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first quarter 2015 issue 97

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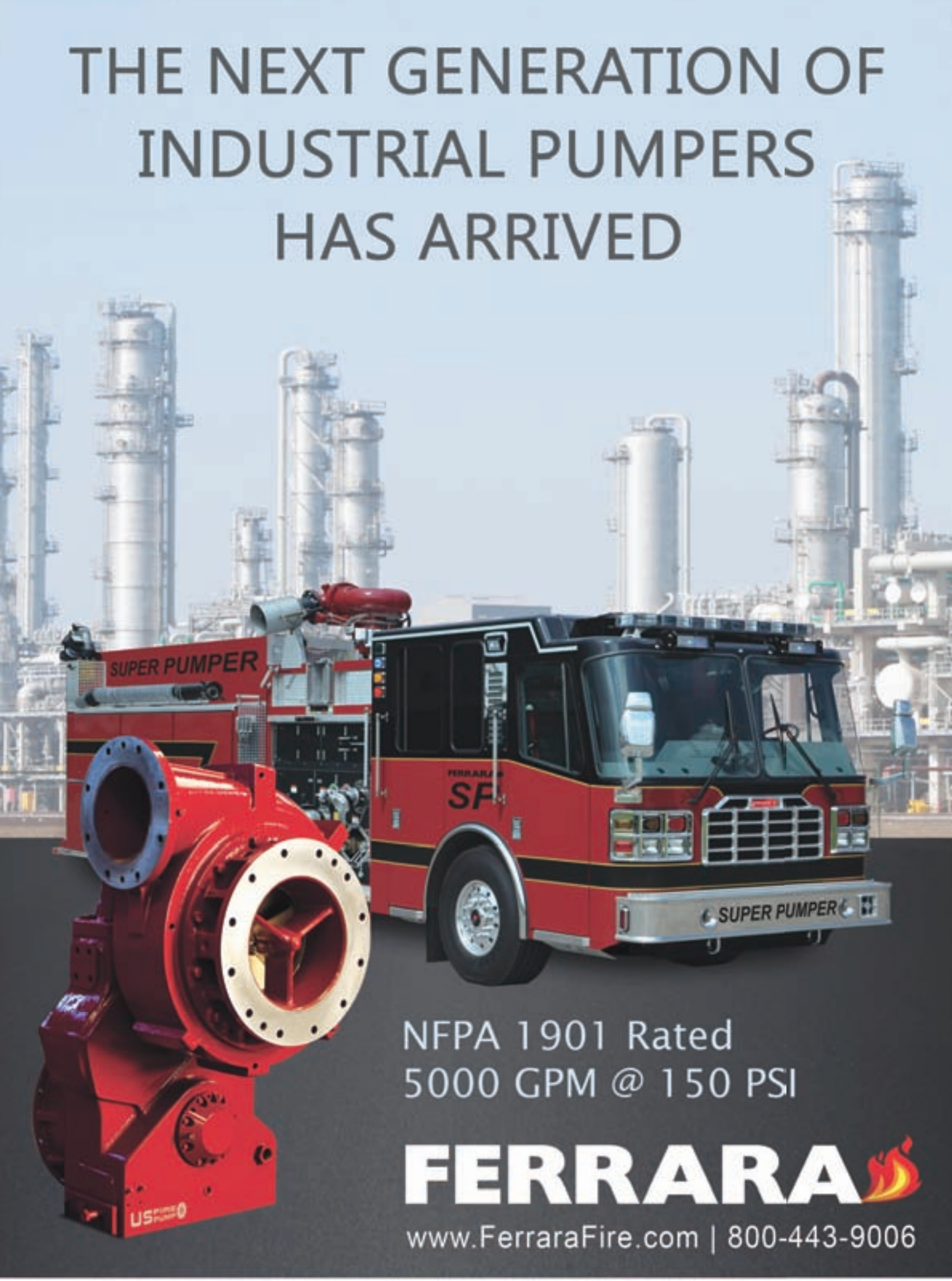

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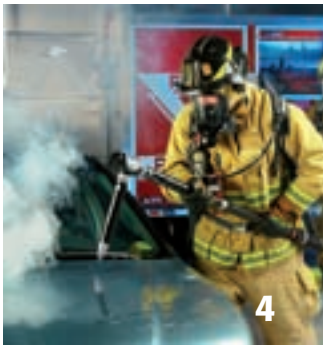

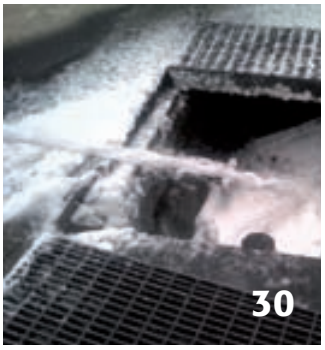

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Front cover artwork by: Darren Small, www.smallphoto.co.uk

INDUSTRIAL FIRE JOURNAL FIRE & RESCUE FIRETRADE EUROPE 2013 FIRETRADE ASIA & MIDDLE EAST 2013

EDITOR'S COMMENT

First of all, I would like to thank Nienke van der Knaap and her team at E-semble in Delft (NL) for providing the VR image of the firefighter for the cover, which was then created by Darren Small, our cover designer. Secondly, I would like to extend my sincere condoleances to the Sutphen family (Suthphen Corporation) in Ohio, on the passing away of Tom Sutphen. He was a great man, and we at F&R are honoured to have met him on many occasions. He was – and still is – an inspiration to the international fire industry. Recently, I attended the Airport Fire Officers Conference in Dublin, where the different speakers highlighted after recent terrorism incidents how important it is to continually improve interoperability and information sharing practices between different agencies – not just police and ambulance. Security and safety are no longer separate issues, they are inherently entwined with one and other, and require even greater operational preparedness from fire and rescue services – municipal as well as airport FRSs. The report from the AFOA Conference (page 19) highlights these challenges. This is followed by a discussion on Safety Data Sheets for chemical products on page 24 – essential reading if you want to remain environmentally compliant.

Ann-Marie Knegt, Editor.

FIRE SERVICE COLLEGE LAUNCHES BA TRAINING SCHOOL WITH DRÄGER

The Fire Service College has opened a new breathing apparatus (BA) training school at its incident training ground in Moreton-in-Marsh (UK). The facility will provide training on the full range of compressed air breathing apparatus (CABA) and will be run in partnership with Dräger. This will ensure the College's training curriculum will be delivered using the most up-to-date equipment available. Up to 200 delegates will be able to undergo training at any one time, expanding the College's ability to deliver assessed, accredited and assured training to fire and rescue services.

The new facility houses four networked briefing rooms, in which delegates will learn how to service and prepare BA equipment. Improved delegate facilities include three new drying rooms and an expanded provision of showers and changing spaces, incorporating an innovative sealed 'dirty room'. The room has been specially designed to minimise the spread of contaminants during the removal and changing of personal protective equipment.

Left to right: Stuart Ovington, Business Development Director, Draeger; Peter Dartford, President of CFOA and Chief Fire Officer of Staffordshire FRS; Jez Smith, MD, Fire Service College.

Humanoid shipboard firefighter

In Mobile Bay, Alabama, Virginia Tech engineering students made history during a five-minute demo that placed an adult-sized humanoid robot with a hose in front of a live fire aboard a US Navy ship.

The robot, SAFFiR, short for Shipboard Autonomous Firefighting Robot, stands 5 foot 10 inches tall and weighs about 140 pounds. Its vision is threefold: stereo camera, stereo thermal imaging to see through smoke and detect heat, and laser rangefinder for accurate mapping.

The demo, four years in the making, is part of a new effort by the US Navy to better assist sailors in fighting fires, controlling damage, and carrying out inspections aboard ships via user-controlled unmanned craft or humanoid robots. The firefighting SAFFiR and the US Office of Naval Research envisions a future — long off, but tangible — in which every ship has a robot as a tool for firefighters.

'It's not going to replace Navy firefighters, it's going to assist Navy firefighters,' said Viktor Orekhov of Morristown, Tennessee, who graduated in December 2014 with a doctorate in mechanical engineering.

SAFFiR is a bipedal humanoid robot that can walk, stretch and bend its legs, swivel its head, and hold and operate a hose with its hands. It has 33 degrees of freedom in movement. It can see in three formats: a standard stereo camera rig, lasers to provide precise ranges to obstacles, and stereo thermal imaging for range finding through smoke and detecting heat.

High-tech PPE for Twente

Delivery of the first wave of firefighting kit for the Twente Safety Region in the eastern Netherlands is expected to start in March.

The new uniforms will be manufactured by the LHD Group in Germany and the multiprotective fabrics produced by TenCate Protective Fabrics, Netherlands.

The contract was awarded following a competitive tender and extensive wearer trials, which resulted in the selection of the TenCate Millenia fabric.

Karin Klein Hesselink, end-use market manager at TenCate Protective Fabrics, commented: 'We are delighted that our high-tech materials have now also been tested by the Twente Safety Region and have proved to be the best and thus been selected for their new firefighters' uniforms. The positive characteristics that the firefighters personally experienced during these field tests are a direct reflection of the results that emerged in our own laboratory and at independent testing institutes. Field tests are an essential part of the whole tendering process. The firefighters should be able to experience for themselves how comfortable and functional their professional equipment is and consequently they should have confidence in the firefighters' uniform providing them optimal protection and support during their hazardous operations.'

According to TenCate, the Millenia fabric uses a fibre that is 10 times stronger than steel wire. Even after exposure to intense heat and flames, the fabric remains strong and supple, unlike many traditional fabrics used in firefighters' uniforms.

Military ARFF orders for Oshkosh

The Australian Defense Force (ADF) is to replace its fleet of aircraft transportable ARFF vehicles and the US Air Force opts for Strikers with ultra high pressure systems.

The Oshkosh Striker AT/XC will be the ADF's first-response vehicle in aircraft fire emergencies at military bases and expeditionary airfields. This next-generation vehicle will provide more advanced on-road and off-road firefighting capabilities to the Royal Australian Air Force and Army and will replace their current fleet of ARFF vehicles.

The Oshkosh Striker AT/XC is based on the Oshkosh P-19R (used by US Marines ARFF since 2013) and the Striker firefighting systems from Oshkosh Airport Products. It features Oshkosh TAK-4 independent suspension system for off-runway response situations, and an integrated diagnostics and automation system to increase the crew's situational awareness.

The Striker AT/XC ARFF vehicles support and sustainment contract was awarded by Australia's Land Systems Division.

The news from Australia follows hot on the heels of an announcement that the US Air Force is procuring 16 Oshkosh Srikers with ultra high pressure (UHP) fire fighting systems.

The purchase includes seven 4 x 4 and nine 6 x 6 Oshkosh Striker apparatus.

The first units will be deployed beginning in July 2015 at key USAF air bases around the globe – including those in the US, South Korea, Japan, and Turkey.

The UHP firefighting system includes a pump that delivers 300 GPM of foam at 1,250 PSI through a front bumper turret. UHP systems release smaller water droplets at much higher pressure than conventional firefighting systems. When used in conjunction with Class B foam, the end result is far less water usage and faster knockdown performance than a conventional firefighting system.

Solberg's fluorine-free foams awarded further certification

Re-Healing Arctic AFFF and AR-AFFF foam has achieved Underwriters' Laboratories of Canada certification.

In addition to its fire performance and long drain times to provide vapour suppression, Re-Healing foam concentrates are an innovative environmentally sustainable fluorosurfactant and fluoropolymer-free firefighting foam used to extinguish Class B hydrocarbon fuel fires with no environmental concerns for persistence, bioaccumulation or toxic breakdown.

Re-Healing foam can be used with fresh, sea or brackish water. The ULC Certification for Re-Healing foam includes RF3 (3%) and RF6 (6%) concentrate types.

'All of the ingredients in Re-Healing foam have been individually tested under the HOCNF protocol [Harmonised Offshore Chemical Notification Format] and are safe for use from the North Sea to the South Pacific,' explained Solberg's General Manager Steve Hansen. 'Every question that has been asked of Re-Healing foam has been answered without a sacrifice in fire performance.'

TRANSFORMER – THE NEW PIERCING NOZZLE FROM TASK FORCE TIPS

During the recent Intersec Conference in Dubai Nathan Calabrese, Task Force Tips International Vice President of Sales, spoke with Jose Sanchez about TFT's most recent release: an innovative yet compact solution for delivering water or foam solution into often inaccessible locations.

When completely disassembled the Transformer system is easily carried and stored in a 60cm long nylon case. When needed, it is easily assembled and placed into service in a matter of seconds. And it packs quite a punch. The new Transformer Piercing Nozzle system is powerful enough to pierce nearly any material encountered on the fire ground and efficiently delivers up to 570 l/pm at 7 bar.

Nathan Calabrese explained that customers worldwide have long sought out a piercing nozzle that offered improved performance and flexibility. 'Currently lances are too large for easy storage or transportation to the fire scene and TFT was asked frequently by distribution partners to offer a better solution.'

During a simple demonstration at the TFT exposition booth, he disassembled the lance in a matter of seconds and quickly stored it in a purpose built bag that could easily fit into any crowded fire apparatus compartment. The Transformer system comprises a number of hard anodised aluminum alloy sections and a hardened steel piercing tip that can quickly be configured and assembled to meet any firefighting challenge. Nathan commented: 'Customer response to this product has been overwhelming with emergency service agencies worldwide standardizing on the Transformer. Even agencies that had in the past integrated the more traditional single piece piercing nozzle are finding the Transformer system to be a cost effective and versatile tool.'

Available in two distinct packages, the PA1 and PA2, each package includes extension tubes, a junction and striking block, inline shutoff valve, and hardened piercing tip. The expanded PA2 package includes a unique distribution nozzle also rated at 570 l/pm at 7 bar and a pistol grip component to aid in managing the device.

Proudly holding a unique configuration he created in less than a minute, Nathan concluded: While development and field trials took well over a year, the final packages have exceeded every customer's expectation for a versatile, easily configured piercing nozzle designed to tackle firefighter's toughest applications.'

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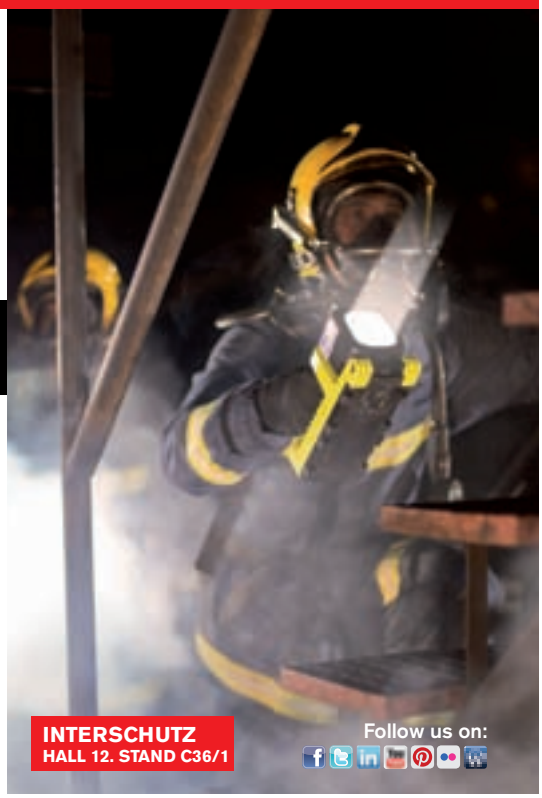

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WATERMIST AND CAFS YOU CAN CARRY ON YOUR BACK

Bavaria Fire Fighting Solutions has designed a portable lightweight mixing unit that enables firefighters to tackle fires with a choice of two powerful extinguishing technologies.

The PowerCAFS was launched in January during Intersec Dubai. At the heart of the unique system is a multifunctional (patented) mixing chamber that generates the foam solution as well as acting as the metering chamber for the water and compressed air. 'We can make watermist as well as wet or dry CAFS foam,' explained Bavaria's Olaf Weins, adding that with wet foam an impressive performance of up to 16m of reach can be achieved, with a functioning time of up to 70 seconds. 'With dry foam we have a range of 11m and a continuous flow time of 120 seconds.'

What is interesting about the new system is that it doesn't use premix foam solution – pure water and foam concentrate are fed separately into the cylinder. 'You turn on the pressure from the bottle, you open the foam cartridge, and then the mixing begins. Using premix foam may lead to problems as it is corrosive.'

The backpack system is available in 6 and 10 l water versions, and Olaf is convinced that the system is easy enough to use to counter any argument about CAFS being too complex for day-to-day firefighting operations. 'It is very easy to select the foam quality you need. As wet foam is the usual desired product for first strike, it is the default setting on the system. But if you need dry foam for running liquid or plastics fires, then you can adjust the foam by twisting a cap, which adjusts the volume of water to the pressure of the air, resulting in the correct ratio of

foam concentrate, air and water.'

The components of the system (patented foam concentrate cartridge, 300-bar compressed air bottle, 18-bar pressure regulator, cylinder with mixing-chamber, nozzle and hose) are all mounted on a solid anodised aluminium backplate, which ensures the system is lightweight and corrosion proof.

Another unique aspect of the PowerCAFS is its weight. The biggest version of the PowerCAFS comes in at only 22kg, which Olaf believes is around 10kg less than the nearest competitor. The powerful extinguisher is aimed at both municipal and industrial markets, and is ideally suited for Class B fires such as liquid running fires.

Olaf explained that Bavaria can also supply a version of the PowerCAFS with an integrated BA system, and that the company is also currently working on 2, 4, 6, 50 l versions and an engine-powered version for pickup trucks.

PELI INTRODUCES THE 9415Z0 LED RECHARGEABLE LANTERN

'This is the most powerful handheld light on the market with the highest safety certification, ATEX (Zone 0, Cat.1). Weighing 1.65 Kg and producing 392 lumens, the new 9415Z0 LED Lantern packs the power without the weight,' said Maria Sistachs from Peli Products.

Four LEDs, powered by the latest generation Ni-MH batteries illuminate a distance of 392 metres.

Other features include:

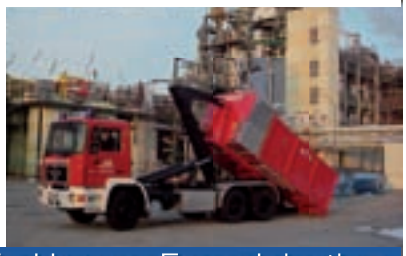
- Approvals: II 1 G Ex ia IIC T4 Ga
- 120° rotating head
- Run time: 11h (low) / 4h 30m (high)
- Battery status indicator
- Three-mode switch (high, low, flashing)
- Rechargeable battery
- Shoulder strap.

Safety-approved for the most volatile work areas, the 9415Z0 LED Lantern has been ATEX certified to Category 1 (Zone 0), so it can be used at the highest risk zone where an explosive atmosphere is expected to exist. This is especially common in chemical, electrical, gas, oil, power, pharmaceutical, fire rescue, hazmat and other high-risk industries. It also features a 'sure-grip', all-weather handle and an extra-large space to accommodate gloved hands.

The light is available in yellow and is backed by Peli's Guarantee of Excellence.

HANNAY REELS F7100 SERIES DESIGNED FOR DUAL-AGENT APPLICATIONS

The new Hannay F7100 Series hose reels feature a dependable, dual internal design for the controlled dispensing of foam chemicals. All models are available with optional aluminum or stainless steel construction. A gear-driven crank rewind is standard with a chain and sprocket drive powered by electric, hydraulic or compressed air motor.



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'If you have built castles in the air, your work need not be lost; that is where they should be. Now put the foundations under them.' – Henry David Thoreau (Walden; or, Life in the Woods)

Most people might know (or assume) that the Egyptians had a lot to do with the formation of what we currently consider as our perception of time. And that's true to a certain extent. They are attributed as being one of the cultures that discovered the mathematical calculations that served as the basis for our 365-day calendar. But there's a lot of paradox related to the Egyptians and their concept of time. Entire books have been written about this subject and historians can point to a lot of historical evidence that really confuses the matter even more. So let's simplify it, shall we?

If someone were to approach you with a piece of paper and a pen and ask you to draw time, what would you draw? Interesting mental exercise, right? Instinctively, most people would probably draw a clock. But what if we removed that option? You have to draw time, not something that measures time.

What would you draw? How would you visually represent what we know as time? When tasked with this experiment, the vast majority of participants ended up with a linear representation of time. That happens to be the fundamental image in our current understanding of time.

Beginning, middle, end. Time is a line, with a start and a finish and stuff in between.

Think of where we are now, calendar year 2015. What do those numbers represent? We're conscious of BC (Before Christ) and AD (Anno Domini – an abbreviation of: 'in the year of our Lord Jesus Christ'). But what do those numbers really represent? That system of counting years wasn't even developed until AD 525 and wasn't universally used in the modern world until AD 800. That's almost a thousand years where we were struggling to even devise a system. Not to mention that the linear concept of time must have a start date, which in the case of modern society we use the birth of Jesus as our Day Zero. Did you know that some modern scholars believe that the actual birth of Christ was four to six years BC? So we're already 4 to 6 years off even if we all agree to agree on a system of tracking years! Kind of gets you wondering about time, huh? And our perception of time?

And that brings me back to the Egyptians. They truly were a paradox in that they had the knowledge and scientific acumen to calculate the seasons and the solar cycles of our sun, but they did not believe in a linear representation of time. To them, time was a circle.

A beginning; a middle; an end; a rebirth, to be continued indefinitely; a circle.

Many religions still use a circular concept as a fundamental tenet of their faith, even today (reincarnation, rebirth, renewal, etc).

So how does all this relate to the fire service? And what point am I trying to make?

In researching all of this, I was drawn to the planetary icons that we call the pyramids. When you look at the pyramids it should challenge your perception of time. Do you think that those pharaohs built those pyramids for their kids or their grandkids? They built those pyramids with the intent that they echo through time for thousands of years, and they succeeded. Knowing now that they believed in a circular concept of time, it illustrates that they were time-stamping their world for eternity.

I know, I know…some heavy stuff here. I promise, there is a point to all of this.

As a fire officer, a manager and a leader, what is your perception of time? Go ahead and Google quotes about goals and you'll get a million of them, but what is your perception of time related to your goals? Short-term goals, long-term goals….how about: 'Egyptian goals?'

You may be working on things that improve your current situation and that of your team. Good.

You may be working on things that will eventually pay off and improve the world around you. Even better.

But have you ever stretched your concept of goals to include an Egyptian perspective?

Are you setting the foundation for a pyramid of leadership development?

Have you snatched the low hanging fruit, when you could have been seeding orchards?

As leaders, we should constantly be stretching the bounds of our imagination and pursuing the full return for our intellectual investments.

Think ahead, think forward, think … Egyptian.

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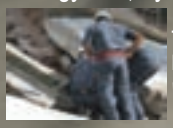

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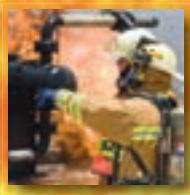

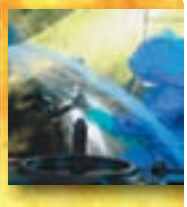

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B-APCO 2015 is Europe's leading, free-to-attend multi-agency forum in public safety communications, offering the blue light services sector a unique platform to see global suppliers showcase their latest products and services set to revolutionise the critical communications industry.

With over 60 critical communications suppliers taking part, 20 hours of free-to-attend, best-practice seminars, and the latest products and technologies set to change front-line services being demonstrated, B-APCO 2015 is set to be this year's most important event for the public sector communications professional.

The free B-APCO conference that runs alongside the exhibition analyses the Next Generation 999 service as well as numerous national projects including the use of data within the emergency services.

Visitors can see, touch and compare all the very latest critical communications' systems, technologies and solutions that will change the way front-line services are operated.

For more information, visit: www.bapco.co.uk.

20-25 APRIL, FIRE DEPARTMENT INSTRUCTORS CONFERENCE, INDIANA CONVENTION CENTER, INDIANAPOLIS, IN, USA

32,000 firefighters from around the world are expected to attend FDIC International 2015 this spring making it the largest FDIC ever held in its 87-year history.

The six-day event will commence with an intense curriculum of Hands-On Training (HOT) courses designed to teach skills, techniques and lessons learned in real-time scenarios, giving firefighters the opportunity to apply newly acquired knowledge to real situations. This year's Hands-On Training courses will be taught by some of the most fireground-proven firefighters in North America.

Several courses will be offered this year in addition to courses focused on advanced vehicle extrication, aerial and tower operations, essentials of search and rescue, fire department rescue operations, flashover simulation, heavy vehicle extrication, aircraft rescue and firefighting, collapse and void search rescue, live fire first-due tactics and more.

The FDIC also features 150+ classroom sessions taught by nearly 500 instructors, as well 800 exhibiting companies showcasing the latest technologies in fire apparatus, equipment and life-saving product advancements.

For more information visit: www.fdic.com

29-30 APRIL, AERIAL FIRE FIGHTING EUROPE 2015, ZADAR-ZEMUNIK AIRPORT, CROATIA

Every summer millions of pounds' worth of damage is being caused by fires, spreading out of control across tinder-dry forest and vegetation. It is a huge problem affecting much of the globe, but it is southern Europe and western states of the USA that appear to be affected most. The financial impact of the fires, the burning down of properties and valuable land are not the only concern. Images of wild fires burning out of control, often claiming lives, can have a detrimental effect on a nation's image and its tourism.

Some economies' revenues depend heavily on thousands of tourists every summer and they don't want to risk losing them. Croatia has a fleet of airborne firefighting assets, comprising six CL 415s super-scoopers, six AT 802 Air Tractors/Fire Bosses and a handful of Mi-8MTV-1 Hips with their Flory water buckets. The fleet also helps neighbouring countries like Bosnia and Herzogovina, Montenegro, Serbia and even Libya too when the need arises.

Speakers and exhibitors from all over the world will attend this event, while an impressive static exhibition and an aerial demonstration by all the aircraft of the Croatian Air Force's aerial firefighting units will be among the many highlights.

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12-13 MAY, INTERNATIONAL SEARCH AND RESCUE 2015 CONFERENCE AND EXHIBITION, BRIGHTON, UK

This Search and Rescue (SAR) conference and exhibition will highlight the operational tactics, latest technologies and current training requirements for airborne sea and rescue/personnel recovery across both civil and military SAR operations.

Key themes will include the ageing population of SAR professionals; challenges faced in the Mediterranean as a result of the unrest in Middle East and Africa; a call for better integration between the SAR agencies; and long-range and offshore SAR. While helicopters are the accepted method of airborne SAR, is there a role for UAVs for long-range missions?

Tangent Link wants to find a way to solve the many global SAR issues. In assembling some of the world's experts on this increasingly important subject, it hopes to highlight how things need to be improved.

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FLEET FOR PURPOSE

Is there such a thing as an internationally recognised standard specification for a fire appliance? Some would argue that the NFPA already provides one, others would point towards the ISO, DIN, or the UK specifications. What is missed by most people is that each of these has been developed around rather different standard operating procedures, writes Patrick Cox.

These standard operating procedures (SOPs) are not necessarily readily transferable to a culture in which a service has developed along different lines to those the vehicle was designed to serve. Thus some are designed to carry 'escape' ladders, others carry only short ladders intended for non-rescue operations and are deployed with a specialist high-rise appliance.

Space does not permit a discussion of all the variations between services. Suffice it to say that a study of crewing, hose deploying evolutions, SCBA control and operations is the tip of a very large iceberg. While there may well be similarities in the actual application of 'wet stuff to the red stuff', that is where there is convergence rather than complete harmony. With that said, we must also take account of the 'local' conditions the services must operate in.

While much of the US and Canada enjoys broad streets and 'gridded' street layouts, that is not the case in large swathes of the rest of the world. That in turn translates into restrictions on the size and weight of an appliance. Add to that the requirement to consider operating conditions, traffic situations, and the need to be able to find roads capable of bearing the loads that will be applied by, for instance, any aerial appliance on its jacking plates, and we add further layers to be considered.

Then there is the matter of water supply. Every thousand litres of water weighs equal to a metric tonne. That is one reason large airport crash tenders weigh in at around 40 tonnes – a 'standard' city or rural fire pump can't be that large. Fitting a bigger tank to a given chassis may sound simple, but the knock-on effect is going to be in reduced equipment stowage and a loss of flexibility. Your typical European design has a small water tank – around 1,800 litres – and a large equipment carrying capacity on a relatively small and compact chassis. The cab is a 'crew safe' design with seating for six or nine firefighters and a selection of ladders on the roof – all under 14 tonnes and with very high stability and a tight turning circle. A similar US design will generally have a much larger water tank, less locker space, a 'deck hosebed' and, if it carries a ladder, it will be side mounted.

Finally, we need to think about training. It may sound simple, but changing the type of appliance may require a complete rethink of crewing, firefighting procedures and training. The larger the numbers involved, the bigger that challenge will be. When one thinks on a 'national' scale, the potential for chaos and disaster increases exponentially. Some years ago this author served in a country where some services made the decision to buy into US-style vehicles, but continued to train and use British-style crewing and firefighting procedures. Predictably, there were major problems on operational deployments.

The wholesale adoption of NFPA Standards for Qualification may, on the face of it, seem to be a very good idea, but the reality is that often they are not the appropriate way for a

ROSENBAUER EXPANDS ITS RANGE OF EMERGENCY PASSENGER RESCUE EQUIPMENT

Rosenbauer's latest launch is the E5000 rescue staircase, a vehicle with a whole host of features that makes it an extremely flexible tool for ARFF. As well as for providing fast and secure E5000 evacuation of aircraft passengers, the rescue staircase is expected to be used for the medical emergency cases that typically occur four to five times per week at all major airports.

The E5000 enables emergency responders to safely access an aircraft as well as to unload freighters during emergency operations. Integrated water lines with a quick attack unit means that the unit is also well suited for firefighting.

The operational range of the E5000 rescue staircase is between 2.5 and 5.5 metres in height – perfect for airside operations because nine out of the ten aircraft used for intercontinental services have an entry height of approximately 2.5 m (bottom door edge). The E5000 is also capable of accessing the lower doors of double-deck aircraft. All functions on the staircase can be operated by a single person using a video monitor, and control panels are located both in the driver's cab and on the upper platform.

Read our e-magazine at www.hemmingfire.com

MAGIRUS AIRCORE – A BIG FAN FOR ALL OCCASIONS

Firefighting operations in underground car parks, car tunnels or subway tunnels are among the greatest challenges for fire brigades due to the enormous amount of smoke and heat that are produced. In these deployment scenarios, conventional firefighting equipment very quickly reaches its limits, leading to protracted firefighting operatons that are potentially dangerous to personnel. Fires and incidents in industrial facilities, refineries, large landfills, and airports present similar challenges for fire brigades. A new product has been created that aims to answer these issues.

In cooperation with the TechnoAlpin Group, a specialist in snowmaking equipment, the Magirus Aircore has been designed to meet the increasingly varied requirements of fire brigades.

At the heart of the Magirus Aircore is an innovative high performance turbine which – when mounted on a vehicle – can be rotated by 360°, raised to 50°, and lowered to -20°. The drive is electric or electro-hydraulic and needs only 25 kW of drive power – an advantage in terms of the reduction in requirements for the chassis.

Built on a Daily chassis, the Magirus Aircore is a highly manoeuvrable vehicle for off-road use which offers fire brigades a variety of tactical advantages in operations.

Among the main advantages of the Magirus Aircore is its optimum water atomisation. Its dosage ensures that water particles are the right size to achieve maximum cooling effect to rapidly extinguish the fire.

With an effective range of up to 80m, operations can be carried out from

a much greater distance, increasing the safety of the personnel. Another advantage of the Magirus Aircore is the tactical flexibility of the device during operations.

Through the use of different extinguishing media such as water and foam, in variable proportion, from direct to indirect, the Magirus Aircore can be used for the entire range of fire classes from A to F.

The amount of water used is flexible up to 3,500 l/min, including the monitor head centrally positioned in the turbine as the water cannon.

FAST-RESPONSE VEHICLES WITH BA CAPABILITY – IN FOCUS

A BA VAN OR BA UNIT GENERALLY DESCRIBES A VEHICLE THAT IS LAID OUT FOR THE TRANSPORTATION OF BREATHING APPARATUS AND/OR REHAB OF FIREFIGHTERS. NOT SO IN SWITZERLAND, WHERE A BA VAN IS A FIRST-RESPONSE VEHICLE THAT IS USED AS A PERSONNEL CARRIER, WRITES DR HOLGER DE VRIES, FREELANCE FIRE ENGINEER FROM GERMANY.

Swiss firefighters riding on the BA vehicle can outfit themselves whilst en route in order (for instance) to complement fire trucks with only a short cab and a crew of maximum three firefighters, or as a back-up to any other fire appliances at the scene.

Oslo FRS was one of the first to introduce this type of vehicle on Dodge vans (initially for their smoke divers, divers, and hazmat response teams) back in the 1970s. The industrial fire service of the Novartis plant in Stein, Aargau (Switzerland), recently added a BA crew carrier to their fleet. It is based on a Mercedes Sprinter Type 516 CDI 4x2, with a wheelbase of 4,325 mm and a gross weight of 5.3 t, built by Feumotech AG Feuerwehrfahrzeuge und Motorspritzentechnik in Solothurn (Switzerland).

In the crew compartment six high-performance HO Bostrom Tanker 450 Flip-Up seats with integrated BA storage and three-point-seatbelts are arranged in single forward and rearward facing row configurations. The vehicle carries all the equipment necessary for BA teams, including radios, hand torches, ropes, BA control board, spare cylinders etc – but no firefighting tools per se.

For the safety of personnel it is critical that the crew section in the middle and the equipment section in the back are rigidly separated from each other. Using a seat that meets SEA and ECE road equipment standards rather than some type of bracket construction adds to passenger safety as well as comfort for longer rides.

Germany is now also seeing similar vehicles taken into service, such as at DESY in Hamburg (Deutsches Elektronen-Synchrotron, a national research centre that operates particle accelerators), based on an orange Renault Master. Similarly, Bochum FRS (Germany) uses a BA vehicle based on an MB Sprinter. Bochum FRS – as per the original Oslo concept – has assigned their BA vehicle to its divers, high angle rescue and BA backup teams.

Smaller versions that are more like rapid response vehicles have also been built for various fire brigades. Egenes Brannteknikk AS (Flekkefjord) supplied one to Harstad Brann og Redning FRS in the north of Norway, based on an MB Vito 116cdi 4x4 (160 PS) with two forward-facing SCBA seats in the middle section, safely separated from the equipment section behind the rear axle.

Available in a variety of gross weights, wheelbases, roof heights and motorisation and sometimes even 4 x 4 traction, these vehicles have a lot to offer the fire services.

country that does not share that heritage. This is, in large part, due to something many fire safety officers will identify, which is simply the difference in building construction. While there may be some similarities in the construction of large commercial, industrial and high-rise buildings, these are often limited purely to the construction. When one looks more closely at the 'fire safety engineered' parts, one finds some very different solutions which may not be addressed by the NFPA Standards which assume all structures comply with their codes. They may be completely inappropriate in some operations in a country which does not use the NFPA codes – or applies them only partially.

Since space does not permit, I will focus here on the standard vehicle of the fire services – the fire pump appliance. It can be considered 'standard' because it has a crew space, equipment spaces, water tank, and pump. It may have hosereels and ladders, it will be around 12-14 tons loaded and it is regarded as the workhorse of the service. And that is about where all similarity begins and ends. In the course of a rather long career, this author has learned that an appliance needs to be built by someone who knows more than a bit about the engineering side of the vehicle, and a lot more than just what it must look like. Around the world I have encountered many examples of fire appliances built locally (often to British or American standard according to the builder) which complied with the locally produced specification which could be interpreted as 'one fire engine; preferably red'.

Perhaps the most amazing example of this is one I encountered in the Middle East. An impressive looking airport tender with the requisite eight wheels, tall and well-finished body, massive deck monitor and so on. Except when you got under it, the pump was never ever going to feed that monitor, four of the wheels were fitted on axles simply added to a standard chassis, and there was no way it would ever have served its purpose. It simply didn't have a lot of what it needed to actually deliver foam. It looked good though. And that is often the problem when the purchase of new vehicles for a fire service is considered. Tenders are invited, and the manufacturers send in the glossy pictures and their prices. If the buyer is a non-firefighter and non-engineer – well, you'll get the cheapest and the glossiest.

These are among the many reasons that countries in Europe, the former USSR, the US and Canada have developed their own national specifications. These dictate things like ground clearance, axle loading, turning circles, stability, load and crew safety, access to equipment, tank capacity and ladders. Each standard' takes account of the unique firefighting procedures, and the equally unique deployment considerations each national service has developed. Probably the most striking difference between an EU/Eastern design, and one from the US is the pump position and the size of the appliance. Roads in the 'Old countries' tend to be tight, narrow and with clustered buildings – the US, Canada and Australia have had the luxury of more space and being able to start afresh in building their cities. Thus, obviously, introducing US appliance designs into Europe is going to raise a number of problems.

Another striking difference is in the pump controls, with many US designs having a number of impressive hi-tech

features, while most European designs (though not all) keep it simpler. Transfer this to a developing nation and one introduces a problem for operators and the need to have dedicated and often expensively trained pump operators. Fine in a country where that is the standard but completely at odds in any national service where the standard is that everyone can do just about everything. Specialisation is a luxury very few services can afford, but it is something that has to be considered very carefully once one steps away from the general services the standard appliance must be capable of addressing.

Yet another complication for some services is the fact that many US-based manufacturers supply only left-hand drive vehicles. Once again, in my long career, I have to say that there can be few more hair-raising things for an incident commander than to be sat on the 'wrong side' of a fire appliance with the driver relying on your ability to gauge the potential for overtaking something! Most EU-based manufacturers are happy to supply a right-hand drive vehicle, but this does need to be a part of the specification at the outset.

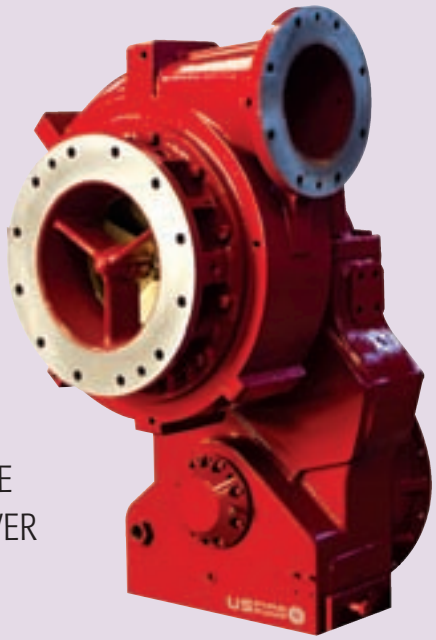
Finally, consideration needs to be given to future direction of the service's vehicle development. Adoption of the US concept of a Squad system with each Squad specialised in certain tasks has some merit, but may be impossible to achieve for a small service on a restricted budget, nor will it be able to achieve specialised appliances. That said, there is a great deal of merit in looking at having a large fleet of small RIV types, supported by Hazmat, Aerials, Tankers and other 'specials' which can be responded when necessary.

For this author, one thing is very clear. You should not buy 'off the showroom floor' unless it meets local conditions, matches existing operating procedures and is compatible with the rest of your fleet. It can be a very expensive and potentially dangerous way to go to introduce a 'hybrid' fleet and systems/procedures that are not completely compatible with your local needs and conditions.

ABOUT THE AUTHOR

Patrick Cox served in the Port Elizabeth Fire and Emergency Service, the Bloemfontein Fire Brigade (SA) and at the Fire Service College, Moreton in Marsh (UK) during a career spanning some 36 years.
Patrick has travelled widely for the College presenting Outreach Courses for the fire services in the Caribbean, several Middle Eastern countries and in the Philippines and Thailand. He has been a regular speaker at conferences on the subjects of fire investigation and fire safety/prevention and other fire-related subjects. He retired in 2006 from the FSC, but continued in a part-time capacity delivering training and conference papers when invited.

PUMPED UP TO THE MAX



VEHICLE MANUFACTURER FERRARA TEAMS UP WITH SPECIALIST US FIRE PUMPS TO CREATE AN INDUSTRIAL FIRE TRUCK THAT CAN PUMP AT OVER 7,500 GPM – A NEW RECORD? STEVE BANNER REPORTS.

The key to tackling major blazes at industrial complexes is often the ability to bring large volumes of water to bear as quickly as possible. That means a high-capacity truck-mounted fire pump may have to be deployed – the Florida-based US Fire Pump (USFP) has come up with what it says is the largest one of its type in the world.

The new engine-driven USFP High Velocity Pump (HVP) is designed to meet the requirements of the NFPA 1901 standard at 6,000 GPM (US gallons per minute) or more. But according to the manufacturer, with sufficient engine power and enough water from a hydrant the performance will exceed 7,500 GPM.

The pump has a wide operating range and can maintain over 5,000 GPM at 150 PSI, over 4,000 GPM at 175 PSI and over 3,000 GPM at 200 PSI.

Ferrara Fire Apparatus of Holden, Louisiana, has become the first company to install the pump on its industrial fire trucks. It is being offered as an option under an exclusive agreement, as Vice President and Director of International Sales, Mark A Coley, explained. 'I guess you'd say we've become a dealer for them and that means we're offering a product that will change the industrial fire truck market. Its capacity means that you need less equipment to do the same kind of work and the agreement will certainly give us a boost in the industrial sector; a sector we've been working hard in for many years.

'What it means is that we'll be able to offer the strongest, biggest and most capable industrial fire truck in the world. It's something that's been needed for a long time.

'A typical fire truck has a capability of 3,000 GPM and you can maybe get that up to 4,000 GPM to 4,500 GPM if you're getting water from a pressurised source. The product we're talking about however allows you to go up to 8,000 GPM if a pressurised source is involved.

'So let's say you've got an industrial fire station with six trucks, each with a 3,000 GPM capability. If you've got this product you may be able to reduce this to three trucks and save money and manpower,' said Mark.

The engine-driven USFP High Velocity Pump is designed to meet the requirements of the NFPA 1901 standard at 6,000 GPM (US gallons per minute) or more.

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Capital expenditure, maintenance costs and the wage bill will all come down but the fire station's capability will remain the same. 'Fewer lives are put at risk too because you end up with fewer people on the fire ground,' he pointed out.

Risk is further lessened because the USFP HVP can be operated remotely if required. 'It is also worth noting that while most pumps run at an efficiency level approaching or just above 70%, this one operates at 80%,' Mark added.

Furthermore, because of its higher efficiency the USFP HVP can make use of the same fire truck engine, transmission and radiator as a less-powerful pump with no loss of performance. They do not need modifying or changing; nor do the axles or the chassis.

'The same 600hp engine that drives a 3,000-plus GPM pump can drive this pump too,' he said. 'It can be dropped straight into a Ferrara chassis without any problem, the only differences being that the plumbing needed is larger than it is with a standard pump and the HVP weighs more.'

The extra burden is, however, less than 1,000lb (450kg), 'It's not that big a number to overcome,' said Mark.

The HVP can be mounted on a trailer or a skid unit instead of a truck chassis, as long as it has access to sufficient horsepower and can potentially be electrically driven. 'It has been tested at a refinery in Louisiana and it's been well received. Its volume capabilities mean that it can extinguish an oil tank fire with the correct mixture of foam.'

High-pressure water mist

With the correct attachments it could also be used to create a high-pressure water mist to cool pipes and gauges and take down poisonous clouds.

As well as in refineries the new pump could find a place in open-cast mines or in nuclear power stations. 'It can be used to help cool reactors if the need ever arises.'

Aside from the USA and Australia, potential markets include China ('There are a number of NFPA-style pumps in operation there') and South America. 'It's slowly adopting the NFPA standard but customers there still buy European-style fire trucks too so it's a bit torn between the two,' he commented.

'Africa is in the same situation. It has a little bit of both but customers there are starting to move more and more towards the NFPA arrangement, especially in South Africa.'

Designed for use with engines with an output of up to 700hp and with a single-piece pump shaft made of heat-treated stainless steel, the HVP features a 12ins (305mm) flanged suction inlet. It feeds an impeller eye which exceeds 10ins (254mm) in diameter with an 8ins (203mm) discharge outlet.

The suction inlet has built-in pre-rotation baffles and is over sized to compensate for the baffles area.

The HVP's auxiliary drive output can power hydraulic equipment used to drive large foam systems or a flanged output to drive air compressors.

Options include bronze construction for the pump.

US Fire Pump boasts over 190 years of experience in design, engineering, manufacturing, marketing and purchasing in its sector of industry.

It is spearheaded by Gary Handwerk, a pump industry leader for well over 40 years who has worked for major pump and fire apparatus manufacturers. He has developed new products and visited above 240 customers around the world, as well as worked on the NFPA Fire Apparatus Committee for over 20 years.

With its roots in the late 1970s, Ferrara Fire Apparatus custom-builds a complete range of heavy-duty fire, emergency and rescue vehicles. The chassis line-up includes the Ultra, Inferno, Igniter and Cinder while other products include incident command trucks and trailers and rear- and mid-mount aerial ladders and platforms .

Ferrara is able to offer everything from independent front suspension to complete airbag protection for the crew and cab and body ECE-29 crash testing.

Recent US orders include a contract to build an additional 12x100ft (30.5m) aerial ladders for the FDNY (Fire Department of New York).

Each of the chassis is being fitted with a stainless steel body, a split cab made from the same material and an 8kW hydraulic generator. On completion the contract will bring the number of 100ft Ferrara ladders in service in the city to 71.

Municipal fire departments can make use of the HVP, said Mark, although it might be a little bit too big for their fire trucks. 'The majority of them tend to have a capacity of 1,250 GPM to 1,500 GPM with some going up to 2,000 GPM,' he said.

Departments can still employ it as a relay pump: 'It could be ideal in that role if massive amounts of water are involved.' And not solely to tackle blazes: it could also be used to pump away large quantities of flood water quickly – useful in countries periodically hit by flooding; from Zambia to the United Kingdom.

The high velocity pump can be mounted on a trailer or a skid unit instead of a truck chassis, as long as it has access to sufficient horsepower.

ARFF MATTERS

THE 14TH ANNUAL AIRPORT FIRE OFFICERS ASSOCIATION CONFERENCE HELD IN DUBLIN IN JANUARY BROUGHT TOGETHER ARFF PROFESSIONALS FROM ALL OVER THE WORLD. ANN-MARIE KNEGT WAS AT HAND TO REPORT THE HIGHLIGHTS OF AN EVENT THAT IS GROWING IN PRESTIGE – AND ATTENDING DELEGATES – EVERY YEAR.

Barry Alderslade, Deputy Airport Fire Manager and Interagency Liaison Officer for Gatwick Airport Fire & Rescue Service (London) kicked off the conference by welcoming all 164 delegates and the main sponsor Terberg DTS. Barry also highlighted that while 2014 might have seemed like a disastrous time for ARFF due to several high profile incidents, it was actually the safest year in recorded history for aircraft-related accidents.

AFOA going from strength to strength

MD of UK-based company Terberg DTS, Alisdair Couper then took over the helm. He applauded AFOA for becoming one of the strongest groups in its industry, and he highlighted that the Airport Fire Officers Association was at the cusp of something great. 'AFOA is very close to becoming a recognised body that can create benchmarks and standards,' he said.

Alisdair emphasised that recent multiple-location attacks, such as the Charlie Hebdo and kosher supermarket shootings in Paris, highlighted that security and fire services could no longer be seen as separate entities, and that the two were intrinsically linked. He continued that currently there were no such things as airport police services, and he wondered how long it would be before there were.

AFS do not only respond to aircraft incidents but they also have the task of protecting airport buildings and the complex physical infrastructure around these, and with this increasingly stringent task in mind, Terberg DTS is looking to set up hub meetings across the UK where these challenges could be discussed.

Another initiative the company is getting involved with is setting up a working group on aerial platforms. Alisdair said: 'At the moment there is no standard for this type of equipment. There is a requirement to develop a tactical agreement on the use of high-reach technology. We would like to offer the opportunity for all interested parties – manufacturers, airport fire services – to take part. Dallas/Fort Worth Airport is already supporting this initiative. Standardisation is key to our industry, and hopefully this initiative will result in the first industry standard in one or two years.' The new working group will be launched in the first quarter of 2015.

The Airport Fire Officers Association's annual conference was held 21-22 January 2015 once again at the Raddisson Blue, Dublin Airport, Ireland.

The AFOA Conference provided excellent networking opportunities for the delegates.

Airport Operators Association – challenges ahead

Ed Anderson, the Chairman of the Airport Operators Association, delivered the keynote address. He highlighted that aviation was the lifeblood of the world – 58 million people worked in this industry worldwide, and it provided global supply chains, prosperity, social benefits, and – moreover – it brought people together.

'The challenges in our industry have become very apparent. It is clear that businesses in our sector have to be financially sustainable. It has become a struggle to keep revenue above costs, and there is a global consolidation to drive down these costs,' he commented.

Ed explained that the picture on airport profitability was mixed. Most airports were now privately owned with significant private shareholderships. The competitition between small and medium-sized airports was constantly increasing, putting additional pressure on resources.

'The second challenge is safety, which is the number one priority. The overall safety record is excellent, with only 3.2 accidents per million flight movements. The Malaysia Airlines MH370 disappearance has highlighted the requirement to improve tracking capability.'

Ed continued that not many things had changed over a period of 25 years, apart from the increasing costs. Even though airport operators regarded Airport Fire Services as essential, it was felt that they were very expensive to staff and to equip, especially since airport fire appliances were bespoke. There also tended to be an inflexible approach on part of regulators and people who worked in these types of operations.

'However, the winds of change have swept through our industry. Regulators now allow the fire service to staff

UPDATE – CAA AND EASA REGULATIONS AND STANDARDS

During the AFOA conference a regulatory update was provided by Neil Gray (Principal RFFS Inspector – Civil Aviation Authority). CAA priorities for 2015 include a transition process that sees in-scope aerodromes moving from compliance with the requirements of CAP168, to compliance with Commission Regulation (EU) 139/2014 (EU Rules).

At the time of the conference, eight of the 50 in-scope aerodromes had successfully completed the process. CAA is also going through a process of transformation to become a performance-based regulator, with better regulation principles (proportionality, accountability, consistency, transparency, targeting).

Guidance for Aerodrome Rescue and Firefighting Service (RFFS) task and resource analysis (TRA) has been reviewed and updated in the form of CAA Information Notice 141/2014. CAA have also worked with the Chief Fire Officers Association (CFOA) to ensure that aerodrome operators and their local authority fire and rescue service partners fully understand the conclusions of the TRA process, and the associated risks. CFOA provided guidance to Chief Fire Officers through its Directorate Programme.

Following the tragic crash involving a Super Puma helicopter on its approach to Sumburgh Airport in August 2013, Air Accident Investigation Branch (AAIB) made some safety recommendations within their report regarding the provision of rescue resources, and the associated risks, for such incidents. Whilst the focus of the safety recommendations was the accident near to Sumburgh Airport, CAA has taken a wider view and, with the support of the aerodrome operator, has conducted a difficult environs survey with the aim of providing guidance to all aerodrome operators on the planning for emergency response to such areas.

The implementation of Commission Regulation (EU) 139/2014 has introduced some potential changes to the requiremenst for RFFS training. The EU rules do not specifically require RFFS personnel to hold a certifcate of competence as required by CAP168, and no provision is made for the accreditation of RFFS training providers by CAA. Working with the Airport Operators Association (AOA) RFFS working group, it has been agreed that the current framework for the training and assessment of RFFS personel, including the occupational standards contained in CAP699, are well embedded and understood, and can be seen as a means of compliance with the EU rules. A working group will be established to review and update CAP699 and consider alternative arrangemenst for the accreditation of training and training providers.

Following the update provided by CAA, Graeme Day, who has represented Airports Council International (ACI) on the EASA RMT, delivered a presentation. In May 2014 EASA established and nominated the membership of a Rule Making Group for task RMT.0589 Rescue and Firefighting Services at Aerodromes. The RMT Group comprised members from Competent Authorities and aerodromes and was formed to review the RFFS Remission Factor, Cargo Operations and Medical and Fitness Standards for RFFS personnel. The RMT Group met four times in 2014 to discuss these matters and drafted Acceptable Means of Compliance (AMC) and Guidance Material (GM) covering the Remission Factor and Cargo Aircraft Operations. Supported by three doctors the Group has also written an Implementing Rule (IR), AMC and GM covering Fire Fighter Medical and Fitness standards.

A Notice of Proposed Amendment (NPA) and Regulatory Impact Assessment(RIA) covering the Remission Factor and Cargo Operations will be published by EASA by the end of March 2015. The NPA and associated Comment Response Document will enable all concerned to make comment regarding the content of the draft AMC and GM. An NPA and RIA covering Medical and Fitness Standards will initially be considered by the European Commission for publication at a later date.

Key elements of the NPA covering the Remission Factor and cargo Aircraft Operations include:

- Worked examples.
- Clarification of the term 'unforeseen circumstances'.
- Inclusion of RFFS vehicles in EASA's reference to maintenance programmes.
- Reference to Q3 when making Critical Area Concept calculations.
- Reference to performance Level C foam when considering media substitution.
- The level of RFFS provision for all cargo aircraft will be aligned to ICAO requirements.
- The provision of medical/ambulance services by RFFS personnel and the use of Nominated Diversion Aerodromes are out of scope for EASA, and the imminent publication of the EASA NPA covering the Remission Factor and Cargo Aircraft Operations represents a crucial opportunity for all concerned to make comment and influence the outcome of the EASA opinion regarding these topics.
- The consultation period will run through Q2 of 2015 and EASA and the RMT Group membership urge everyone to take the time to take part in the consultation when it is published.

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Fire and Rescue Division

Senior Airport Fire Officers presented several incident case studies.

according to risk. Capabilities of the equipment have been improved, and the relationship between airport operators and the airport fire service has improved considerably. Airport CEOs now see a fire service that is customer focussed and efficient in its operations. There has been a real leadership change,' he commented.

Ed emphasised that the security issues would remain with us because aviation would always be a major target for terrorists. 'We need to outsmart those who wish us harm so our measures need to be proportionate, while based on risk at the same time, as well as compliant with legislation.'

Ed also highlighted that Europe and its airports in particular were experiencing an infrastructure shortfall compared with the Asian and Middle Eastern airports, which were growing rapidly. The Rukatski whitepaper issued in 2003 identified that major runway capacity expansion was required in the UK.

'The 2013 Aviation Policy Framework did not cover major airport expansion, as this was left to the Independent Airport Commission. Airport expansion is required in London and the south east of England, and a final report on this matter has been promised after the election. The Airport Operators Association has consistently urged political parties to provide the UK with sufficient world-class hub capacity in order to keep competing in the global race.

'We have made enormous strides when it comes to customer requirements, and from the UK alone there are around 50,000 routes for customers across the whole world. Low-cost carriers have increased the potential for people to travel. Even Michael O'Leary [CEO of Ryan Air] has seen the light, since he now realises that customer service is important as opposed to just being price-driven,' commented Ed.

He further highlighted that airports were striving to improve passenger experience with an intense focus on service standards. He also urged a reduction in red tape and regulations – the regulations coming from the European Union were proving to be a massive cost for the industry especially. Aviation was also carrying national security costs, and Ed pointed out that the Air Passenger Duty (APD) in the UK was higher than anywhere else in Europe. AOA is campaigning for a reduction in Air Passenger Duty on the long haul APD band as well as for the abolition of APD for children under twelve – extending it to 16. Ed concluded: 'The level of APD in this country is unacceptable. The Scottish will be halving APD soon, and the levels need to be evenly matched across the UK. As an industry we are facing plenty of threats, so we need to become as sustainable as possible, and minimise our environmental impact. As an organisation we have plenty of work to do so we do not slide down the global aviation league table.'

Ground support equipment – knowing the risks

Alisdair Couper from Terberg DTS explained that ground support equipment (GSE) present at all airports presented its own set of safety challenges. He asked whether firefighters knew how to operate GSE and how to rescue someone from it. He highlighted that certain exhaust particulate systems could pose problems, and that the new generation of ground support vehicles presented a number of challenges.

'Some ground support equipment, for instance, is powered by lithium ion batteries, which can pose a fire hazard,' said Alistair. 'There is currently no control and situational awareness about the different types of vehicles used at an airport, so there is a requirement for familiarisation for the fire service.

'Aircraft catering trucks, for instance, have bodies made out of a type of polyester that flashes over at 1,000 degrees °C. There are many other trucks in and around the airport which contain hazardous chemicals, including spraying vehicles.

'As manufacturers, airport operators and fire services we have the responsibility to familiarise ourselves with the specialist vehicles around the airport, the chemicals used in them, the types of plastics in the bodies and other hazards. Added challenges are that maintenance on grounds equipment is typically poorly executed, while driver abuse is a large problem as well. This means that an aircraft with grounds support equipment attached to it presents a massive risk. Therefore it is important to assess the risks related to this type of equipment and to engage with airfield licensees, because GSE is as critical as any other part of the infrastructure of an airport,' concluded Alisdair.

Aircraft Investigation Branch

Sid Hawkins, Head of the Aircraft Investigation Branch (AIB), pointed out some of the challenges faced by his organisation and how it was overcoming these by increasing cooperation with other agencies.

Sid explained that a team from the AIB was currently involved with the search for MH370. Sid's risk analysis did not deem it safe for his team of investigators to go to the wreckage of MH17 in Ukraine, since it was located in a hostile zone, and because civil air crash investigators should not be deployed in war areas.

'As apart of our response strategy, it is extremely important that we have the right processes in place, and deploy our staff effectively and in a safe manner. We have to make sure that everyone in our team is well protected. I review constantly how we work in order to improve our organisation so we can help the airport fire service and other relevant agencies in the future. The information process is continuing to be improved in the UK. Four to five years ago our number of field deployments was up to about 80, but now this has dramatically dropped to 30.'

However, a large percentage of these 30 incidents were far more significant than the events of four of five years ago. Sid therefore called for increased collaboration between the AIB, emergency services and airport fire and rescue services.

'I rely on you, as airport fire officers, to be my point of contact on the accident site, and as a source to provide good information about the emergency.'

Sid explained how the AIB had investigated several aircraft incidents that had recently occurred in the UK, including the Heathrow Dreamliner incident in 2013, in which a Boeing 787 caught fire due to the combustion of lithium ion batteries and the Vauxhall helicopter crash, when an experienced helicopter pilot flew into a crane in a busy urban area.

The AIB will investigate any aircraft-related incident where there has been a fatality or serious injury, as well as when an aircraft has gone missing or where an aircraft has suffered major damage.

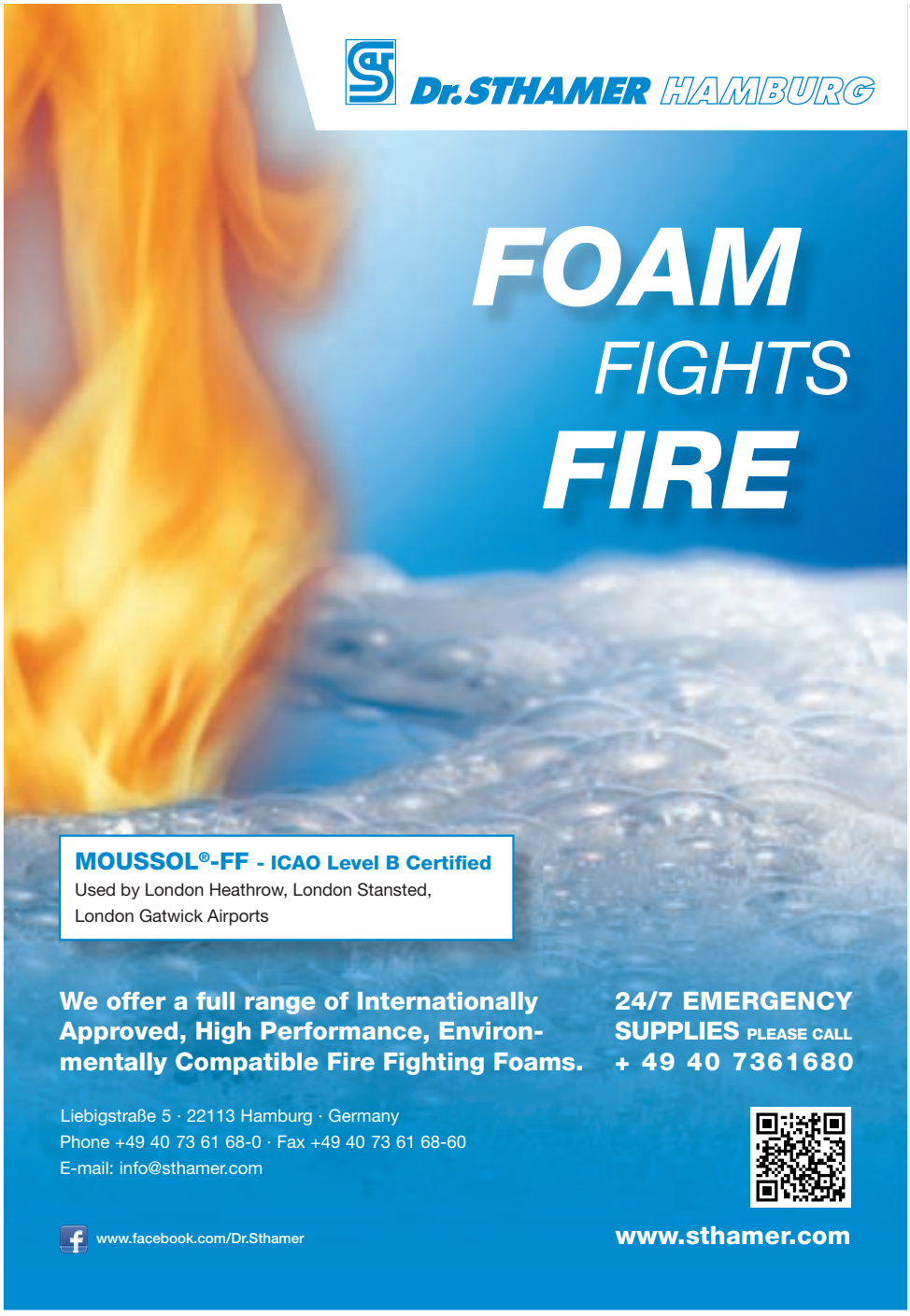
Lessons learnt from previous accidents included that there was still very little knowledge on composite materials as used in the new generation of aircraft, and not much data on how composite components behaved when exposed to fire.

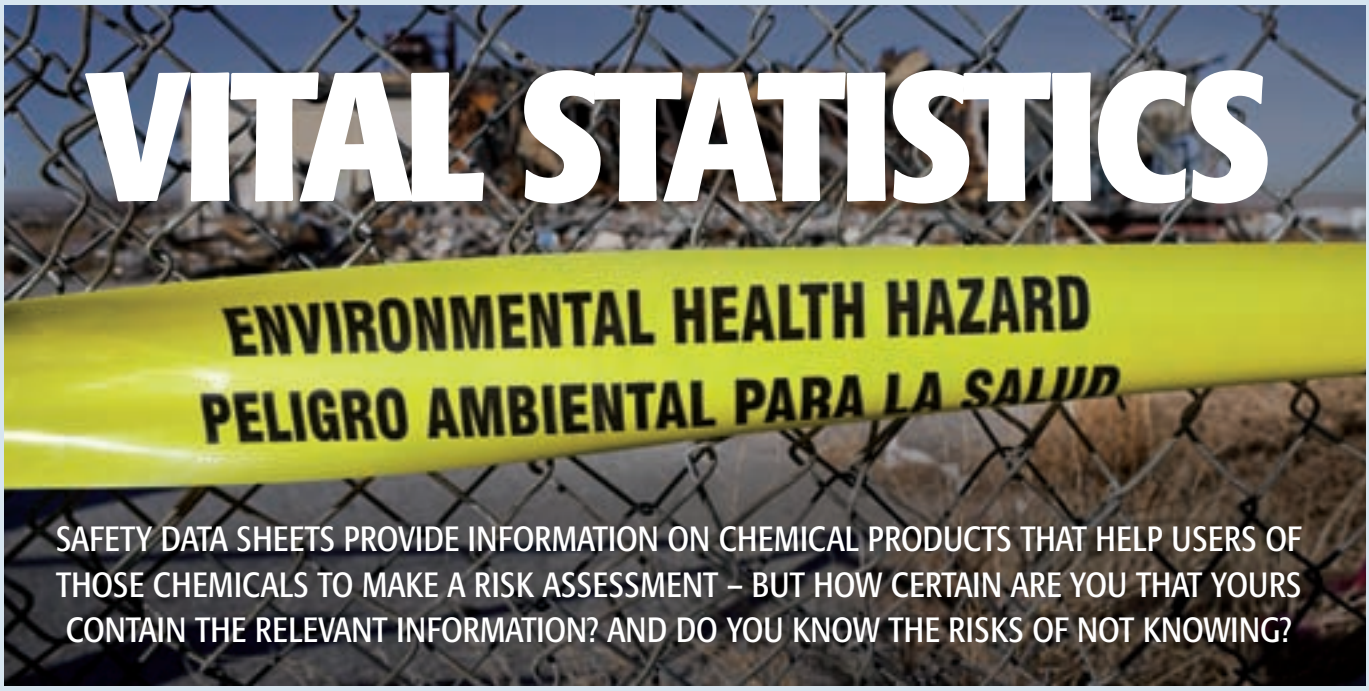
Sid also said that he was involved in research with the UK Ministry of Defence, the University of Manchester and the UK fire and rescue services looking at the dangers of lithium ion batteries. The final results would be published in around 18 months. 'Lithium ion batteries are a massive issue in the aviation industry, not just as cargo, but they are also prevalent in many items that people take onboard an aircraft.

'It is now standard during our investigations to seize all electrical items from the wreckage. The number of devices that contain lithium ion batteries is incredible these days.'

He concluded his presentation by praising the good relationship between the AIB and the fire and rescue service, and the improvement in the interoperability between emergency services. 'The events that we have attended highlight how much the airport fire service has moved forward in the last five years. Everybody seems to have accepted the change in their remit, and the planning and the cooperation has been very effective, making my life particularly easy.'

The AFOA Conference is rapidly becoming the 'must-attend' event for people involved in the ARFF industry.





VITAL STATISTICS

SAFETY DATA SHEETS PROVIDE INFORMATION ON CHEMICAL PRODUCTS THAT HELP USERS OF THOSE CHEMICALS TO MAKE A RISK ASSESSMENT – BUT HOW CERTAIN ARE YOU THAT YOURS CONTAIN THE RELEVANT INFORMATION? AND DO YOU KNOW THE RISKS OF NOT KNOWING?

Ensuring that the data that accompanies hazardous chemicals is correct is about to take centre stage at the Fire Protection Association Australia's annual two-day Hazmat conference in Sydney, 16-17, June. Here, the main theme is all about creating a safer world through ensuring required information is accurate, appropriate and available to anyone who interacts with dangerous goods and hazardous chemicals – firefighters and industrial emergency responders being likely users.

The main document that applies to foam (and other hazardous chemicals) is the Safety Data Sheet (SDS), as prescribed by the REACH Regulations, which tends to be long and complex.

There are some compelling reasons for companies that buy foam to take a renewed interest in Safety Data Sheets. The 'polluter pays' principle applies, which means that the buck stops with the end user.

Companies whose runoff foam ends up in a water course cannot put the blame on whoever supplied the foam if the chemicals are found to be environmentally damaging. There is no defence for the polluter if the data pertaining to environmental effect is missing from the Safety Data Sheet or if it is not sufficiently comprehensive; there is an obligation for the end-user to request relevant information in writing from the supplier where necessary. A potential defence may be found if the Safety Data Sheet provided by the supplier contained factually incorrect information.

The other issue highlighted below, however, is that in the vast majority of cases the data contained in Safety Data Sheets for foam concentrates is insufficient to satisfy regulators that a substance will not harm the environment. Faced with the uncertainty that arises from incomplete data, points out Roger Klein, regulators have no choice but apply the 'precautionary principle', which is basically that they assume the worst and make the polluter clean up.

So if you are a foam procurement officer and you haven't made sure you have a Safety Data Sheet that tells you what you need to know and what the regulators will want to know about the product, then you shouldn't be buying it or using it.

SAFETY DATA SHEETS – ARE THEY ENVIRONMENTALLY FIT FOR PURPOSE? BY ROGER A. KLEIN.

The structure and content of a product Safety Data Sheet (SDS, previously known as the Material Safety Data Sheet or MSDS) is prescribed by Article 31 of the REACH legislation and consists of sixteen sub-headings or sections[i]. Sections 10 (stability and reactivity), 11 (toxicological information), 12 (ecological information) and 13 (disposal considerations) are directly relevant to carrying out a suitable and sufficient assessment of environmental risk, with Section 12 of particular importance and discussed here.

The REACH Regulations[ii] requires that the supplier shall provide the recipient of a substance or preparation with a Safety Data Sheet (SDS) prepared in accordance with Annex II for materials (a) classified as dangerous (67/548/EC or 199/45/EC), or (b) satisfying either the PBT or vPvB criteria, or (c) for reasons other than (a) or (b). The supplier shall also provide the recipient on request an SDS, when not classified as dangerous (§5, §6, and §7 of 1999/45/EC), but contains substances (a) posing a hazard to human health or the environment ≥1% w/w for solids and liquids or ≥0.2% v/v for gases; or (b) present individually ≥0.1% w/w and which satisfy the PBT or vPvB criteria (Annex VIII), or that have been included for any other reason; or (c) for which there are workplace exposure limits. Articles 32 through to 36 of REACH impose various duties to communicate information up and down the supply chain, to allow access to information by workers, and an obligation to keep information. In particular it is important that formulators and suppliers of firefighting foam pass on any environmental or health warnings for individual components given by the feedstock manufacturer.

The usefulness of Safety Data Sheets for carrying out a suitable and sufficient assessment of environmental risk is compromised significantly by the let-out clauses contained within the REACH Regulations especially for complex formulations such as firefighting foams which may contain low concentrations of chemical substances or precursors for toxic pollutants that regulatory authorities would not wish to see released in a highly dispersive manner, e.g., during Fire Service operations, directly to the environment, for example, biocides, metal ions, or fluorochemicals.

Even when released in small amounts relatively low toxicity materials may exhibit long term effects and, if persistent,

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From a regulatory point of view, lack of evidence for environmental harm cannot be equated with evidence for lack of environmental harm.

repeated discharge will cause an increase in concentration[iii].

It is important to stress that, from a regulatory point of view, lack of evidence for environmental harm cannot be equated with evidence for lack of environmental harm. This non-equivalence is the basis for the so-called 'Precautionary Principle' in which the regulator errs on the side of caution in situations where either there are incomplete data covering persistence, bioaccumulation and toxicity (PBT) and/or when comparison with chemically similar compounds (either homologues or analogues[iv]) with known PBT profiles suggests a cause for concern. High environmental persistence such as exhibited by fluorochemicals and their ultimate degradation products, e.g., PFCAs, associated with unknown or uncharacterised long term effects, will trigger the precautionary principle. The EU Biocidal Products Regulations (EC 529/2012) underpin the importance of this principle '…Regulation should be underpinned by the precautionary principle to ensure that …. do not result in harmful effects on human or animal health or unacceptable effects on the environment…'.

So where do this leave us with Safety Data Sheets and the information needed for an assessment of environmental risk? What additional information is required by end-users or regulators?

It is necessary to have information on persistence, bio-accumulation, and toxicity, i.e., knowledge of the PBT profile. Data identifying environmentally persistent components, as well as their degradation products, needs to be included in the Safety Data Sheet. The trigger level for classification of a substance as persistent (P) is defined under REACH as having a half-life in marine water >60 days, in fresh or estuarine water >40 days, in soil or freshwater or estuarine sediments >120 days, or in marine sediments >180 days. Environmental persistence should not be confused with bio-persistence which has to do with biological clearance in a living organism. The criterion for vP is satisfied if the half-life in fresh, estuarine or marine water is > 60 days, or in soils and sediments >180 days. Bio-accumulation criteria are satisfied if the bio-concentration factor (BCF) is >2000 (B) or >5000 (vB). The toxicity criteria (T) rely on evidence for carcinogenicity, reproductive toxicity, or long-term chronic toxicity with NOEC <0.01 mg/l or where the classifications (T, R48) or (Xn, R48) are appropriate. Acute toxicity, although an issue with firefighting foams and frequently discussed in the technical press, may actually be environmentally less damaging than long-term effects but does need to be determined with environmentally relevant organisms, e.g., fresh or salt water, or location-specific species.

Currently REACH prescribes that only substances which satisfy simultaneously persistence, bio-accumulation and toxicity criteria (PBT) or are very persistent and very bio-accumulative (vPvB), must be listed in the SDS. This is not ideal for an assessment of environmental risk although inclusion in the SDS without all of these criteria being met can be justified based on '…reasons other than those referred to in (a) and (b)....' – see above.

All fluorochemicals in firefighting foam as well as any perfluorinated breakdown products are very persistent, with some also bio-accumulative and/or toxic. Lack of data on persistence (P), bio-accumulation potential (B), or toxicity (T) is not evidence of a lack of any environmental risk. Regulators tend to apply the 'precautionary principle' in such a situation.

Biological oxygen demand (BOD) is a measure of the oxygen requirement for microbial breakdown of the oxidisable components in a material. It is usually reported at 5 days or 28 days expressed as either mg O_2 utilised/gm or mg O_2 utilised/kg or litre, although there are a wide variety of other periods used in the industry, e.g., 7, 10, 15, 20 days.

The BOD at 5 days (BOD5)[v] is an indication of the acute oxygen stress, i.e., the initial rate of oxygen consumption, to which the receiving aquatic environment will be subjected. As such it is an important indicator of the likely damage to oxygen requiring organisms as it represents the initial rapid phase of biological degradation, which subsequently decays more or less exponentially over time finally reaching a plateau.

On the other hand the BOD at 28 days (BOD28) reflects the overall ultimate ability of biological organisms to degrade mainly organic components of the formulation but which may also include metal ions that can be oxidised, e.g., Fe2+ to Fe3+. The BOD28 value is used as a measure of biodegradability.

One is, however, caught between a rock and a hard place. A relatively low BOD5 is desirable in order to reduce acute oxygen stress. Equally a high value for BOD28, i.e., close to 100% of the chemical oxygen demand (COD), indicates ready biodegradability. Unfortunately one cannot have both! Either you have a relatively low BOD5 (low acute oxygen stress) associated with a low BOD28 (relatively slow biodegradation), or the opposite, a high BOD5 associated with a high value for BOD28. In many cases sacrificing 28-day biodegradability for a reduction in immediate acute oxygen stress and death of living organisms, may be environmentally the best option.

The chemical oxygen demand (COD) measures the total chemically oxidisable material, e.g., in the foam concentrate. The standard measurement involves oxidation with acid dichromate solution followed by back titration to determine the amount of dichromate consumed, and the calculation of the mg O_2 per kg or litre of material required for 'complete' oxidation. Unfortunately not all chemical compounds are susceptible to dichromate oxidation. In particular the perfluoroalkyl chains of fluorochemicals are chemically extremely stable because of the strength of the C-F bond and are not degraded. Very much stronger and non-standard oxidising conditions are required for cleavage and

mineralisation to fluoride such as use of combustion in pure oxygen, catalysed persulphate, or sodium biphenyl. This means that the standard protocol COD values quoted for a foam concentrate will not include the fluorochemical component, often 10-20% of the total organic material present in a high specification AFFF. This in turn highlights the issue that marketing claims of near 100% degradability for fluorochemical-containing foams, such as AFFF, AFFF-AR, FP and FFFP, are quite meaningless and untrue. Moreover, a requirement for >99% degradation after 28 days for AFFF concentrates in the Australian DOD Procurement Guidelines makes no sense and is clearly in error.

It is possible to calculate the COD for individual components of a foam concentrate. One of the most common bulk components in an AFFF concentrate is a glycol ether derivative, e.g., 2-(2-butoxyethoxy)-ethanol (C4H9OCH2CH2OCH2CH2OH; CAS# 112-34-5). The oxygen utilisation for complete breakdown to carbon dioxide and water is given by the stoichiometric equation

C8H18O3 + 11O2 ==> 8CO2 + 9H2O

Thus 162 g glycol ether requires 352 g molecular oxygen for complete oxidation to carbon dioxide and water and the COD is 2,172,840 mg O_2 per kilogram.

BOD and COD values for foam concentrate are usually given as mg O_2 per litre. The glycol derivative frequently represents the majority of the oxidisable organic material in a concentrate. With a

GET THE FACTS ON CLASS A FOAMS AND WETTING AGENTS

The UK Fire Industry Association has published a free fact file on biomass firefighting with Class A foams and wetting agents.

Fact File 61 sets out how the use of these agents can be used to reduce the extent and duration of fires involving biomass storage.

The paper has been published by the Fire Industry Association as a result of major fires involving bulk storage of biomass in the UK. These events occur in wood storage for power generation or in waste management sites involving a mixture of combustibles. Common factors include high fuel load, large heat output, large emissions of toxic smoke, significant quantities of water for extinguishment, extensive post fire clean up.

The increase in these types of fires has been caused by electrical power generating stations converting from coal to wood, as well as the fact that waste recycling is becoming a legal requirement.

While research/test laboratory SP Sweden has identified spontaneous combustion within biomass stored in silos (as well as identified possible engineering solutions) – the problem remains for biomass storage in open air piles.

Fact File 61 sets out how the use of Class A firefighting foams and wetting agents can limit the heat and smoke produced, the quantities of water needed to achieve extinguishment; the resources to achieve extinguishment; and the overall environmental impact.

It sets out why these agents are effective on ordinary combustibles, providing test evidence of foam's effectiveness on wood fires when compared with plain water. The key performance characteristic is that both wetting agents and Class A foam reduce the surface tension of water, thereby enabling the water to penetrate the combustibles. A major advantage is that it enables responding agencies to use less water to extinguish the fire.

The paper addresses environmental concerns, highlighting that Class A foam agents do not persist in the environment nor do they bioaccumulate – but there may be issues associated with aquatoxicity and biodegradation. 'Since Class A foam agents do not contain any persistent organohalogens, it is entirely feasible that any Class A foam agent run-off resulting from an incident, once collected could be handled by a waste water treatment plant.'

The paper concludes that Class A foam agents are effective and offer significant benefits compared to plain water when used on solid combustible fires. To download Fact File 61, visit www.fia.uk.com

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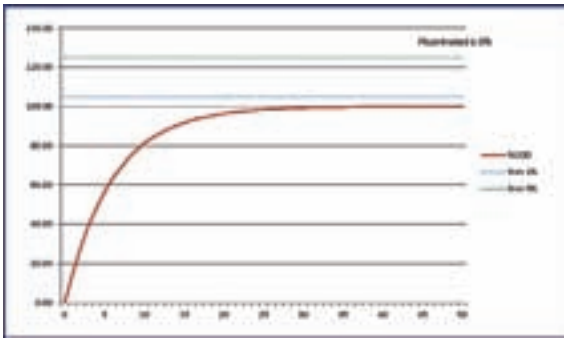
Fluorosurfactant and/or fluoropolymers in AFFF, FP or FFFP should be listed in Safety Data Sheets. Although components may not meet REACH's PBT criteria, breakdown products may do so eg 8:2 fluorotelomers degrade to PFOA.

typical glycol concentration of 20% w/w this would give a COD value, using the example above, of ~400,000 mg O_2 per litre just from the glycol component, comparable to many commercially available formulations. Recently introduced formulations from one small UK company that are described as solvent-free, i.e., contain no glycol derivatives, aim to reduce the total BOD/COD for the foam concentrate by some 40-60% to levels around or below the current lower limit for AFFF's.

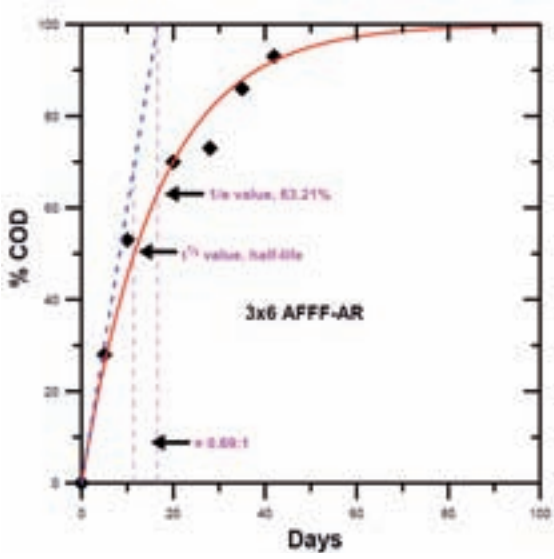
For Class A foams and fluorine-free Class B foams which contain just hydrocarbon surfactants one would expect the theoretical oxygen demand (ThOD) and the chemical oxygen demand (COD) to be essentially identical. This is not the case for fluorine-containing foams such as AFFF, FP or FFFP, as the fluorosurfactant and/or fluoropolymer content, although theoretically oxidisable, will not be detected by standard COD protocols using relatively mild (in chemical terms!) oxidation methods. Thus what appears to be complete biodegradation as evidenced by the BOD approaching 100% of the COD is an illusion since chemically resistant fluorinated materials remain, which are chemically stable and environmentally extremely persistent. This is illustrated in Figure 1 (below).



The minimum requirement for a suitable and sufficient assessment of environmental risk therefore requires both a BOD5 and a BOD28 value for the foam concentrate as sold and for individual end-user induction rates, i.e., 1%, 3% or 6%, together with COD values to be reported in the Safety Data Sheet in mg O_2/litre, as highlighted recently in the QLD/WA Draft Policy on Firefighting Foams. Additional BOD values are desirable especially if the foam biodegrades much faster or more slowly than the average. A full curve over 28 or 42 days is certainly a good idea if the degradation curve is not mono-phasic but shows multiple components.

How do current commercially available SDSs perform in this respect? It is mostly quite unusual to see both a short term BOD5 and long term BOD28 value for the biological oxygen demand. Very often the reporting period in days is non-standard (or in one recently introduced product non-existent!), or BOD and COD values are only quoted for individual components rather than for the complete formulation. This is not particularly helpful in assessing risk and should be strongly discouraged.

If one assumes to a first and reasonable approximation that biodegradation decays exponentially then it is possible to estimate the half-life for breakdown from the BOD5 and BOD28 values as shown in the figure. This has practical significance as 7 half-lives are required to reach greater than 99% breakdown (1/27 = 1/128 = 0.78% remaining). Foam formulations vary widely in their ability to degrade. Half-lives vary between about 7 days and 28 days, with BOD5 values ranging from 15% to 80% of the COD value, based on data collected for nearly 70 commercially available products. Estimation of half-life is shown in Figure 2 (below) using BOD5 (expressed as %COD) as an estimate of the initial rate. For BOD5 values not more than about 30%-40% this procedure gives a reasonable estimate for "t½": as an example, let us assume a BOD5 of 34%; the 100% intercept will be (100/34) * 5 = 14.7 days; t½ is the equal to 0.69*14.7 giving a half-life "t½" = ~ 10 days.



Greater transparency and clarity as well as disclosure of minor components in the SDS is definitely required. In particular persistent substances such as fluorochemicals need to be listed whether or not they satisfy the combined PBT criterion or are vPvB. Long term toxicity especially for these persistent substances needs to be identified even if the toxicity is relatively low. Although components of the preparation may not satisfy the REACH PBT or vPvB criteria in their own right, their breakdown products may do so and should be explicitly identified. For example, 8:2 fluorotelomers degrade to give PFOA, or biological oxidation of protein in FP or FFFP type foams produces highly toxic ammonia.

So the answer to the title question 'Are Safety Data Sheets environmentally fit for purpose?' is a qualified 'no'. This should be no surprise as one suspects that the REACH Regulations were never intended to satisfy fully the requirements for a suitable and sufficient assessment of environmental risk.

i: http://www.reachonline.eu/REACH/EN/REACH_EN/article31.html
ii: The Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulations, EC 1907/2006.
iii: Release of even non-hazardous materials to groundwater should controlled if the concentration is likely to increase over time, i.e., they substances are persistent – EU Water Framework Directive 2000/60/EC Annex VIII(i) and Groundwater Daughter Directive 2006/118/EC Article 6(b).
iv: (a) a homologue or member of a homolgous series is used to refer to chemical compounds which contain identical functional groups such as alcohols, carboxylic acids, sulphonates, etc., but which differ in the chain length and number of carbons in an alky chain, for example, perfluorooctanoic acid (PFOA, C8: C7F15COOH) and perfluorobutanoic acid (PFBA, C4: C3F7COOH). (b) a structural analogue refers to a chemical compound that either is closely related to another compound, only differing by the substitution of one or more functional groups such as, for example, a carboxylate group for a sulphonate group, or a CH3 methyl group for a CF3 trifluoromethyl group, or replacement of alky chain hydrogen atoms by fluorine, e.g., hexanoic acid C5H11COOOH and perfluorohexanoic acid C5F11COOH; structural analogues may also mimic one another in overall molecular shape whilst contain very differently bonded atoms.
v: US EPA Method 5210B - Lenore S. Clescerl, Andrew D. Eaton, Eugene W. Rice (2005). Standard Methods for Examination of Water & Wastewater (21st ed.). Washington, DC: American Public Health Association, American Water Works Association, and the Water Environment Association ISBN 0-87553-047-8.

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Fight fire with ice

Tony Tricarico of FireIce talks to *F&R* about a powder that when added to water becomes a powerful fire extinguishing gel with some surprising properties. FireIce is widely used across the USA to combat electrical fires as well as forest and structural fires – and with no negative environmental side effects.

'In studies that began in 2010 on the water additive FireIce, there have been some extremely interesting revelations, especially in the results of the Class C extinguishing capabilities. The studies by various laboratories and agencies have been time consuming and expensive but well worth the wait,' explained Tony Tricarico, North East Regional Director of FireIce and former Captain Special Operations Command for the FDNY.

'FireIce is a dry powder, that, when added to water is an enhancement to firefighting forces allowing our firefighters to knockdown more fire with less effort and in a shorter period of time, thereby permitting us to keep more forces in service with a quicker turn around, thereby enabling us to get our units back in service quicker.'

FireIce creates a gel that eliminates the consumption of oxygen by the fuel, suppresses the vapours of the fuel, cools the fuel down below it's ignition temperature and will not permit re-ignition once applied to a fuel.

Tony added that FireIce will adhere to a vertical surface and can be applied via a hose line, a pressurised extinguisher, or via a large calibre stream. This environmentally-friendly gel will not harm the firefighter using it should they get it on their skin or in their eyes. Even if a firefighter ingests the gel, it will have no ill effect on them.

In several cities in the US, FireIce is being used to combat electrical fires in manholes and on electric poles. FireIce is currently being used to extinguish forest fires, structural fires, electrical and metal fires and to protect exposures from ignition via structural fires and forest fires.

The US Department of Agriculture has conducted many tests on the product in accordance with the US Forest Service specifications.

Lateral ignition and flame-spread testing was deemed as acceptable as were the metallurgical testing and the Mammalian Toxicity tests. For the Mammalian Toxicity tests the acute oral and the acute dermal toxicity are within the acceptable range as are the primary eye irritation and the primary dermal irritation. The metals testing required that aluminum, mild steel and yellow brass were to be submerged continually in a FireIce solution for one year. The results were that the inter-granular attack on the metal surfaces were non detectable and the uniform corrosion testing results were all acceptable. The USDA additionally conducted fish toxicity testing which also resulted in acceptable levels in accordance with the USFS specifications, concluding that the FireIce product has no adverse effects on the environment.

The US Department of Labor Mine Safety and Health Administration finds FireIce suitable for use in fighting fires in mines and the Florida State Fire Marshals office concluded that when FireIce is used to combat a fire that requires an arson investigation, the FireIce product will not interfere or hinder the investigation whatsoever.

At the Southwest Research Institute in San Antonio Texas, an evaluation was conducted on 2-A and 40-A cribs as well as a 10-tyre fire, in accordance with UL 711. All seven of these tests were passed in addition to a set of 90-day metallic corrosion tests that were performed on brass, mild steel and aluminum in accordance with the USDA Forest Service specifications and all were, once again, within the acceptable limits. A number of different agencies, laboratories and manufacturers have conducted similar testing, said Tony: 'What is really great is that FireIce has been tested time and again, using similar protocols and passes every time.'

In Ontario Canada, Kinectrics Laboratories conducted five field test air sampling collections in January 2010 at the High Current Laboratory. The conclusions of these tests were that the application of FireIce to neoprene jacketed copper and aluminum cables is effective in reducing airborne organic compounds and airborne metals. Removal efficiencies from 2 to greater than 15 times can be expected when added to an active fault. For a FireIce encapsulated fault, greater than 60 times removal of metals and arc generated is possible, based on the tests performed.

And finally, testing was conducted with Consolidated Edison at the Fire Academy in New York City using a hose line with FireIce flowing on to a 50,000 volt arc. The end results were that using a hose line to battle an electrical fire from a distance of 25 feet will result in a current leakage back to the nozzle person of approximately 660 micro-amps. To put that in perspective, 1,000 micro-amps will just start to allow a human body to have a physiological effect, kind of like a tingling.

'In short, FireIce has no negative or toxic effects on the environment for terrestrial and aquatic ecosystems as tested by the government and will not cause any ecological damage, showing biodegradability in soil systems.

'When compared to other products on the market today, there is no doubt which product presents no risk of any type of contamination to the eco-system or the firefighter using it,' concluded Tony.

FireIce is used across the USA to extinguish electrical fires in manholes and electric poles.

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ARFF & more

With 14 aviation rigs and six foam tenders the International Fire Training Centre in Durham Tees Valley Airport is well known in the ARFF world – but it is also gaining a strong reputation in the offshore, marine and industrial sectors. Business Operations Manager Gary Watson spoke with Jose Sanchez de Muniain about the latest developments.

Business Operations Manager of the International Fire Training Centre, Gary Watson.

Why do ARFF firefighters travel to IFTC from overseas?

We welcome delegates from Vancouver, Tahiti, Hong Kong, Europe, Middle East and Africa. They travel a long distance for fire training because we have a fire ground 19 acres in size and 14 aviation rigs, as well as six foam aviation tenders. We offer authentic training, and they like that we burn gas and kerosene, which burns black smoke.

Most training facilities only have one rig, and if you only have one rig you are not being tested. If you use it too much, you get to know where all the trip hazards are etc. So many firefighters come to us for revalidation every four years, because we have the facilities to change things around.

We take on novices and equip them with the skills and a certificate of competence to work legally in any UK airport. And because the UK CAA is widely recognised around the world, some people come to us from other geographies. We can also take experienced firefighters and put them through some very demanding training scenarios.

What's new in ARFF for IFTC?

A year ago this month we gained accreditation from the French civil aviation authority, so we can now deliver revalidation training to French airport firefighters. We've just had the first course of the year for guys from Beziers, Brest, and Bergerac.

Are there any major trends in ARFF training?

Some of the major changes are to do with regulatory shifts. EASA, the European Aviation Safety Agency; can now set the standards for Europe, and we have until the end of 2017 to gain compliance. While the UK exceeds that level of compliance at the moment, other European countries may have to review theirs.

The major change is that EASA is saying that an airport now just needs to demonstrate how it achieves an acceptable level of compliance. It used to be that to demonstrate the acceptable level of compliance you needed a CAA certificate from one of the five UK centres. Now you can go anywhere for your fire training, you just need to demonstrate that it's to a level that's acceptable to EASA.

While pluralism could be good, almost by definition it could also make it difficult to have a common standard. So airports are talking about how they are going to deal with that.

What other markets do you operate in?

We also diversify into oil and gas where we have relationship with Falk Safety Services, and we train personnel for skills acquisition and revalidation of competence – all OPITO accredited – prior to deployment to offshore platforms.

We also run JOIFF-accredited courses on the industrial side, and more recently we received accreditation from the UK Maritime Coastguard Agency to deliver the STCW95 basic training.

What are the main differences between the ARFF and industrial firefighting markets?

The challenge that anybody has in the industrial stage is that in most cases there's a different level of statutory obligation to train the firefighters – in some places it's more about good practice. There are different routes to get a statement of competence to be an industrial firefighter compared to the way you do to be an airport firefighter.

Industrial courses tend to be shorter too, two days instead of six weeks, and as such, people don't want to travel too far. Saying that, we've carried out some for industrial firefighters in Algeria, but that is because they have built a landing strip next to the gas plant to increase security. They came to us because we could provide both sides of training.

Any recent major investments?

We've spent £200,000 ($350,000) on a new virtual reality suite for incident command training, including a number of virtual scenarios such as a civilian airport, chemical incidents and gas escapes. Physically it's a room with blackout blinds and a huge screen. The incident commander can shout commands to four crew commanders sitting behind him in pods.

We've also spent 850,000 ($1.1m) on two new appliances for our aviation courses from Sides, and we've also just bought and installed a dry rig helideck. We've already got a helideck for fire training, but this one is to teach offshore workers safe helideck operations, such as how to land, fuel up etc.

We been investing on the industrial front and have bought a well head and a tank farm with a bund so we can train firefighters to contain a fire before it spreads to neighbouring tanks. We also have a chemical distribution plant rig to simulate chemical spills and casualty recovery.

How does the IFTC deal with runoff water?

The runoff water goes into an oil separator that skims off all the fuel, and we use that for dirty burn spill trays. The protein-based training foam goes into a reed bed where it is eaten up. We reuse about 95% of our water.

BACKGROUND

The International Fire Training Centre in Durham, North East of England, first opened its doors in 1981 as the official ARFF training centre for the UK Civil Aviation Authority. Since its acquisition by Serco in 1996 it has diversified into other areas including industrial firefighting, offshore safety training and incident commander training. Today the IFTC estimates it retains around 85% of the ARFF training for the UK.

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Hands-on hazmat!

HazSim is a hazardous materials detection simulation training system that replicates real-life situations. In 2014 Massachusetts hazmat instructors began using HazSim at one of their training academies to achieve effective, customisable, interactive training, writes Los Angeles County Firefighter and HazSim founder Phil Ambrose.

The virtual device simulation enables trainers to mirror dangerous environments from a distance, allowing front line responders to develop their response time and ability to assess hazardous situations.

Prior to using HazSim, the training academy's approach to training was the same as that of many other safety organisations around the world – using regular meters alongside hypothetical scenarios often controlled by passing notes around, or by using real chemicals to simulate potentially dangerous situations. The problem with this model is a lack of hands-on experience that mimics what a real life situation might look like, as well as the potential for real chemicals to create a real unsafe environment.

After introducing HazSim to their training program, the training academy noticed a marked change in their ability to place students in the 'dread zone' by using a training meter that can replicate scenarios and remotely change values of different types of sensors and gases from up to 1,000 feet away. By sending the trainees down range and adjusting the values, hazmat instructors are creating an opportunity for students to test their knowledge of chemicals and what the most appropriate response would be to diffuse a hazardous situation. For example, being able to understand whether a scenario may be radioactive or oxygen deficient is an essential skill for a hazmat responder.

A training meter enables the instructors to change the values of different types of scenarios from up to 1,000 feet away.

In addition to replicating real-life scenarios, HazSim has also served as a hazmat instructor tool. With the ability to change values from a great distance, instructors have been able to show trainees that a situation can change in an instant. While students are monitoring changes as they go deeper and deeper into scenarios, instructors are changing meter readings – as opposed to passing notes down or issuing alerts via their radios. This is a valuable benefit because trainees can then see and assess the change for themselves.

As instructors get a better feel for how students are grasping the material, the training academy can better evaluate their skill level. For a training program that affects thousands of fire safety professionals throughout an entire region, having a tool that enables instructors to ascertain whether or not students understand the material and are retaining important information, is imperative. The academy has been able to witness at first hand how students would respond in a real life situation – a skill that does not leave much room for error.

The Massachusetts training program supports 245 technicians statewide. They offer two classes per year, training around 23,000 firefighters.

Later this year HazSim is set to develop a new version that will include improved chemical weapons meters, a confined space probe attachment and range extension. The new version is set to roll out mid year.

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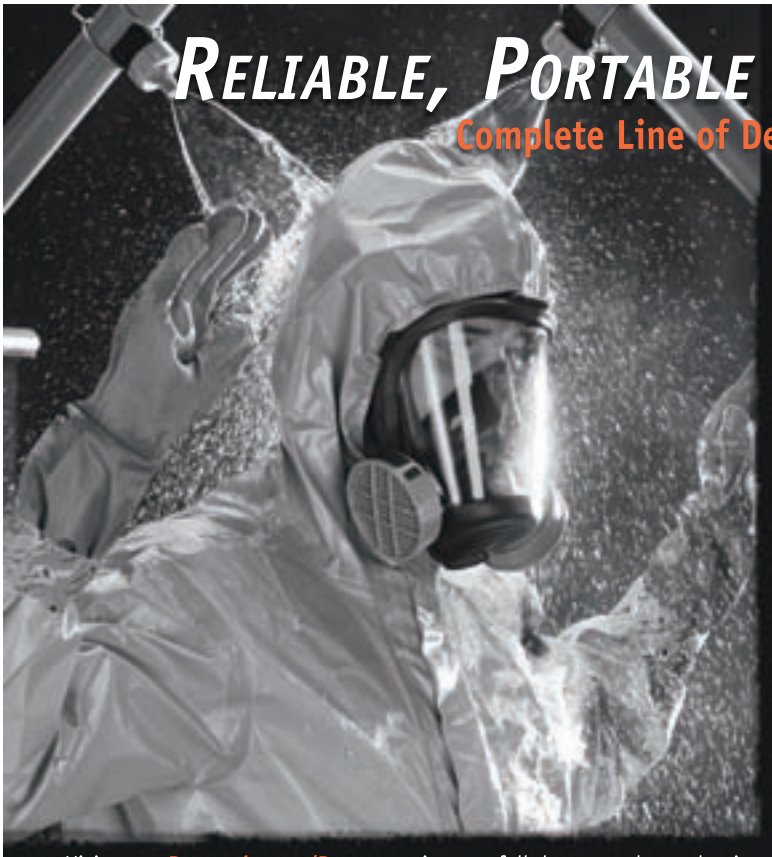

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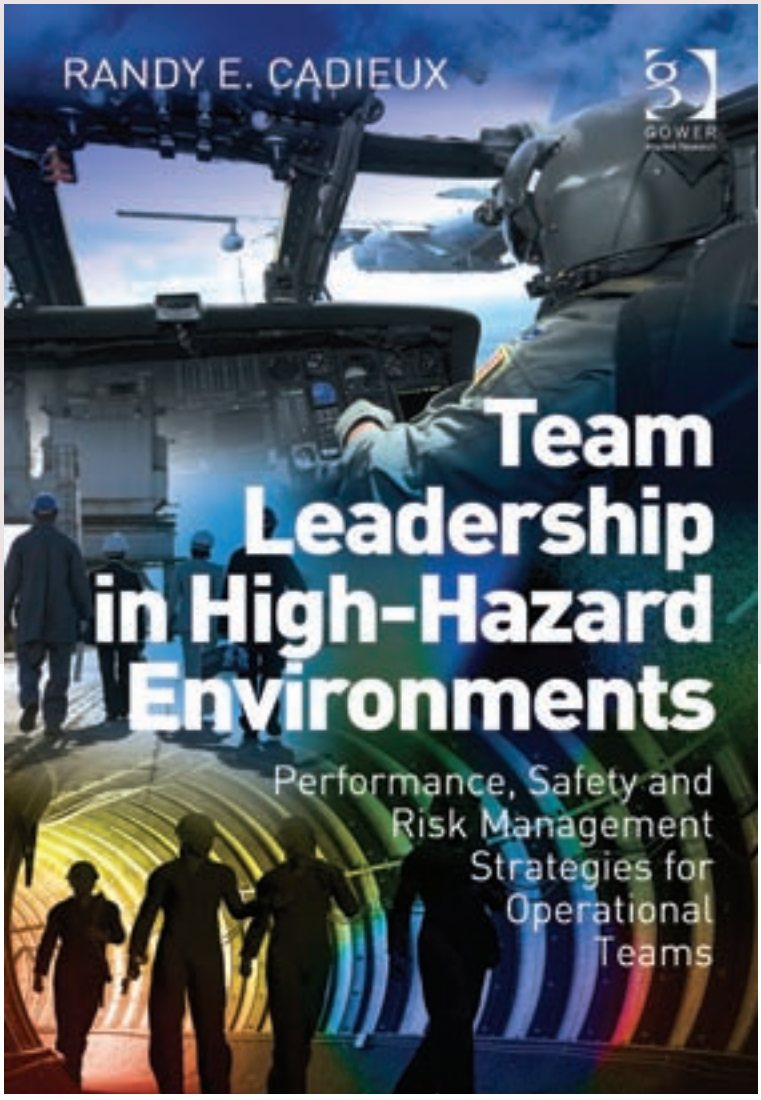
Ready to lead

If you are a leader, have aspirations to be a leader or find yourself filling a void created by ineffective leadership, you should be asking yourself this on a regular basis – how do I develop as a leader?



Our guest book reviewer is William Mitchum. Following his first career as a commercial diver in the Gulf of Mexico, he shifted to the Fire/EMS industry and has worked in that capacity for the past 15 years. His first assignment in Florida's poorest urban community prepared him for rotations in Iraq and Qatar. For the past five years he has been using his overseas contract experience to provide a leadership model for a Fire/EMS department at a stateside automotive manufacturing facility.

I had the opportunity to do just that recently when I was asked to review *Team Leadership in High-Hazard Environments*.

The author Randy E Cadieux is a 20-year veteran of the United States Marine Corps and the skills he mastered while serving his country are eloquently captured in this textbook of leadership strategy. His primary occupational specialty was as a KC-130 Hercules pilot and throughout the book one can hear his experience thrumming through his words as clearly as the Rolls Royce turbo-props that carried him around the world. This book isn't a reminiscence of his time in the military. It should really be approached as a text-book.

The reader should sit down in a quiet environment and be prepared to receive his experience as if delivered from a clip-board during a pre-flight check.

My description should not dissuade the readers that are prepared to challenge themselves; rather it should prepare them to expect an expansion of their strategies and concepts. Cadieux's military background frames a lot of what he has to say and how he chooses to say it. That doesn't mean that the content is dry or militaristic. It means it's well-prepared, functional and intended to get the job done.

This book does an excellent job of defining many concepts and theories that we hear all the time in leadership environments. The author speaks those out loud, breaks them down to their purest form and expands on them in great detail.

The information related to safety I found especially poignant, and I began highlighting quotes that expressed thoughts that had gone through my head on several occasions. 'Safety is often measured by the mishaps that do not occur, which is intangible and extremely difficult to count. Even examining safety based on trends and accident rates is problematic and does not always accurately reflect how safe an organisation really is. (p5).'

But where many such books might outline concepts and discuss variables, Cadieux uses that model as a foundation on which to build actual leadership exercises and provide real-world case review examples. He explains that the strength is not only recognising the challenges that we face as high–hazard leaders but exercising our ability to cope with them, overcome them and develop new ways to achieve success. While the bulk of his experience was in the military sector and he draws great knowledge from that realm, this book is very easily translatable into just about any environment where there is a distinct need for crisis management and decision making.

The skill set and strength of will needed to transfer 45,000lbs of fuel in mid-air at 500km/h is just as easily represented in the fire department environment or that of a high stress manufacturing facility. Cadieux goes to great lengths to illustrate how, as leaders, we need to be able to itemise the fundamentals of each challenge, so that we can develop mission specific strategies to overcome them.

I believe that readers of this book would agree that the author clearly has high level competencies that he's gladly sharing with those willing to expand as leaders.

'Leadership is not for the faint of heart and it requires a willingness to make difficult decisions and put in the hard work to correct deficiencies at multiple levels. (p53).'

I would highly recommend this book to anyone that is committed to the process of expansion as a leader and to the parallel goal of improvement as an individual.

PPE – adapt to the times

Whilst innovation is fundamental to driving progress through the adoption of new materials and product design, it can also be accompanied by increased costs. Modern, better performing materials are often intrinsically more costly to produce whilst improved manufacturing techniques require additional investment, writes Philip Tasker Sales Director for Bristol Uniforms.

Over the past 10 years personal protective equipment (PPE) for the emergency services and, in particular, the fire and rescue service (FRS) has developed by providing more specialised clothing that has been designed to protect wearers from exposure to the specific hazards and dangers associated with their differing operational conditions. During this time we have seen fire services reidentify themselves as fire and rescue services to reflect their wider remit.

Whilst firefighters have always been engaged in rescue work directly linked to structural fires, their increasing involvement in the broader range of urban search and rescue activities has meant that their operational activity increasingly involves rescue work. The natural extension of this wider responsibility, and its varying nature, for those engaged in supplying specialist protective garments has been to design new clothing to meet the specific needs of the wearers.

In the case of technical rescue work, the garments need to provide greater physical protection than structural kit whilst normally requiring less heat, flame and protection against water penetration. This led, in 2005, to the development of prototype garments designed specifically for technical rescue applications which have since been widely adopted throughout the UK's FRS. Similarly, wildland firefighting requires the focus to be on protection against intense heat and flame lick, which has in turn led to the design of very light weight flame retardant coveralls.

The benefit for fire and rescue services has been the scope to better equip their firefighters for any eventuality. The downside is inevitably the need for larger PPE budgets and more complicated wardrobe management as two, or three, different sets of kit are provisioned and stored. Bigger budgets also need to cover the added costs of procuring, maintaining and managing larger stocks of garments along with the logistics of handling and monitoring PPE allocation and service records.

Using fewer garments

Given the growing pressure on budgets, which has increased considerably in the years since the financial crisis of 2008, manufacturers of firefighter PPE have been looking for innovative solutions that maintain the levels of personal protection of firefighters, whatever their operational needs, whilst reducing the overall level of costs associated with procurement, stock, maintenance and technical support. In response, Bristol Uniforms has developed an innovative layered approach which uses fewer garments – in different combinations – to provide firefighters with the accepted high levels of protection, as measured by European Standards, whether deployed in structural or wildland operational environments or in technical rescue activities.

Bristol Uniforms' XFlex Layered Garment has been introduced as an economical solution to PPE provision and a means of reversing the trend of recent years which has witnessed the proliferation of garments acquired by fire and rescue services to meet the various operational scenarios.

Making garments last longer

In addition to cost benefits, which can be achieved through rationalising garment stocks, further savings can be (and are being) made through more effective wardrobe management. This, in short, involves adopting maintenance programmes designed to extend the service life of firefighter PPE and reduce long-term replacement costs. Innovation comes in many guises, and the availability of a wider range of options allows FRAs more choice through adopting procurement and

Bristol Fire Motorcycle outfit. Top left: integrated harness.

The XFlex layered garment is Bristol's answer to economical PPE provision.

management programmes which best suit their needs and financial circumstances. The cost-effectiveness of regular garment maintenance has been proven over the last 15 years, with the maintenance and repair facilities available being steadily expanded to extend further the operational life of all types of PPE.

When managed services were first introduced, certain types of garment damage, such as contamination, were not available. Now, special facilities have been introduced which allow garments, which might previously have been condemned, to be returned to firefighters for continued normal operational use.

A typical example is asbestos and pathogen contamination which can now be removed from all types of garment from coats, trousers and gloves to boots, helmets and SCBA frames.

Reducing procurement and ownership costs

UK Government is encouraging FRAs to engage more proactively in 'collaborative working' as a means of sharing fixed costs and generating procurement efficiencies. For PPE, a national scheme that already provides these benefits, has been in existence for eight years. The Central PPE and Clothing Contract (CPCC) was introduced in 2008 with the specific purpose of offering all FRAs in England and Wales the opportunity to acquire a wide range of PPE and non-PPE garments which have been independently assessed by a broad coalition of UK fire services.

Major economies have been realised by the group of FRAs, employing over 7,500 firefighters, which have, through adopting the scheme, substantially reduced their procurement costs, buying efficiencies and totally eliminated the costs of technical and wearer garment trials.

Working creatively

PPE innovation is a combination of creativity in design and manufacture coupled with new approaches to the whole process of equipping firefighters with the best protective garments available in the most efficient way.

The last few years have seen the pace of PPE product development, as well as its maintenance and management, expand considerably to meet the challenges of more demanding economic conditions – both in the UK and many developed nations. The adoption of more creative thinking by both users and their suppliers, combined with improved collaborative working, should help to maintain the highest safety standards we have come to expect for our firefighters whilst, at the same time, satisfying the need operate in much tougher economic conditions.

Bristol's RescueFlex USAR kit.

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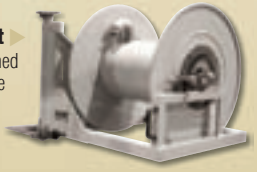

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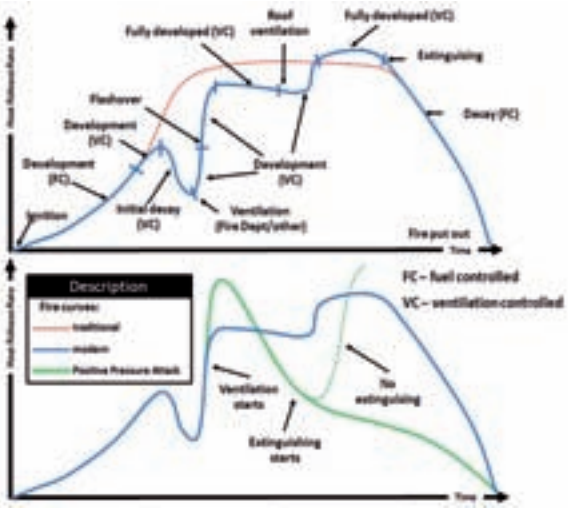
Testing time for PPV

The Training Division of the Regional Headquarters of the State Fire Service in Olsztyn (Poland) recently carried out extensive tests with seven types of PPV fans to help optimise its training curriculum for tactical ventilation. Szymon Kokot-Góra, Senior Captain and Lecturer, reports.

Positive Pressure Ventilation (PPV), be it in attack or post-knockdown mode, is something that fire departments around the world perceive as an advanced firefighting technique. It inevitably carries some risks, but the potential advantages can surely outweigh these. Operational preparedness inspections carried out by the Polish Fire Service had highlighted some gaps in both understanding and application of PPV techniques, and consequently the National Fire Chief ordered a drive for improvement in training and understanding of ventilation techniques. Olsztyn's Fire Training Centre was the first to create a comprehensive and scientifically-based continuing education and training programme.

Shift and crew managers from the region's 24 fire stations gathered for three days to learn to how to optimally use PPV fans and how to incorporate their use into their tactics.

Firefighters used seven different types of models, which provided the perfect opportunity to better understand similarities and differences in the equipment available today.



Top: participants with equipment and training props. Right: comparison of fire curves – traditional, modern and PPA (positive pressure attack).

Fire is a pressure phenomenon. Much of today's attention is focused on flow paths and combustibility of smoke. The firefighting world is awaiting the results of the UL Firefighter Safety Research Institute's breakthrough research on PPV expected this year, nevertheless there is already a vast amount of knowledge available for better understanding of this complex subject. Here I will describe some of the current knowledge as well as some of the findings from our workshop.

We know from UL and NIST research that today's fire curve is somewhat different from the one we knew before.

The main differences lie in the tendency of fires to become ventilation controlled, usually before the arrival of the first due apparatus, and on their greater dependence on ventilation as such. If positive pressure is applied, it will almost always lead to an increase in the heat release rate of the fire and will also cause higher HHR peaks in comparison with natural ventilation. However, due to the fact that approximately two thirds of heat in enclosure fires is transferred via convection in fire gases, this forced gas exchange will soon lead to an improvement of fire conditions. If extinguishment follows, the job is done. If it doesn't – things will almost certainly go out of control.

Forced ventilation can increase the intensity of combustion and spread the fire to previously uninvolved areas. There is a fundamental need to coordinate ventilation and extinguishment – a well-practiced game plan and a clear division of tasks are essential components of a response. This, obviously, is achieved only through training.

We also have to keep in mind that by introducing an air stream into a structure we are mixing combustible gases with oxygen and shifting them into flammability limits. The larger the volume is, the less controllable the environment. Velocity of gases inside a ventilated structure increases

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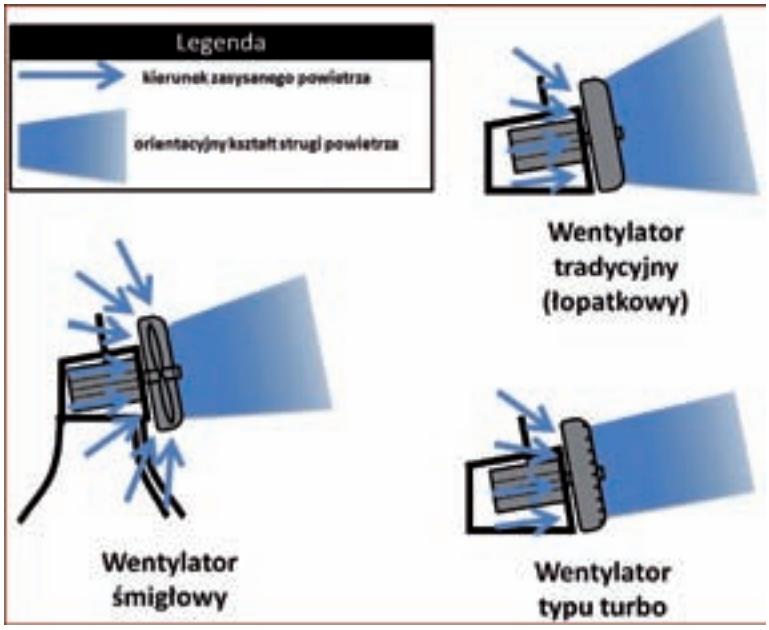

Approximate flow and streams in different fans, based on training smoke trails.

when space is limited – narrow corridors, doorframes etc. In these areas velocity will be higher and turbulence greater. In large halls there seems to be a steadier shift of the volume of gases when used on cold air, but when we take into consideration the thermal stratification, we immediately notice that cold flow tests and applying PPA (attack mode) at a working fire may look very different.

Comparison of fire curves: traditional, modern and PPA (positive pressure attack)

All seven fans used during the training were gas-powered, and interestingly, all but one had the same engine. All differences in their performance were thus the result of the engineering and design behind the construction of the aerodynamic components. We noticed differences in the rotating element: a propeller which should have an open design converts rotational motion into forward thrust while an impeller which needs casing uses rotational motion to suck fluid in. One of the tested fans (Ventry) had a propeller, which caused it to be quieter and lighter. Other fans had impellers, and one of them (Leader) had air strengtheners, which narrowed the stream from cone-like to cylinder-like. Thus 'the rule of seal of the cone' around the inlet becomes obsolete with improvements made in the equipment. Nearly all known brands are introducing so-called 'turbo ventilation', which also enables setting the fan farther back from the inlet, allowing for operating space near what is usually the main entrance. Using smoke machines and applying the smoke from behind of the fan can help visualize the shape of the stream and give a better understanding of the positive pressure streams.

Approximate flow and streams in different fans, based on training smoke trails

Some of the tested units did not have the AMCA 240 rating certificate (ANSI/AMCA Standard 240-06: *Laboratory Methods of Testing Positive Pressure Ventilators for Aerodynamic Performance Rating*); nevertheless – as our tests proved – such rating only gives a general idea about the performance. Measurements made allowed to determine the optimal distance from the inlet for each fan. Apart from two fans (Ventry and Leader), all fans performed at their best when put closer to the inlet, as 'the rule of the cone' would suggest. A rule of thumb would say that the diagonal of the door is the proper distance to create the seal. In our case this distance was 2.3m and all fans performed better while being closer to the door. A Venturi effect is then created and apart from the stream created by the fan, additional air is entrained. This increases the overall volumetric flow rate (volume over time) in the outlet, which can be defined and the

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The downloadable courses have been put together by Leader and EducExpert and are designed to assist in positive pressure ventilation training.

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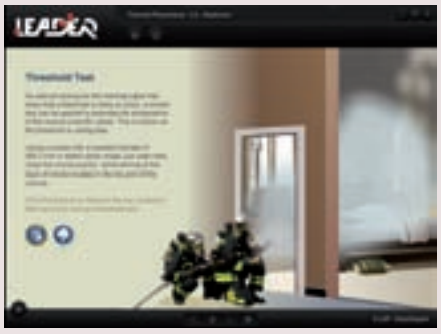
The modules are the result of a partnership between Leader, a manufacturer of firefighting and search and rescue equipment, and EducExpert, an organisation focussed on international long-distance learning for industry, and especially the fire safety sector.

Three major topics are addressed by the new ventilation course are:

- The main principles of fire and the different phases of development.
- Explanation of the thermal phenomena and their consequences.
- The basics of fire ventilation during fire fighting according to three principle techniques (offensive, defensive and combined ventilation).



Each module includes a self-assessment composed of questionnaires and practical exercises for rapid validation of acquired knowledge.

The course demonstrates how integrating PPV at the right time into the normal stages of the firefighting operation enables the effective removal of smoke during or after the fire. It also shows how the use of PPV increases safety and the effectiveness of firefighting by reducing heat and, by greatly increasing the visibility, it allows the quick extinction of a fire and decreases or stops its spread.

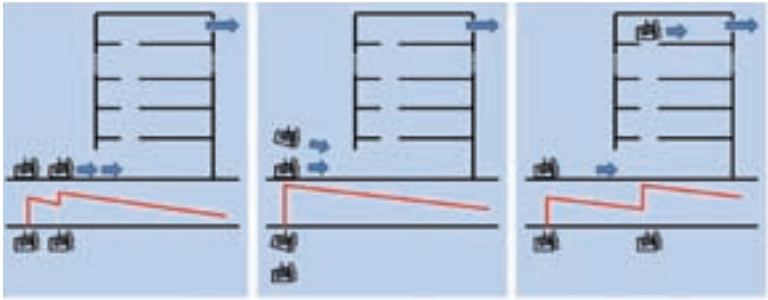
Leader's Jeremy de Lerue sums up the benefits of the online training course: 'Firstly, it is interactive! Using superb animations and interactive features, participants are more involved and, therefore, students learn quicker. The modules are available free of charge following registration. To download the course, visit the training section at: http://www.leader-group.eu/leader-training/interactive-courses-334.html.

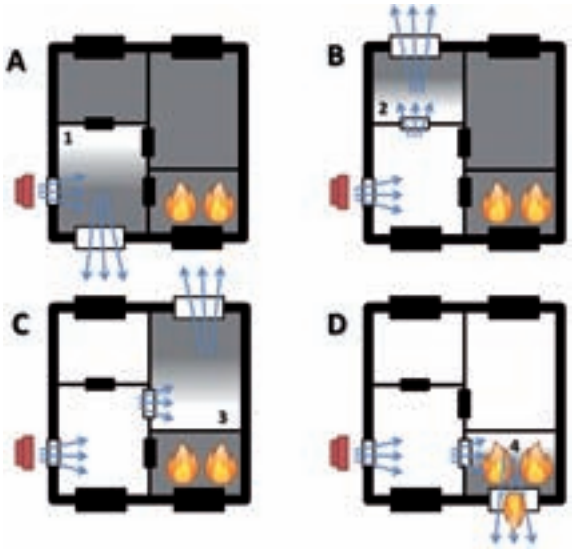
Make and model	Engine	Rotor diameter [inch]	AMCA 240 declared capacity [m³/h]	Weight [kg]	Type
Skorpion H22	Honda GX 160 5,5 HP	16	22 000	27	Impeller traditional
Ventry 20GX 160	Honda GX 160 5,5 HP	20	29 388	30	Propeller
WO-14	B&S Vanguard 6HP	21	14 000	40	Impeller traditional
Leader MT 236 EPT	Honda GX 160 5,5 HP	21	29.539	42	Impeller turbo
Tempest TCA 21H 6,5	Honda GX 160 5,5 HP	21	34 250	38	Impeller traditional
Kobra H34	Honda GX 160 5,5 HP	21	34 000	48	Impeller traditional
Rosebnauer Fanergy V21	Honda GX 160 5,5 HP	21	35 000	50	Impeller traditional

Make and model	Distance from inlet [m]											Velocity of air in the outlet at optimal distance with "Reick's Smoke Stopper" [m/s]	CO concentration [ppm]
	0	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5		
	Velocity of air in the outlet [m/s]												
Skorpion H22	0,1	0,5	0,3	0,2	0	0	-	-	-	-	-	-	-
Ventry 20GX 160	0,8	1,1	1,4	1,5	1,6	1,2	1,1	1	0,9	0,6	0,6	2,0	24
WO-14	0,8	1,1	1,3	1,4	1,5	1,7	1,3	1,3	1,3	0,9	0,6	2,2	40
Leader MT 236 EPT	1,1	1,2	1,2	1,3	1,4	1,3	1,3	1,6	1,8	1,9	0,9	2,2 - 2,5 (tilt dependent)	28
Tempest TCA 21H 6,5	0,6	1	1,2	1,3	1,4	1,2	1,3	1	0,8	0,8	0,5	1,8	18
Kobra H34	0,7	0,8	1,3	1,2	1,1	1,2	1,1	1	-	-	-	-	54
Rosebnauer Fanergy V21	0,7	0,9	1	1,2	1,1	1,2	0,9	1,2	1,2	1	0,6	1,4	56

product of multiplying the surface area of the outlet(s), ventilation coefficient and velocity of air in the outlet. The first two factors are constant and the last one is variable. By measuring it while changing the distance of the fan from the inlet, we established the optimal distance for each fan. Why are we after the outflow rather than looking at AMCA rating? Firstly, if the cone seals the inlet, some quantity of pushed air is left outside. If the fan is closer, all air is pushed to the structure and additional air is entrained. Some manufacturers – like Rosenbauer – even include this in their catalogue of products, suggesting approximately double flow rate in relation to the one rated by AMCA. Secondly, some of the pushed air is used to create an overpressure, which is partially dependent on the outlet/inlet ratio. Thirdly, almost every building has leaks so additional air will travel into different areas outside of the envisaged ventilation route. The best measure of our success is the amount of gases leaving the structure! At this point we need to remember that research has shown that PPV fans are able to create an overpressure of app. 60-70 Pa while hot smoke can cause pressures oscillating around 20 Pa, depending on the temperature of gases and the height of the smoke layer.

The tables above are a summary of our cold-flow tests. We made every effort for the tests to be repeatable and the results concise. Nevertheless, these results can only be used to get a very general idea of the performance and due to many imperfections in applied methods may not be used to do a direct comparison of the tested units. The main goal was to determine the best position for a given fan and to better understand the aerodynamics of PPV. Also changing wind conditions were not recorded, albeit on testing days wind was not significant. It is fundamental to say that all manufacturers have various models of fans and those used may not be the latest or the best model, even though efforts were made to obtain similar units for training. Testing consisted of measuring of the velocity of air in the outlet and changing of the distance of the fan from the inlet. Each time velocity was measured after at least 30 seconds after changing of the fan's position. Measurement was made over the period of 30 seconds and an average value was determined. Later on, most fans were also tested with the use of Michael Reick's Smoke Stopper (*Fire and Rescue* Q3, 2014), which leads to an increase of outlet flow rate and less backlayering of smoke. At optimal positions, CO measurements were made to emphasize this aspect of the use of gas-powered equipment. The overall volume of the ventilated enclosures was approximately 263m³. Inlet opening surface area was 1,8m² and outlet 1.96m². With the outlet/inlet





Above: pressure build-up along the ventilation path with different configurations of series of fans. Right: sequential ventilation ie selective removal of smoke. It can be done as shown (1-2-3-4) or in reversed order (1+4, and the remaining rooms – separately or together).

ratio around the value of 1, approximate efficiency of gas exchange oscillated around 70%.

The training programme also included tactical aspects. Vent for life/fire/safety rules of engagement were discussed and an algorithm of positive pressure attack was analysed and practiced. Conditions where PPV should not be applied were discussed, including strong wind into outlet, backdraft conditions and size-up problems. An important aspect was the fan's weight and dimensions, which directly influence the possibility of its use in initial stages of a response (storing and carrying ability). During the testing part we also took a look at misting rings. Although a stream of air can carry small droplets of water, the ability of those to travel over larger distances and change direction is rather small, which gives this additional option low practical application, in my opinion. To have a similar effect, water can be applied from a fog nozzle without the need to buy extra additions. Another piece of equipment tested was a flexible air duct attached to manholes for pressurizing wells. It proved to be a useful addition, but did not prevent the introduction of carbon monoxide into the pressurised space.

As stated before, our goal was to give our firefighters the knowledge and abilities to better understand and optimise the use of their equipment. The motto can be summarised by the words of my good colleague and a great firefighter, Art Arnalich, Battalion Chief in Guadalajara Region in Mexico: 'Best buy? Keep the old fan and invest in further training!'.

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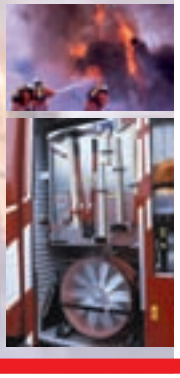

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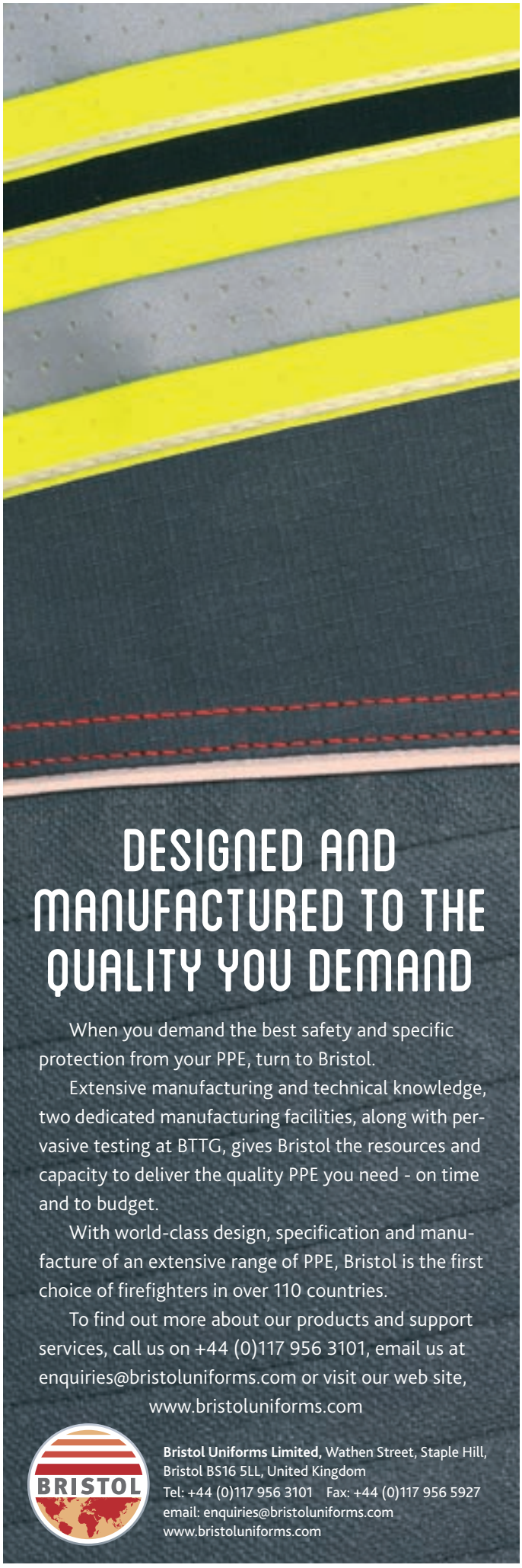

Extra back-up for when you need it

The national disaster management system in Hungary has improved significantly in the past several years. The Disaster Management Act of 2011 fundamentally changed the structure of the emergency management system and complementary regulations now include mandatory functions, writes Captain Tamas Timar, Unit Leader of the Disaster Management Operational Service.

The new act and the government decree (234/2011 Act on Disaster Management) entered into force on the first of January 2012. The key aspect of the act was that firefighting and technical rescue were now the responsibility of the Hungarian State.

'The four pillars of the act are the strengthening of the protection against major accidents involving dangerous substances, the improvement of population protection, the development of the system of civil protection and the establishment of a uniform and strong disaster management body, including the formulation of the maintenance and control of professional fire brigades by the State.'

Operational fire protection tasks belong to the professional fire brigades. The entire territory of Hungary – as an operational territory – is covered by professional fire services. One of the elements of this renewed structure is the Disaster Management Operational Service (DMOS), which entered operational phase as a separate organisational body in every Hungarian county as well as the capital on April 1, 2012.

Members of DMOS must be ready to respond within two minutes of a call-out.

Current structure

- National Directorate General for Disaster Management (NDGDM)
- County disaster management directorates (20)
- Disaster management branch offices (65)
- Professional fire headquarters (105)
- Disaster management posts (58)
- Municipality fire brigades (60)
- Industrial fire brigades (72)

Organisation

The regional bodies (20) operating under the Ministry of Interior National Directorate General for Disaster Management (NDGDM) are the county directorates of disaster management. The directorates are obliged to run a standby service to have professionals on duty at all times; this is the Disaster Management Operational Service (DMOS), which operates at every Disaster Management Directorate. The members of the DMOS fulfil their duty by acts, regulations of the ministry and are under command of the director general.

The structure of the Disaster Management Operational Service

The operational area of a DMOS sector corresponds to the area of a particular county. This means that any given DMOS is only entitled to intervene or supervise at incidents and fire service interventions inside its own county. The fulfilment of this duty requires 24/48 shifts with constant standby at the station of duty (this means one day duty, two days off). The number of days on duty, the day offs and holidays are pre-set

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by internal regulations.

The number of staff in the DMOS consists of nine people in each county, of which three are chiefs of duty, three are deputies and three are safety and security officers (two-three persons per day). On top of that there are five persons employed in the capital as drivers, where the daily minimum for the number of people on duty is three (two persons + one person as driver). The main requirements of this role is to have a BSc or MSc in fire service, to have been a fire chief with at least two years experience, to be in possession of a driving licence with extra blue light qualifications, as well as having a clean bill of health and fitness.

Duty starts between 6.00-8.00am and shifts last until the next the morning. They kick off with a briefing, after which equipment gets checked (eg measuring tools, detectors, breathing apparatus). During daytime there are pre-defined tasks such as organising drills and training sessions.

Deployment of the Disaster Management Operational Service

The level of a call out determines the number of forces required to attend an incident. The alerting level is classed from one to five. The type and the number of vehicles that are required are determined by the operations control centre.

The DMOS is called out in the following cases:

- In cases of level II (2.5-3 units) or a higher alert level;
- If a firefighter has been seriously injured, desperately wounded or has died;
- If the county's or capital's main operations control on duty decide to call out DMOS based on feedback from an incident;
- If the on-scene incident commander requests a consultation in the case of a complicated incident (technical rescue, crane, rescue from heights/depths, accidents caused by fallen trees, etc);
- If there is a need for DMOS's special equipment on site;
- If a firefighting vehicle has been involved in an accident and it has caused personal injuries;
- On direct order of a county's director;
- on direct order of the county's Inspector General of Fire Services;
- If a chief of DMOS decides to do so in order to control a safe outcome for an incident or it is reasonable to do so based on feedback.
- Alternate deployment is possible as follows:
- If on-site inspection or on-site control is necessary.

The members of DMOS are required to deploy within two minutes after the alert comes in.

The DMOS supervise and control the safe intervention of the responders on an incident site. During the intervention the first and foremost task of the DMOS is to help and support the work of the incident commanders. When the case has been justified, they can take over the command. When an incident runs out of control, the DMOS will address the situation immediately. In case of large scale, complicated events which require a large number of resources, the DMOS organises and controlls the command staff, while also initiating the engagement of volunteer rescue services and controlling their activity on site.

The on-duty emergency call system of the disaster management operates 24-hours a day on each level to receive reports and emergency calls from citizens, and it carries out reporting and data provision activities to superiors and partner organisations.

The DMOS is constantly monitoring the availability of necessary personnel and physical means of safe interventions. The team members pay special attention to hazardous materials incidents, as well as to rescue operations from heights and depths. They also collect data about the use of PPE, its functional requirements or potential shortcomings or damage.

Exercises

DMOS organises training for the fire service units in its respective counties in order to improve operational preparedness, as well as technical rescue exercises. These also include other rescue agencies, which are no part of the fire service.

Organising, managing and monitoring tabletop exercises, firefighting drills, joint emergency management exercises are also amongst the duties of DMOS.

Over the last couple of years approximately half of the fires in Hungary have occurred as a result of open fires. DMOS puts emphasis on the training of fire investigation staff. In addition to its own training program, DMOS staff are trained by police investigators and US fire investigation professionals.

Tasks of the DMOS include fast, efficient and safe intervention during firefighting events (fires, accidents, and other damage control); evaluating and monitoring fire tests as well as the analysis of incidents, of which the conclusions can then be used in the field of prevention and intervention; and coordinating firefighting and technical rescue activities. The main task of the agency, however, is to make Hungary a safer country for its residents.

Captain Tamas Timar, Unit Leader of the Disaster Management Operational Service. Basic requirements to be part of DMOS are a BSc or MSc, to have been a fire chief with two years' experience, and to have a driving licence with extra blue lights qualifications.

THE MAIN FUNCTIONS OF DMOS

To support fire service incident commanders
To take over the management of large scale fires when deemed out of control
To be on 24/48 hours standby duty
To respond to any call out within two minutes
To deploy to the incident site with the pre-determined equipment
To implement operational analysis
To continuously monitor conditions for safe interventions
To supervise the quality of service.

Floodfighters unite in

The Floodfighters Masterclass 2014 event was held 10-17 October in Charlotte, North Carolina, USA, and again these action-packed water rescue days were hosted by Charlotte Fire Department attracting rescue pros from all over the world, writes David Lane from Lane, Jefferies & Associates.

Charlotte Fire Department, led by Chief Jon Hannan and North Carolina's Department of Public Safety, were the organisers of this year's Masterclass, the latest in a series organised in conjunction with the UK FRS. The aim of the events is to further develop flood response and major incident management capabilities.

Battalion Chief Tim Rogers and NC Emergency Managers Jeff Cardwell and Greg Atchley delivered a full briefing on the week's operations to come and the history of the CFD and North Carolina Department of Public Safety (NCDPS) swift water/flood programme from the frontline of hurricanes and natural disaster.

The delegates then set off to Lake James Operations for special rescue operations with inflatable rescue boats (IRB), patient/survivor management and rescue stretchers. The delegates also got to grips with navigating by GPS in small rescue craft, IRB beaching and survivor transfers.

Chief Dulin then prepared the attendees for a night-time, multi-boat, area-wide flood SAR exercise on Lake James, a flooded valley.

The next day the exercise continued under threat of

North Carolina

approaching tornados. The participants trained at paddle boat, rope operations, survival swims, throw-bags, shallow water crossing techniques, contact and towed swim techniques, live bait rescue techniques and some further IRB Operations of ferry gliding and hovering, power turns, survivor recovery/pick-up – after which everyone went for safe shelter from the approaching tornado.

On the following day delegates headed to Lake James to await the arrival of the North Carolina National Guard aviators with one of their UH-60 Blackhawk helicopters to undertake HART Water Operations. North Carolina (NC) Emergency Management's Helicopter Aquatic Rescue Team (HART) is a 'special ops' team consisting of NC National Guard, NC State Highway Patrol air assets, emergency management and local emergency services personnel. Candidates for HART technician positions are chosen based on stringent prerequisite training, as well as a rigorous physical fitness evaluation. This partnership with soldiers from the NC Army National Guard is a very successful collaboration for missions involving swift water/flood rescue, lost persons and urban/wilderness high angle rescues.

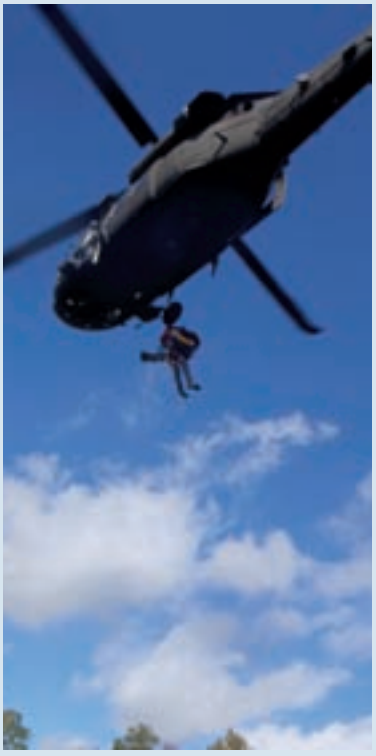
The attendees participated in several helicopter-aquatic rescue training operations.

The following morning the attendees undertook table-top exercises in wide area search operations (WASO).

The Floodfighters Conference was held on October 17, and the delegates enjoyed a very full programme delivered by expert presenters from all over the world on how to mitigate flood hazards and how to improve water rescue response.This was also broadcast on the web.

Deputy Chief Jeff Dulin said: 'The biggest thing that we get out of this is that we meet fellow firefighters from across the world and we exchange ideas – because they do things a little bit different than we do. In this manner we can always learn from eachother. We build lifelong friendships.'

Chief Jon Hannan presented delegates with their IFE and NCEM CPD certificates, highlighting how much he had appreciated the excellence in training he had witnessed during the week.



Saved! A UK delegate is airlifted during a HART rescue evolution.
Photo: Professional Rescue and Charlotte FD.

The Swiss army knife of stretchers

ANYONE FACED WITH TRANSPORTING A CASUALTY OVER ROUGH, DIFFICULT TERRAIN OR REMOTE LOCATIONS NEEDS A STRETCHER THAT IS LIGHT AND STRONG AS WELL AS EASY TO CARRY, DEPLOY AND RE-STOW. IS THAT TOO MUCH TO ASK?

The perfect stretcher would feature cross-chest straps and a figure-of-eight foot harness that would permit vertical lifting without the risk that the patient would slide off at either end. Hopefully too it would include a number of other useful features; a system that would protect and immobilise the casualty's head – for instance – that could be used with or without a collar, not to mention the ability to stay afloat with a patient on board if the individual concerned was wearing a lifejacket. Useful too would be a lifting eyelet rated at 200kg at the top for vertical hauling or lowering.

All these qualities and a lot more are to be found in the Saviour Tactical Stretcher. That is despite the fact that it is a roll-up stretcher that weighs a modest 5kg or thereabouts as opposed to 10kg to 15kg for a normal stretcher.

'I designed it in conjunction with a manufacturer, and it's made in a factory just outside Liverpool, UK,' said Saviour designer, Paul Savage OBE (Officer of the Most Excellent Order of the British Empire). 'Because it is British made it conforms with all the relevant EC Directives and requirements for CE marking,' he continued. 'UK production also means that we can ensure it is a quality product.

'It comes in either a tube or a rucksack-type bag with dimensions of 70cm by 30cm by 30cm when packed. Furthermore, when in use, if required, it will fit inside any standard

The Saviour Tactical Civillian and its bag.

The Saviour series of stretchers cocoon the patient. They feature a 'double skin' down the centre for increased spinal support.

basket-type response stretcher for the onward patient journey. This means, for example, if firefighters are using a Saviour Tactical to help rescue somebody within a building, and a hydraulic platform with a basket-type response stretcher has to be deployed, the Tactical and the casualty can be put straight in the basket,' said Paul, adding that Saviour Tacticals fit into all standard aircraft litters too.

'What we're thinking about here is the onward patient journey. The ability to put a Saviour Tactical and the patient into so many things means that the patient doesn't have to be decanted all the time. This is crucial as we know that constant rolling and moving from one stretcher to another is detremental to the patient.

'The Saviour Tactical is actually quite comfortable and comforting. It cocoons you.'

So-called because it can be deployed rapidly, the Tactical uses a skin made from low-density polyethylene. 'What makes it slightly different from normal roll-up stretchers however is that it has a double skin down the centre for increased spinal support.

'Another advantage is that all the straps are individually replaceable, which means that if you get one that is so significantly contaminated that there is no way it can be decontaminated, then you can simply change it. As a consequence you don't have to throw away a stretcher costing hundreds of pounds when you can spend £15 ($22) on a new strap and it can be put back into use.' This is an important advantage Paul stressed. 'There is no other stretcher of this type with replaceable parts currently on the market. Other stretchers are, theoretically, single-use, with straps that are sewn in with a lot of stitching, which means a lot of potential contamination points. The Saviour Tactical's straps have a five-year life while the skin has a ten-year life.'

The Saviour Tactical also comes with integral head and foot end drag harnesses. 'The harness is a 6m loop of material. Once the casualty is on the stretcher you can break the loop out, tuck it around you and start walking. You can drag them up and down stairs, across grass, across concrete, you name it. A single person can extricate a single person when needs be. In today's volatile world with the possibility for mass casualty incidents, the ability to drag will provide rapid effective evacuation using minimal rescuers.'

The materials used in the Saviour Tactical can cope with wet, sandy and other harsh environments. 'They've been trialled primarily under severe maritime conditions.' Plus they are X-ray translucent and CT scanner friendly. 'With the Saviour Tactical, a casualty can go from being trapped at the top of a building to being X-rayed or scanned at a hospital without having to be taken out of the stretcher at all.'

A non-intended bi-product of the cocoon nature of the Saviour Tactical is that it can act as an effective pelvic splint when the casualty is in it and the stretcher is tight. 'We've had cases where patients have undergone a CT scan and it has been discovered that the Saviour Tactical was the only thing that that was holding their pelvis together.'

Furthermore, the positioning of the straps means that defibrillator pads can be used and chest compressions performed, again without the patient having to be removed. The Saviour Tactical will fit an automatic LUCAS chest compression system too without modification.

'Soft carrying handles ensure that two or four people can carry the Saviour Tactical easily. Poles can be used if heavier casualties need to be transported over long distances.'

Tactical is neutrally buoyant. Drop it into water and it will float and its ability to keep a patient in a lifejacket above the surface of the water means that it can be relied on in water rescues. 'You can swim the casualty out to a waiting boat using the drag harness.'

Paul hasn't stopped with the Saviour Tactical, and it now has a new stable-mate called the Saviour Technical. Opt for the Technical and you will get the same features as the Tactical, plus a 200kg horizontal lifting capacity as well as an enhanced vertical hauling capability. 'The Technical has been designed to add certified horizontal and vertical lifting capability and is therefore perfect for line rescue teams and similar operations. It really is the swiss army knife of stretchers.'

No more expensive than anything else on the market, the Saviour Tactical is in use with the Royal National Lifeboat Institution (RNLI) across its whole inshore lifeboat fleet and on trial with the Maritime and Coastguard Agency. 'It's in use with specialist units of the British armed forces too and has been sold to military and search and rescue teams abroad

'Before you buy another stretcher, consider the Saviour range. The Saviour Tactical and Technical provide solutions to all patient extrication and transportation issues in one cost effective unit. The ability to drag, lift, float, haul and winch makes these products unique in the market.'

The Saviour Technical and its bag.

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