

# Achieving fire fitness for

How useful would it be to know the exact welfare status of firefighters on the fireground, in real time? Or being able to accurately analyse the fitness levels of firefighters quickly and easily in the gym? *F&R* looks at the latest technology.



*The Inbody 520 provides essential information about a firefighter's fitness levels.*

The US Coastguard has reported that a firefighter's core body temperature can increase to 104 degrees Fahrenheit or 40 degrees Celsius during operations. Working in the most harsh and demanding environment imaginable can have all sorts of detrimental effects on health and can result in firefighter deaths. Heart attack and heat exhaustion are more often the cause than burns or smoke inhalation. Heart attacks occur as a result of poor cardiovascular health, and under the harsh conditions encountered on the fire ground it is important to know when a firefighter is getting overstressed or over heated in order to remove him from this critical situation in advance.

UK company Hidalgo, part of the Jaltek Group, launched a new field-deployable occupational welfare system at the recent Fire and Rescue show in Birmingham. The Equival welfare status monitoring system was developed by Cambridge-based Hidalgo, with development partners, the US Department of Defense (US Army Research Institute of Environmental Medicine) and Cambridge University Hospital, and has achieved stringent medical approvals in the UK, Europe and US.

The Equival system measures a wearer's real-time welfare information, which is transmitted and can be displayed in a remote location in a meaningful format for the user or viewer.

The Fire Service College in Moreton on the Marsh has tested and installed the system for the monitoring of firefighters during training scenarios, and an advanced trial paper was published last year by the US Montana Woodland firefighters on the ease of using Equival and the high quality of data achieved in field operations.

The Equival Monitoring unit consists of the monitoring belt and the Equival sensor, weighing less than 75 grams. The sensors are designed specifically to operate in harsh environments and maintain performance in the presence of heavy perspiration. The application to the body using a comfortable chest belt has proven very popular and unobtrusive in trials.

The sensor monitors various physiological functions directly from the body and using on board intelligence can use this to ascertain conditions like heat stress and exhaustion. This data on the wearer's body functions can be remotely monitored by an external team using Equival Explorer – a standalone software application also developed by Hidalgo. Alternatively, data can be integrated with a traditional incident management software platform.

The Equival system features multiple radio interfaces and is radio system agnostic. Group Marketing Manager David Roome added that the complete system or core elements which integrate into a wider incident management platform can be provided.

According to Roome, the system is very cost effective, but for most organisations he has spoken to, cost is a secondary issue. "For the fire service this system takes the data that indicates a firefighter's wellbeing, and derives a specific measure from it such as fatigue level or heat stress, both of which are critical in this occupation. Instead of presenting the control centre with a detailed waveform view, which is far too complicated, the system analyses the data and produces a simple welfare index indicator like traffic light display. The detailed data can also be viewed if required."

Based on this data, the command and control team can cycle

# life

firefighters efficiently to make maximum use of available resources while also performing a greater duty of care to the firefighter.

The uses for Equivital are numerous. Apart from using it for lone workers in extreme situations, the device can also be used for triage by placing the sensor unit on a casualty using a self-adhesive pad. Roome explains that this can be applied directly to a casualty's chest as an enhancement to basic medical triage during any incident. Roome added, "It enables the users to set up a virtual monitoring centre at the site of an incident where it may be difficult to keep track of all casualties. "Equivital is a world leading system in its class and is set to positively change the way the emergency services operate, specifically allowing protection and monitoring of personnel and casualties during major incidents."

## Biospace Inbody

It is not just on the line of duty that the firefighter is at risk from life threatening conditions. More often than not, heart attacks happen after the exposure to stressful situations, and this is why cardiovascular health for firefighters is essential during every stage of their career, and not only during the initial recruitment process. Staying fit and healthy is a challenge at any given time, but for firefighters it is essential to keep themselves motivated, and that is why Korean-based company Biospace has introduced a series of ingenious new devices, called Inbody, that can accurately measure all levels of fitness of the human body. Having successfully introduced the Inbody to fitness centres and military organisations all over the world, the company is now looking at other sectors where this type of equipment could be beneficial.

Philip Middleton from Derwent Healthcare, the UK distributor for Biospace, explains that the idea behind the analyser is that it motivates people to stay as fit as possible and achieve the fitness levels they require to perform in their role.

"The device can be placed anywhere, but it would be beneficial to put it in the firefighter gym, where people will see it and use it. You step up on the plate with minimal clothing on, take hold of the handgrips, and Inbody passes an electric current at different frequencies through the body. Biospace sets itself apart from any other products, by obtaining a complete measurement of each arm, leg and trunk. This provides extremely accurate results, detailed enough for professional use, while giving a detailed break down of your internal composition," says Middleton.

The Inbody comes in three different models, the 230, the 520 and the 720. The difference between the models is the number of frequencies sent through the body, for instance, the 230 sends two frequencies out and the 720 produces six. The more frequencies used, the more information the Inbody produces.

Middleton adds that the Inbody range can provide much beneficial information. "When you look at cardio vascular risk, for example, which is extremely important when an occupation is stressful, the Inbody 720 would tell you how large your visceral fat area is. The visceral fat area, is also known as abdominal fat, and high amounts of visceral fat are closely linked to an increased



risk of cardiovascular disease, heart attacks and diabetes. In short, it is not the fat on the outside that kills you, but the fat you can't see. By determining how high fat levels actually are, the user can bring these down by adapting the right diet and exercise for this purpose."

Middleton explains that Derwent healthcare provides full training in both operation and interpretation of the data of the Inbody, and it doesn't stop there, because the company will deliver ongoing support. People find the Inbody analysers very motivational, says Middleton. "Some of our clients are companies that use the device to monitor occupational health, and they find that people tend to keep hold of their results and try to improve upon them. Generally, when people try to lose weight and increase their exercise regime they get demotivated when they do not lose weight due to muscle increase. With the Inbody however, it is possible to see that fat has decreased and where and how much extra muscle you have developed, which is fantastic for motivating yourself."



*Equivital system measures a wearer's real-time welfare information, which is transmitted and can be displayed in a remote location.*

*The Inbody 720 is the most advanced body analyser in Derwent's range, and provides information on the size of the visceral fat areas in someone's body.*