A world's first

In today's climate, it is entirely possible that a firefighter can come into contact with CBRN materials at any time – and if so, there is a valid argument that a firefighter's turn-out gear should include a level of CBRN protection. In the event of an incident, this type of combined garment would allow him to vacate the area safely, rescuing injured personnel while escaping. Jose Maria Sanchez de Muniain talks with Karen Lehtonen, Director (Products), Lion Apparel, about a new piece of kit that is said to be the world's first fully certified structural firefighter CBRN ensemble.

Karen Lehtonen: "We are increasingly finding that end users are not afraid to challenge the existing protocol and seek out new science, often from other first responder groups, and this sharing of knowledge and experience is of real benefit in an effective decision-making process."

Lion's CB-Xit garment is a very intriguing example of a new garment which combines fire protection for everyday requirements with a level of NFPA-approved CBRN protection. Its manufacturer Lion strongly believes that this type of combined garment – which provides some CBRN protection for everyday working life – represents a real breakthrough and new platform for tackling the global terrorist threat.

So which textile/composite elements of the turnout gear comprise the CBRN protection?

It works by combining the form-fitting, contoured mobility features of Lion's V-Force turnouts with the chem-bio protection of WL Gore & Associates' Gore Chempack barrier technology. The lightweight PBI Matrix outer shell and patented Shadowbox reverse-orientation thermal liner system of the CB-Xit work together to provide thermal protection coupled with a high level of breathability. The reverse orientation thermal liner also provides an added layer of protection to the barrier from thermal assaults. The WL Gore Chempack barrier technology provides protection from specified CBRN agents as well as certain particulates. The Lion-designed interface components of the ensemble also provide for added protection from vapour inward leakage.

CB-Xit's level of inward leakage protection is considerably above the spec required for NFPA 1971, CBRN option for vapour protection. Why?

The interface components designed by Lion decrease the amount of vapour inward leakage from the environment to the wearer. The unique components and interfaces used by Lion allow for a level or protection over two times the NFPA minimum.

The materials of construction also allow for the physiological protection to exceed the NFPA minimums in areas such as TPP [thermal protection performance] and THL [total heat loss].

Given that the ensemble includes hood, gloves, boots and SCBA – all of which a fire department will already have purchased – what are the alternative options for a fire department wanting to protect its firefighters against CBRN incidents? Could a fire department purchase the CB-Xit turnout clothing only, and still be protected?

The CB-Xit is certified as an ensemble with specific interface components and elements ie hood, gloves, boots, and respiratory protection. The only way to achieve the designed and certified protection is to utilize the ensemble in the certified configuration.

Substituting other elements will reduce the level of protection provided by the ensemble and may not provide the level of protection necessary to escape from a CBRN terrorism incident. A fire department cannot certify an ensemble – only the manufacturer or the supplier of the ensemble can make the certification.

Effective operational balance is key. If we consider alternative options for a fire department it is notable that Lion has proactively created a range of garments which take into account many different operational requirements and many different threat levels. A fire department may therefore be interested in other garments or ensembles as there are notable crossovers in selection. For example, the Fire Department City of New York has recently upgraded its CBRN protection capability with the help of Lion's MT94, a single layered lightweight one-piece garment which is ideal for HazMat and search and rescue.

FDNY chose the MT94 because it will provide its HazMat teams with a more functional alternative than wearing traditional fully encapsulated Level A suits.

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Does CB-Xit comply to a European equivalent standard to the CBRN element of NFPA 1971?

We do not believe there is a European equivalent to the NFPA 1971 CBRN certification requirements since NFPA 1971 covers structural firefighting gear with a CBRN option for escape from the hot zone and not dedicated CBRN entry protection as in NFPA 1994.

What would you say to fire departments who still only purchase fully encapsulated – ie gas tight – CBRN protection garments?

The historical protocol amongst the wider first responder community created the ideology that fully encapsulated Level A garments were the only viable choice for CBRN protection because these garments are the only type to protect against absolutely everything. However this type of protection presents other challenges because it is difficult to operate in these garments for prolonged periods and carry out essential duties – and heat stress is a real issue.

Today more fire departments and indeed other responder agencies are recognising the value of balancing lower physiological burden with adequate levels of protection. It is essential that firefighters can carry out their duties. Lion would simply urge fire departments to trial the new generation of balanced fit-for-use garment protection. We are challenging the traditional protocol but offering a new way of thinking and a host of tangible benefits.

How should the CB-Xit be cleaned after exposure to CBRN attack?

If exposed to CBRN materials, the garment cannot be worn again and must be disposed of appropriately. In our experience, as part of their health and safety protocols most end user communities would not re-use a contaminated garment. Since it is a one-time exposure ensemble, the CB-Xit should not be cleaned and re-used. If not exposed, the garment is of a durable firefighting construction and can be worn multiple times.

Is CB-Xit more expensive than an equivalent ensemble minus the certification?

As you would expect, CB-Xit is more expensive than a general turnout garment. This is due to the additional costs in barrier materials and interface components. However, if we accept that firefighters face the unknown on a daily basis then the benefit of providing them with ever-present CBRN protection outweighs the extra cost. It is simply worth it for unique peace of mind protection. The CB-Xit provides the firefighter with vital minutes to escape from a hot zone when exposed to sarin, anthrax or nuclear particulates, and so the additional cost is negligible if we consider the real life benefits.

Lightweight chemical protection suit makes European debut

A new gas-tight chemical-protective suit that has been launched recently in Europe by Saint-Gobain Performance Plastics is gaining much interest – and not surprisingly considering there has been little innovation in this sector for a number of years.

The new Type 1 ONESuit Pro is a single-skin suit designed to be worn over BA and – whilst providing certified protection against chemical and biological agents – it also offers new levels of wearer comfort.

Ian Hutcheson, Marketing and Development Manager for Saint-Gobain Performance Plastics (Ireland), told *IFJ's* Jose Sanchez de Muniain that the polymer technology employed in the ONESuit Pro originally came from the military sector.

Although the ONESuit Pro was originally launched during the FDIC in 2009, European certification has now been secured to level EN 943-1 and EN 943-2 – the highest in the European Union and Asia.

Customised versions of the suit will be available for industrial, emergency team, and CBRN applications.

"What makes us unique is that we manufacture all the materials within the suit, using our expertise in fluoropolymers. We carried out the research in our own laboratories and we have something that is unique in terms of cost, comfort and protection," said Hutcheson.

The chemical resistance aspect of the suit is embedded into the inner face of the polyester base material, which means the crucial barrier is protected from abrasion.

The outer face is formed of a robust "sacrificial", polymeric coating so that the suit is puncture resistant.

Unlike other solutions on the market, the suit is made by welding the different fabric panels together, which avoids punching holes in the suit material as is done with sewing techniques and involves lower production costs than bonding and over-taping techniques.

The suit has been certified for limited use by emergency teams, and Hutcheson believes that the so-called "limited life" concept provides a higher safety level to firefighters, as well as being more cost effective than re-usable equivalent products. "This is because in using limited-life products you are not dealing with decontamination issues, using water and then having to deal with the run-off, and handling the gas-tight suit when you don't know whether it is fully decontaminated. You can clean a suit with water but you can never be quite sure it is decontaminated and validation is difficult."

Hutcheson adds that after an emergency the decontamination of a conventional re-usable gas tight suit – which also requires recertification prior to being reused – can cost hundreds of euros/dollars. Limited-life suits, however, by definition are not reused after exposure to contaminants but can be re-used if no exposure has taken place. "If you go to an incident and it turns out the responder hasn't been exposed to chemicals, you can take appropriate measures and pack it up again, ensure there are no holes with a pressure test, and then use it again."

A number of ONESuit Pro suits are being trialled in the UK and France. "People are impressed with its flexibility and the fact it compresses well and is easy to pack in the back of a tender. The big pressure on value that brigades are under is also working in our favour."

In the US, concluded Hutcheson, it is gaining popularity for being lightweight whilst providing a high level of protection.