are:

- The profile is superior with a wider toe box that prevents toe cramping.
- The rounded heel eases the foot during the roll-over phase of walking avoiding scuffing of regular sharp-edged designs and ensures high levels of slip resistance.
- A better roll-over motion that allows the shoes to perform 90% of each step without bending the outsole thus reducing creasing stress on the bonding and preventing wrinkles being produced in the uppers which can cause pressure points on the foot. The walk will be more comfortable, the foot less stressed and the muscles more relaxed.
- The energy absorption level is given by the rubber compound of the outsole by the depth and shape of its cleats and by the composite material of the anti-perforation insole and, most of all, by our J-Morphic last. Therefore, in order to give our superior results for a light-weight structure with high energy absorption rates Jolly boots do not need hidden PU mid-soles or inserts that are prone to deterioration at high temperatures.

A 20 year veteran of the UK fire Service was pleased to announce to us following years of wearing the Jolly fire-boot, "the shape of this boot inside and out gives me the sensation that the boot is a part of me and I can stand longer and walk further… they make me feel like running!"

For more information, go to www.jollyscarpe.com

9306/CA

STIVALE DALLE PRESTAZIONI SUPERIORI ESTREMAMENTE FLESSIBILE E CONFORTEVOLE | SUPERIOR PERFORMANCE BOOT, EXTREMELY FLEXIBLE AND COMFORTABLE | BOTTES DE PERFORMANCE ÉLEVÉES, EXTRÊMEMENT SOUPLE ET CONFORTABLE | FEUERWEHRSTIEFEL MIT ÜBERDURCH-SCHNITTLICHEN LEISTUNGEN, SEHR LEICHT UND KOMFORTABEL | BOTAS DE RENDIMIENTO SUPERIOR, EXTREMADAMENTE FLEXIBLE Y CÓMODO

FIRE PROFI 2.0

CROSSTECH

CE EN 15090:2012 F2A HI3 CI AN SRC



REAR ELASTIC BAND

LEATHER HANDLES FOR DONNING



ANKLE PROTECTION SYSTEM

360° FLEXING SYSTEM



EASY PULL OUT SYSTEM

LONG LASTING RUBBER PROTECTION

WEAR INDICATORS



TOMAIA / UPPER / TIGE / OBERMATERIAL / CUBIERTA
Pelle idrorepellente con spessore 2.0 – 2.2 mm
Water-repellent leather 2.0 – 2.2 mm thick
Cuir hydrofuge, 2.0 – 2.2 mm d'épaisseur
Wasserabweisendes Leder, Stärke 2.0 – 2.2 mm
cuero hidrófugo con espesor de 2.0 – 2.2 mm

FODERA / LINING / DOUBLURE / FUTTER / FORRO
CROSSTECH®

SUOLA / SOLE / SEMELLE / SOHLE / SUELA
Gomma nitrilica, antistatica, antiolio, resistente al calore a 300°C
Nitrile rubber, antistatic, resistant to oil and heat at 300°C
Caoutchouc nitrile, antistatique, antihuile, résistant à la chaleur à 300°C
Nitrilgummi, antistatisch, ölbeständig, kontaktwärmefest 300°C
Caucho nitrilo, antiestático, résistente al aceite, résistente al calor hasta 300°C

ALTEZZA / HEIGHT / HAUTEUR / HÖHE / ALTO
38 CM (SIZE 42)

TAGLIE / SIZE RANGE / GAMME DE TAILLES LIEFERBARE GRÖSSEN / TAMAÑOS
EU 36-49 (50-51 supplied as specials)

JOLLY SAFETY EQUIPMENT LTD
P.O. BOX 120
WELLINGTON - SOMERSET - TA21 1BU

JEREMY DAWKINS
SALES MANAGER
+44 7796 810702

The Turbinator from Knowsley SK

Always providing precision proportioning

In-line water driven foam proportioning pumps have become more and more popular in the last decade. Their low pressure drop and accurate foam proportioning over a wide range of flows are necessary in many systems. But this technology is not simple: the equipment on the market until now is quite complicated and sensitive to contamination and over speeding. The new Turbinator water driven foam proportioning pump developed by Knowsley SK effectively solves these problems, making this technology the preferred choice for a wide range of fire fighting systems.

Precision proportioning – Always

The Turbinator is a positive displacement foam proportioning pump designed for Fixed and Mobile applications. The unit is driven by a special volumetric water motor which is directly coupled to a precision gear foam pump. Because both parts of the Turbinator are positive displacement devices, the ratio of foam concentrate to firewater is fixed over the full operating range. This makes Turbinator the ideal proportioning technology for systems with different flows, such as multi-legged deluge systems, sprinkler systems and mobile large incident equipment.

The Turbinator unit does not require setting up or on-site adjustment – the proportioning rate is achieved at any flow rate and pressure within the operating range.

▼ **MIDI Turbinator in portable application use feeding multiple hose lines.**



Technology built to last – Forever

With Turbinator technology, Knowsley introduced a flexible, abrasion resistant paddle material in the water motor which gives the unit its unique wear characteristics. The usual contamination present in fire water does not damage the paddles. Overspeed up to 120% of the nominal flow, which can occur during automatically controlled activation of large systems, does not damage the unit. In addition, the Turbinator resists dry running in accordance with NFPA20.



© Images courtesy of Knowsley SK

▲ **MAXI Turbinator installed on fixed skid feeding foam pouring systems on storage tanks and bunds.**

Design and installation: Simple as 1-2-3

The close-coupled design offers a very compact and efficient installation with just three connections: fire water inlet (1), foam concentrate inlet (2) and foam solution outlet (3). The unit can be installed directly into vertical or horizontal piping systems. The Turbinator foam pump delivers 3m suction height easily, which makes it possible to install the foam concentrate tank below the unit installation level – even with high viscosity concentrates in arctic conditions (thick foams). Simple, cost effective atmospheric foam tanks are fine for Turbinator.

With its unique low differential pressure, Turbinator fits in the most complicated systems, even when long pipe runs or static pressure loss are involved. Turbinator does not require external power supply or control circuits and is safe for any ATEX environment.

The Turbinator is available in 3 sizes from 500 l/min to 12'000 l/min with proportioning of 1% and 3% with freshwater and saltwater construction. Each Turbinator built in our Manchester, UK factory is 100% functionally tested on a high flow test rig through its whole operating range ensuring functionality at all times.

For more information, go to www.knowsleysk.com

Positive displacement foam mixing machine
Integrated water drive and foam concentrate pump
Uses firewater supply as power source
Turbinator
Foam Mixing Technology
Fixed
Mobile
Truck
Knowsley SK
Discover more:
knowsleysk.com

EFFECTIVE & FRIENDLY.
IT'S NOT AN OXYMORON.



Solberg RE-HEALING™ Foam not only provides the performance you are accustomed to with current firefighting foams, and rely on, it's also safe for your firefighters and the environment. RE-HEALING Foam has superior vapor suppression and longer drain time for better burn-back resistance. The first true fluorosurfactant and fluoropolymer-free foam, there are no environmental concerns for persistence, bioaccumulation, or toxic breakdown.

Learn more about RE-HEALING Foam and 1%, 3%, 6%, 3x3% and 3x6% ATC™ concentrates available at **solbergfoam.com**

UL, ULC, FM, EN, IMO, ICAO
Product certifications vary dependent upon concentration type.

RE-HEALING™ FOAM
AUTHENTIC FLUORO-FREE

SOLBERG

THE SOLBERG COMPANY
1520 Brookfield Avenue
Green Bay, WI 54313
USA
Tel: +1 920 593 9445

SOLBERG SCANDINAVIAN AS
Radøyvegen 721 - Olsvollstranda
N-5938 Sæbøvågen
Norway
Tel: +47 56 34 97 00

SOLBERG ASIA PACIFIC PTY LTD
3 Charles Street
St. Marys NSW 2760
Australia
Tel: +61 2 9673 5300

Firefighting foam concentrates – the constant evolution: Part 1

In the last decade there have been many advances in foam for firefighting. Since 2001 the multinational 3M ceased to manufacture surfactants and fluorinated AFFF foams due to the ban on PFOS (perfluorooctyl sulfonates), a flurry of development has been carried out by manufacturers of fluorinated derivatives and foams.



Javier Castro

Javier Castro has been in the fire business from 2001. He has led all R&D activities on firefighting foam concentrates for Auxquimia, from AFFFs to Fluorine free over more than 15 years. Over this period of time he has developed some special products designed for very specific applications. He has been directly involved not only in product development, but very active on technical consultancy, always very close to end user's needs. Mr. Castro holds a chemical Engineer Degree from Oviedo University and he has been deeply trained over his career on QHSE, Finance and Management amongst others.

The ban of PFOS required by an European and American Regulations, the decreasing of chains length (from 8 to 6 carbon atoms) in the fluorinated materials to reduce precursors of PFOA, the different proposals to limit the PFOA levels or even the regulation on the use of halogenated organic compounds in some countries have made the market of foams for firefighting very dynamic with changes on legislation, development of new products, etc. in the last decade. The fluorine-free foams (Fluorine Free, 3F, FFF) have become very important in recent times, in some cases even as substitutes for AFFF agents, being the subject matter of controversy and discussion in all international forums.

In addition to new formulations and types of foam, new testing standards have been developed and modified seeking test conditions as representative as possible of the real risks. Examples of this are the widely accepted protocol LASTFIRE tests as a requirement of foams in the petroleum industry or changes in the ICAO standard for airports. The European standard EN-1568, has been revised in 2008 and it has introduced new test fuels with respect to 2001 version; a new revision is on approval process and it will be published soon.

New fuels have gained importance in recent times, such as ethanol or gasoline with polar solvents as additives (e.g. the ethanol itself, MTBE, ETBE, etc.) which converts one specific type of hydrocarbon fuel in a complex mixture of hydrocarbons and polar solvents whose behaviour in contact with a foam solution has special features that should be taken into consideration.

The use of CAFS (Compressed Air Foam System) and the use of electronic foam proportioning systems have been

▼ **Fire testing ground in Auxquimia´s facility, Spain.**



Image courtesy of AUXQUIMIA S.A.U.



Images courtesy of AUXQUIMIA S.A.U.

▲ EN-1568-3:2008. Forceful application over heptane.

a major technological breakthrough in the industry of fire fighting. These systems are more efficient and allow a precise control of dosage, even at very low proportions rates (0.1-1%).

Throughout this article we will briefly review the changes in the foam sector to fight fires in the last decade, especially in the following fields:

1. Testing Standards
2. Environmental regulations
3. Fuels
4. Foam Concentrate
5. Fire-fighting Systems

1. Testing Standards

Until 2001, when the European Standard EN-1568 unified the criteria for approving and evaluating the foam concentrates, each country used its own standards, what made very difficult to compare the quality of foam concentrates manufactured in different countries.

Since 2001, the reference standard in Europe for testing and qualification of foam is the standard EN-1568, which consists of four parts:

- EN-1568-1: Fire extinguishing media. Foam concentrates. Specification for medium expansion foam concentrates for surface application to water-non miscible liquids.
- EN-1568-2: Fire extinguishing media. Foam concentrates. Specification for high expansion foam concentrates for surface application to water-non miscible liquids.
- EN-1568-3: Fire extinguishing media. Foam concentrates. Specification for low expansion foam concentrates for surface application to water-no miscible liquids.
- EN-1568-4: Fire extinguishing media. Foam concentrates. Specification for low expansion foam concentrates for surface application to water-miscible liquids.



In 2008, a new version replaced the original edition from 2001. The most significant changes between the two versions are:

- Definition of the material for the testing pans (Stainless Steel).
- Clarification of the requirements for a product to be classified as IA according to EN-1568-3, especially in the French version of the standard.
- Introduction of a new fuel on the fire tests of Part 4 (Isopropyl Alcohol).

The standards EN-1568-1: 2008 and EN-1568-2: 2008 do not establish classifications for products, only the fulfilment or not of the standards themselves. However parts 3 and 4 (EN 1568-3: 2008 and EN 1568-4: 2008) establish a classification of products according to their performance on the fire, both in extinguishment and in re ignition. For this reason, it is not enough to establish as requirement the compliance with these standards, but it should be indicated the minimum classification required for each individual part of the standard applicable (3-4).

Below we make a summary of the possible classifications for foams according to these standards:

EN 1568-3: 2008

- I: Extinction capacity by forceful application to hydrocarbons.
- II: Extinction capacity by forceful application to hydrocarbons when the application of the foam is interrupted (slow extinction).
- III: Extinction capacity with hydrocarbons by gentle application.

◀ EN-1568-3:2008. Gentle application over heptane.







Image courtesy of AUXQUIMIA S.A.U.

▲ EN-1568-4:2008. Acetone test.

Once the extinction test has been carried out, it is performed a burn back test to measure the level of protection that the foam is able to provide after extinguishment. There are four classifications (A, B, C and D); A indicates the highest level of resistance and D the lowest.

A product that meets the standard EN-1568-3 can be classified between class IA (maximum) and class IIID (minimum), it can be also classified in the intermediate range of classes between class IA and class IIID.

EN 1568-4: 2008

On polar solvents, tests are performed only with gentle application and the classifications are as follows:

- I: if extinction time is below 3 minutes.
- II: if extinction time is longer than 3 minutes.

In this case, it is also carried out a burn back test to determine the resistance of the foam, being the class A for those foams with longer burn back times and the class D for the shortest.

The new version of 2008, in addition to the acetone test, has incorporated a test with isopropyl alcohol (IPA). Some foams with good behaviour on acetone are very poor in other polar solvents such as IPA. For this reason it was decided to keep both fuels in the standard in order to have a more realistic range of behaviours of the foam. It must be pointed out that the rankings may be different for both fuels, e.g. the same foam can be rated as IA with acetone and IIB with IPA.

****Those users who want to have premium quality products, which are capable of dealing with any hazard of liquid fires with guarantees, should demand products rated IA or IB according to EN-1568-3 / 4:2008.

Along 2016 is expected to be published a third version of EN-1568, which will include new classifications, reference to Fluorine Free Foams and some ecotoxicological data.

Until the appearance of standard EN 13565-2 (“Fixed firefighting systems. Foam systems, design, construction and maintenance”) in May 2009, the different classifications according to the test standard EN-1568 had no impact in the design of firefighting systems. EN 13565-2, depending on the classification of the foam according to the standard EN-1568 i.e. depending on the quality of the foam, settles the application rates to be used, “rewarding” those products with a higher performance at lower application rates. It also takes into account what type of system to use (foam cameras, monitors, spears manuals, etc.) in the design of operating conditions.

UL-162

UL listing based on the standard UL-162 (Foam Equipment and Liquid Concentrates) is a worldwide recognized standard for testing firefighting foam concentrates. The laboratory which manages this certification, follow-ups, etc. is Underwriter Laboratories Inc. (UL).

The main difference with other standard for foams is that UL-162 not only describe a fire testing method for foam concentrate but also a “compatibility” confirmation between all the components that are present in the “chain” from the manufacturing process to the final use of the product; compatibility with drums, proportioning tests, foam quality tests, marking, etc. are subjected to the standard. Additionally, a follow up is required in a quarterly base; samples of concentrates and containers are taken and sent to UL laboratories for verification.

The listing or certification process for UL-162 is more complex than for other standards as EN-1568, ICAO, LASTFIRE, etc. with which only physic-chemical properties and fire tests are analyzed in fixed conditions. UL-162 requires to conduct foam quality tests with commercial equipment (UL listed) in order to verify foam quality previously to fire testing.

For the above, the customers who require UL listed concentrates are not only demanding a fire performance (which is covered by other standards) but also for a product with a performance of the foam when it is used with a specific type of equipment and which is subjected to periodically controls by an external body, assuring homogeneity along the time with not formulation or packing changes out of control.

According to UL-162 there are 3 different applications that a foam concentrate can be listed with:

- Sprinklers and Spray Nozzle (point 9)
- Topside Discharge Devices (point 10)
- Subsurface Injection (point 11)

Each type of application has a different testing method.

The most common and the normal requirement is the Topside Discharge defined as “A method of foam discharge wherein the foam is applied onto the top of burning fuel surface”. This type of discharge includes monitors, hand nozzles, foam chambers, etc.

Full-scale equipment (“field installed components, such as proportioners and foam makers that are intended to extinguish fires”) should be selected for



TABLE 3 – FOAM APPLICATION AND BURNBACK IGNITION

Application	Foam Concentrate	Fuel Group	Test application density, gpm/ft2	Time of foam application, minutes	Duration until burnback ignition, minutes	Minimum Design application density, gpm/ft2
1, Type III Discharge Outlets	P, FP, S, FFFP, AFFF, FFFP	Hydrocarbon Hydrocarbon	0.06 0.04	5 3	15 9	0.16 0.10
2. Type II Discharge Outlets	P, FP, S, FFFP, AFFF, FFFP, All	Hydrocarbon Hydrocarbon Polar	0.06 0.04 b	5 3 5	15 9 15	0.10 0.10 c

TABLE 4 – FUELS FOR POLAR SOLVENT TEST

Polar Solvent Group	Standard Test Fuel
Alcohol	Isopropyl Alcohol
Ketones	Dimethyl Ketone
Esters	N-Butyl acetate
Carboxylic Acids	Glacial Acetic Acid
Amines	Ethylene Diamine
Aldehydes	Propyonaldehyde
Ethers, except Diethyl and Methyl Tertiary Butyl Ether	Isopropyl Ether
Impurities for any polar test fuel is not to exceed 1.0 percent	

the listing process with the concentrate. Both proportioner and foam maker should be UL listed for the operation conditions that will be used in the tests.

The fire tests have to be conducted with a nozzle which gives approximate same expansion and 25% drainage time of the full-scale equipment (tolerances are detailed in the standard). Depending on the equipment selected, the foam quality generated will have different properties so fire performance can be also difference; non-aspirating monitors, which have an excellent reach, produce pourer foam quality than aspirating hand nozzles; with non-aspirating devices the foam concentrate quality should be high quality to pass the UL-162 tests.

▼ Type III foam discharge.



Images courtesy of AUXQUIMIAS,A.I.I.

Fire Tests Topside discharge

The UL-162 establishes two different topside application discharge outlets:

- Type III: For portable or fixed devices that delivers foam directly onto the fuel surface causing general agitation (monitor, hose stream nozzles, etc.).
- Type II: Fixed devices that deliver foam in a “gentle” manner (foam chambers, foam makers, etc…)

The hydrocarbons fire tests are conducted using heptane. The discharge type and application rate depends on the type of product (Proteinic, Fluoroproteinic, Synthetic, AFFF, FFFP) according to table 3.

In case of polar solvents, there is a reference fuel for each type of chemical structure (see table 4). Only Type II application can be listed for polar solvents and the application is selected by the manufacturer and should be indicated in the listing certificate. Note that MTBE requires a specific tests to be considered listed with this fuel.

Each foam concentrate only can be delivered with the container which is listed with. It is not allowed to mark with UL logo packing not approved or those that not meets UL-162 requirement for example totes or IBC.

LASTFIRE

For the oil industry, the greater risk of fire comes from the large hydrocarbon storage tanks, where are stored large tonnages of liquid fuel products. The LASTFIRE test protocol simulates the difficult conditions that occur during a fire in a storage tank, such as the longer time of pre-combustion, metal sheets with great thickness at high temperature, etc. as well as various types of foam application that can be used to extinguish the fire, from the use of aspirated or non-aspirated monitors to the fixed systems. The protocol sets three types of tests:

- Semi-aspirated: Simulates foam application with non-aspirated monitors.
- Aspirated: Simulates foam application with aspirated monitors.
- System: Simulates foam application with foam chambers.

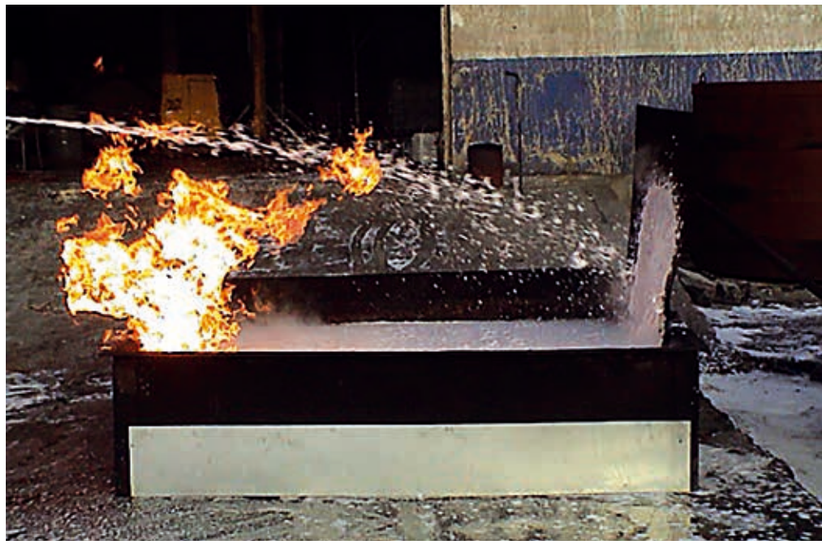
According to this protocol and for each test, the foams obtain different scores depending on fire control time, extinguishing time, vapour suppression and burn back resistance. Then as a result of the obtained score, the products are classified as “Good”, “Acceptable”, “Reduced” and “Poor” Fire Performance. The compliance for the petrochemical industry to LASTFIRE protocol should be acceptable or good rating in all three types of application.

Airports, through the International Civil Aviation Organization (ICAO), has also been active in updating their testing procedures; These changes have been approved in 2013. So far, two levels of foam quality were established: Level A and Level B. Every airport, according to its category and its firefighting equipment must use foam of one of those two levels. Since every time planes seem to get bigger, therefore the risk is also increasing, a new level in the certification for foams has been created, level C, which makes possible to extinguish fires with larger surfaces using the same equipment.

Apart from the introduction of the new level C, the protocol has changed slightly and will not allow the movement of the nozzle throughout the test, which makes extinction more difficult. By contrast, the standard will allow longer time for extinguishment (From 1min to 2 min.)

For more information, go to www.auxquimia.com

▶ Type II foam discharge.





Are F3 Foams an alternative to C6 AFFFs?

NO!

US Air Force leads the way converting to all C6 AFFF foams replacing PFOS, PFOA and long chain AFFFs with 418,300 gallons of 3% C6-based environmentally friendly AFFF, meeting 3% Mil Spec Mil-F-24385

dynaxC6

"One of the most far-reaching benefits to worldwide aviation safety" AFFF Firefighting Foams – containing C6 Telomer Fluorosurfactants since 1976.

*** US Naval Research Labratories (NRL) website – 90 years of Innovation**

"SEAC considers that fluorine-free foams can be taken into account on a long-term basis but cannot be relied on for the coming years for such a critical use."

Committee for Socio-economic Analysis (SEAC), Draft Opinion, on an Annex XV dossier proposing restriction on PFOA, its salts and PFOA-related substances, 10 September 2015, p14.

DYNAX CORPORATION
PO Box 285, Pound Ridge, NY 10576 USA
T 914 764 0202 techinfo@dynaxcorp.com
F 914 764 0553 www.dynaxcorp.com

dynax FLUOROCHEMICALS

What's new with... Foam concentrates

With the greatly increased emphasis on firefighter safety, the leading manufacturers have boosted their research and development efforts to provide the end user with the safest, most efficient and reliable foam concentrates. In this Buyer's Guide we highlight the latest offerings from the worlds leading suppliers.

3F Foams

For the past ten years the fire industry has been struggling to find the answer to the environmental issues surrounding foam concentrates. But now, following four years of research and development 3F are clearly on their own when it comes to new generation products. 3F have now developed into Europe's leading manufacturer of technologically advanced foam concentrates. 'Solvent Free' technology was developed by 3F to reduce by 50% the COD and BOD of fire-fighting foam. This technology known as Smart Foam has been introduced to foams that contain fluoro surfactants and foams that are Fluoro Free, to provide a further environmental benefit for the end user.

In terms of both fire performance and lowest environmental profile, 3F are the first manufacturer in the world to introduce 'Fluoro Free and Solvent Free' foam to the industry. FREEDOL SF is the first FFF-AR of its kind using this technology and proving to the market that AFFF and AFFF-AR can be replaced when required. Another first is FREEDEX SF1, the only 'Fluoro Free and Solvent Free' foam approved to EN3 for Class B and Class A with two of Europe's leading extinguisher manufacturers for use in stored pressure and cartridge extinguishers. This new Smart Foam product is now approved with a Chinese manufacturer to the Australian and New Zealand standards and will continue to expand into other world markets in the coming years.

For more information, go to www.3fff.co.uk

ANSUL

ANSUL world-leading firefighting foam concentrates are backed by a 100-year legacy of proven quality and performance. Our products are developed and tested at the ANSUL Fire Technology Center, one of the most extensive fire research and testing facilities in the world.

ANSUL's full range of environmentally-mindful C6-based foam concentrate products includes Aqueous Film-Forming Foam (AFFF), Alcohol-Resistant Aqueous Film-Forming Foam (AR-AFFF), Class A, military-specification, high-expansion and flouroprotein concentrates.

Our UL-listed and FM-approved foam concentrate products have been relied on to meet the most demanding challenges of industry and commerce, including high hazard/high risk markets such as aviation, chemical and petro-chemical, fire service and marine. All of our foam concentrate products are tested exhaustively with ANSUL industry-leading foam hardware products, ensuring optimal performance.

We do it all under one roof – R&D, design, engineering, manufacturing of agents and hardware, testing and training – so we truly stand behind the quality of our products. When it comes to helping protect your most valued assets, count on the ANSUL brand's century of leadership in the fire protection industry.

For more information, go to www.ansul.com

ANSUL®

BUYER'S GUIDE

Angus

Angus Fire has totally reformulated its range of firefighting foams under the Integrity banner to radically improve their environmental credentials in accordance with the US EPA's Stewardship Programme.

Every fluorinated foam within the range (from Angus FP70 to Angus Tridol Ultra 1-3) is now based on very pure C6 (short-chain) telomer chemistry. By working with regulators, customers and test facilities, each of these foam concentrates is now fully approved and suitable for use across a range of sectors on a wide variety of risks whilst maintaining the high performance that has become synonymous with any Angus Fire product.

In addition, Angus has released a range of fluorine free products for applications where environmental pressures are paramount. Angus Jetfoam is the first fluorine free, aviation foam to pass all aspects of ICAO Level B (fire and physical performance) and the only fluorine free foam capable of film formation on aviation kerosene.

The Respondol ATF is the brand new fluorine free foam from Angus Fire. A superior quality foam concentrate, designed for extinguishing and securing all types of flammable liquid fires and Class A incidents. Respondol ATF is a patented combination of surfactants and other ingredients specifically designed for general emergency responders who are faced with a variety of risks in a range of situations. Angus Respondol ATF is approved to EN1568 part 3 and 4 on all fuels and with all water types.

For more information, go to
fa@angusuk.co.uk

ANGUS FIRE

Dafo Fomtec AB

Dafo Fomtec AB is a producer and supplier of firefighting foams, powders and equipment. We are an independent and privately owned company with head office in Stockholm and production in Helsingborg in Sweden.

We are dedicated to high quality and high performing firefighting products to fulfill your demands. Many of our products have international recognized approvals such as: UL, FM, EN 1568, ICAO, IMO, MED and so on. During the years, we have put a lot of resources and effort in research and development to continuously improve our product portfolio – both regarding performance and environmental profile. As a part of this work, we perform annually over 300 full size fire tests where new products are put to the limit before they are sent for approval and placed on the market.

Our product portfolio consists of a wide range of products of all kinds and for all markets. The film forming AFFF- and AFFF-AR foams have been successfully transferred to the short chain C6-fluorosurfactants. Their performances have been evaluated in full scale fire tests before released to the market. In the range you also find protein-based foams, such as P-, FP-, FFFP and FFFP-AR types. We also offer a wide range of fluorine free foams – marketed with the name Enviro. Here you find Class A foams, multipurpose foams and FFF-types. The latter being fluorine free foams with high fire performance to be an alternative for AFFF- and AFFF-AR types. We also offer different types of foam solutions (premixes) as well as training foams – the latter especially designed to have as small environmental impact as possible.

For more information, go to
www.fomtec.com

CHEMGUARD

CHEMGUARD firefighting foam agents are engineered to meet the challenges of special hazards within the industrial, marine, mining, municipal, oil, petrochemical and transportation industries.

Our full range of environmentally-mindful C6-based foam agent products including Aqueous Film-Forming Foam (AFFF), Alcohol-Resistant Aqueous Film-Forming Foam (AR-AFFF), Class A, military-specification, high-expansion and flouroprotein agents are suitable for a variety of industry applications.

Our world-leading foam agents undergo extensive testing with best-in-class CHEMGUARD foam hardware products, making for the ultimate combined solution of UL-listed and FM-approved products. Known for advanced research and development, engineering and design expertise, quality manufacturing and high-end, field-tested products, we provide unmatched customer service and field support. Trust the CHEMGUARD brand for your foam product needs.

For more information, go to
www.chemguard.com

CHEMGUARD

PROFOAM

PROFOAM is specialised in production of firefighting foams. Years of innovative research have resulted in the development of more than twenty unique products, protein and synthetic based, adapted to a wide range of international firefighting requirements.

The production plant is located at Novara (near Milan Italy) in the heart of Europe, allowing an easy access to most countries around the world. What sets us apart is having a substantial production facility (200m3 with adequate supplies of foam concentrate.

Large production capacity, quality products, knowhow and reliability distinguish PROFOAM as the universal leader of foam manufacturers, giving the professional end user the quality assurance they need where matters of safety are paramount.

For the oil industry we recommend the use of protein based foam compounds (FP, FFFP, ARFP), as they provide superior burnback resistance, as well as being kinder to the environment. Besides in places where sea water is used for firefighting, protein foam compounds work more effectively with sea water than synthetic foams.

PROFOAM INTERNATIONAL

Major international petrochemical companies and oil industry have trusted us with using our products in their depots, refineries and chemical process.

PROFOAM is also known for its concerted effort to utilise chemical products that have least environmental impact, as well as for it short delivery terms, expertise and availability in customers' assistance.

Responsible for worldwide sales, the PROFOAM INTERNATIONAL team in Paris assists and advises international end users in the correct choice of foam compounds.

For more information, go to
www.profoam.it

Dynax

Founded in 1991, Dynax is a leading producer of fluorotelomer-based surfactants and foam stabilizers used in fire-fighting foam applications. As a result of the SBIR project carried out for the Air Force, Dynax developed environmentally more benign AFFFs and proposed higher performance standards for Mil-spec agents. Dynax also developed the first polymeric foam stabilizer (C6≥99%), making it possible for customers to produce low-viscosity or Newtonian AR-AFFF.

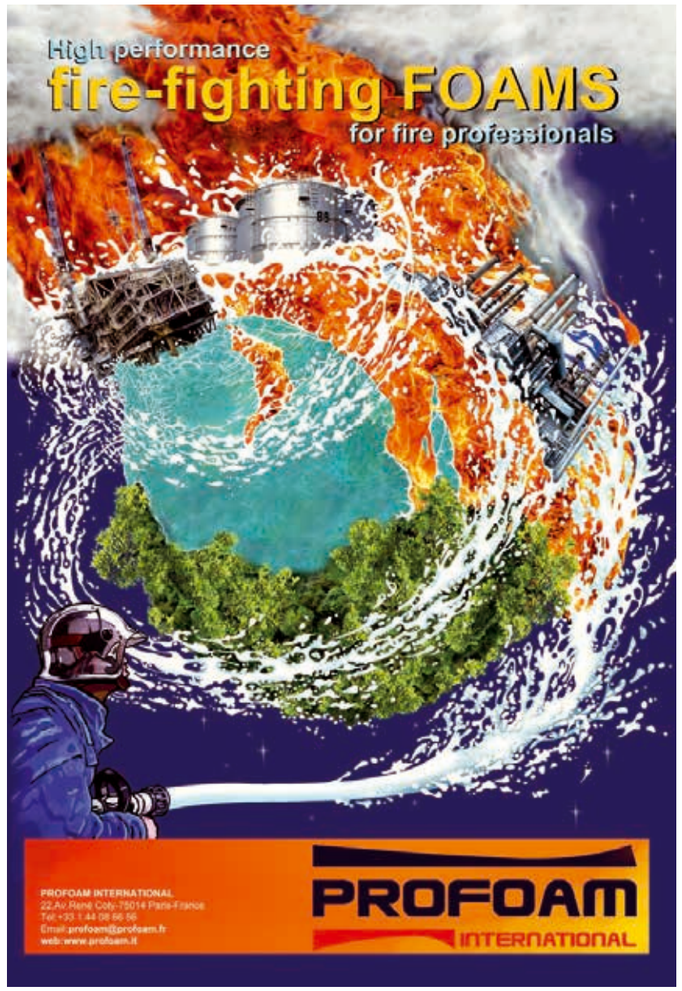
Dynax fluorochemicals, all derived from a high-purity short-chain (≤C6) fluorotelomer intermediate, neither contain PFOS and nor degrade into PFOS or PFOA.

With more than 90 years of combined experience in the fire-fighting foam industry, Dynax's expertise includes the development of new and innovative fluorochemicals and technical support to foam agent producers.

Today, as one of the largest producer and supplier of specialty fluorochemicals to the fire-fighting foam industry, Dynax continues to develop benchmark products to further strengthen its growing leadership.

For more information, go to
www.dynaxcorp.com

dynax FLUOROCHEMICALS



Subscribe at www.iffmag.mdmpublishing.com/subscribe

AUXQUIMIA

All the products manufactured by AUXQUIMIA are developed by its own R&D&I Department. Being aware of the importance of this research, AUXQUIMIA makes a remarkable effort, both technical and financial, in order to be in a constant evolution to achieve the best performances.

We are producing top-performance foam without the use of C8 chemistry to the point that, in 2015, our US branch even qualified our C6 formulation for a 3% AFFF that met US military specification MIL-F-24385, which is currently listed in the QPL Directory as Phos-Chek 3% AFFF MS. This was the first C6 fluorochemical foam concentrate to be listed in the QPL in accordance with the US Environmental Protection Agency's Stewardship Programme – no small achievement considering this certification is the most demanding in the world for AFFF's.

Our range of fluorine-free foams UNIPOL-FF has been evolving through the years to cover most industrial and civil applications. In 2011 it achieved a rating of 1B in Heptane and 1A in acetone on EN-1568:2008, in 2012 it achieved LASTIFIRE certification and in 2015 UNIPOL achieved UL 162 listing (Standard for foam equipment and liquid concentrates) with polar solvents, an extraordinary achievement given that all other fluorine-free foams have only been listed with hydrocarbon fuels.

Furthermore, sprinkler tests based on the same protocol with UNIPOL-FF-3/6 were also carried out with the challenging polar solvents acetone, ethanol and isopropyl alcohol, and the results again showed very good extinguishing times. Our foams are under constant development and we have set ourselves some further challenges for the future.

For more information, go to www.auxquimia.com

AUXQUIMIA
Fire fighting products

Solberg

Solberg is your one-stop resource for high performance, sustainable firefighting foam concentrates and custom-designed foam suppression systems hardware. Solberg has the expertise, capabilities and resources to serve the high-hazard, high-risk market sector globally.

RE-HEALING™ Foam concentrates from SOLBERG are an innovative, high fire performing environmentally sustainable fluorosurfactant and fluoropolymer-free firefighting foam used to effectively extinguish Class B fuels with no environmental concerns for persistence, bioaccumulation or toxic breakdown. RE-HEALING foam concentrates are very effective firefighting foams for flame knockdown, fire control, extinguishment, and burn-back resistance. Control, extinguishing time, and burn-back resistance is paramount to the safety of firefighters everywhere.

RE-HEALING foam concentrates have shown excellent performance in each of these categories. Concentrates are available in 1%, 3%, 6% 3x3% ATC and 3x6% ATC formulations.

ARCTIC™ AFFF, C6 compliant foam concentrates are intended for use on Class B hydrocarbon fuel fires and are available in 1%, 3% and 6% concentrations. ARCTIC ATC™ foam concentrates are intended for use on Class B hydrocarbon and polar solvent fuel fires. Concentrates are available in 1X3%, 3x3%, and 3x6% ATC formulations.

FIRE-BRAKE™ foam concentrate is a synthetic firefighting foam concentrate specially designed to be used for wildland, structural and other Class A fuel fires. The foam concentrate is biodegradable and non-toxic, so it is environmentally sustainable. FIRE-BRAKE foam concentrate is proportioned at a rate of 0.1% – 1.0%.

SOLBERG brand foam suppression systems hardware is engineered by a team with over 225 years of combined in-the-field fire protection experience. As a custom manufacturer, we tailor firefighting hardware to meet your particular specifications. You can count on us to work with you and deliver products that perform as needed, when you need them.

For more information, go to www.solbergfoam.com

Fire Safety Devices

FireChem is committed to serve you better by providing the best possible Fire ChemicalSolutions to meet the modern challenges of Fire & Safety requirements involving Flammable Liquids Hazards & Gaseous Hazards inherent to Oil & Gas, Aviation, Industrial & CivilSectors.

FireChem was established in 1999 as part of Fire Safety Devices Group and has grown to become the largest Fire Extinguishing Chemicals manufacturer in the Asia. FireChem has a reputed place among the top manufacturers in the Global Fire Fighting Chemicals Industry.

FireChem's reputation for Quality and Reliability is widely acclaimed and its products meet various National and International Standards. The product quality is further endorsed by certification agencies like – Underwriters Laboratories (UL), Germaniseher Lloyd (GL), Det Norske Veritas (DNV), Lloyd's Register (LR), Bureau Of India Standards (BIS) etc. FireChem is certified to ISO 9001 Quality management system and ISO 14000 for Environmental Management System.

FireChem is in a position to offer any type of Foam Fire Extinguishing Concentrate which can comply International Standards like UL 162, US Mil Spec, ICAO Level A & B, UK Defence, EN 1568,GL,IRS etc.

For more information, go to www.fcfsd.com

FIRECHEM

BIOex

Since 1998, BIOex has designed and manufactured the latest generation of ecological foam concentrates and also produces conventional foams for use in firefighting operations – solid class A fires, liquid class B hydrocarbon fires, liquid class B polar solvent fires and toxic gaseous vapors.

- 2002 – At BIOex we were convinced of the harmfulness of fluorine derivatives and were already working to preserve our environment by launching ECOPOL, the first fluorine-free multi-purpose foam concentrate.
- End of 2015 – We launched the new formula ECOPOL F3 HC specially developed to create the first fluorine-free 3% foam concentrate with an exceptionally fast extinguishing action on hydrocarbon fires.

Specializing in the design and production of ecologically friendly 100% fluorine free foam concentrates; BIOex has launched a new formula – ECOPOL F3 HC. THE first fluorine-free 3% foam concentrate for hydrocarbon fires that performs better than the best AFFFs.

Ecological

- Fluorine-free 3% foam concentrate
- Readily biodegradable

Exceptional Extinguishing Performance

- Used at 3% in direct application on hydrocarbon fires
- Obtained the best 1A performance classification under EN 1568-3 standard by an independent recognized laboratory (certified 1A/fresh water – 1A/sea water)
- Obtained the best performance classification under LASTFIRE – Good-Good-Good

Effective On Hydrocarbon Fires

- Exceptionally fast extinguishing action on hydrocarbon fires
- Very long burn back time equal to the best protein foams!

Powerful Foaming Capability:

- Offers durable adherence on vertical surfaces
- Insulates of storage containers in case of fire nearby

See the video ECOPOL F3 HC versus AFFF at https://www.youtube.com/watch?v=oVZOwMHsnYs

For more information, go to www.bio-ex.com



Dr Sthamer – Hamburg

As Europe's foremost Fire Fighting Foam Manufacturer, Dr Sthamer – Hamburg has been developing and producing foams since the 1920's. Dr Sthamer is a Hamburg based independent family owned business founded in 1886.

Dr Sthamer have been formulating firefighting protein and fluoro-protein based foams as well as AFFF, AR-AFFF and Fluorine Free Foams.

Their latest generation foams are divided into 3 product families:

- Fluorinated AFFF and AR-AFFF using the latest C6 Carbon chain fluorosurfactants in full compliance with the US EPA 2015 requirements and the EU 757/2010 POP (Persistent Organic Pollutants) Directives. These foams are independently tested and certified by 3rd party laboratories to EN1568, UL, IMO, MED, ICAO LASTFire Etc.
- Fluorine Free Foams, AR-Fluorine Free Foams, Class A 0.5% and 1% Foams, CAF's Foams, High Expansion Foams and Wetting agents all with 3rd Party Independent certification.
- Protein based foams, including FluoroProtein foams with UL Listing, EN1568 and IMO1312 approvals.

Dr Sthamer Foams, are suppliers to the Petrochemical Oil and Gas Industries, Aviation, Marine and Offshore and to Municipal and Military market customers Worldwide.

We operate a 24/7 Emergency Supply capability, and can mobilise supplies at any time of day or night for worldwide shipments, by truck and air.

For more information, go to www.sthamer.com

Williams Fire & Hazard Control

The Williams Fire & Hazard Control business boasts a successful history of responding to over 200 industrial fire incidents throughout the world. Such success inspired a full line of specialized response equipment including high performance nozzles, high-flow transportable firewater pumps and monitors, foam concentrates, mobile response trailers, foam proportioning systems for field use and fire trucks, dry chemical extinguishing packages and advanced storage tank protection. From storage tanks and pipeline emergencies to offshore platforms and vessels at sea, response personnel and specialized equipment stand ready to respond to the industry's worst fire emergencies.

The front-line experience of the Williams Fire & Hazard Control firefighting team is the driving force behind the development of the THUNDERSTORM foam concentrates we use to help protect what matters most.

THUNDERSTORM AR-AFFF foams offer the industry's best performance on both hydrocarbon and polar solvent fires, and our application methodology, equipment designs, and response success have all been predicated on that superior performance. Since its introduction to industry in 2000, THUNDERSTORM 1x3 AR-AFFF foam concentrate has become the gold standard in industrial foam caches around the world in a variety of facility types, helping to protect raw and finished product in refining, storage, transferring and transportation environments.

For more information, go to www.williamsfire.com

Orchidee

Orchidee is a leading European developer and producer of a wide range of firefighting products. Orchidee Foams, Powders, and Water Additives are marketed worldwide and its Orchidex and Pulvex brand names are a symbol of quality and Performance.

Orchidee is the preferred supplier to a wide range of customers across many industries, and across the globe. These include, the world's leading manufacturers of portable extinguishers, fire brigades, large industrial companies, oil refineries, electricity plants, storage farms, airports, oil & gas exploration, military and others.

The company's in-house R&D division is continually advancing the industry with cutting edge products that are breaking new ground in terms of performance and biodegradability. In 2010, Orchidee introduced BlueFoam to the market, a top performance fluorine-free foam, which is setting new standards of environmental & safety.

Our products are developed in accordance with the highest international safety & environmental standards.

The company's ongoing R&D drives the ingenuity and top performance of every Orchidee product, making Orchidee a leading name in the world of firefighting products.

Our products have an outstanding shelf life, and we offer a variety of packaging configurations according to the customer's request.

For more information, go to www.orchidee-fire.com





Offensive fire attack – Variables that interfere with the fire gases outlet: Part 2

In the article published in the previous issue, we did a description of the fundamentals of the exterior offensive attack technique, establishing that its effectiveness depends on three different aspects: Interfering as little as possible in outgassing, thus avoiding changing the dynamics of gas flow, to generate as little water vapor as possible, to effectively cool solid fuels. The variables related to the obstruction of fire gases outlet by water stream (and the air it drags) projected inward have been discussed in the previous article. Now we will try to describe what happens inside the room on fire.



Pablo Boj

Pablo Boj is a profesional firefighter in Malaga Fire Department (Málaga, Spain) since 2002, and crew commander since 2008. Pablo holds a degree in Criminology and his work has been focused on the field of fire investigation and fireground tactics.

Water dispersion and effectiveness

In a confined fire we can make a simplification of the elements involved: the fuel that feeds the fire, the layer of hot gases from the combustion and the enclosure that surrounds and contains them. We start from the premise that in order to be able to decrease the intensity of fire, the water should reach the fuel feeding that fire. Furthermore, we should avoid changing the dynamics of hot gases flow, minimizing where possible the generation of steam, namely the one generated when water traverses the gas layer or when getting in contact with structural elements that do not contribute to fire (walls and ceiling, provided they are not covered or coated by combustible materials).

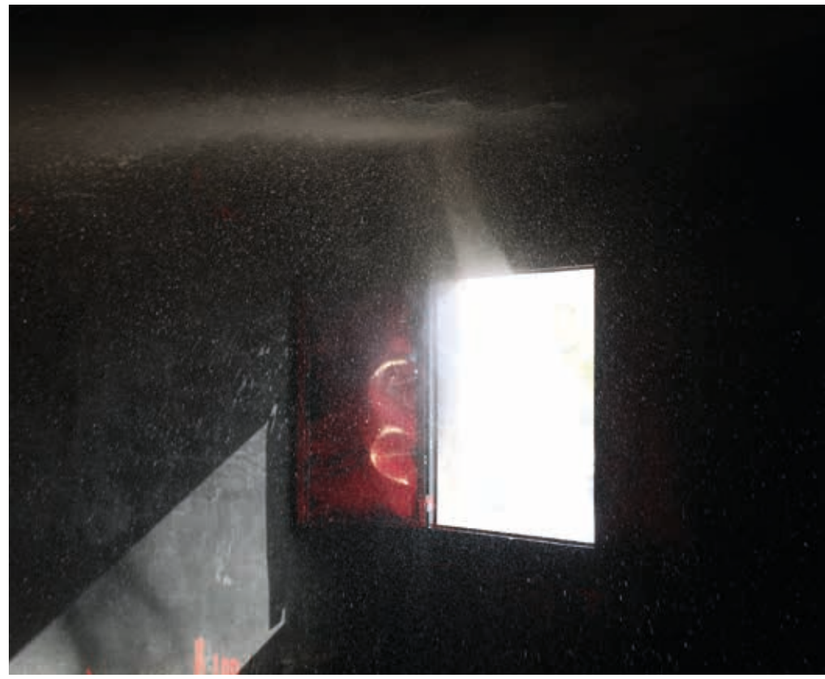
The straight stream projected into a room against the ceiling goes through the gas layer without suffering significant vaporization due to the small surface that the water body exposes. Once it breaks against the ceiling, it loses kinetic energy by drawing a dispersion pattern that varies depending on the speed and the angle at which it reaches the ceiling.

▼ In the discussion of the assumptions, the design and realization of tests, a large number of firefighters participated.



© Image courtesy of Pablo Boj

▶ The behavior of water after reaching the ceiling depends on its speed and angle of impact.



Once again we have the influence both of the delivery pressure, which shows up in the speed with which the water leaves the nozzle and of the entrance angle of the jet into the room. When water reaches the ceiling, it spreads and slips under it, being this movement more horizontal the faster the speed of the jet and the smaller the angle of entry, what means more time in the layer of gases, and therefore a greater vaporization in this area. In addition, faster speed causes greater dispersion of water and drops of smaller diameter.

As a result of gravity and disaggregation, the water ends by rushing towards the ground dropwise. The size of these drops, as they traverse the layer of gas while falling, is decisive in the degree of vaporization, being preferable large drops against mist, since the smaller size, the bigger surface exposed to heat and the bigger residence time in the gas layer, which means that less liquid water will reach the solid fuel at lower levels.

Finally, water will fall vertically on fuels or on the ground, or it will impact on the walls. In this respect, we should minimize the amount of water reaching walls, as water will use its cooling capacity on them by generating steam and then it will drain into the lower planes, where it will accumulate without any effect on fuel.

Trials conducted

In order to study all these aspects, several trials have been conducted in the facilities described in the precedent article.

Trial 3. In the same room, we project water inwards, with different configurations of pressure, flow and operating position in respect to the façade, making an observation of the water spraying on a water sheet on the floor.

Results and discussion

Results of Trial N.3 allow us to make the following statements:

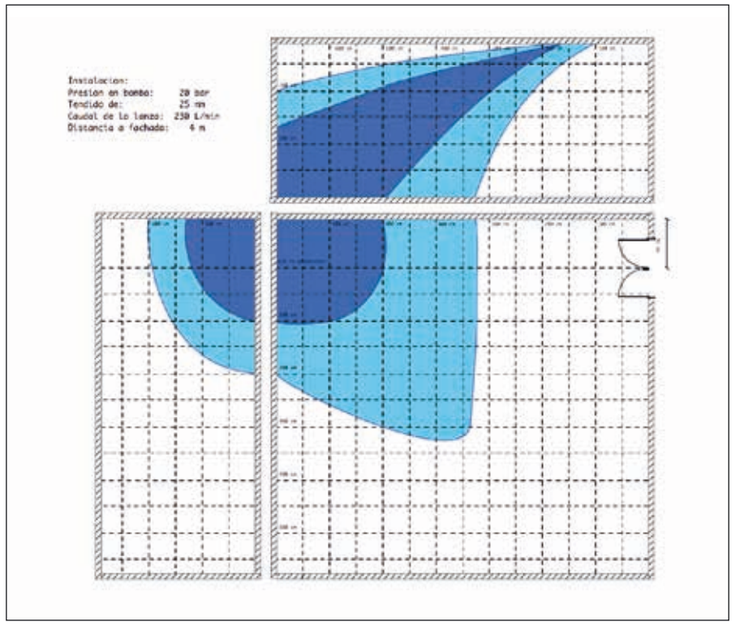
- The higher pressure and the lower entry angle, the greater distance reaches the water projection.
- The greater angle of entry, the greater dispersion in the axis perpendicular to the projection.
- The lower pressure and the higher actual water flow, the thicker drops confirmed by direct observation.

In respect of water dispersal patterns, we check that they vary considerably, mainly moving between 3 and 7 meters in front of the window, extending in the transverse axis with configurations with lower pressure and higher actual flow.

▼ An installation with a high water pressure from a position away from the façade can make a large amount of water reaches the opposite wall, and not on the fuel surface.



© Image courtesy of Pablo Boj



◀ **We have developed patterns projection of different configurations (hose diameter, pressure, distance to facade) from the observation of the water sheet.**

Final conclusions

Type of hydraulic system

From the results obtained in the framework of the study it emerges that, among the facilities studied, the most effective and producing less interference in the exhaust is the one of 45 mm against that of 25 mm, by applying the appropriate pressure to the height we have to achieve, and adjusting the flow to the intensity of the fire.

Although the 45 mm hose is a priori more difficult to handle, in practice it does not pose any particular problem because the operator has a basically static position and, by having a high projection angle, he can place the hose so that the reaction is absorbed by the ground.

▼ **An installation with moderate water pressure, from a position close to the façade, has a greater reach in the perpendicular axis of projection pattern.**



© Images courtesy of Pablo Baj

Operator position

In a real situation, it is difficult for the operator to know the size and distribution of the room into which he or she projects the water beyond what he or she might guess basing on the use of the building. However, we can say that it will always be preferable to start in a position as close to the front as possible and starting the projection of water by focusing a point near the window, because in this way we will reduce the air flow that interrupts the gas output. Furthermore, by using an angle closer to the vertical water projection has a greater radius of dispersion and prevents the water from reaching the opposite wall if this was nearby.

The operator should also be placed in a position allowing him/her to avoid walls, insofar as possible, if these are visible. In any case, it is always useful to the operator to know the dispersion pattern of the jet used, because a more effective implementation can be achieved.

In summary, we can establish the following general rules for the application of this technique in order to improve its effectiveness:

- Use preferably hydraulic systems that allow us an adequate projection of flows based on their diameter and not on their pressure. In the case of Deparment using small diameter lines, 45 mm hoses instead of 25 mm ones, adjusting the pressure to the height of the fire and the nozzle flow to its intensity.
- The operator must be located as close to the façade as security conditions allow, directing the water jet against the ceiling immediately below the window frame.
- Project the water to a fix point, moving the operator between one touch and the other in order the water projection to reach different areas into the room, avoiding walls if possible.

For more information, go to www.fundamentosparabomberos.es/



A made in Canada solution for specialist off-road fire fighting

First Responders don't have a choice where fires and accidents happen. In off-road environments, teams are challenged by the fact that their traditional fleet vehicles are too large to get to the scene of an incident quickly and efficiently. To solve this dilemma, fire departments and search and rescue teams the world over, from Australia to Austria, Mexico to Malaysia are increasingly turning to different types of all-terrain vehicle platforms that hold stretchers and other equipment for wildland fire fighting, off-road incidents or disasters such as floods or snow and ice storms.



Matt Chandler

Matt Chandler is the Marketing Communications Manager for ARGO and is responsible for spearheading the company's First Responder target market strategy.

Canadian based Ontario Drive & Gear Ltd. (ODG), is one such manufacturer who has capitalized on this demand and is fast making a name for itself as the Fire & Rescue industry's supplier of choice. For nearly 50 years, ODG has been the leading manufacturer of extreme terrain vehicles, with the amphibious ARGO world renowned for its versatility and capability of traversing difficult terrain.

▼ **The fully amphibious ARGO offers excellent stability and can transport Fire & Rescue personnel and equipment across water to extricate and evacuate injured parties and get them home safely, all without vehicle preparation.**

Originally geared towards recreational users, over the years increasing numbers of fire departments and search & rescue organizations have begun to recognize the ARGO's unique capabilities, with many ultimately purchasing vehicles and outfitting them with aftermarket accessories such as stretchers, water tanks and lighting systems to meet departmental and constituency needs.

With demand coming from all corners of the globe for an off-road vehicle designed to address specific industry applications, the company recently unveiled a dedicated line of First Responder ARGOs that let Fire & Rescue personnel go anywhere and 'Get in" and 'Get Out' safely, no matter the terrain. Designed for reliable off-road fire and rescue, the ARGO Responder MD and FF vehicles feature interchangeable modules allowing the unit to serve as a fire-fighting pump, off-road ambulance or crew transport for a team of up to 6 first-responders.



Image courtesy of ARGO

The ARGO Responder FF features a 75 gallon water tank and 5 gallon drop-in foam cell which firefighters can use to suppress fires on the spot or prevent fires before they start while the ARGO Responder MD features a Ferno #9 stretcher for extricating patients or performing rescues.

First-response features and designs for the fire & rescue vehicle have been in development, and in service around the world for the past ten years but the recent rollout is the first time that ARGO has developed specific models to meet the industry's demands.

Hazmat calls. Train derailments. Wildfires. Wilderness rescues. Disaster response. The applications for off-road, all-terrain first responder vehicles are many and varied, with ARGOs leading the way.

In Norway for instance, the government relies on them for tunnel emergencies. The country is crisscrossed by upwards of 700 railway tunnels, all of which make for extremely difficult work environments for firefighters. For Norway's first responders, the ARGO has proven itself as the ONLY small vehicle which can work with rail wheels for train or subway tunnel rescues, and with the high load capacity and terrain capabilities to boot.

In Japan meanwhile, the government uses the vehicles to navigate through sensitive terrain in the immediate aftermath of natural disasters. When a series of landslides crippled Hiroshima in August 2014, ARGOs were called on to transport first responders and equipment to and from the area and extricate survivors. With its minimal ground pressure, the impact of an ARGO is actually lighter than an adult's footstep, a feature that was absolutely critical in navigating the sensitive landslide zone. The terrain of the accident was a mixture of sediment,



▶ **Swamps, water, forests, mountains – the ARGO thrives in the off-road environments that traditional vehicles are unable to tackle.**



Images courtesy of ARGO

▲ **ARGOs are used by first responders around the world, as this civil defense organization demonstrates in Singapore.**



Images courtesy of ARGO



▲ **For Norway's first responders, the ARGO has proven itself as the ONLY small vehicle which can work with rail wheels for train or subway tunnel rescues, and with the high load capacity and terrain capabilities to boot.**

◀ **With their minimal ground pressure, the impact of the ARGO vehicle is actually lighter than an adult's footstep, a feature that is absolutely critical in navigating disaster recovery zones, as this Japanese fire department demonstrates.**

debris and rubble, which the ARGO had no trouble in managing.

Aside from its ability to tread lightly and its versatility in off-road situations, the vehicle's amphibious capabilities are what has won it praise from departments whose territories include any sort of water bodies, places where accidents and incidents are all too prevalent.

The Township of Muskoka Lakes in Ontario's 'Cottage Country' is a good example of the type of environment where the ARGO thrives. Littered with lakes, the town's fire department have come to rely on their ARGO for a multitude of amphibious water rescues including kayaking mishaps and snowmobilers falling through early spring ice among others.

"We did research into getting a vehicle that can be used all year round." Chief Harry Baranik comments. "The ARGO was the only vehicle that could float and go over very rough terrain. When you have members of the fire department going out to rescue people in ice water situations, this is the perfect vehicle to do it."

Snow storms are another area in which ARGOs have proven their mettle. In areas prone to torrential storms, firefighters are relied upon to assist stranded people, quite often a tremendous challenge when the snow comes down so fast that snowmobiles, salt trucks and heavy equipment are unable to offer respite. The 'Snowvember' storm that rocked Buffalo in 2014 showed just how important a specialist all terrain / off road vehicle can be in a crisis situation. From November 17-21, 2014, a lake effect snowstorm of epic proportions pummeled areas of western New York. More than 7 feet of snow fell in a narrow band extending from Lake Erie through South Buffalo and into its suburbs. People were trapped in their homes as snow piled against doors more quickly than it could be removed. A state of emergency was declared and except for EMS personnel, everyone was ordered to stay off the streets. Thankfully, one of the local departments had a fully tracked ARGO that ended up being used around the clock to rescue trapped residents and help get first responders to where they needed to be. As the local chief remarked after the worst of the recovery period was over, 'When every second counts, you can count on the ARGO.'

Affirming the above remarks, one of the earliest advocates of the ARGO as a first response vehicle was Kirk Walker, the Executive Director of REACT, a volunteer search & rescue unit that serves the region around Waterloo, Ontario.

Kirk has been using the ARGO for nearly ten years notes, "The greatest value of the ARGO could be in the improved response times it allows EMS teams. The ARGO's all-terrain ability simply allows personnel and equipment to reach the rescue or recovery scene faster. Rough terrain is a serious obstacle to paramedics on foot. It's difficult to carry a stretcher safely over broken ground: it can become dangerous for the patient and hazardous to the paramedics who carry the stretcher. If your rescue is two or three kilometers into the bush, the ARGO gets life-saving personnel and equipment onto the scene quickly, and back out again safely."

As ODG works with more and more fire departments and search and rescue organizations, it continues to tweak the ARGO to ensure first responders can take on trouble like never before and get home safe. With 75 per cent of the planet covered in water and a high proportion of terrain accessible to traditional trucks, there's no shortage of places where these versatile off-road machines can thrive. No doubt it's only a matter of time before readers see one in their own neighbourhood.

For more information, go to www.ARGOxtv.com



Unmanned Aerial Systems (sUAS) or drone training

As technology improves and changes, so does the way we conduct fire-rescue operations. One of the biggest changes to the fire service in recent years has been the introduction of small Unmanned Aerial Systems (sUAS) or drones into daily operations. With the inclusion of this new tool, not only do we change the way incidents are managed, but also the way we train for them. When properly used, drones can dramatically increase safety. But, just like every tool we use, comprehensive and ongoing training is the key to success.



Jason Hershcopf

The uses for drones are unlimited and can be applied in a variety of ways: 360 degree checks at house fires, scouting the upper floors of a high-rise building, hazardous materials investigation, pre-planning, technical rescue, as well as search and rescue, just to name a few. There is no denying that drones will play a more and more important role for first responders including firefighters as the technology develops. Drones provide a higher level of safety for firefighters and access to new information.

Drones also provide unique real-time tactical and strategic information on the fireground; information which was not previously available through other means. For instance, thermal imaging has been available for years and many departments use handheld cameras. However, thermal imaging cameras can now be mounted to drones, allowing pilots to fly above structures to get a more complete picture of a scene. Incident commanders (ICs) can then decide how to extinguish a fire or contain a hazard with the least risk to firefighters.

Drones can also be used to rapidly inspect entire structures without having to worry about size, hazards or access issues, or to to quickly cover large areas during search and rescue operations.

▼ **Using thermal imaging, firefighters can see exactly where the fire is located in this RV fire.**

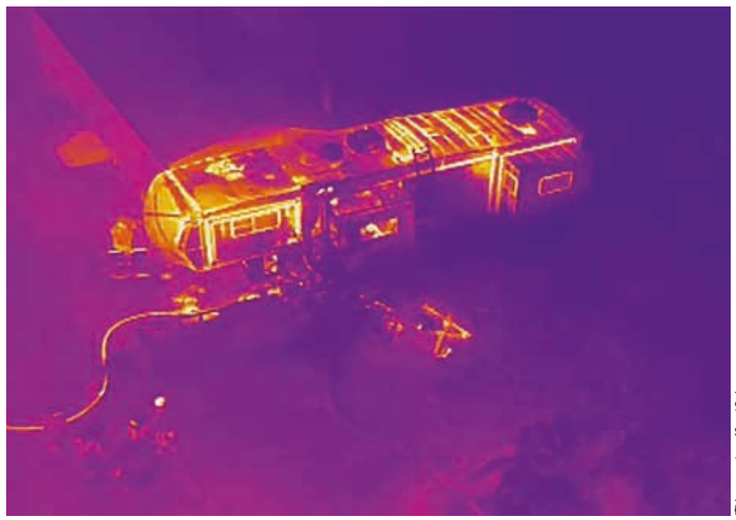


Image courtesy of Garret Bryl

Jason Hershcopf is the President of Cobb UAS, a company dedicated to the training and safe and effective use of drones. He has been involved with fire rescue for 26 years and is currently a paramedic in the US. In addition, he has been flying remote control aircraft for over 30 years.

▶ **This DJI Inspire is being used to provide real-time imagery to incident commanders during recent floods in Texas.**



Additionally, we can utilize drones with mounted sensors for HAZMAT incidents. Drones can fly into potentially contaminated areas to obtain readings without risk to fire/rescue personnel, which is not only safer, but also cheaper, as disposing of a drone typically is less costly than HAZMAT suits and decontamination equipment.

For large scale or geographically dispersed incidents, drones can provide a better vantage point. For example, an IC can get a better view of a brush fire to learn where to deploy resources and what direction the fire is moving. Drones can fly above trees and get much closer to an actual event than the operator or command post. As a result, the aerial view will allow the survey of acres, versus the limited amount that can be seen on the ground.

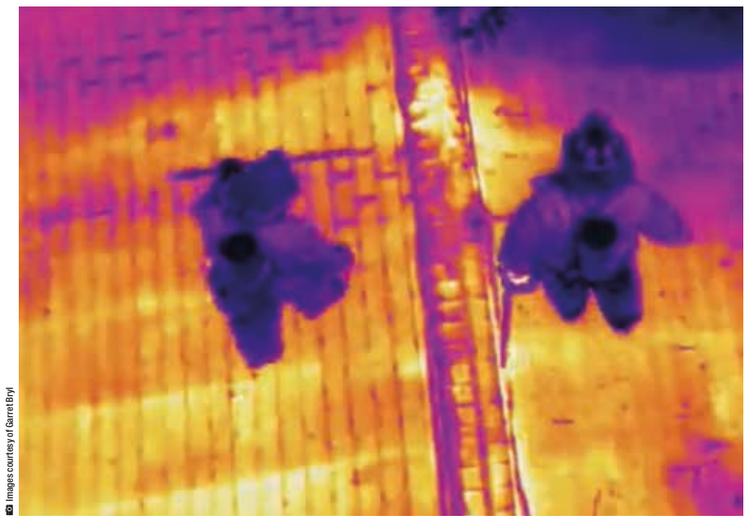
Furthermore drones can capture videos and still images of an incident or training, in addition to streaming live HD videos. These images can then be used as part of a debriefing or as evidence in an investigation.

When we look at resources that are currently available, many departments have helicopters either as part of their agency's equipment or as part of an agreement with another agency. In either case, the use of helicopters can be appropriate for covering large areas or extended flight times, but is costly. At hundreds or thousands of dollars per flight hour, they are significantly more expensive to operate than drones. Helicopters can also take an extended period of time to request and arrive on scene, while drones just need to be pulled out of their case and launched, usually within minutes. Drones also provide the ability to immediately respond to instructions, while using a helicopter requires radio transmissions and the pilots/operators understanding of what is being asked. In addition, high definition videos can be hooked up from drones and directly be linked to a command post or vehicle.

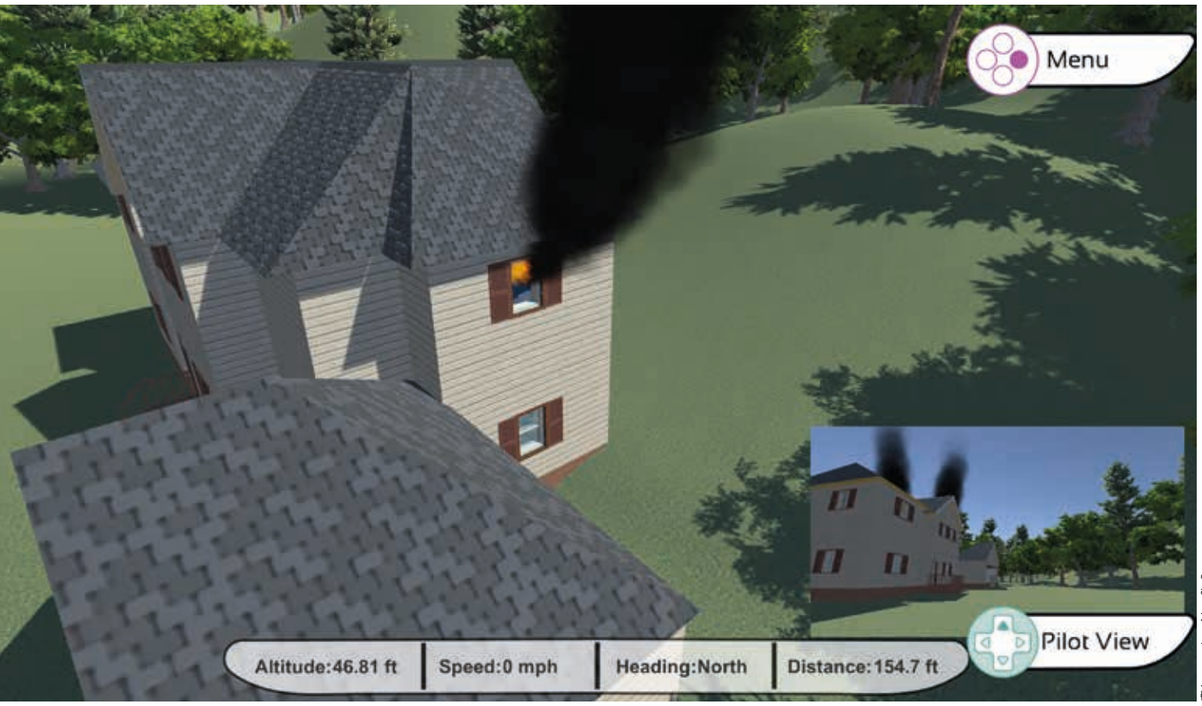
Given the unique and dynamic operating environment, a two person pilot/operator team is usually recommended. This allows the pilot to concentrate on the safe operation of the aircraft, and the observer the operation of the cameras/payload. Using this methodology is similar to the crew resource management (CRM) successfully used in the airline industry to improve safety by distributing workload.

Having said that, operating a drone during an emergency is very different from flying a drone as a hobby, or from flying commercial drones to take pictures or videos, and it's most likely also different from flying drones during training. The dynamic and often unknown environment of an incident presents unique challenges. As such, a live incident is not an appropriate time for a new pilot to fly a drone for the first time. Including drones in daily training is imperative. These training evolutions not only help pilots become familiar with how the aircraft operates, but help camera operators learn how to get the best vantage point. They also teach the IC's what new information is available, so they can think about how best to use it. Having drones flying around during

▼ **Thermal imaging provides valuable insight as to the stability of a roof. This image shows firefighters walking across a roof that is compromised.**



Images courtesy of Garret Bryl



© Image courtesy of droneSim Pro

▲ This image from droneSim Pro shows how a drone can be used to provide live imagery to incident commanders during a house fire.

training also allows firefighters learn to operate with the additional overhead sounds and distractions.

However, before a pilot is able to fly a drone during operations, he or she needs a lot of practice and comprehensive training. A great way to start is to practice flying a drone on a simulator such as droneSim Pro (www.dronesimpro.com), which was originally developed to meet the needs of the fire service. The simulator allows drone pilots to learn basic, as well as advanced skills and help develop reflexes that are important in order to prevent costly aircraft accidents and damage. Another advantage of the simulator is that pilots can practice 24/7, without having to worry about weather conditions or battery life. Once basic flight skills are mastered, pilots can transition to the real aircraft.

As a next step, pilots need to learn about fly around hazards, unknown areas, thermals, smoke and water. Most of the time, pilots are going to start flying in environments that they have not previously had a chance to surveil prior to an incident, similar to medevac pilots. Besides, if they are going to fly beyond visual line of sight (BVLOS), they will not be able to see the drone and will only be able to control it and avoid obstacles by using an onboard camera.

For Departments that want to use drones to carry a payload like a radio, life jacket, or other supplies, pilots must be proficient in flying a drone with the additional weight to deliver the payload accurately to its destination. The increased weight decreases the maneuverability of the drone and failure of the lift system can cause injury to people on the ground.

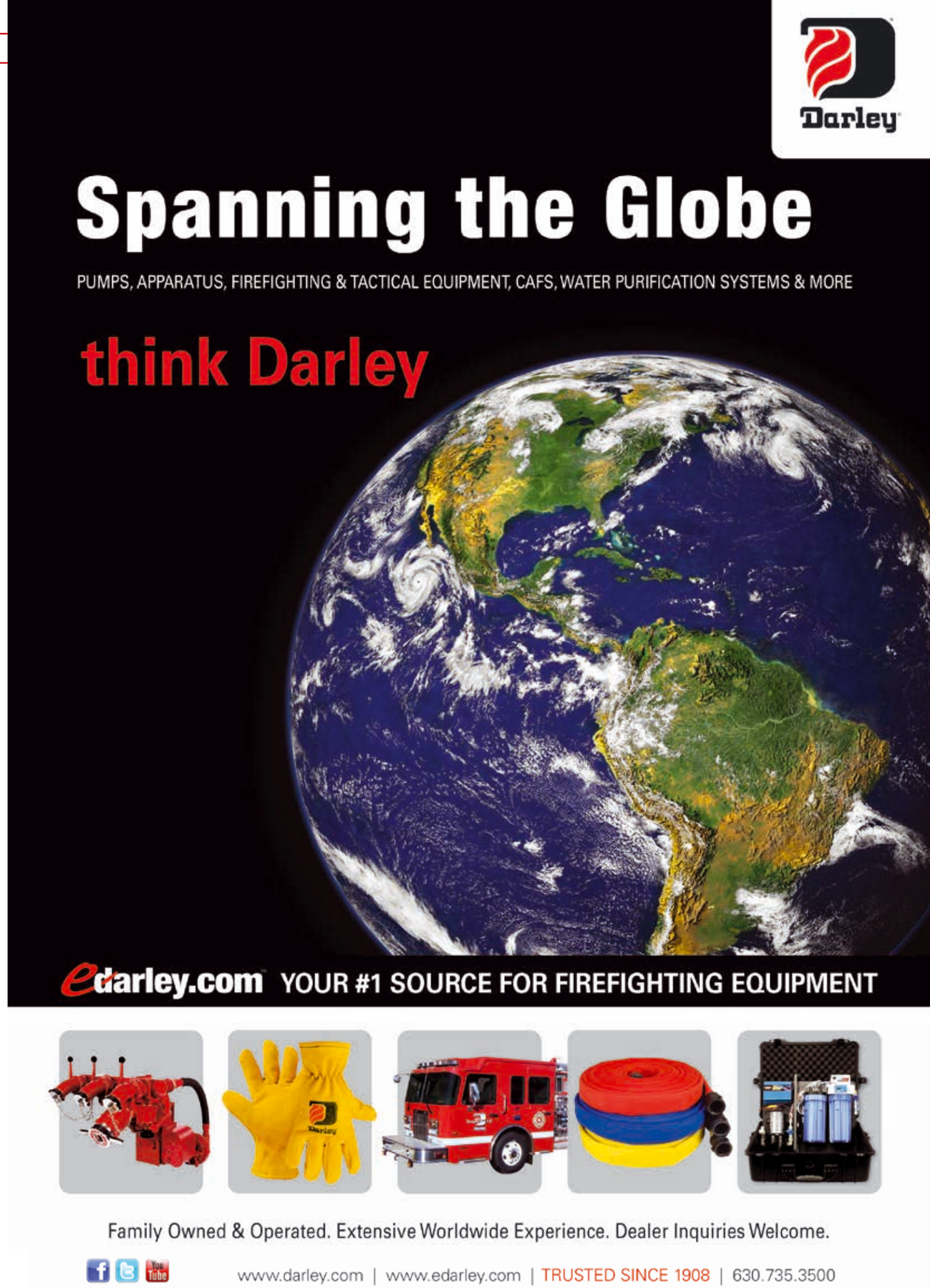
Firefighters also need to learn the capabilities of the different types of drones, and which one will best complete a mission. For example, to cover a large area for search and rescue, a fixed-wing aircraft might be the best option. A quadcopter, or bigger, would be best to cover a small area or maintaining a visual on a specific area of interest. There is also a new generation of drones available called tilt-rotors. These aircrafts allow a pilot to take off like a quadcopter, but then provide the range and speed of a fixed wing. Given the different options, knowing the best tool to use is going to give better results.

In addition, pilot training also needs to include local regulations and department policies. For instance, some areas don't allow drones to be flown over people who are not actively involved with a flight, or who haven't been notified prior to drone operations.

Moreover, incident commanders need to learn how to integrate the new information they are receiving as a part of their command and control. For example, a thermal imaging camera can be flown over a roof and give information on whether or not it is safe to allow firefighters to walk on it. They can also make command decisions on how to attack a fire based on thermal flows. As we learn to interpret this new information, we can determine where, or even if there is a fire, how it is affecting a structure or environment, and how we can keep firefighters safe.

Admittedly, there are a few things that need to be considered and learned when implementing drones into daily operations. However, they are an amazing asset and can help prevent accidents. And most importantly they can potentially save lives!

For more information, go to www.cobbuas.com



FDIC®
INTERNATIONAL

APRIL 24-29, 2017

INDIANAPOLIS, INDIANA
INDIANA CONVENTION CENTER
& LUCAS OIL STADIUM



ANSWERING THE CALL
FOR 90 YEARS

PRESENTED BY Fire Engineering OWNED & PRODUCED BY PennWell® FDIC.COM

INTERNATIONAL TRAINING & EXPO OPPORTUNITIES



FDIC International is the largest gathering of fire professionals in North America with 55 participating countries. Join attendees and exhibiting companies from around the world for a week of informative fire-focused meetings, workshops tours, an extensive program and exhibition. FDIC International highlights perspectives on the role of firefighters, and helps participants develop a vision to meet challenges and ensure the future sustainability of the industry

FDIC International Lounge

All international attendees are invited to take advantage of the official FDIC International Lounge, located in room 111/112 in the Indiana Convention Center. Translators, conference and event information local area information, etc. will be available

International Networking Reception

Join fellow international attendees and exhibitors for an evening of cocktails and appetizers at the International Networking Reception

FDIC® INTERNATIONAL **WORLD'S LARGEST**
FIREFIGHTER TRAINING CONFERENCE & EXPO
INDIANAPOLIS, IN | WWW.FDIC.COM

WHERE LEADERS COME TO TRAIN

DEPARTMENT OF COMMERCE · UNITED STATES OF AMERICA ·
INTERNATIONAL TRADE ADMINISTRATION

PRESENTED BY Fire Engineering OWNED & PRODUCED BY PennWell® www.fdic.com

1st UK Rosenbauer AT for Land's End Airport

Land`s End Airport (EGHC) in the county of Cornwall, UK is the most south westerly commercial airport operation on the UK mainland. This successful – privately owned airport is located in a stunning coastal location boasting unrestricted views looking out on to one of the busiest shipping lanes in the North Atlantic Ocean. The airport offers an exclusive scheduled air link to St Mary`s Airport on the archipelago Isles of Scilly which consists of five inhabited islands located 28 miles west of the Cornish peninsula.

Land's End Airport officially opened in June 1937 with the inaugural flight to the Isles of Scilly taking place on the 15th September 1937 when a de Havilland Dragon with the pilot and four passengers landed on St Marys golf course on the largest of the Scilly Isles. Since 2012 Land`s End Airport has been locally owned by the Isles of Scilly Steamship Group (ISSG) who retain their administrative headquarters in Penzance.

ISSG`s subsidiary Lands End Airport Limited operate the airport and another subsidiary Isles of Scilly Skybus is the sole provider of aircraft on this exclusive route to St Mary`s Airport! In 2013 the company embarked on a multi million pound (£) investment in the airport to upgrade many of its dated and inadequate facilities. With some additional funding courtesy of the European Regional Development Fund the airport has seen the completion of some significant capital projects in the past 36 months which have greatly enhanced the airports infrastructure and the overall passenger experience! These include the construction of a new eco-friendly passenger terminal, a state-of-the-art air traffic control tower, the installation of new lighting & navigation systems, improvements to the apron plus the laying of two of their four runways to an all weather surface. The final instalment will see the installation of a Global Navigation Satellite System (GNSS) to the main runways.

▼ **The stunning M.A.N 13.290 4x4/ Rosenbauer Advanced Technology 3 ARFF vehicle posed in the Cornish sun.**



© Image courtesy of Gary Parkinson

The airport fire & rescue service have also seen some specific enhancements under the directive of the Isles of Scilly Steamship Group. In 2013 the airport was upgraded from category 2 to category 3 aircraft movements and additional fire service personnel were recruited to fully comply with UK CAA CAT 3 requirements. All fire-service personnel now receive professional training at a UK CAA certified fire-training centre and more recently the fire station was extensively refurbished & modernised. In the summer of 2015 the airport management engaged in discussions with leading European fire engine manufacturers for the supply of their first new & purpose built ARFF vehicle!

Following a competitive tendering process; an order was placed with Rosenbauer UK for the supply of a state-of-the-art Rosenbauer Advanced Technology 3 series aviation, rescue & fire-fighting vehicle; the first of its kind in the United Kingdom.

The 3rd generation of the Rosenbauer Advanced Technology series (AT for short) captivates over 90 safety and ergonomic innovations gained from the production of over 5000 AT series fire-fighting vehicles since its introduction in 1994! The AT series boasts a production process which is continuously being perfected. The superstructure makes use of bent laser-cut aluminium sheets assembled into a high-strength light-weight body which is self-supporting, torsion-resistant and finished with robust flush-fitting plastic covers. The seamless integrated crew cabin has been refined with the latest safety and ergonomic features and includes the innovative safe exit rotating crew-cab stairs – permitting the crew to safely exit the vehicle even when fully donned in PPE. The spacious interior offers various seating layouts with 3 x SCBA mountings, 3-point safety belts to all seats plus an optional complete roll-over airbag system with seatbelt pre-tensioners.

The innovative rear superstructure can accommodates both water, foam and dry chemical fire-fighting media; the pump and a comprehensive array of fire-fighting and crash-rescue apparatus stowed on space saving, flexible and easy accessible rotating shelves – which are fully illuminated with the latest LED lighting technology. The Rosenbauer Logic-Control System based on CAN-bus technology provides the driver with a quick and comprehensive overview of the operational status of the entire vehicle. It provides information about the tank contents, open equipment lockers and much more. In addition, all signals units, lighting systems and fire-fighting media can be controlled & monitored from this unit. In the rear locker there is an additional LCD flat screen which virtually mirrors all of the control & monitoring options on the in-cab mounted system.

The Rosenbauer Advanced Technology series is available on a wide range of chassis & engine combinations with custom built superstructures and flexible fire-fighting media in a superior fire-engine package adaptable for urban, industrial and aviation rescue & fire-fighting applications. Factually the AT series is one of the most successful fire engine concepts of the 21st century!

Working closely with the customer Rosenbauer UK have recently fulfilled the delivery of this stunning AT3 aerodrome rescue and fire fighting vehicle tailored to meet the urban dynamics of Land`s End Airport Fire & Rescue Service. This UK 1st (Rosenbauer AT No 4994) is set-up on the robust M.A.N TGM 13.290 4x4 chassis incorporating the latest 290 bhp Euro 6 diesel engine and 12 speed Tipmatic automated transmission. This AT3 makes use of a seamless clean flowing Rosenbauer crew safety cabin with 3 x forwarded facing crew seats fitted with integrated SCBA mountings and seat belt pre tensioners plus wide opening doors linked to the innovative safe exit crew cab steps.

Land`s End Airport specified their AT3 with a rear superstructure incorporating the inventive Rosenbauer easy access stowage system enclosed by 7 x full length roller shutter doors finished in a stunning dark grey paint finish. Fire-fighting media includes 2,445 litres of water, 326 litres of foam plus a very cleverly stowed 75 kg Perren Engineering DCP trolley. Due to a low-height restriction the tender makes use of a remote bumper mounted Rosenbauer RM15 monitor delivering 1,800 lpm fed by a Rosenbauer NH35 multi pressure pump rated at 2,500 lpm @ 10 bar linked to the Rosenbauer FIXMIX foam proportioning system. The tender incorporates a 80 metre high-pressure hose reel fitted with a Rosenbauer Select Flow RB100 branch – plus a vehicle under body self-protection system. This stunning category 3 ARFF vehicle which is finished to a class leading standard meets all current UK CAA, ICAO and NFPA standards.



© Image courtesy of Gary Parkinson

▲ **The 75kg DCP trolley lowered by an innovative compact electric winch system.**

Rosenbauer UK Managing Director, Oliver North, commented; "The AT, which we've had the pleasure to build for Land's End Airport, is an extremely poignant one as it completely raises the bar for what any commercial chassis airfield fire fighting appliance can be. Not only airport specific, it highlights our ability to use the market leading AT and make it bespoke for any fire fighting organisation.

With the first AT domestic fire engines recently delivered to the Buckinghamshire Fire & Rescue Service, I genuinely feel that this initial batch of AT`s will be the first of hundreds due into the UK over the next few years. Our initial feedback from the fire-fighters who will be using these appliances over the next twenty years or so has been extremely flattering; and we look forward to an excellent partnership supporting their AT`s over the next few decades."

For more information, go to www.rosenbauer.co.uk

Subscribe at www.iffmag.mdmpublishing.com/subscribe

21-22 September 2016, NEC, Birmingham, UK

The Emergency Services Show

See the latest development in drones and hybrid vehicles

The latest developments in drones, hybrid vehicles and PPE will all be showcased at this year's Emergency Services Show which takes place in Hall 5 at the NEC, Birmingham, UK from 21-22 September 2016. Fire and rescue personnel and industrial brigades from around the world are invited to attend the free event to familiarise themselves with the very latest vehicles and equipment designed to help them fight fires and respond to terrorist attacks, road traffic accidents and natural disasters.

New: Drone Zone

Launched in partnership with SUAS Global, the new Drone Zone will showcase drone suppliers and bring together industry specialists with end-users. The free seminar programme includes presentations on risk management, privacy, security implications and regulations. Drone supplier Coptrz will be on hand to offer advice on how to choose the right drone and what kind of training is required. Other UAV suppliers exhibiting include Aeraccess, Excelerate, Primetech and WH Bence. Visitors with an interest in air surveillance should also pay a visit to the UK Civil Air Patrol (CAP) stand where a Cavalon autogyro will be on display.



Showcase of Latest Kit and Technology

Visitors with an interest in vehicles will find leading names such as Mercedes-Benz Trucks, BMW, Volvo Emergency Services Cars, Volvo Trucks and as well as Incident Command Units and welfare units, all types of in and on-vehicle ancillary equipment, including communications and IT.

On the Excelerate stand, visitors will be able to see the new joint command vehicle for police and fire services in Northamptonshire. Currently under construction, it is believed will be the only one of its kind in the UK and will provide a base for commanders when in attendance at large scale or major incidents.

Terberg Fire and Rescue will be launching TACR4, the latest model in its range of TACR compact aircraft vehicles. The vehicle's multi-role capability allows the units to be used not only in an airport environment but also in the local authority, industrial and military market sectors. The unit can be reconfigured very quickly to suit various incident types for example from wildfire applications in summer seasons to winter flooding.

Winter readiness will be a theme throughout the show with a number of free seminar sessions focusing on flooding, presented by The Environment Agency, National Flood Forum and UK emergency services. Meanwhile the Flood Advisory Service team will exhibit their 40ft, roadshow trailer which is used to visit flood prone and flood hit communities providing advice on flood risk and protection.

Barrus, a leading custom-engine builder, will be showcasing the Mercury 175hp diesel outboard and the 185hp kerosene version. The diesel engine is ideal for applications where petrol is either not available or carries a fire risk.

Delta Fire will stage the official launch of its new Generation 2 Pro Series Fire Nozzles at the Emergency Services Show. It will also launch the new Delta 'Attack' and 'Lay' Packs and the new patented Nozzle Hose. Meanwhile Le Maitre will be demonstrating its new RESCUE 300 high powered smoke generator and Holmatro will display its new 5000 series cutters, which are lighter and more ergonomic than ever, significantly reducing the physical burden on the operator.

Bariquins is exhibiting its bariatric training mannequins for the first time anywhere at this year's show and Harken Industrial's Technical Team will be demonstrating the operational features of the PowerSeat man riding winch. Other major names confirmed in the impressive indoor and outdoor exhibition include Bristol Uniforms, PBI Performance Products, Draeger, Holmatro, Weber Rescue, Emergency One/Clan Tools & Plant, Ferno, Openhouse Products, Physio-Control, Scott Safety and Interspiro.

The latest kit and technology will also be widely discussed in the PPE and ICT Innovation Theatres, details of which will be published soon.

Registration

Entry to the exhibition and seminars is free. The NEC is linked to Birmingham International Station and Birmingham Airport and directly accessible from the UK motorway network. Parking for visitors and exhibitors is free of charge.

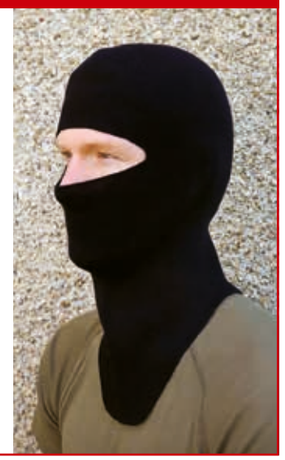
For more information, go to www.emergencyuk.com

Armadillo Merino — Stand D78

Armadillo Merino design kick ass socks to protect your feet in the heat of action however their latest innovation is even more cerebral. Recent focus has been on heads over heels to incorporate new yarns and garment features that will significantly increase head protection and user performance.

The new Fire Resistant Balaclava, is a very unique garment; it's a world first, as it combines a special superfine fire resistant merino yarn with the latest in seamless technology in a balaclava that delivers superior safety and comfort to users. The new balaclava also draws on recent innovations in Formula One and the Special Forces community to create a remarkable balaclava that helps optimise wearer performance in high-risk environments. Better performance is achieved by being more comfortable with super soft next-to-skin comfort, no abrasive seams, less heat, less sweat and no smell.

Armadillo Merino also offers a "tailor-made" program allowing the customised design of headwear to meet your specific PPE and helmet requirements. The fire resistant Balaclava can also be colour matched to integrate with your existing PPE.



www.armadillomerino.com

Bristol Uniforms — Stand A70

Bristol Uniforms is a leading designer, manufacturer and supplier of protective clothing, meeting the diverse needs of emergency services personnel in the UK and around the world.

Working with leading international fibre and fabric manufacturers including WL Gore, PBI Performance Products and DuPont, Bristol's in-house design teams continue to develop innovative and progressive garments offering maximum safety, flexibility and comfort.

This year, Bristol will be exhibiting its broad range of PPE solutions designed to meet specific needs, such as Air Ambulance coveralls, Ambulance apparel for Hazardous Area Response Teams (HART), a range of high visibility and wet weather clothing, and its specialist Urban Search and Rescue (USAR) range.

Also on display will be Bristol's innovative LayerFlex range, which provides a layered approach to PPE for firefighters. LayerFlex comprises three garments: RescueFlex Coat, XFlex Outer Coat and XFlex Trouser, each with a variety of fabric options drawing on specialist materials from WL Gore, PBI Performance Products and DuPont. When used in different combinations, these garments provide appropriate protection for structural and wildland firefighting as well as technical rescue operations.

In addition to designing and manufacturing world-class PPE, Bristol also offers a lifetime approach to garment maintenance, cleaning and repairing stock through its in-house managed services offering.

www.bristoluniforms.com

Goliath Footwear — Stand G78

If you are attending the Emergency Services Show 2016 this year, make sure you see the latest range from Goliath on stand G78

On display will be full structural fire boots, wildland boots, and a variety of multi-role boots handing fire and rescue teams much greater adaptability. In particular ask about the 'Pyros' GORE-TEX® rescue boot and the new Apollo Wildland boot using TenCate® technical fabric. The Goliath's quick release water rescue boot will also be available for a fully protective footwear solution for flood rescue.

All YDS fire boots feature the original injected DDR technology produced by the ISO9001 quality assured factory, which delivers a tough rubber outer sole to protect from nicks and cuts and 300°C heat, and an air injected rubber mid-layer provides a cushioned comfort for the foot. The 'Rubber / Rubber' sole material combination provides the optimum protection in hazardous and hot environments.

In-house SATRA testing ensure all YDS fire boots meet the high standards of fire crews around the world, with their range independently tested to meet the current European and Australian firefighter safety boot regulations.

www.goliath.co.uk

Hainsworth Technology

Stand **B86**

Hainsworth Technology are passionate about protecting the individuals who face hazardous situations as part of their profession and commit to ensuring that the kit firefighters wear meets the very highest level of performance, giving them the confidence they will return home safely at the end of every shift.

Hainsworth are lucky to be able to utilise more than 150 years' experience and knowledge as a manufacturer of industry-leading fabrics for firefighter PPE and firmly believe in the three core messages they apply to the development of all Hainsworth Technology products – Design that Saves, Protection that Shows and Quality that Lasts. This, combined with an intimate knowledge of the properties of different fibres and yarns, led to the development of a range of both outer shell and lining products which maximise comfort, thermal performance, and durability.

The TITAN range of outer shell fabrics help minimise the effects of heat stress as they are breathable, lightweight and flexible allowing the wearer better manoeuvrability and regulation of temperature. ECO-DRY presents a range of solutions for outer shell, linings and now also station wear.

Hainsworth Technology will showcase their full range of protective fabrics from stand B86.

www.protectsyou.co.uk

Island Remote Imaging Solutions

Stand **OS110**

Island Remote Imaging Solutions (IRIS) has evolved from the emergency rescue sector through its sister company Emergency Fire & Safety Ltd.

Due to the high demand of innovative rescue products and services in the rescue world we set out to create a platform for product development and innovations in the following areas;

- UAVs and Drones in the emergency world,
- Water rescue products
- Slurry rescue
- Safety audits
- Thermal imaging
- 3D Imaging and mapping
- Medical innovation of rescue products
- Drone platforms for all levels of rescue
- Drone Racing
- Water rescue drones that can work in water environments

IRIS has invested in the best quality aerial platform (15 working aerial platforms camera gimbal system). They are unique in the area of thermal imaging and are one of the only operator's in this field with thermal imaging ground and aerial work, to assess the energy efficiency of commercial or domestic premises.

IRIS team members are also part of the SKYWATCH, which is a charitable organisation which works with all the emergency services in the areas of Arial search & rescue, missing persons, investigations and so on. They are also innovators in the world of rescue and are currently releasing a specialist rescue system that can be deployed by drones which will be on display during the show.

james@irisni.co.uk

Jolly Scarpe SpA

Stand **F68**

Jolly Scarpe SpA has been working in the world of professional footwear for over 30 years in support of those who dedicate their lives to the safeguarding of their community's citizens.

As well as dominating the UK fire-fighting market for many years with their wide range of innovative and long wearing fire boots, Jolly is successfully exporting fire boots to more than 30 countries worldwide. Along with these, their best known products, Jolly also manufactures high quality boots for various specialist tasks within Military, Police, Search & Rescue and Law Enforcement environments offering the highest possible foot protection in the most hazardous conditions whilst still able to offer the utmost in comfort.

Extensive research, advanced manufacturing techniques, innovative materials, safety, comfort and excellent customer service are the fundamental values which make Jolly Scarpe a world leader and true reference point for professionals working in these sectors.

www.jollyscarpe.com



Mi-TICS™

- The lightest and most affordable NFPA 1801 compliant thermal imager with 6 operational modes.
- Highest dynamic temperature range: 1,100°C for excellent detail in extreme firefighting applications.
- Small and wearable at just 793g with an oversized 3.5" display.
- Enhanced Standard Feature Set: Laser Pointer, Compass, Heat Seker, Cold Seeker and much more.

Visit us at:

EMERGENCY SERVICES SHOW

21 - 22 September, Birmingham NEC ■ **STAND H36**

IAFC'S ANNUAL CONFERENCE & EXPO

19 - 20 August, Henry B. Gonzalez Convention Center ■ **BOOTH 26113**

argus®

thermal imaging from Avon Protection

argus thermal imaging
t: +44 (0) 01225 896 708
e: argus@avon-protection.com
www.argusdirect.com

PBI Performance Products

Stand **A64**

PBI fabrics are the first line of defence on the fire ground. They are renowned for their exceptional flame resistance and thermal protection from radiant heat and favoured by firefighters around the world.

PBI offers a wide range of fabrics that meet the needs of every situation and work effectively as an integral part of the protective garment. Each fabric has different properties and applications, but every PBI fabric provides the required protection from heat and flame that an outer fabric must deliver.

All PBI outer fabrics including PBI Gold, PBI Matrix, PBI Max, Gemini XTL, Titan 1260 and Ibena X55 are lightweight and strong and achieve high flame resistance. They deliver excellent tensile strength and will not become brittle, shrink or break open when exposed to flame and high temperatures. This 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.

PBI's 'next to skin' fabrics include PBI TriGuard, which delivers excellent protection against heat, flash fire and arc flash.

PBI PERFORMANCE PRODUCTS, INC.

www.pbiproducts.com

Reach and Rescue Ltd

Stand **OS110**

The award winning, innovative Reach and Rescue pole has successfully saved many lives around the world. The revolutionary system has been designed by Reach and Rescue Ltd, a UK based company, in conjunction with a leading UK Fire and Rescue Service, to speed up rescues massively and keep the operator safe from the hazard zone in situations that can involve water, ice, mud and flood related incidents.

The key function of the Reach and Rescue Pole is that it accurately deploys a flotation or rescue device to a casualty as quickly as possible, thus saving valuable time on the rescue that might otherwise have been wasted, leading to possible tragedy. This directional method of administering aid is significantly a more accurate form of rescuing than the existing throw bag procedure.

From an operational perspective, the Reach and Rescue Pole is incredibly versatile. There is a huge selection of flotation and retrieval attachments that are available in kits or individually meaning the Pole can be specifically tailored to suit the requirements of any rescue situation. This year we will be launching a brand new product at the ESS, which ticks a huge box for manual handling in the Water Rescue Services so be sure to visit us on Stand OS1100.

www.reachandrescue.com

Reach and Rescue

Long Reach Telescopic Rescue System

Vimpex

Stand **C73**

Vimpex will be unveiling a variety of new industry products to add to its current range of emergency service equipment, including the latest in thermal imaging, helmets, fire and rescue gloves, nozzles and USAR kit. Vimpex partner with leading international manufactures to ensure its UK and European customers are provided with the most up-to-date products available.

As a specialist supplier of personal protective equipment (PPE), thermal imaging cameras, firefighting and technical rescue products, working closely with its specialist manufacturers, Vimpex safeguard UK emergency service personnel by only offering quality products designed to exceed user expectations. The team at Vimpex work hard to supply the products their customers want at the right price, while offering a sales and after-sales service that is second to none.

At ESS this year, Vimpex will host guest manufacturing partners from Pacific Helmets, Athena Gloves, Adaro Torches and Makita. These representatives will be available on Stand C73 to discuss current and future product developments and answer any question you might have. Come and see our new look stand and catch up on the latest product offering from Vimpex.

www.vimpex.co.uk

VIMPEX

Shaping Alarm Technology



FIREFIGHTER PROTECTION

Can lightweight PPE be truly safe?

The international PPE industry is changing, with lightweight garments increasingly coming to the fore. But, is it possible that textile innovations can improve physiological conditions for fire fighters, whilst still ensuring adequate protection? What advances are taking place in the world of fabrics, to improve safety and comfort? And are there any stand-out examples of brigades leading the way? Rob Beadle, PPE specialist at technical textiles at Arville, discusses…



Rob Beadle

The PPE market is constantly evolving. Sometimes innovations may appear, at first glance, seemingly minor. Replacing heat-absorbent hi-vis trims, for example, with fabric that can dissipate stored energy, and reduce the risk of burns without compromising the material's reflective properties, may only seem like a small adjustment. However, the process still requires years of research, development, testing and approval, and it is most definitely worth the effort. The resulting wellbeing and safety benefits, to the fire fighter, can be significant.

Other PPE developments are even more revolutionary. In such instances, the process can therefore take longer still, and the level of debate, on an international scale, is likely to be vast. But progress is not only important – it is imperative.

Take lightweight PPE, for example. There is a growing need to balance protection with physiology, which is admittedly no mean feat in heat-intensive situations. Of course the fire fighter needs to be safeguarded with robust, fire retardant PPE, but the dangers of 'over protection' must also be acknowledged. If moisture management is not specified in the PPE's design, heat induced heart attacks or severe scalding from sweating, could pose risks to life equally as dangerous as the fires themselves.

▼ **PPE must fulfil different levels of safety e.g. thermal and chemical protection, fire retardance and water resistance.**



Image courtesy of Rob Beadle

The development of lightweight, flexible and breathable PPE is therefore not just driven by comfort-centric considerations. It could actually be considered a safety-critical situation.

Thankfully, due to textile innovations and the availability of high-performance yarns and treatments , it is possible to manufacture technically proficient PPE with different levels of thermal and chemical protection, fire retardance and water resistance. The durability of these textiles also ensures value for money, which is crucial in the cost-sensitive fire fighting sector.

Further modernisations mean woven textile-based PPE products can be designed, which are lightweight, flexible and breathable. The result is garments that are more wearable and that aid agility – particularly important when considering that only 5% of a fire fighter's working life is spent in a fireground scenario. Flexibility, comfort and focus are especially important when speaking to a distressed individual in a trapped car, for instance.

However, such technological advances will also ensure the fire fighter is physiologically more comfortable during a heat-intensive emergency, due to the improved level of internal moisture management.

Layered PPE with carefully engineered fibre placement is driving much of the progress, and is a strategy being trialled in the UK, for example, by Greater Manchester Fire & Rescue Service.

Studies have shown that an inner garment made from absorbent fibres can help wick away and dissipate sweat. It facilitates moisture movement to keep the individual dry, without adding to the weight of the apparel.

Then there's the PPE's lining to consider. Quilted linings made from non-woven fibres may be breathable, but are bulky and not particularly ergonomic. That's why they're being replaced by more flexible PTFE membranes to aid water vapour transfer, moving moisture away from the individual and out of the garment.

The final requirement for the layered system is a durable, yet lightweight and breathable outer shell fabric that can form a barrier to heat and flames.

This layered system means the fire fighter can wear the level of protection required for the situation at hand, thus reducing the surplus weight carried when full PPE is not necessary.

It could even be argued that fire fighters' underwear should form part of the PPE range, to ensure a truly layered approach and protection from the skin out. Otherwise, nylon undergarments could still pose a burn risk. This is something textiles specialists can tackle with ease, if brigades will allocate the budget. Unfortunately however, cost-driven decision making, whilst understandable, sometimes holds innovation back.

Of course any PPE developments need to be compliant with international safety standards such as EN469 and/or AS/NZS4967, and laboratory testing will assess the performance of lightweight fabrics under varied trial conditions.



Image courtesy of Rob Beadle

▲ **The PPE market has come a long way over the years – it is startling to think back to when fire fighters worked in heavy woollen tunics and rubber pants.**

Rob Beadle is PPE Specialist at Arville.



Image courtesy of Rob Beadle

◀ Modern fire fighter PPE must strike the right balance between protection and comfort.

But it is important to think above and beyond the standards – they should only be seen as setting the baseline. With engineering innovation and ever-smarter thinking, it is possible to design continually more advanced lightweight fabrics that strike an effective balance between protection and comfort.

David Matthews, a fire and industrial PPE specialist who has travelled the world to drive progress in this niche field, believes that a fire fighter is rarely 'comfortable' in the true sense of the word. However, because these personnel are constantly exposed to extremely heat-intense situations, it is important that textiles specialists – with the input of those in industry – continually innovate to achieve the aforementioned balance. Collectively, and collaboratively, we must ensure fire fighters are safe, but they should not be overprotected to the point that physiology in fact becomes an added danger.

It must be noted that safety and 'comfort' aren't actually the only factors that need to be considered when it comes to lightweight PPE. Brigades understandably hone in on the likely lifespan of garments too, wary that longevity could be compromised if personnel must de-robe and wash the PPE after every incident. Textiles specialists are therefore working hard to manufacture long-lasting, compliant PPE fabrics that can maintain performance consistency even after repeated cleansing, thus controlling costs and protecting brigades' return on investment.

Is there such thing as a single 'best fit' solution? Whilst it would be convenient to find a 'one size suits all' type of lightweight PPE, this is unlikely to be feasible in the world of fire fighting. The sheer level of diversity adds weight to the argument that industry standards can only outline the minimum quality benchmark. The demands placed on one fire fighter can vary significantly to the next. In the UK alone, for instance, it is naïve to think that a fire fighter in London should wear the same PPE as a fire fighter in Oxfordshire. The risks in the capital city are incredibly different to those in quieter residential suburbs where there are no metros or airports. The PPE requirements for that fire fighter are therefore very different too.

Look further afield and fire fighting conditions become even more varied. Wildfires, common in Australia for example, are often trickier to tackle than structural fires because of the added complexity of wind. This will further influence the requirements that the PPE must fulfil. It also perhaps goes some way to explaining why testing, in that part of the world, is so user-driven, and the market, steered by the Australian Fire Advice Council, is so advanced.

Industry input is also very prevalent in America, with fire fighters being extremely vocal and their viewpoints immediately taken on board. Unfortunately in some parts of Europe, contribution at steering committee level is less prevalent, again largely due to resource constraints.

But collaboration is important, as is talking. That's why Arville has proactively established relationships with brigades and advisors throughout the UK and overseas – to understand exactly what the PPE needs to do, before textile developments even unfold.

The PPE market has come a long way over the years – it is startling to think back to when fire fighters worked in heavy woollen tunics and rubber pants. When changes first started to be implemented, fire fighters unsurprisingly expressed caution at the mention of lightweight materials. Nowadays, on the other hand, users will openly express how important lightweight really is.

For more information, go to www.arville.com



1. The Athena FX1 glove offers firefighters extremely high comfort and protection
   - Awarded level 5 dexterity
   - Awarded level 5 cut resistance
2. Manufactured using PBI MAX, the strongest and most flexible outer shell fabric in the world
3. Features pre-curved fingers and hand shape providing unmatched dexterity
4. Can be washed with turnout gear at 40°and 60°
5. Maintains EN659 performance after 60° wash



VIMPEX

For more information, or to become a distribution partner, contact us at sales@vimpex.co.uk or call +44 (0)1702 216 999
www.vimpex.co.uk



WE WON'T LET ANYONE ELSE GET THEIR HANDS ON YOUR PPE

Because you need your PPE to give maximum protection day-in, day-out, our Managed Services is essential for confident, effective firefighting.

Bristol will collect, decontaminate, clean, inspect, repair and deliver your PPE using our own skilled technicians and facilities. We can also look after your helmets, gloves and boots too!

With world-class design, specification and manufacture of an extensive range of PPE, Bristol is the first choice of firefighters in over 110 countries.

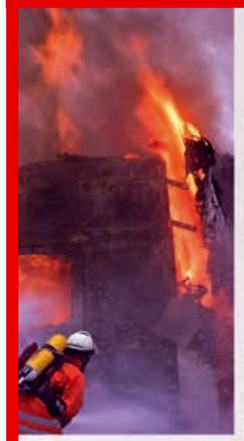
To find out more about our products and support services, call us on +44 (0)117 956 3101, email us at enquiries@bristoluniforms.com or visit our web site, www.bristoluniforms.com

BRISTOL

Bristol Uniforms Limited, Wathen Street, Staple Hill, Bristol BS16 5LL, United Kingdom
Tel: +44 (0)117 956 3101 Fax: +44 (0)117 956 5927
email: enquiries@bristoluniforms.com
www.bristoluniforms.com

THE PORTABLES FOR PROFESSIONALS:
Unbeatable in performance. Incomparably solid, light and maintenance free.





VM 600 D ex
Positive pressure fan for fire-fighting
With spray adapter
- Very compact construction – best version for limited storing place
- Powerful fan with electronic drive and low noise emission
- Fully explosion protected for zone 1, 2, 21 and 22
- ATEX certified

VL 500 D ex
Axial Fan
Now completely from aluminium
- Ideal for semi-stationary use
- For ventilation and aeration with hoses
- Certified fully explosion protection acc. to 94/9 EG ATEX
- Fire trucks standards acc. to DIN 14555

Developed by specialists for specialists taking into account any requirements to be met. For outdoors and indoors. In terms of performance, safety, flexibility, stability, dimensions, handling and the low noise level for any area of application and purpose.



ruwu® PPV fans
As individual as your needs.

As a qualified solution provider for custum-made fans, we provide the right product for every use area.

This small and powerful fans are proven in the most extreme fire and rescue conditions.

Available in three designs suitable for every operating condition.

When Fire brigades and Rescue services require a robust, reliable and compact fan for removing gasses and vapours, which can be easily transported to incidents, they look further than ruwu® mobile fans.

The compact low footprint design allows for ease of storage when the fan is not required.

ruwu® mobile fans are versatile and can be fitted with connectors for forced ventilation and made intrinsically safe for those incidents where explosive gasses may be present.

The entire product range and detailed technical data can be found at **ruwu.de**

From the smallest portable fan through to the powerful positive pressure fan – we have the right fan for you. Or if we don't, then we will develop it.

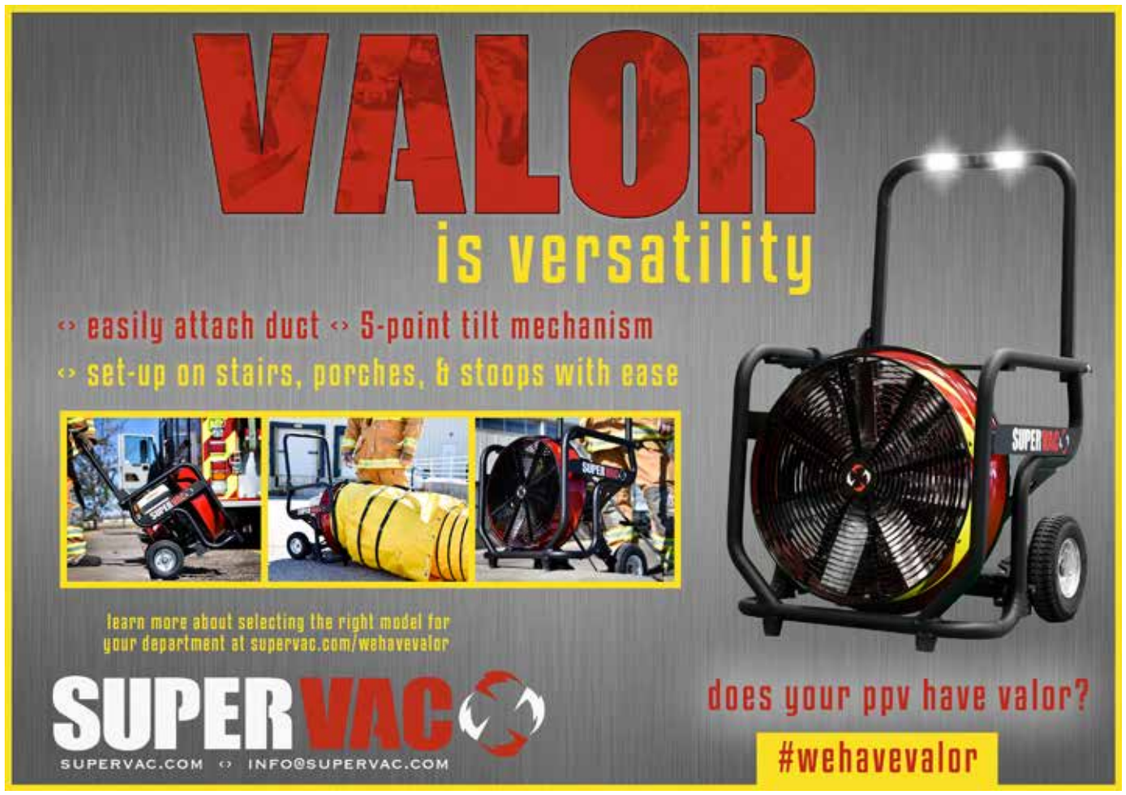


Russwurm Ventilatoren
GmbH
Ortsstrasse 25
D-86405 Meitingen-Ostendorf
Phone: +49-(0) 82 71 / 81 75 - 0
Fax: +49-(0) 82 71 / 81 75 - 40
E-Mail: sales@ruwu.de

ruwu® High-Efficiency-Fans

Mobile fans
Axial fans
Radial fans
Fan impellers
Fan service

... and you have the air under control



Computational Fluid Dynamics Analysis of a PPV Fan

Performance data of modern PPV fans differ from manufacturer to manufacturer although motor size and impeller diameter is nearly same. This causes uncertainty among firefighters who have to decide about investments in new equipment.



Hans Rußwurm



Professor Philipp Epple

Hans Rußwurm, Rußwurm Ventilatoren GmbH, Germany.

Prof. Dr.-Ing. Philipp Epple, Coburg University of Applied Sciences, Germany.

How to get comparability? International and common accepted standards are not there: AMCA 240 is preferred by American manufacturers, European manufacturers alternate between industrial standards (DIN 24163, ISO…) and own not validated measurement methods. So how to find an answer, a neutral point of view?

Therefore, in order to have a better understanding of the performance of a PPV fan, first two scenarios were investigated. First, the fan running alone and then, when running in a burning building. These two scenarios were simulated with computational fluid dynamics (CFD) and their performance characteristics investigated. The fan model chosen was the VM 400 Dex – Model from Rußwurm Ventilatoren, Germany, Figure 1.

The simulations were done in an academic study at the Coburg University of Applied Sciences, Germany, using the CFD (computational fluid dynamics) software ANSYS CFX. In the first scenario the fan was simulated operating over the ground and with fresh air only. In this scenario two boundary conditions were analysed, see Figure 2.

As it is known from experience, the fan does not push the wind through the blades only. Due to the high velocity of the air flow through the fan itself, also the air surrounding the fan is pulled with the flow due to viscous shear stresses. The amount of air pulled with the fan jet seems to be, at a first look, quite large. This can be seen qualitatively in Figure 3. The amount of flow rate surrounding the fan is about 5 times the flow rate through the

▼ **Figure 1: The PPV fan VM 400 Dex – Model from Russwurm Ventilatoren, Germany.**

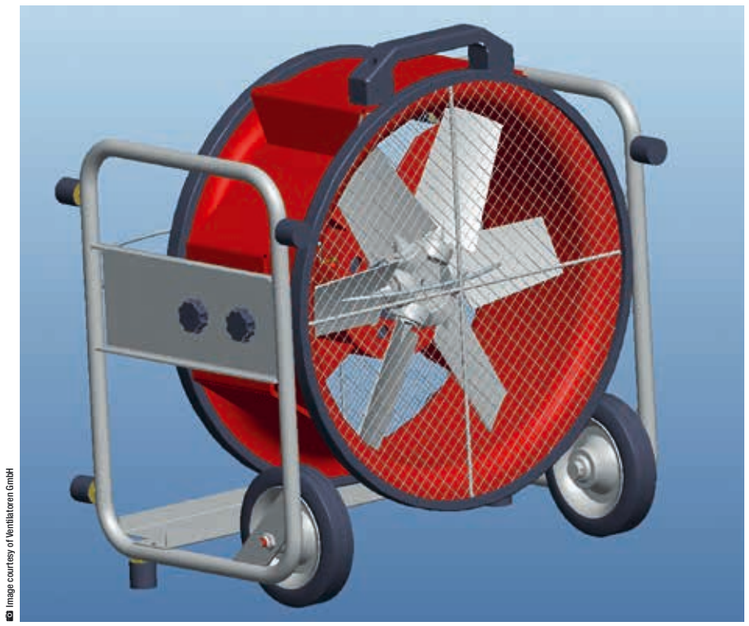


Image courtesy of Ventilatoren GmbH

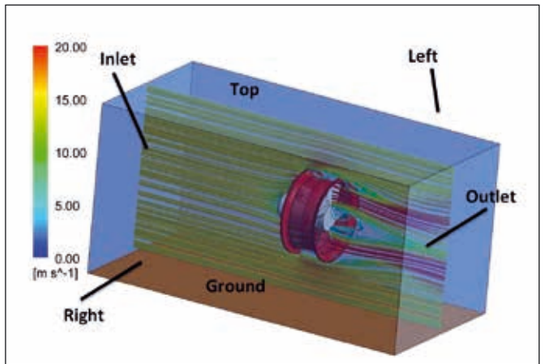


Figure 2: Boundary conditions for CFD Simulations.

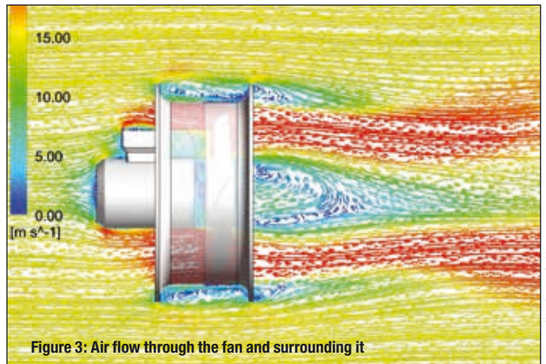


Figure 3: Air flow through the fan and surrounding it – the surrounding air flow pulled by the fan can be clearly seen.

Images courtesy of Ventilatoren GmbH

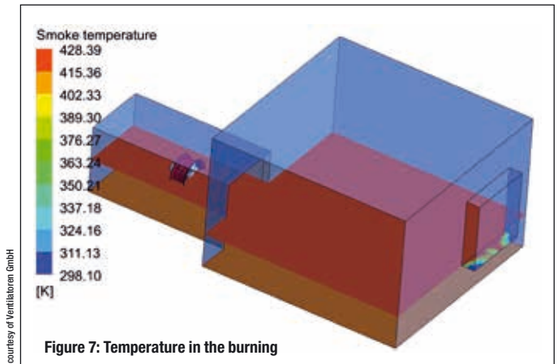


Figure 7: Temperature in the burning room when the fan is not running.

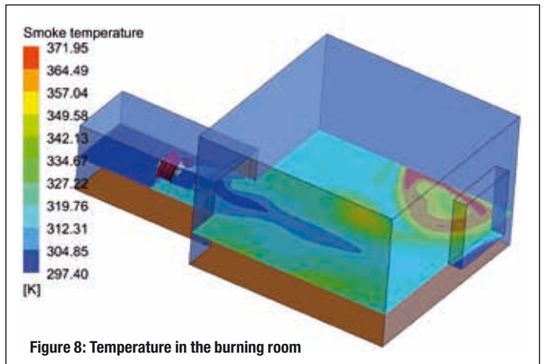


Figure 8: Temperature in the burning room when the VM 400 DEX fan is running at 2.900 rpm.

fan itself. However, here the fan is operating as stand alone. When operating blowing into a burning room of a building, this situation changes. This was analysed in a second scenario.

In the second scenario, the fan was used to blow away the smoky air in a burning room, as shown in Figure 4. This flow domain consists of a fan outside the building at the left and of a burning room at the right. The ground in the room is on fire and hence generates smoke. In order to consider the fire on the room's ground, a two phase flow numerical simulation was performed. The fresh air is coming in from the far left inlet and the smoke is coming in from the ground of the room. The mixture of fresh air and of smoke leaves the room from the window at the far right. The simulation shows that when there is a fire on the ground of the room, all the room and its adjacent spaces are filled with smoke, as can be seen in Figure 5.

Turning now on the VM 400 DEX at 2.900 rpm, the smoke almost completely dissipates in the line of the fan and also to a large extent in the whole room, making it possible for fire workers to go into the room to fight the fire and rescue people, Figure 6.

A similar effect can be seen looking at the temperature contour plots in the room when the fan is not running, Figure 7, and when the VM 400 DEX is running at 2.900 rpm, Figure 8.

When the fan is running as stand alone, it was shown above that the flow rate surrounding the fan is about 5 times the flow rate through the fan itself. This is, however, only a local effect. When the fan is blowing into the room, the real question is: how much flow rate is really entering the room, crossing it and flowing out of the window in the opposite side? From the computational fluid dynamics simulations one can read out this data. It comes out, that when the fan is blowing into the building, only an additional 20% of the flow rate flowing through the fan is coming from the fan close surroundings into the building. This can be easily read out from the simulation data when looking at the flow rate coming out of the window and comparing it to the flow rate through the fan in addition to the flow rate coming from the burning ground.

Therefore much care is needed when analysing the PPV fan performance. Doing flow rate measurements through the fan and it's close surrounding only, when the fan is running alone in the lab, will not deliver the right figures. Indeed it will give the wrong impression that the usable flow rate in a building can be as much as 6 times higher than through the fan alone. This is not the case! In reality, for the position of the fan, i.e. the distance from the fan to the room's door, simulated in this study, the flow rate is only 1.2 times higher than the flow rate through the fan alone.

To have a better understanding on the influence of the flow rates in and around the fan, in an additional study, the walls around the fan were also simulated as opening. That means that the PPV fan was placed in front of the room's door in the open ambient, see Figure 9, and not from a closed room or corridor as in the previous cases. From Figure 9 one can see how complex the flow around the fan can be when pleaced in the open ambient.

Here two cases were simulated, one without the fire, i.e. with fresh air only and one with the fire coming from the room's floor, i.e. with smoke. In the first case the mass flow of fresh air flowing into the building was about 1.5 times the masso flow rate of fresh air passing through the fan. In the second case, i.e. when there was smoke due to the fire in the room, this ratio was equal to 1.4. One can see from this figures and the figures from the cases mentioned before, that it is not possible to find one unique ratio of fresh air flowing in to the building to the air flowing through the PPV fan. This ratio changes considerably with changing operating conditions. Only in this study four ratios were mentioned: 6.0, 1.2, 1.5 and 1.4. Which one is right or effective? What is the effective flow rate of the PPV fan? To answer these questions, several other questions have to be answerd carefully before one can determine the effective flow rate of a PPV fan, as for example:

a) Is the PPV fan being operated from the free ambient into the room or is it operating from a closed ambient, i.e. a neighbour room or corridor?
b) What is the distance of the PPV fan from the door?
c) How much smoke is being generated by the fire in the room?
d) What ist the flow resistance of the room, which depends on the size of the room, the number of windows and so on?
e) How does this ratio changes when changing the rotating speed of the fan (RPM)?
f) How does the smoke coming out of the burning room influences this ratio?

In order to have an answer to these questionsa a systematic study has to be performed to find the bounds in which this ratio can vary. Only then the fireworkers can have a confidence margin for the declared mass flow rate effectively generated by the fan. Especially one has to mention under which conditions the flow rate stated in the fan's specification was measured. Therefore, measuring the effective flow rate of a PPV fan is not a simple task and has to be done under well specified conditions.

Perhaps a new standard base has to be carefully established in order to get reliable data sheets with the effective flow rate through PPV fans which can be really used for firefighting.

For more information, go to www.ruwu.de

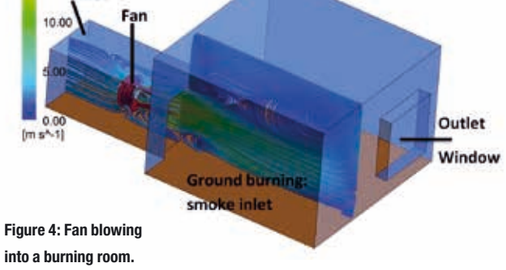


Figure 4: Fan blowing into a burning room.

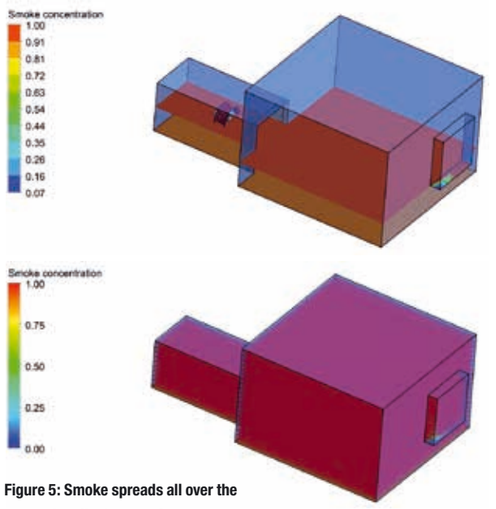


Figure 5: Smoke spreads all over the room when the fan is not running.

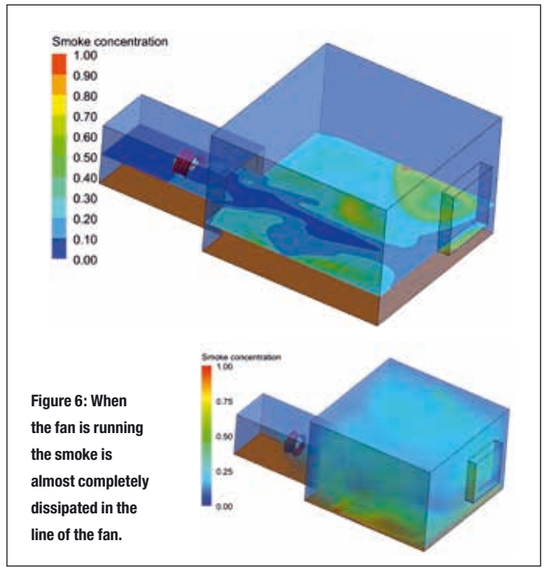


Figure 6: When the fan is running the smoke is almost completely dissipated in the line of the fan.

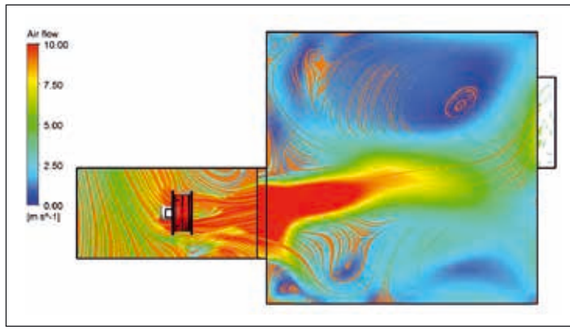


Figure 9: PPV fan blowing from the open ambient into the room.

Subscribe at www.iffmag.mdmpublishing.com/subscribe

High speed in-vehicle networks for fire apparatus

Technology in public safety is advancing at an exponential pace. First responders require broadband connectivity at the scene of an incident to support an array of in-vehicle devices, such as laptops and tablets and mission critical applications, such computer-aided dispatch (CAD) and automatic vehicle location (AVL), to enable faster and more efficient responses in the field.



David Markland

David Markland, AirLink Product Management at Sierra Wireless.

Vital information provided by these systems, including location, navigation, hazmat and building information, enables first responders to arrive on scene more informed, and better prepared to protect both the public safety and their own.

Fire departments offering emergency medical services require connected EKGs (electrocardiograms), digital fire plans, tracking and telemetry applications, so teams can efficiently attend to fires, begin patient treatment, and coordinate with other first responders and emergency rooms.

While the benefits of technological advances appear obvious, the proliferation of in-vehicle applications, mobile devices, and wearable gadgets is creating a headache for IT teams. Each onboard or wearable device requires a fast, reliable wireless connection and, as the number of applications has grown, so too has the number of ways to connect them. Firefighters need wireless connectivity that performs as well as wireline networks, and each system needs to be connected securely and managed remotely.

One option that IT Managers are now deploying is purpose-built, high performance vehicle networking solutions. There are in-vehicle routers and gateways available that provide enough bandwidth to support multiple, data-intensive applications and devices. They offer features like Gigabit Ethernet and Gigabit Wi-Fi for the Local Area Network (LAN) or Vehicle Area Network (VAN), and LTE-Advanced to support huge volumes of traffic over the cellular network. These

▼ **The first minute of response time is critical for location, navigation, and hazmat information to plan a crew's approach at the scene.**



Image courtesy of David Markland

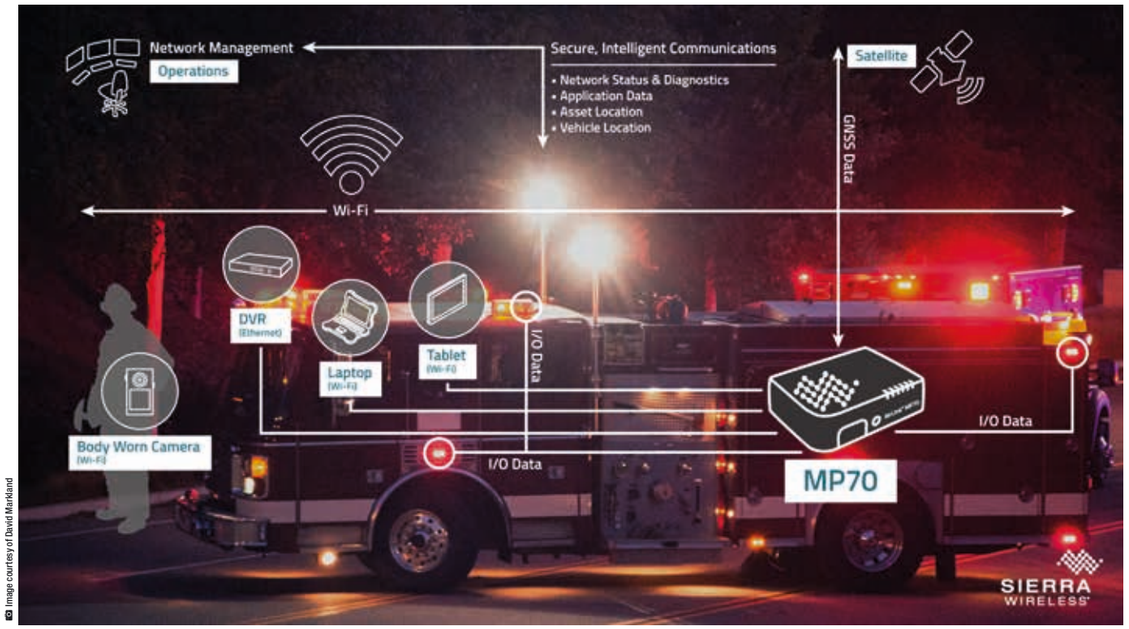


Image courtesy of David Markland

▲ **In-vehicle routers such as Sierra Wireless's MP70 provide secure, intelligent communications for mission critical applications, by creating a high performance vehicle area network in and around the fire truck.**

routers also deliver secure, managed and uninterrupted connectivity to enable mission critical applications to communicate back to command and control teams in real time, allowing fire departments to reduce response times.

High performance routers can effectively turn firetrucks into a truly mobile office at an incident scene, enabling all connected technologies to be fully operational up to 800 hundred feet from the vehicle. This is vital for wearable devices used by individual firefighters. New developments in vehicle technology enable the creation of a secure VAN that serves both wired and wireless devices, and connects everything to the department and operations teams via a secure wireless wide area connection (WWAN). With this type of architecture, fire departments can improve firefighter safety and increase effectiveness, by enabling crews to provide the right response at the right time.

So what are the specific network challenges facing fire crews, and how can high performance routers address them?

Maintaining constant communications

One of the biggest challenges for in-vehicle applications for firefighters is maintaining uninterrupted communication. Firefighters need to be in constant contact with their enterprise-based operations teams to provide real-time scene updates, while also collaborating with medical response teams or law enforcement. This information is easily exchanged when fire apparatus are at the station via Wi-Fi, and administrative tasks such as software updates and uploading/downloading of large data files can be undertaken while on premises.

However, complications arise once the apparatus has been sent on a call. The in-vehicle router is responsible for maintaining the same level of network connectivity that crews experience at the station while the vehicle is on the move. Some solutions attempt to extend the Wi-Fi connection from the station until further down the road, but then disconnect before a cellular connection has been established. This means dispatch data can potentially be off air for between 30 and 40 seconds within the first minute of a call. This nearly one minute loss of connectivity can affect the entire response, especially if average response times are four minutes. The first minute is critical for location, navigation, building plan/hazmat information, which is key in the overall approach at the scene.

High performance routers allow applications to make a seamless transition between Wi-Fi and cellular networks. Some solutions have the ability to use multiple cellular and Wi-Fi networks, and are able to smoothly manage network handoffs, and can be customized based on department policies.

Moving data rapidly:

Once reliable connectivity is established, the next challenge for crews is uploading or downloading large files at speed while on call. Building plans and video footage require large amounts of bandwidth and reliable network connections. Carrier deployment of LTE-A networks has paved the way to supporting a wide variety of high bandwidth applications over a single connection. LTE-A improves network capacity and coverage by delivering very high data rates. The faster the network connection, the faster crews can get access to the data they need, and the faster they're able to react at the scene. This includes building plans, bird's eye views, hazardous material information, access and egress routes and fire control systems. Firefighters with body worn cameras can stream live video back to operations using the fire apparatus as a Wi-Fi hotspot. High

Subscribe at www.iffmag.mdmpublishing.com/subscribe



Image courtesy of David Markland

performance routers offer the faster LTE-Advanced (LTE-A) connection.

The value for command staff is greater awareness of incident scenes. Rescue personnel can communicate with hospitals, and paramedics on-scene can send EKGs via telemedicine applications through the in-vehicle router, so that when a patient eventually leaves the scene and reaches a hospital, their medical history arrives with them.

Remote network and fleet operations management:

With all the recent technological advances in equipment, fire departments have recognized the need for a complete management solution that can enable operations, IT and fleet managers to see the location and status of the fleet and configure or update routers, connected devices and mission critical applications over-the-air from a single system. For example, the Seattle Fire Department recently deployed a successful communications solution using high performance vehicle routers. With 33 fire stations and over 60 vehicles including fire trucks, ladder trucks, and medical units, they recognized the need for IT to accurately monitor these mobile devices.

High performance vehicle routers also provide network management platforms that enable remote, centralized monitoring and troubleshooting of network performance for an entire fleet. Centralized network management platforms provide dispatchers with enhanced visibility on the status of critical applications and vehicles, and offer additional accountability in the event of unforeseen circumstances or equipment failures. Maintenance information can be sent directly to the teams who can understand it, and who are responsible for fixing it.

Features such as vehicle tracking to support fleet management operations are also important. Newer routers are incorporating inertial navigation systems, with built-in accelerometers and gyroscopes, to keep track of emergency vehicles when they don't have access to GPS location data. Challenging landscapes and urban canyons often provide teams with environments too difficult for typical GPS systems to work effectively. Mobile routers with inertial navigation systems deliver superior visibility in any circumstance, providing uninterrupted, timely and accurate location information to mobile devices and mission critical applications, while also enabling dispatch teams to monitor vehicle locations and progress on call.

▲ High performance routers enable connected wireless technologies to operate up to 800ft from the vehicle at incident scenes.

Summary:

Technology is significantly improving the overall effectiveness of firefighters worldwide. And purpose-built high performance vehicle routers now provide fire departments with sufficient speed, bandwidth and range to support the wide variety of devices and applications that protect firefighters and those they serve.

For more information, go to www.sierrawireless.com

"Because a split second can decide between life and death on the runway."



Extreme performance and reliability for emergencies.

Airport fire brigades have never faced larger challenges than today. Even for the most difficult missions, Magirus has developed a complete range of highly specialised fire engines with drive variants ranging from 4x4 to 8x8. All are characterised by their extreme performance and reliability and all have proven themselves worldwide. Magirus DRAGON vehicles are the powerhouses that persuade with their exceptional speed and manoeuvrability. Magirus IMPACT vehicles inspire due to their compactness and flexible configuration options. Much has changed since 1930, when Magirus developed the first airport fire-fighting vehicle. But one thing has remained the same: At Magirus, it is still fire-fighters like you who put all their expertise and know-how into constructing the best equipment in the world for your missions.

www.magirusgroup.com

SERVING HEROES. SINCE 1864.

MAGIRUS

A robust crisis response solution has never been more critical for first responders

Crisis response capabilities are coming under increasing scrutiny in most areas of the world. Globalisation, coupled with population growth and contemporary security issues, is bringing with it a whole new set of challenges to effectively responding to an emergency. From large-scale international sporting events to the ever present threat of natural disasters, the need for intuitive technology that enables a joined-up, collaborative crisis response has never been greater. In Europe and around the world, the clamour for such technology has been getting louder and Intermedix is responding to the call.



Joel Portice

Joel Portice, Global CEO, Intermedix.

The role of technology is becoming more important in disaster preparedness and response because of the need for interoperability and the ability to exchange information simultaneously across multiple agencies. This is important when tackling major fires, where a co-ordinated response can be vital in preventing a crisis from becoming a series of mixed responses and a logistical nightmare.

▼ **WebEOC the crisis management tool serving those who save lives.**

Agencies across the world recognise that being reactive is simply not an option and that as in so many cases, preparedness is key. While natural disasters cannot always be prevented, having a plan and the tools to manage them in advance has been shown to save lives.

Viewed through this prism, disaster management tools and techniques have changed and improved radically thanks to custom built technology platforms that have moved spreadsheets and whiteboards to web-based software and dashboards.

This move allows for multi-agency coordination and real-time exchange of life-saving information. While spreadsheets are inherently retroactive, and therefore out of date, the next generation of crisis management software allows real-time gathering and reporting of incidents and information.

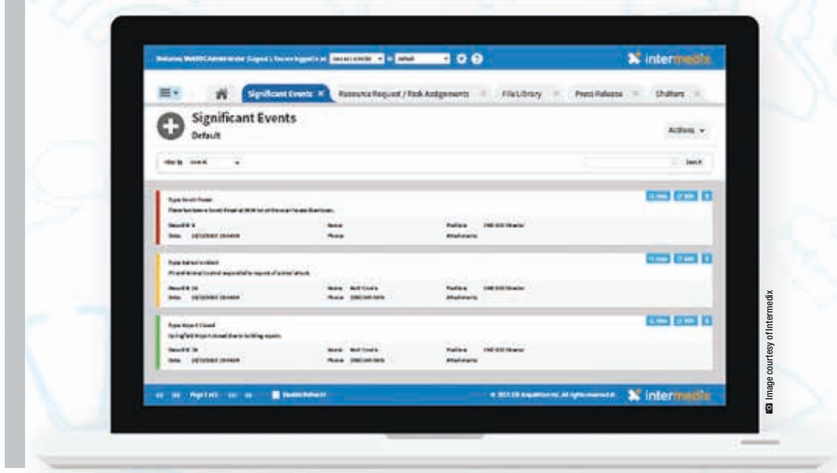


Image courtesy of Intermedix

▶ **WebEOC cross-agency situational awareness.**

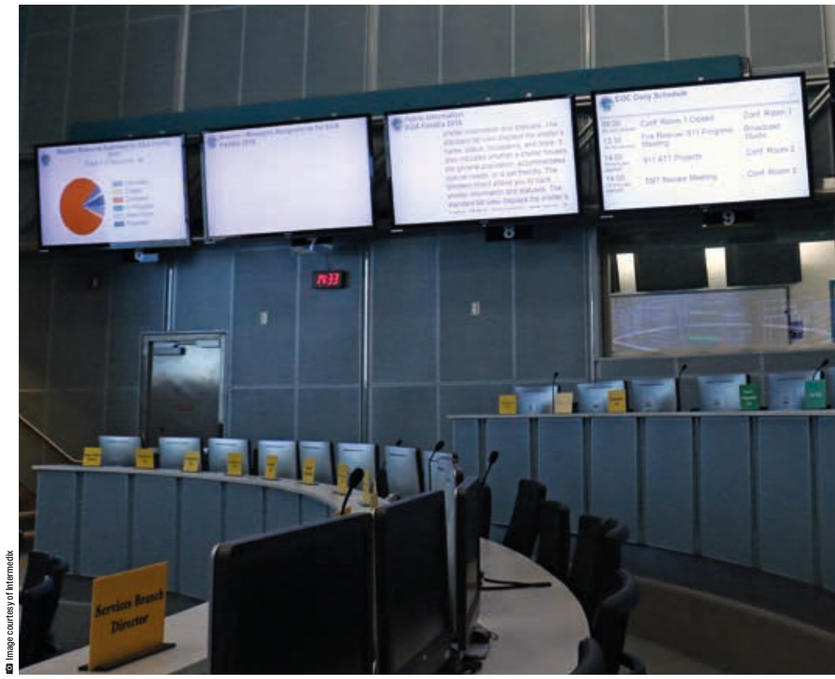


Image courtesy of Intermedix

Intermedix Global CEO, Joel Portice, has spent time in the UK and Europe introducing the benefits of the system that is driving a global revolution in the crisis management arena. From nuclear power stations to fire departments, the state-of-the-art software, WebEOC, is deployed worldwide because the foundation of effective emergency preparedness is the same across industries the world over.

WebEOC was first developed as a tool for crisis preparedness and response and has additionally evolved to effectively support daily operations and communications. The latest version of the software was released last year and the company is constantly striving to innovate to fulfil its mission of serving those who save lives.

When it comes to emergency response, it is essential to be able to share information as a situation develops. WebEOC allows fire, police and ambulance agencies to receive status reports and notifications, coupled with the ability to notify other relevant national agencies as required. Latest advances include sending and receiving such reports direct to a smartphone, allowing those on the ground at the heart of the inner cordon to have access to the very latest updates as they are happening not after the fact.

According to Portice, Intermedix "connects the healthcare and emergency response and preparedness 'ecosystem' which is made up of four components: first responders, healthcare providers, government agencies and commercial corporations. "We're the only company that has developed a platform to bring all of parts of this ecosystem together in the event of a crisis," explained Portice. "Any organisation that could be affected by an emergency or disaster, whether it's manmade or natural, is a potential Intermedix customer."

Experience counts when responding to disasters, which is why the emergency services carry out so many drills and why Intermedix is trusted to deliver the software solutions. WebEOC allows simulations and real events to be analysed so any lessons to be learned are proactively documented for the future. In the US, WebEOC was used to coordinate the response to the wildfires in San Diego in 2007 and 2015 and the response to the Boston Marathon bombings in 2013. The 2007 San Diego fire blazed through some 380,000 acres of California and led to over 300,000 people being evacuated.

Such a major movement of people during an emergency could not have taken place successfully if the involved agencies did not have a trusted plan in place, and the personnel and the tools to manage it. Thanks to WebEOC, state and local emergency responders were able to draw on experience from past crisis management simulations to deliver a successful outcome. In the wake of natural disasters, open and clear communication within fire departments and between other first responders is critical. The more seamless the communication, the more effective the response can be. This is equally valuable when responding to acts of domestic terrorism, such as the Boston Marathon Bombings.

The official 'After action report for the response to the 2013 Boston Marathon bombings' in the US recognised WebEOC as being a key factor in best practice. With a marathon course that crossed eight local territory boundaries, the preparedness, response and recovery involved cross-agency coordination and communication across federal, state and local public safety, emergency services, healthcare providers and medical partners.

It is a reassurance for agencies considering WebEOC to know they are using a system that has been 'battletested' in a number of different scenarios and has proven itself robust and reliable over many decades of use. WebEOC is now in use worldwide and is recognised as the standard response to every crisis. Correspondingly, Intermedix has always had a global outlook, because crisis management is not restricted to just one country.

Portice explained, "We're a global company and we have some of the world's leading experts in our team. Most of the potential disasters that occur in the world have common themes that can be planned for. We will never be able to eradicate the risk of disasters, despite our best efforts, we can make absolutely sure that we



Image courtesy of Intermedix

▲ **WebEOC accessible crisis management technology.**

are as prepared as possible for any eventuality.

WebEOC supports the emergency preparedness professionals that need to be prepared for these eventualities with accurate, real-time information surrounding incidents and the ability to access information from multiple locations. Live information can be shared between responders, and once approved, non-classified data from WebEOC can be shared with the public and media as required.

As for the future? Portice said: "We will continue to innovate and advance the ways in which we serve those who focus on their priorities of saving lives and limiting damage. We are investing in our European base in the UK, and with this I will be spending more time in Europe to develop relationships with our European partners."

There has been a growing appreciation in Europe that proven crisis management software can prove useful in a host of situations, which has led Intermedix to enhance its presence with a new UK headquarters in Reading, Berkshire to support these emerging European clients. The advantages of using a system that has already proved its worth on the global stage is attractive to those continental agencies who need tailor made solutions that meet their needs today and are customisable for the challenges of tomorrow.

"We're an international company with a global staff and a global mind-set," added Portice. "We have expertise in EPRR (Emergency Preparedness, Resilience and Response) nuances in different countries and different cultures throughout the world. I'm proud we have some of the world's best technology and analytic innovators working at Intermedix, as well as leaders from an EPRR and first response background, many of who themselves have personal experience of front-line emergency response."

Intermedix is an established company with proven global technology solutions, serving emergency responders, government agencies and corporations. It has more than 2,500 employees around the globe and provides services and solutions in more than 25 countries located in North America, Australasia and the Middle East.

The company's crisis management solutions are used by more than 15,000 customers, including government state and federal agencies, emergency responders, military, healthcare providers, energy plants, and corporations. It is estimated that in every single major incident in the US, at least one agency involved will be using the company's WebEOC technology to manage the crisis response and post-event recovery. Intermedix aims to continue investing in WebEOC to deliver the same levels of service as part of the firm's ongoing European expansion programme.

"At Intermedix we have a simple mission. It's six words: To serve those who save lives. Our whole focus is to use our technology, our people and our resources, in order to help those responders focus on their mission. We will continue to do that and I think that comes across, not only in better technology, in more precise analysis and information, it comes from doing everything we can to promote and enhance the communication between agencies," concluded Portice.

For more information, go to www.intermedix.co.uk

PAB Akrapović

When conditions are at their worst, we are at our best.

THINKING AHEAD

firefighting series



PAB FIRE COMPACT
EN 443:2008, EN 14458:2004, MED Approved

Designed to protect the head under the most extreme conditions. Optimal relationship between protection and comfort with a broad spectrum of optional upgrades. Structural firefighting has never been safer. Now available worldwide!

PAB Akrapović | Most 26, HR-52420 Buzet, Croatia | info@pab.hr | www.pab.hr

SINCE 1953

COMMAND & CONTROL

A new era for incident control?

There are a number of challenges associated with the management and reporting of fire and rescue incidents. Traditional methods of whiteboards, paper-based reporting and Vehicle Mounted Data Systems (VMDSs) have by their nature taken incident commanders and command teams away from the fire ground and into vehicles. The inaccessibility of information has meant resources that are designed to support decision making and incident control are not always used to their full capability.



Thomas Hennessy

The need to capture a more comprehensive picture of key events and critical decisions made during an incident and to increase the accessibility of information on the ground is leading to a shift towards more intuitive and responsive ways of managing incidents through mobile technology.

Here Thomas Hennessy, business development executive at Incidentcontrolroom.com® discusses the limitations of traditional approaches to incident control and explores the use of mobile technology to improve real-time decision making and reporting.

Assessing traditional approaches

A National Incident Command System (NICS) has been developed to enable good practises to be embedded and deployed consistently when managing fire incidents across the UK and Ireland.

Typically, when an incident occurs, the incident commander appoints a command support officer who is responsible for capturing the incident information, documenting decisions, creating the incident log and reporting key information back to the control centre, such as dynamic risk assessments and tactical mode data.

The command support officer may update an Incident Command Board (ICB) situated in a vehicle during an incident to give a transient record of events. At the end of every incident, the incident commander would then fill in a fire report, which is stored as the main legal document.

Vehicle Mounted Data Systems (VMDSs), comprising of a rugged laptop mounted in the front of a vehicle, are also commonly used. The VMDS stores information such as guidelines on how to disassemble a car, mapping systems for local water sources, pre-fire plans for higher risk buildings and access to railways and other essential services. A chemical safety database may also be included, consisting of emergency action codes and instructions for dealing with chemical substances.

There are a number of limitations associated with the use of VMDS technology to manage and record incidents. For example, security and password protected areas can make the system difficult to use. Due to the inaccessibility of information from the fire ground, fire fighters can be reluctant to access the information and may only occasionally use the resources available. ICBs also have restrictions such as no date and time stamp functionality, limited space to write and the inability to share information offsite.

▼ **ICR: Fire and Rescue™ is used by 65% of all fire services in Ireland.**



© Image courtesy of Thomas Hennessy

Thomas Hennessy is Sales Manager with Incident Control Room.

Going mobile

In recent years, more and more fire services are adopting mobile technology. For example, 65 per cent of all fire services in Ireland now use a mobile application called ICR Fire and Rescue™.

There are many factors that are driving this increased adoption. Perhaps most importantly, it is widely accepted that the incident command team are more useful on the fire ground, as opposed to in a vehicle. Mobile technology can move information from the vehicle, closer to the incident ground and into the hands of the incident commander.

By increasing the accessibility of information, a fire service can ensure it is more widely used, encouraging best practise and ensuring compliance with procedures. Using handheld devices, officers can easily refer to standard operating guidelines (SOGs) and have instant access to a library of information, which is particularly useful to support the decision making process when handling more unusual incidents.

The need to share information offsite, for example, with the control room, is also a key driver for the use of more mobile systems. Remote access means that officers back at the station can log in and access up to date incident progress, as well as photographs directly from the scene of the incident.

In addition, the ability to record what is happening on the fire ground and capture events as close to real-time as possible is a major advantage when compiling reports after an incident, and also helps to support health and safety procedures and future training activities.

As well as improving incident control, fire services can also generate cost efficiencies by implementing mobile technology. Tablets are relatively inexpensive compared to rugged laptops which need to be regularly maintained.



▲ **Celina Barrett, Chief Fire Officer at Kildare County Fire Service and Ben Woodhouse, Station Officer at Athy Fire Station.**

Using mobile technology: a case example

Kildare County Fire Service is just one example of a fire service that has successfully migrated from traditional approaches for incident control to the use of mobile technology.

Kildare County Fire Service provides a fire service to a population of over 210,000 citizens in County Kildare, Ireland, consisting of approximately 100 employees spread over six fire stations. Last year alone, the service responded to 1760 incidents.

Niall Burke, senior assistant chief fire officer at Kildare County Fire Service was first introduced to ICR Fire and Rescue™ at the Chief Fire Officers Association (CFOA) conference in 2014. He said: “We recognised that the technology we were using had become outdated, stagnant and restrictive in nature. We had received many requests to make the VMDS more mobile but couldn’t find a way to do it.”

Initially four station officers trialled the software and were asked to evaluate whether it was something that would support teams on the fire ground. After a successful review period, the technology was rolled out across all six fire stations.

Niall explains: “The library of information stored on ICR is continuously developing into a rich resource and information hub that can be accessed on the fire ground. Having accessibility to this information is invaluable and reading it on a tablet at the incident scene is much more efficient than as a PDF back at the vehicle. The information can also be used as a training resource to promote continual best practice.

“The app helps us to deliver consistency around the application of the National Incident Command System (NICS). As you work through the various screens you are prompted to record dynamic risk assessments, tactical modes, sectorisation, operational priorities and personnel on the fire ground. I have also been impressed by the speed at which an incident report can be generated using real-time data.”

By migrating from a legacy VMDS to an app-based solution, Kildare County Fire Service has been able to increase access to information at the scene of incidents, as well as improving reporting procedures, in real-time and post-incident. The system has led the way for a wider mobile computing strategy at the fire service, opening the door to other mobile applications, all with the aim of making the role of fire fighters simpler and safer.

For more information, go to www.incidentcontrolroom.com

The physiologic effects of turnout gear

Turnout gear, also known as thermal protective clothing (TPC), is an encapsulating garment that is typically worn with respiratory protection. These garments protect the firefighter from external heat and flame but the tradeoff when donning these garments is impaired ability to dissipate internal heat created from the exertion during fireground and rescue operations. These garments also impair movement and reduce the firefighter's maximal workload.



David Hostler

David Hostler, PhD, NRP
University at Buffalo
Department of Exercise and Nutrition Sciences
Center for Research and Education in Special Environments.

Chemical protective garments, such as Tyvek, are lighter than TPC but the formation of a complete barrier to evaporation makes it nearly as stressful. Regardless of the risks associated with TPC, these garments must be worn when working in hazardous environments and the characteristics of these garments is unlikely to change in the near future. Therefore, it is important to understand the effects of TPC on the firefighter and plan ahead to mitigate the heat stress.

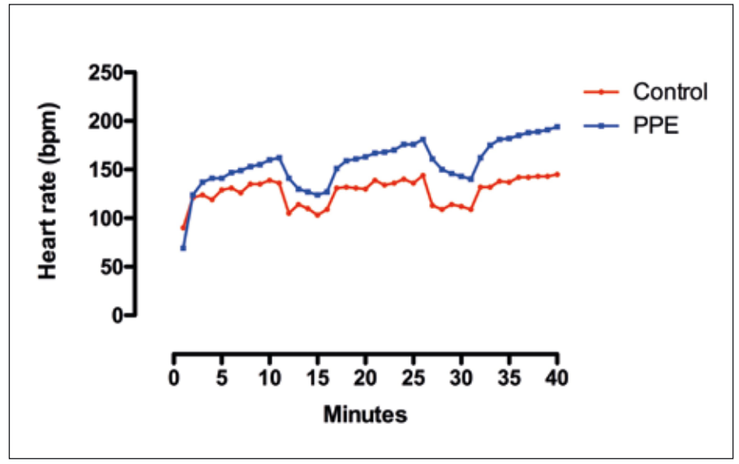
The body is not a single temperature from the skin to the core. The brain manipulates the body systems to keep the core temperature higher than the skin temperature. By maintaining this gradient, we can transfer warm blood from the core to the skin when we are too hot and pull blood away from the skin if we become too cold. The firefighter is at risk of injury if core temperature rises faster than heat can be dissipated through the skin. There are five ways a human can gain or lose heat in order to maintain body temperature in an acceptable range. The most important method for shedding excess heat to the environment is to increase blood flow through the skin, produce sweat, and allow the sweat to evaporate. The process is normally very efficient unless the environment is very humid or the skin is covered by garments, both of which inhibit evaporation. The firefighter suffers both of these issues when wearing TPC. The sweat produced as the firefighter's temperature rises cannot efficiently evaporate through the TPC creating a wet environment between the TPC and the firefighter's skin. Additional heat stress is suffered when the radiant heat from the fire or the sun warms the firefighter externally.



Image courtesy of the University at Buffalo

◀ **Firefighter physiology testing in the Emergency Responder Human Performance Lab at the University at Buffalo.**

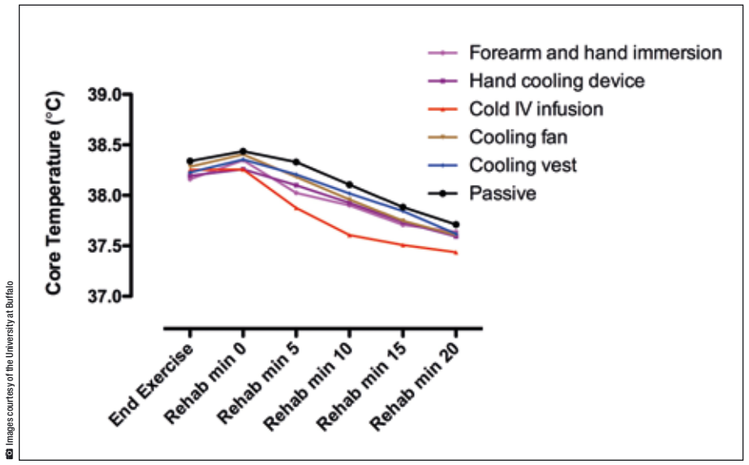
▶ **Figure 1: Heart rate response of a subject walking on a treadmill in athletic clothes (red line) and in chemical protective clothing (blue line). See the text for a description of the study.**



Sweating can further aggravate heat stress by reducing the amount of blood available to carry oxygen to the working muscles. Sweat is produced from the liquid component of blood and heavy sweating causes a progressive dehydration. This can be quite rapid during fire suppression. In our experiments, a single 20-min. training fire can result in a firefighter losing as much as 1-kg of body mass from sweating. Longer bouts of lighter intensity work in TPC can result in nearly 2-kg of lost body water from sweating. Dehydration forces the body to work harder to accomplish any given task. The heart must beat more rapidly to move the reduced volume of blood to the working muscles. As dehydration becomes more severe, the amount of blood that can be diverted to the skin is reduced and heat stress becomes worse.

The sum of these physiologic challenges is exertional heat stress (EHS). High heart rate, high core temperature, rapidly rising skin temperature, and rapid breathing characterize EHS. This condition can occur in many settings of sport and occupation but, for the reasons discussed above, the firefighter can do the least to avoid or slow the onset of EHS. Figure 1 most clearly demonstrates EHS and the effect of protective clothing on physiology. In this graph of heart rate during exertion, a young healthy male carried a 4.5-kg tool and walked on a treadmill at a comfortable pace and mild incline. After 10 minutes, he walked more slowly on a level plane for five minutes to allow for partial recovery. This was repeated three times. The red line shows the subject's heart rate response when wearing short pants and a short sleeve athletic shirt. Notice that the heart rate response is very consistent through exercise. In comparison, the blue line shows the heart rate response when wearing a Tyvek coverall and filtering facepiece respirator. Each subsequent bout of work results in a higher heart rate and incomplete recovery. By the end of the third bout, his heart rate was nearly maximal even though he was still at a walking pace. This is the picture of exertional heat stress. The subject was sweating heavily under the garment. The sweat could not evaporate so the subject has less circulating blood volume causing the heart to beat more rapidly and the subject's core and skin to rapidly rise. Firefighters subjected to this type of stress without adequate rest and recovery intervals will become too fatigued to continue working or suffer a heat illness.

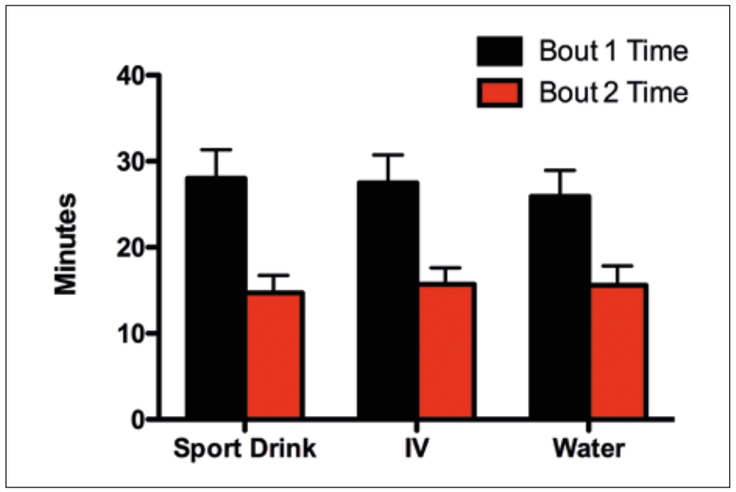
Heat stress during fireground and rescue operations is unavoidable. Devices that can be worn under TPC to cool the firefighter are either not practical or not effective. Heat stress must be mitigated at regular intervals by rehydrating and by providing a cooling interval. There are a few simple rules that can be applied to enhance recovery



Images courtesy of the University at Buffalo

▼ **Figure 2: Six cooling modalities tested after exertional heat stress. Note that all of the modalities only perform about the same as passive cooling performed in a comfortable (~22°C) environment. Also note that core temperature had not returned to baseline (~37°C) after 20 minutes of cooling. Redrawn from Hostler et al Comparison of active cooling devices with passive cooling for rehabilitation of firefighters performing exercise in thermal protective clothing: a report from the Fireground Rehab Evaluation (FIRE) trial. Prehosp Emerg Care. 2010 Jul-Sep;14(3):300-9.**

Subscribe at www.iffmag.mdmpublishing.com/subscribe



▲ **Figure 3: Firefighters performed exercise in TPC until exhaustion (black bar). They were then rehydrated with sport drink, water, or IV fluids. They then performed a second bout of work in TPC until exhaustion (red bar). The choice of fluid did not affect the time did not affect the work time after the recovery interval and the second bout of work was typically shorter than the first. Redrawn from: Hostler et al Comparison of rehydration regimens for rehabilitation of firefighters performing heavy exercise in thermal protective clothing: a report from the fireground rehab evaluation (FIRE) trial. Prehosp Emerg Care. 2010 Apr-Jun;14(2):194-201.**

after exertional heat stress. The first and most fundamental is to remove as much TPC as possible. These garments contributed to the exertional heat stress. Wearing them during the recovery interval is counterproductive. At a minimum, the firefighter should remove helmet, hood, coat and gloves. There is an additional benefit to pushing the TPC pants down around the boots when the firefighter is sitting. Temperature will be high at the beginning of the rest interval so removing garments and rolling up long sleeves will allow the sweat to evaporate. Remember that evaporation is impeded by humidity so you may have to move the recovery area indoors or into an air-conditioned vehicle when the ambient humidity is high.

Allowing the firefighter to passively cool is effective when TPC is removed and the recovery area is placed in a cool, non-humid environment. We conducted a study comparing five cooling devices to passive cooling in a room temperature setting and found that all modes, including passive cooling, worked equally well (Figure 2). It is worth noting that temperature does not return to baseline after 20-30 minutes of rest. Firefighters who perform another bout of work after the rest interval are starting at higher heart rates and temperatures than normal and, after the recovery interval, they most likely will not work as long or at the same intensity as the previous bout of work.

Passive cooling, however, will not be as effective in hot or humid conditions. In these situations, a fire department will have to find a rest area that is indoors or in a vehicle or choose to invest in active cooling devices. One of the simplest devices available are 20 L buckets filled with cool water that the firefighter uses to immerse his hands and forearms. This form of conductive cooling removes heat from the blood in the superficial veins before it returns to the central circulation. Over 15-20 minutes, this can be very effective at cooling the body (Figure 3). Research from our lab and others has shown that other devices, such as cold towels and fans, are largely ineffective when the environment is hot and humid.

Rehydration is an important part of recovering from exertional heat stress. As shown above, the fluid lost from sweating while working in TPC is substantial. Most firefighters will not drink enough fluid during the rest interval to fully rehydrate. In fact, it may not be possible for many individuals to consume that much fluid in a short period of time without suffering gastric distress. The individuals must be counseled to continue drinking after the incident concludes in order to be effective during the remainder of the shift. The type of fluid that should be consumed is a hotly debated topic. Most advocate using plain water for rehydration although a very recent study reported that certain beverages such as milk and electrolyte solutions remain in the system longer than water when consumed after exercise. Beverages with high sugar content, such as soft drinks, should not be used to rehydrate after heat stress, as there is the potential for mild kidney damage.

Lastly, it is important to understand what can be accomplished in the recovery interval. Firefighters in our studies often report feeling fully recovered 10-15 minutes into the recovery period. This is probably due to the rapid skin cooling that occurs when TPC is removed. In fact, good rehydration and cooling practices only partially corrects the physiologic strain caused by exertional heat stress. It cannot reset the firefighters physiology back to baseline. The residual heat and dehydration after the recovery period will not allow the firefighter to work at the same intensity or duration as the previous bout (Figure 3). Prolonged incidents will require more manpower to minimize the chance of a firefighter becoming overly fatigued and suffering an injury.

In summary, firefighters at every level must understand the physiologic strain caused by TPC and working on the fireground. The most important lesson to learn is that TPC should be removed every time it is safe to do so. This will prevent further heat stress and may correct some of the heat stress that has already occurred. Firefighters should work to maintain normal hydration throughout the shift. Do not overhydrate, but regularly drink small amounts of fluid throughout the shift and somewhat larger amounts when you are sweating. It is a good practice to drink a liter of fluid in the hour following an incident to be prepared for the rest of your shift. Lastly, getting hot is part of firefighting but it is not healthy to have high body temperatures for long durations. Take every opportunity to cool off and be prepared to deploy an active cooling strategy when the weather conditions will not permit efficient passive cooling.

For more information, go to www.firefighterresearch.org

Professional cleaning and disinfection technology

MEIKO
The clean solution

Forget about cleaning, just breathe





TopClean M – Professional cleaning and disinfection of respiratory equipment

www.topclean-m.de

Standard of operation for cave rescue in Hungary

In Hungary specialized cave rescue teams undertake the rescue role when explorers and researchers become stuck in caves. These organizations have adopted a unified procedure for undertaking cave rescues. During a cave rescue the interest of the casualty has priority and any other issues are dealt with as a secondary issue. Careful consideration must also be given to any circumstance which may endanger the health or safety of the rescuers.



Colonel Péter Jackovics

Colonel Péter Jackovics, civil protection counselor, Head of Department for Emergency Management, National Directorate General for Disaster Management (NDGDM), Ministry of the Interior, has two decades of professional experience in domestic and international disaster relief and assistance. He is the commander of HUNOR. He led the governmental rescue team in Srí Lanka, Indonesia, Haiti, Malta and Serbia. He is Hungary's UNDAC expert. As deputy head of the EU civil protection team, he directed the assistance granted by EU countries to Japan. Under his leadership, the basic professional requirements, the National Classification System for voluntary rescue organizations to be deployed in rescue operations have been elaborated in the six different branches of rescue. At present, he is a student of the Security Science Doctorate School of the Óbuda University. His area of research is the risk mitigation of special rescue operations during disaster assistance.

The chief rescuer and the head of every rescue action group have sole responsibility for measures to be implemented.

Others involved at the rescue, regardless of their rank or status in their own organization must follow or execute the instructions of the chief rescuer.

All participants involved in the rescue will only be nominated tasks which they are competent to fulfill.

The unified procedure is based on the Hungarian Cave Rescue Services' elaborated and approved policy.

The surface control party and all independent mobile action groups involved in the rescue can be directed by cave tour leader or search master.

Those entitled to lead any of the rescue phases or to take over the leadership of the rescue, must possess the required skills:

a) Until the arrival of additional helpers' (co-rescue), the cave guide involved in the accident (tour, search), in case if their incapability its appointed replacement, in their absence any other who is present and able to perform the task.

b) In the case of additional ad hoc help arriving (expanded co-rescue) the most suitable: the most experienced, qualified person with suitable management ability, good physical and psychical condition, with exception of those participants involved in the accident.

▼ **Hungary's governmental rescue team is on operation action at INSARAG Reclassification Drill. Hungarian National Organisation for Rescue Organisation took first reclassification under Heavy Urban Search and Rescue Standard in 2012. Col. Peter Jackovics is commander of HUNOR.**



© Image courtesy of NDGDM

▶ **Voluntary USAR team is demonstrating technical rope capability to construct a system that allows for the movement of a load with victim from a high point laterally to a safe point bellow.**

c) When the cave rescue service gets arrives (rescue service rescue), it is compulsorily for the head of the rescue service to take control.

Anyone involved in the cave accident or those who are not capable, cannot be in charge of rescue.

In the case of a cave accident, the injured person should be put in safety place, provide urgent first aid applicable to the circumstances and abilities, following the condition survey and the status evaluation and proceed as follows:

a) Alert the cave rescue service without delay in case of serious injury or if it is believed people are in danger. The rescue of the injured must be carried out by the cave rescue service action under the supervision of the medical team / doctor using the special rescue stretcher.

b) If the severity of the injury can not be judged clearly, the condition of the injured person(s) must be presumed as serious;

i. In the case of a minor injury and if the condition of the injured is suitable, the delivery to the surface can be started in a co-rescue or rescue action.

ii. In parallel with the rescue it is obligatory to notify the Disaster Management Service and the National Ambulance Service.

Requirements of Cave Rescue Service

A cave rescue service (an organization which undertakes cave rescue) must be able to alert and have appropriate members of staff available to get in action as well as a competent rescue doctor and the necessary medical equipment.

The cave rescue service is obliged to make available on the internet continuously its operational area, up-dates on availability, alerting arrangements and list of members.

Every cave rescue service has to be able to implement first phase activity, in any domestic cave, independently from the usual difficulties of the approaching route to the accident scene.

To determine the resources required for the rescue the available data has to be taken into consideration; seriousness of injury, place of accident and access difficulties.

Rescue of the injured person can only be started if all the necessary resources are available on site. The decision on the minimum number of members of a cave rescue service required has to be calculated with a maximum 90 minute assembly time, and 50% action-entry rate.



Degrees of cave rescue in Hungary:

1 (light): completing a complex rescue on easy terrain slightly or seriously injured person, includes first degree rescue service operation, obstacle-clearing of rescue route, rescue of injured person;

2 (medium heavy): completing a complex rescue of a very seriously injured person on easy terrain or a seriously injured on medium heavy terrain, includes first degree rescue service operation, providing necessary logistic background and resupply;

▼ **Central voluntary rescue organisation is using rope technique. Annual exercise is holding on formal industrial area at Budapest in 2015 winter.**



© Images courtesy of NDGDM

Subscribe at www.iffmag.mdmpublishing.com/subscribe



© Image courtesy of NDGSM

◀ Rope rescuers in HUNOR were trained by expert from Hungarian Cave Rescue Organisation. Picture was taken at HUNOR INSARAG Reclassification Exercise at November 2012. UN Classifiers are watching the rope rescue operation.

3 (heavy): completing a complex rescue of an injured in any condition, includes first- and second degree rescue service operation;

4 (burden): completing a cave rescue of more than 24 hour duration on heavy terrain, includes third degree rescue service operation;

5 (extreme): completing a rescue of more than 24 hour duration, requires mobilization of extreme capacities (i.e. many people, international collaboration, specialist knowledge, special means, complex technical systems);

Required capacity for each degree of rescue:

1 (light)

- medical crew of minimum 4 people professional staff of which at least 2 paramedic, all have cave tour experience, possibly having cave tour course;
- practiced cave rescuer of minimum 6 people, of which at least 4 skilled cave tour leaders or search leaders with experience;
- less practiced cave rescuers of 6 people, of which at least 2 skilled cave tour leader or search leaders with experience;

2 (medium heavy)

- medical crew of minimum 4 people professional staff of which at least 2 doctors all who have cave tour experience, possibly having cave tour course;
- practiced cave rescuer of minimum 12 people, of which at least 6 skilled cave tour leaders or search leaders with experience;
- less experienced cave rescuers of 6 people, of which at least 2 skilled cave tour leader or search leaders with experience;

3-5 (heavy)

- medical crew of minimum 6 people professional staff of which at least 3 doctors all have cave tour experience, possibly having cave tour course;
- practiced cave rescuer of minimum 30 people, of which at least 15 skilled cave tour leaders or search leaders with practice;
- at least 20 less practiced cave rescuers;

The Cave Rescue Service has to undertake a major training exercise every second year to deal with cases of 4-5 degree rescues;

Conditions of Cave Rescue Service regular membership, on probation:

- actively participates in a complex training exercise of at least medium or heavy cave rescue domestic exercise on at least medium terrain within 1 year, or maximum of 2 years;
- learns both theoretical and practical knowledge of cave rescue equal to domestic and international norms and pass the exam;
- Continuously practices cave touring or cave search and cave rescue;

A candidate is considered proficient in cave rescue when:

- Minimum three years continuous, certified, regular membership;
- Active participation at least six times in medium heavy, domestic, complex cave rescue exercises;
- Continuously experiencing cave expedition, cave rescue;

A cave or cave section can be classified as easy, medium difficult or difficult in relation to cave rescue difficulty rating, namely:

- easy: if there is no need of rope protection for a generally experienced caver to explore the route, takes no longer than three hours (calculated with continuously moving experienced team of five members)
- medium difficult: if the route contains not more than two climbing-rope sections in addition to the easy rating;
- difficult: all routes more complex than the previous ones;

The route should be upgraded by one grade if the exploration is effected by specific complicating factors such as:

- risk of landslip,
- flooding,
- significant stenosis,
- longer narrow sections,
- extreme climate conditions,
- equipment supply difficulties,
- significant access difficulties to the cave entrance

For more information, go to
www.okf.hu
www.caverescue.hu



DECONTAMINATION

Fire fighting decontamination – long term leadership in occupational health

The modern world of firefighting is a constant game of "cat and mouse" as our domestic world undergoes constant change and improvement. New building materials are created all the time and construction techniques continually change. However as these materials and methods change, they also conversely affect the very nature of the operating environment that a firefighter has to work under in an emergency situation.



Dr David Crouch

Dr David Crouch, Associate Director – Product Management (Military & Civil Defence) at Scott Safety.

Firefighters now face a dichotomy of threats in that they must respond to emergencies in buildings that could be hundreds of years old, creating one specific set of threat conditions, whilst in the next moment respond to a modern building fire with a completely different set of hazardous conditions. For example modern plastics/composite materials such as Nylon, Polystrene and Polyvinyl Chloride (PVC) will all degrade in a fire to yield noxious gases such a hydrogen chloride, hydrogen cyanide etc. as well as cancer causing particulate materials such as naphthalene and alpha-pyrene. Older buildings which may contain asbestos or lead containing materials in their construction pose just as much a risk to the firefighter if not more so. Again these risks are common to the firefighter in his or her daily operating environment and do not include the more exotic hazards encountered in other areas of the first responder domain e.g. CBRN or HAZMAT incidents.

During a fire, firefighters wear self-contained breathing apparatus (SCBA) to protect themselves against acutely toxic concentrations of combustion products. However after a fire has been extinguished, fire-fighters undertake overhaul, a phase when potential reignition sources are extinguished and site investigations begin. During this overhaul period, fire-fighters can be exposed to potentially harmful concentrations of residual combustion related particulates, gases, and vapours such as carbon monoxide (CO), nitrogen dioxide (NO_2), sulphur dioxide (SO_2), and more than 120 volatile organic compounds (VOCs), including carcinogens such as benzene, 1,2-butadiene, formaldehyde, naphthalene, styrene, and toluene. Formaldehyde is of particular concern in this group, given its status as a known human carcinogen and upper airway irritant. Although it is recommended that fire-fighters use SCBA during overhaul, many fire departments either do not require or do not enforce this procedure.

As a result of this increased operational risk to fire fighters, respiratory protection has now been developed to cover a wide range of firefighting scenarios utilizing both positive and negative pressure environments within the single respirator face piece. As one approach considered by fire departments to the above issues has been the use of APR, rather than SCBA during overhaul operations. For example researchers in the United States have demonstrated that air purifying respirators (APR) fitted with chemical, biological, radiological, and nuclear (CBRN) canisters may reduce occupational respiratory exposures in the fire fighting domain. Designed for Top Down Convertibility, masks such as the AV-3000 HT face piece (Figure 1) are an example of this new requirement and can be configured to operate in either APR, PAPR or positive pressure breathing apparatus (SCBA or airline supplied) modes.

The health risks entailed by fire-fighters work situation can not only lead to cancers, but other health problems such as fertility disorders, cardiovascular diseases, asthma and other allergies such as dermal and respiratory sensitization. Whilst the above respiratory protection will shield the wearer from these hazards from an inhalation perspective in a fire, it will not protect them from the long term chronic effects of contaminants adsorbed into their equipment. Long term exposure, through dermal transfer and ingestion, for example can lead to "chronic" accumulation of these carcinogenic materials into the body. If not properly addressed through correct cleaning and decontamination protocols this problem can result in long term damage to the fire-fighters health. For instance the fire-fighters' work environment is a global problem and several types of cancer are now classed as an occupational illness for fire-fighters in Sweden, Canada, Australia and parts of the USA

Present strategies for alleviating combustion product contamination of firefighting equipment and personnel is very rudimentary and usually involves either routine washing via laundry of the equipment & clothing or direct replacement of the aforementioned equipment. Cleaning of such equipment & clothing is normally undertaken on a cyclical basis (e.g. once every 3 months) via laundry services specifically designed for such apparatus. Whilst effective, this service is a huge logistical burden in requiring large quantities of water and detergent per unit cleaned and is only undertaken sporadically over a prolonged period of time e.g. not after every incident. As a result there is an increasing likelihood of exposure to the aforementioned contaminants and therefore prolonged accumulation in the body, which can ultimately result in chronic effects being observed longer term in firefighters.

To combat this human tragedy a significant amount of research is now being undertaken across the globe to find alternative methodologies which could be used to help reduce the occupational exposure fire-fighters receive during their daily life. One alternative methodology that could conceivably be used in the future fight to reduce occupational exposure is that of dual fluid atomization technology. Dual fluid atomization systems, such as the depicted Light Decontamination System – LDS, are highly portable systems making them versatile enough to be used at the scene of any fire e.g. the firefighter could be immediately decontaminated following egress from the incident area, thereby minimizing the occupational exposure to carcinogenic materials and other related hazards.

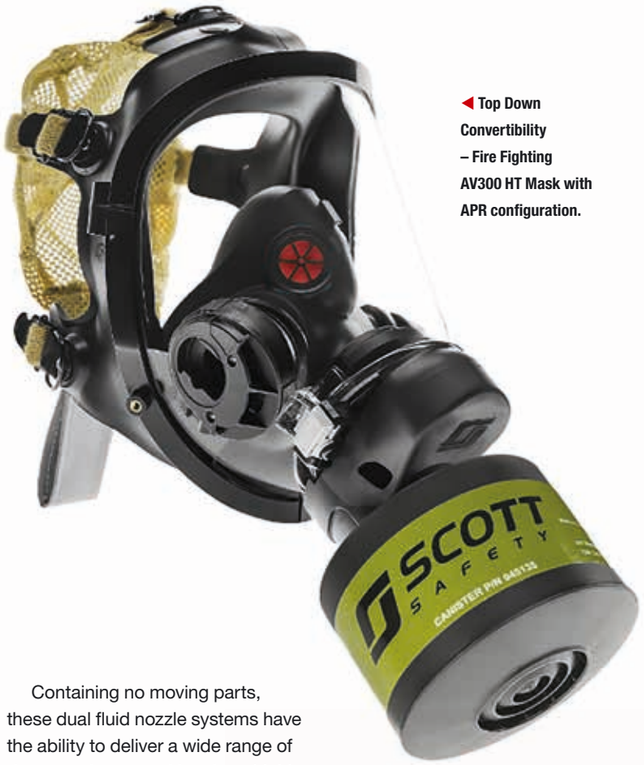


© Image courtesy of Scott Safety

▲ **LDS – Multi-purpose system for all CBRN/HAZMAT and PPE decontamination needs.**

To combat this human tragedy a significant amount of research is now being undertaken across the globe to find alternative methodologies which could be used to help reduce the occupational exposure fire-fighters receive during their daily life.

Subscribe at www.iffmag.mdmpublishing.com/subscribe



◀ **Top Down Convertibility – Fire Fighting AV300 HT Mask with APR configuration.**

Containing no moving parts, these dual fluid nozzle systems have the ability to deliver a wide range of decontaminants making them highly suitable for not only occupational firefighting decontamination applications but other first responder domains such as CBRN and HAZMAT incidents as well. Utilizing compressed air to atomize a liquid, not only are these systems capable of producing large dense clouds of very small droplets (typically 1-10 microns), they are also capable of reaching all non-line-of-sight surfaces. This latter facet makes them perfectly suited for decontaminating complex structures and surfaces such as the ones found in people and equipment.

Effective against both airborne and surface threats, “dual fluid” nozzles typically use 10% of the decontaminant required by existing systems to afford effective decontamination. This is again a vast improvement over the current approach to decontaminating equipment and people which involves ‘total flooding’ using large quantities of active effluent which then requires subsequent treatment and is highly inefficient in terms of cost.

Dual fluid systems, due to the large number of droplets they produce, are also capable of knocking down short range particulate hazards and the isolation of highly mobile fibers such as asbestos and radioactive materials etc, through the delivery of polymeric coatings. The system can easily be reconfigured for Toxic Industrial Chemical (TIC) and CBRN applications with minimal effort via a simple change in decontaminant. This latter feature further reduces logistical burden and offers a truly comprehensive decontamination capability in a single system. Such system integration, combining the advantages of tailor made and versatile decontaminants, with the versatility of “dual fluid” nozzle based systems will allow the first responder of the future to effect timely decontamination in any global theatre against any threat encountered. Thereby reducing the occupational hazards that first responders such as firefighters will face in the future.

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



▶ **Light Decontamination System.**

Images courtesy of Scott Safety





FREE Subscriptions

Gulf Fire

Gulf Fire Magazine is the only quarterly journal specific to the Middle East Fire market dedicated to both fire protection and firefighting. The editorial features are written by industry experts and comprise a unique blend focussing on the latest technology, training methods and equipment as well as highlighting sector specific issues. Regular product and company profiles, events updates and news make Gulf Fire Magazine the first choice read for fire protection and firefighting professionals.

www.gulffire.com





APF ASIA PACIFIC FIRE MAGAZINE

APF Magazine is the only quarterly journal for the Asia Pacific fire market dedicated to both fire protection and firefighting. Written by leading fire prevention and fire fighting professionals, every issue is packed with in-depth technical features and the most recent developments in testing, codes and standards. Regular product and company profiles, events updates and news make APF the first choice read for fire, rescue and safety professionals.

www.apfmag.com

IFP INTERNATIONAL FIRE PROTECTION MAGAZINE

IFP Magazine is the only international journal dedicated to fire safety, prevention and protection covering every aspect of the passive and active fire protection market. The editorial features are written by industry experts and comprise a unique blend focusing on the latest technology and equipment as well as highlighting sector specific issues from around the world. Regular product and company profiles, events updates and news make IFP the first choice read for fire safety professionals.

www.ifpmag.com



Written by Fire Professionals for Fire Professionals

Streaming video and firefighting

Firefighting teams have to make immediate decisions informed by years of training and experience. The question is, will live video streaming from the incident enhance effectiveness or impede rapid decisions on the ground? Our experience working with a wide variety of front-line teams, from soldiers to first responders, tells us that adding a carefully considered video streaming solution to their toolkit can provide a tremendous benefit in informing supporting teams and commanders.



Mark Patrick

There are multiple opportunities for live video. At Digital Barriers we take a holistic view focusing on all possible providers and consumers of video, as well as the situational awareness that can be derived from them. Providers of video range from fire-service vehicles, temporary video infrastructure placed by firefighting teams, body-worn cameras on firefighters' uniforms, existing local government or law enforcement cameras, and social media video streams. All are useful but require a cohesive solution in order to gather and disseminate video effectively and avoid information overload. Furthermore, there are significant technical challenges to overcome that should not be trivialised.

The firefighting vehicle fleet attends all manner of incidents and often has a standby role near major events ready to respond as required. Video from the vehicle provides an excellent asset for the command team to use when assessing the environment around the vehicle and any surrounding issues such as over-crowding. This aids general readiness to respond. If an incident does occur, having cameras on the vehicle which are easy to

▼ **Digital Barriers demonstrating EdgeVis Wireless Video Streaming Technology at IFSEC 2016.**



Image courtesy of Digital Barriers

Mark Patrick is Chief Technology Officer, Digital Barriers.



Image courtesy of Digital Barriers

▲ **EdgeVis Live Video Streaming Technology can be viewed remotely via a Mobile Device.**

access by the command team allows them to make additional operational decisions regarding the level of additional support needed and what further emergency services are required – such as more firefighting vehicles, police for crowd control, or ambulances for casualties. Multiple cameras may be placed on the vehicle including one or more "PTZ" cameras; these "pan-tilt-zoom" cameras allow a remote team to zero in on areas of interest to see more detail.

If an incident is underway the firefighting team can rapidly deploy "drop cameras" on tripods as they move to assess the incident area, providing a remote view of blind-spots. Other specialist drop cameras include those carried by drones which may play an increasing role in future incident management. All of these video assets can be viewed locally from the lead engine and from the command team. This allows one central team member to monitor multiple danger areas and assess increased risk of issues such as building collapse.

Body-worn cameras on firefighters' uniforms give local and remote command teams the ability to view specific activities. They can also determine which additional actions need to be taken and can help teams determine if dangers start to exceed acceptable risk. They also allow firefighters to stream live video to subject matter experts, even if they are very remote, for expert advice on how to deal with an issue. Digital Barriers' streaming technology has a unique capability that allows incredible detail to be seen over very low bandwidths, even from a remote viewer's smart-phone. Of course this requires a very comprehensive approach to security, and this general need is further explored below.

In rapidly managing a response to an incident it is often useful to take over local street cameras: general surveillance CCTV that may be controlled by local government or law enforcement. However, the ability to see these cameras is often limited to a centralised incident command, even when it is really needed in the field. There are specialist approaches that allow that video to be harvested and sent real-time to the teams on the ground to allow them to see areas that may be hard to approach on foot. The same is true for video streaming from social media; at any large scale incident, the amount of video generated by the public is overwhelming. But it is possible to provide this sort of video to a local command centre quickly and reliably to further assist in incident management.

Steaming video from the field is hard. There are a number of significant constraints, in part generated by the demanding requirements of firefighting teams. The video must be streamed in real-time and not delayed; it must be secure, affordable and reliable – very different from streaming video for a FaceTime chat on an iPhone! It is possible, however, to meet these constraints using a mix of wireless technologies.

The police force was an early adopter of video on vehicles and body-worn cameras, but their use is mostly for evidence collection and to manage liability – i.e. for post -incident analysis and evidence capture. In part, this is because police forces adopted these solutions before it was technologically feasible to reliably stream video in a cost effective manner. Digital Barriers believe that live video is much more useful than just "black box recording" for the emergency services community. So, we have focused our developmental efforts on real-time streaming. The fire-service has a significant need for the additional insight that remote video streaming can provide. It allows ground-teams to concentrate on a hazard, while the centralized incident management team are able to provide a different level of support with the enriched situational awareness available. That said video harvested from an incident also has significant benefits for post incident analysis, to pass to both criminal investigation and training teams.

Streaming over cellular networks is the preferred approach as the infrastructure already exists and is relatively cost effective. However, video is very bandwidth hungry and uses a lot of data. Additionally, during an incident, there may be many members of the public each consuming an element of the local bandwidth by streaming video from mobile phones to social media and contacts. This causes contention for bandwidth and can create delays in the video causing reliability issues. There are many approaches to egress video over cellular. Digital Barriers' approach is to use our specialist EdgeVis codec (encoding and decoding algorithms)



Image courtesy of Digital Barriers

▲ **EdgeVis Live Full Resolution Retrieval in Action.**

which provides secure and reliable video over ultra-low bandwidths and can therefore cope when networks become constrained. Other techniques we have adopted include creating a local wireless "bubble" at the scene. By using Wi-Fi or mesh radio systems to provide local high-bandwidth communications, control teams are able to view and command teams on the ground via cellular or even satellite communications. Dedicated first responder networks are being revamped across Europe to include higher bandwidth capabilities. Whatever method is adopted, we strongly recommend that the local video systems are kept loosely coupled from communications technology. This will allow either side to upgrade without incurring the cost of a wholescale replacement.

The initial deployment of video streaming can appear to be a big leap for a fire service, but actually there are quite simple ways to engage with these capabilities to fully explore their benefits. Plenty of valuable lessons have been learned by the law enforcement field, especially by police tactical operations teams. Equipping a fire engine with fixed cameras and a set of drop cameras is a quick exercise, and the infrastructure required to support the system at the command centre can be standalone initially and later integrated into command and control systems. The most important area to address is often security, so the infrastructure must be securely encrypted and access to the system controlled and logged. Use of body-worn cameras requires the most development to ensure that there is no interference with the firefighter's movements. They also need to be tested to be certain that they can withstand the environments likely to be encountered.

Key Concepts

There are a number of key concepts that govern the requirements of a video system.

- **Latency:** How much of a delay there is between the occurrence of an event and it being viewable remotely. In many systems this can be three to ten seconds. This is unacceptable if the centralised incident management team are to provide effective support. Latency needs to be less than one second to be effective, otherwise known as "real-time".
- **Quality:** Video quality is generally measured by resolution and frames per second (fps). The higher each measurement is the more data is used. This increases costs, as well as streaming and storage challenges. Typically we recommend that video is stored at full high definition (1920x1080 pixels – the same as a typical HD television set) and at 12-15 fps. Video streaming is typically lower quality, though our solutions allow the full high resolution detail to be viewed.
- **Cameras:** The choice of cameras is vast, with normal daylight and low-light cameras, fixed cameras and pan-tilt zoom cameras being the main choices. Thermal cameras are familiar equipment for many firefighters and can also be equipped. One camera type may not suit all applications teams, so they should strongly consider deploying multiple camera types.

For more information, go to www.digitalbarriers.com

How to Evacuate a Multi-Storey Building

When it comes to evacuating a multi-storey building all companies and organisations, providing services to their employees or the public, need to be prepared for any eventuality. With this in mind, extra precautions need to be taken to accommodate wheelchair users and the mobility impaired ensuring the risk level when evacuating is reduced.



Mark Roberts

Evacuation procedures need to be in place along with designated trained staff that will assist in the evacuation process; those employees also need to undergo practical training in the operation of any equipment used in the evacuation. It is now the employers or service provider's responsibility to evacuate people from a building in an emergency; it is no longer the role of the Fire Service to facilitate the safe evacuation of non-domestic premises as outlined in the Regulatory Reform (Fire Safety) Order 2005. It is therefore illegal to plan a fire evacuation that relies solely upon the fire service being involved, potential outside factors such as traffic delays cannot be predicted and can affect the brigade's response times, the buildings evacuation strategy needs to be self-contained. Employers who neglect proper evacuation measures for employees, visitors or the mobility impaired can be found guilty of failing to provide a duty of care and will face legal proceedings. Health and safety stipulate implementing the necessary certified policies and training in order to comply.

Pre-planning is essential ensuring the needs of all employees, visitors or the mobility impaired are identified and a Personal Emergency Evacuation Plan known as a 'PEEP' or a 'GEEP' General Emergency Evacuation Plan is devised by the relevant person responsible to comply with Part 2 Section 8 of the Fire Safety Order (RRO).





© Image courtesy of Evac+Chair International

◀ **The standard Evac+Chair 300H model 182kg payload capacity.**

The PEEP is tailor-made to secure the safety of the named individual(s) in the event of a building evacuation. It will explain the method of evacuation detailing the escape routes and identify those person(s) who will assist carrying out the evacuation and training or practice needs. It will also detail the refuge areas (this is where the mobility impaired can await assistance). The plan should be tested and used during regular evacuation drills to ensure all staff involved are aware of the procedures and receive a copy of the relevant PEEP, a copy of the document should be filed accordingly.

When planning for an emergency in a public access building where mobility impaired or disabled people have total access, a PEEP would not be sufficient. The responsible person would need to devise a General Emergency Evacuation Plan known as a GEEP; the plan will contain the same points that are covered in a PEEP, but needs to be as robust as is practical to accommodate everybody in any potential situation.

The time required to safely evacuate a small building that is not a high rise, wouldn't normally be an issue due to passive fire protection. Therefore high rise buildings can present a number of challenges, the most obvious one being the potential distance needed to take to travel down the stairs to exit the building. These kinds of buildings set themselves apart from others that have a single staircase, due to the time it takes to evacuate and the time required to do so smoothly and effectively. The standard fire protection in a high rise building can range from thirty to sixty minutes allowing the responsible person adequate time to safely evacuate the people under his/her care. In such instances Evacuation Chairs have proved, all over the world, to be the most time efficient and user friendly, enabling the operator and passenger to safely exit the building. Due to the potential number of people that may require assistance, the correct type of equipment and quantity is paramount and is required by law to be implemented. These kinds of products range from Slide Sheets, Slide Pads, Evacuation Chairs or Stretchers. All evacuation aids need to be located in each designated refuge point as specified in the buildings fire strategy. Each fire escape has to accommodate able bodied people and the mobility impaired; therefore all equipment has to be readily available and easily accessible in each refuge point.

In order to comply, the responsible person should obtain professional advice to establish what is exactly required. This will involve evaluating each floor in order to determine the quantity of each piece of evacuation equipment and the suitability, the reason behind the rational for each floor being evaluated is to avoid the operators having to make repeat journeys over an excessive distance and re-entering the building, there needs to be sufficient equipment and people willing and trained to operate it.

Evacuated people should never be left to wait for the Fire and Rescue Service unattended in a refuge point. It can be used as an area to wait until it is safe to exit the building or a place of rest. The refuge areas needs to be a safe place and must not have any adverse effect on the means of escape, this can range from a corridor, stairway or an enclosure such as a compartment, somewhere that will provide protection form the fire and smoke and should also be clearly sign posted and kept clear of obstructions, mobility impaired people can remain there until they are assisted to a final exit. Whoever accompanies the mobility impaired person, as identified in the PEEP, needs to report the location of that person to the responsible person in charge of the evacuation. It is essential that all refuge areas have access to an effective communication link to a fixed or mobile staffed area; a person in the refuge area needs to be able to make the necessary communication in an emergency.

The key to ensuring you are prepared for any eventuality is to plan for regular fire drills; these will all depend on the type of building and the occupancy. As a general rule, an evacuation drill should be carried out twice a year; ideally it should be done quarterly. The evacuation needs to be done in accordance with the PEEP or GEEP that was designed specifically for the building, the environment and of course the people. The fire drill will also involve using the relevant equipment installed, the elevators will not be in use and everyone will evacuate to the designated refuge area. The fire drill will be spontaneous and without warning, the only people aware of the fire drill taking place will be the organisers. The responsible person will need to record the time it takes to make a full evacuation, dependant on the type of building working with your local fire authority will help you to determine a 'safe time'. In the case of a tall building, there is more risk involved due to the distance people have to travel to exit safely, it is therefore essential everyone is aware of the procedure, should there be an increase of people in the building, for example more staff, then the fire drills would need to be more frequent to ensure they are still being carried safely and correctly.



© Image courtesy of Evac+Chair International

▲ **Emergency Ski Pad, patient secured in place with straps and dragged to safety.**

An emergency evacuation can happen at any time without warning, the key to dealing with these situations is to be prepared this is vital, from assessing the building layout to appointing the designated responsible person and of course practising regular fire drills will ultimately save time and more importantly lives in the future.

For more information, go to www.evac-chair.co.uk

Mark Roberts is a Director at Evac+Chair International.

Subscribe at www.iffmag.mdmpublishing.com/subscribe

Teamwork in rescue – fire, USAR and the right equipment

In the aftermath of events such as a factory explosion, earthquake, or a terrorist bomb, man-made structures are often reduced to rubble piles, sometimes of immense dimensions. For victims trapped deep inside, their rescue depends on the actions of firefighters and USAR teams and the effectiveness of the procedures, equipment and techniques they deploy. If fire is involved, USAR teams often have to wait for the fire services to bring a situation under control before they can move in to start their search and rescue efforts.



Mikael Westerlund

Mikael Westerlund, CTO, Savox Communications

While first responders and medium and heavy USAR teams are typically some of the first on the scene in the aftermath of a disaster, the discipline and procedures they follow and the equipment they employ in their efforts, can mean the difference between life and death for those trapped and still alive beneath the rubble. With such victims potentially conscious or unconscious, possibly able to speak, or totally unable to communicate, getting USAR teams to work as fast as possible is of paramount importance. That said, it's only possible for these teams to begin their SAR efforts once any fires have been extinguished, or near extinguished and the rubble pile then made safe by engineers and shoring teams.

It's an unfortunate fact in the case of fires, that it may be many days before firefighters can bring a situation under control sufficiently for others to begin their work, although they will take a lead from fire teams and when absolutely necessary sometimes work alongside them before deploying fully. But when they do go in, it's at this point that the steps and drills USAR teams follow and the equipment they use, can make the difference between life or death for those awaiting rescue. 298

▼ **Canine at work in a fire/disaster scenario where fire fighters, USAR and canines come together to succeed.**



Image courtesy of Savox Communications

Inside the SAR toolbox

At the disposal of the USAR team are a specialist set of technical tools used to 'listen' for and locate victims trapped in the rubble pile. These include the latest seismic and acoustic listening devices often used alongside telescopic cameras. These can include heat detecting sensors, but together this toolbox delivers the latest and most effective tech for finding live victims in the voids of a rubble pile once the firefighters have done their job.

Sound vibrations generated by a victim travel through the solid parts of a structure or ground and are picked up by seismic/acoustic sensors, placed on flat surfaces, such as concrete, or wood. They can be pushed into the ground using screw-in spike attachments, or attached to steel structures at any angle or in any plane using magnetic attachments. The operator's display interface provides seismic results in visual form and audio results in the headphones; the system allows the operator to review all feedback enabling him to pinpoint the victim's location. The display panel shows the differing seismic signal strengths coming from each sensor, which appear in a way similar to a graphic equalizer and by seeing which sensor delivers the strongest signal the operator can direct the team to move the other sensors until they home in on the victim's location.

If a victim is alive but unconscious, many seismic systems, however, may miss them as they need to make some kind of noise or movement to be detectable. At the same time, the acoustic detector will pick up sounds such as voices or breathing and can, therefore, detect an unconscious, though breathing victim. Some systems use two acoustic search probes simultaneously giving the operator a stereo comparison of any noises; airborne sound waves have been shown to travel within and under layers of debris in a rubble pile but become attenuated before they escape to the surface. Certain, well known devices in the industry have addressed this by their configuration – attached either to rigid telescopic booms on which they can be pushed into the void, or to flexible cables on which they can be lowered into the rubble. Two-way intercom-based communications between rescuers and trapped victims are also integrated into some leading acoustic sensor systems. 680



Image courtesy of Savox Communications

▲ **SearchCam 3000 used in USAR operations. Once located, telescopic search cameras can be used to home in and even communicate with victims.**

In mentioning the key USAR tools to be employed during a rescue when fire and USAR teams are working alongside one another, it would not be complete without citing the initial, very basic but proven steps when teams typically begin their search by calling out and listening for any responses or sounds. This will often be followed by the use of specially trained dogs to sniff out and locate victims. The Federal Emergency Disaster Management Agency (FEMA) in the US trains dogs for use in mass-casualty events, for both domestic and overseas disasters. Some canines are trained to discriminate between different kinds of scents and for different scenarios, e.g. rubble, water, forest and avalanche searches, although USAR dogs will alert on any human or cadaver scent and are generally non-scent discriminating.

When fire and disaster mix – a case study

An explosion on 17 July, 2015 at the Wood Treatment Limited wood mill in Bosley, Cheshire, UK, caused a major fire and the structural collapse of many buildings on the site. The event occurred at around 0900hrs requiring the deployment of some 15 fire appliances and by 1030hrs when fire teams had deployed it was ascertained that two explosions had taken place, four employees were missing and 35 injured were taken to hospital.

The explosion had been caused by the ignition of wood dust produced in the process to make wood-laminate flooring. Quantities of heating oil, kerosene, acetylene were also present adding to the combustibles and asbestos added to the other dangerous constituents in the mix. This presented dangerous conditions for both the fire fighters and the USAR teams who had to wait on the sidelines until the fires were out before setting about their work. The Cheshire Fire Brigade described as 'fully developed', fires in several areas including a four-storey building that had collapsed among the devastation. The possibility of further explosions meant the fire services had to proceed carefully, with water the main fire-fighting element. 1000

By the evening on day one, the large multi-agency team now gathered, including Merseyside and Lancashire USAR teams, would need to remain for several days before they would be able

Subscribe at www.iffmag.mdmpublishing.com/subscribe



Image courtesy of Savox Communications

▲ The Delsar Life Detector showing seismic and acoustic sensors together with the operator's display panel.

to deploy using their Searchcam 3000s and LD3-4 Delsar life detection systems from Savox Communications. Once the fires were under control these devices would be used on many occasions in the days ahead.

Some of the USAR shoring teams worked with the fire services to ensure structures were safe for the firefighters to do their job and gain access to areas where fires were burning in isolated places. At the end of day one the Cheshire Fire Brigade spokesperson was quoted as saying its crews were 'working tirelessly to ensure that search and rescue teams could safely access the site' as soon as possible to search for those missing'.

Specialist USAR teams were only able to began initial assessments some 24 hours after the disaster struck, with dogs employed at a very early stage thereafter together with the basic search methods outlined above, followed by the first uses, where possible, of the Savox search and rescue cameras and life-detection systems. These two solutions are almost de facto industry solutions in use all over the world.

During the second night, USAR teams discovered a body that in an area that had been identified as of interest by one of the SAR dogs. On day three, demolition and specialist heavy lifting gear cleared a path to the centre of the site for the USAR teams whose efforts continued through the next week alongside the firefighters who continued to douse the site with water. It was at this stage that USAR changed to one of search and recovery and by lunchtime on 21st July a second body was found. On the morning of the 27th July, a fresh USAR team from West Yorkshire arrived on site to replace the crews from Lancashire who, like their Merseyside counterparts, had attended since the start. The Merseyside USAR group remained and continued working with the West Yorkshire team. A full two weeks after the incident began on 31st July the USAR teams were still working 24/7 to locate the missing with firefighters continued to monitor and cool the site. 1381

Right equipment at the right time

In an event like Bosley Mill, deploying the right SAR equipment at the right time is down largely to the efforts and coordination of the fire department on the scene and whose efforts must ensure the safety of both its own teams and the USAR operatives.

Dogs employed at an early stage are responsible for a many victim-location SAR successes and while no live victims were pulled from the rubble on this occasion the location of deceased workers was aided by the canines. In addition, deployed at Bosley were technical search tools, including Delsar seismic/acoustic life-detection equipment and SearchCam 3000 telescopic cameras, which were used in combination during the SAR phase. Once the recovery phase had begun, however, the SearchCam 3000 alone was employed in the search for the missing.

Recognized in the industry as probably the most powerful such tool available for USAR purposes, Delsar offers full frequency spectrum monitoring that enables an operator to detect everything from the lowest frequency hum, to the highest pitched screech. However, as with all such seismic sensors operating in a wet situation where the fire brigade uses vast amounts of water to drench a fire, water 'dripping' throughout a rubble pile can cause false alerts because it can sound like a person tapping on a hard surface. USAR operators have to use their experience to distinguish between regular water dripping in a post-fire scenario and the tapping of a person, which is often less regular.

Communicating around the rubble

Operators of technical USAR kit have, until relatively recently, not had a sophisticated means of communicating with other members of the USAR team or fire fighters working alongside them. This made telling everyone to be quiet on detection of a victim, or getting other members of the USAR team to move sensors around the pile, very difficult. A new communications solution – the SR100-Rescue from Savox Communications – is now enabling life detection operators to communicate with other members of the USAR team more effectively who, in turn, can communicate with fire fighters around them over a two-way radio solution that links directly into their other search tools. It also enables the team to communicate directly with command and control elements of a USAR deployment, which has not, previously, been possible.

For more information, go to www.savox.com



How the development of body armor has helped firefighters

The nature of protective clothing means that there are naturally similarities between different products. For example, there are a number of similarities between bullet proof and stab proof vests, including materials and design. This may seem obvious, but even Turnout Gear shares a number of similarities with bullet proof vests, beyond them both being used to protect an individual. Even their design and development follow similar paths due to the desired end result.



Thomas Bowman

This seems obvious given that both are attempting to protect against a wide range of threats in difficult environments. Nevertheless, the crossover between the two areas is deeper than many realize.

The threats that Firefighters must face from day-to-day will differ greatly from the threats facing others who were body armor. However, many of the threats are very similar. For example, there are an alarming number of reports of Firefighters being targeted for violence and attacked, sometimes fatally. This is where body armor may be of use to Firefighters, but even in day-to-day work the development of body armor can and does influence the manufacture of turnout gear.

Of course the main threat that Turnout Gear is designed for is fire; more specifically, heat. Body armor, on the other hand, has to be able to stop bullets, knives, needles, and a variety of other weapons. As we will see, both items have the capability to deal with the threats the other is designed for, albeit far less effectively. The materials used in both bullet proof vests and turnout gear are largely the same, as both utilize plastic fabrics made of Aramids. These plastic fibers are strong, flexible, lightweight, and heat-resistant, making them ideal to be used for protective clothing of all types. The most common and well-known example of an Aramid fabric is Kevlar, which is synonymous with ballistic protection.



◀ **Bullet proof vest manufacturers focus on improving breathability and comfort, which is an aspect of Turnout Gear that needs development.**

Kevlar is not only incredibly strong, but is lightweight and flexible. This is why it is so heavily favored in body armor manufacture. However, Aramids are also capable of withstanding extreme temperatures, and will not melt or degrade at temperatures of upto 800°F. This means that Kevlar has also found use in Turnout Gear, although Aramid manufacturers often look to provide materials with far higher heat resistance, usually at the expense of some ballistic protection. Nevertheless, Kevlar does find uses in Turnout Gear, offering some protection against impacts and blunt trauma. Some manufacturers offer blends of materials, for example a mixture of Kevlar and Nomex, another aramid material from DuPont that has a far higher resistance to heat. By producing a blend the material can offer the heat resistance needed by Firefighters while also decreasing friction and improving co-operation between the layers of Turnout Gear.

The introduction of materials like Kevlar not only improves protection, but also the overall performance and comfort of the gear. Making protective clothing more comfortable is usually an afterthought, and yet is incredibly important. If nothing else, body armor or Turnout Gear that is not comfortable is less likely to be worn. This is less of a problem for Firefighters, who simply have no choice in wearing their gear, but for Law Enforcement in particular this is a major problem, and many Officers have been killed while not wearing their vest. Improving the comfort of Turnout Gear should still be a high priority for manufacturers, particularly as it will help tackle some of the major problems that can occur in the line of duty. The main problem facing Firefighters is heat, as already noted, but the excessive build-up of moisture that it causes is just as serious. Excessive sweating alone can cause severe physical issues, such as exhaustion and cardiac arrest, but any build-up can also lead to very severe burns if the moisture is heated. Furthermore, if the air barrier in the Gear is compromised by the moisture, it can seriously degrade the protection it offers.



◀ **An explanation of the layers in a bullet proof vest, and the similarities it has to Turnout Gear.**

▶ **By using custom panels using blends of protective materials, Turnout Gear can be more comfortable and more protective.**

This is an important area of interest, and one in which body armor manufacturers can help improve Turnout Gear. There has been an increased focus in the body armor industry on improving the comfort of vests to help ensure it is worn. This has led to the development of new, thinner materials that allow for a thinner vest at the same protection, research into ergonomic design, and most importantly the inclusion of temperature-regulating materials. By including these materials a vest can actively reduce the temperature of the wearer by drawing moisture away from the bed, which would prove to be very useful for Firefighters. Furthermore, the combination of these breathable materials with fabrics like Kevlar allows for a better barrier to heat, whilst at the same time removing excess heat from the layers closest to the skin. This means that the layers of Turnout Gear could work together more efficiently, creating a far more comfortable and protective piece of equipment.

For more information, go to www.safeguardarmor.com

Thomas Bowman is one of SafeGuard's leading ballistics experts. He spends his time updating partners on the developments within the industry and is instrumental in driving the company's research and development.

Subscribe at www.iffmag.mdmpublishing.com/subscribe

INTERNATIONAL
FIRE FIGHTER

Relaunching our APP for Android and iOS devices

IFF





- **We have restyled and improved all our APPS.**
- **Now available with News Updates, Magazine Articles, Blogs and Video.**
- **Featuring daily updates and original content.**

Download for *FREE* today at the Google Playstore and the Apple iTunes Store by searching for *IFF Magazine*.



ANDROID APP ON Google play

Available on the App Store

ADVERTISERS' INDEX

Angus Fire	39
Auxquimia	27
Avon Protection	59
BioEx	37
Bristol Uniforms Ltd	65
Bronto Skylift	13
Cutters Edge	4
Dafo Fomtec	29
DQE	91
Dr Sthamer Hamburg	31
Dynax Corp	32
Emergency Services Training Institute (Texas A&M)	27
FDIC 2017 / Pennwell Corp	52-53
Fire Safety Devices	39
Fol-Da-Tank	47
Goliath Footwear	61
Heatseeker Technology & Design LLC	43
Holmatro	101
Intersec 2017	17
JOIFF	12
Jolly Safety Equipment	21
Knowsley SK	23
Magirus	73
MDM Publishing	92
Meiko Maschinebau	83
Oshkosh Airport Products	14
PAB Akrapovic	77
Pacific Helmets	87
Paratech Inc	11
POK SAS	10
Profoam International	35
Russwurm Ventilatoren	66
Safe Fleet / FRC	19
Saphire Complete Training Concepts	91
Skedco Inc	9
Solberg	24
Super Vacumn Manufacturing	66
Task Force Tips Inc	IFC/1
Teikoku Sen-I Co Ltd	7
Tyco / Williams Fire & Hazard Control	IBC
Vimpex	65
Waterous Company	OBC
Wehr Engineering / Glasmaster	19/61
WS Darley Inc	51
Yone Corporation	2

Come and see us at

THE EMERGENCY SERVICES SHOW
21-22 September 2016 • Birmingham, UK

intersec
22-24 January 2017 • Dubai, UAE

www.mdmpublishing.com



Williams Fire & Hazard Control presents the world renowned 2016 EMEA Xtreme Industrial Fire & Hazard Training School.

Learn Petroleum Oil and Gas (P.O.G) Xtreme firefighting techniques, fire behaviour, equipment applications (fixed and ER Mobile), chemical agents, and incident recognition, command and control through hands on firefighting and real world case studies.

The course is delivered by the Williams Fire & Hazard Control world class industry leading experts, who will share with you their knowledge from 35 years of experience in successful fire and hazard management, control and extinguishment.

Having fought over 200 of the industry's most threatening flammable liquid fires, successfully, this is your opportunity to learn from those that have been there and done that.

Experience...
is the difference

"When faced with fires at petroleum, oil or gas facilities we have learned that it is experience that makes the difference and this course can be the perfect opportunity to gain that experience."

Chauncey Naylor,
Director for Training & Emergency Response Operations at Williams Fire & Hazards



Xtreme INDUSTRIAL FIRE & HAZARD TRAINING

25th - 29th September 2016. Vernon, France.

For more information and to register, please visit:
www.europeworkshop.com

tyco Fire Protection Products

www.williamsfire.com

Copyright © 2016 Tyco Fire Products LP. All rights reserved.


EVERY THING COUNTS
When fighting a fire, every thing counts, including location. It's why Waterous builds fire pumps and compressed air foam systems (CAFS) designed around the needs of fire brigades worldwide. From smaller, rear-mountable HL fire pumps to cutting-edge CAFSystems like the ONE STEP™, Waterous understands what brigades from Brisbane to Boston to Budapest need to attack fire.
WATEROUS – THE GLOBAL LEADER IN FIRE SUPPRESSION.
FIRE HAS NO BORDERS.
NEITHER DO WE.
1+ 651-450-5000
WATEROUS
waterousco.com