

HELPING FIREFIGHTERS AVOID BURN HAZARDS ASSOCIATED WITH FIRES

1,800 to 10,000 firefighters are burned annually, even though they are wearing modern personal protective equipment (PPE) (Lawson 1996, Stroup 2007). One reason for the high incidence of burns is that firefighters cannot tell how hot their environment is because firefighting PPE works so well. Without knowing it, a firefighter can be in an environment that is so hot that their breathing apparatus and other protective gear begins to fail. The hazard associated with infrared radiation (IR) is particularly acute because the intensity of IR can increase to dangerous levels in a few seconds (Mensch 2011, Lawson 1996).

Through a Small Business Innovative Research (SBIR) award, the Department of Homeland Security Science and Technology Directorate is working with TDA Research, Inc. to develop and produce the "Burn Saver" thermal sensor to provide real time alerts to firefighters in dangerous thermal conditions. Firefighter turnout gear ensembles can only tolerate exposure to Class IV fire conditions [(500° – 1832° F; heat fluxes of 10 – 100 kilowatts per square meter (kW/m²)] for less than a minute before degrading. Providing firefighters a timely warning that PPE failure is imminent will permit them to rapidly respond to the thermal hazard to avoid catastrophic protective ensemble failure.

BURN SAVER

The Burn Saver is a smart, wirelessly connected heat load sensor/thermal hazard identifier that attaches to the right shoulder strap of the Self-Contained Breathing Apparatus (SCBA). It weighs 12 ounces and is 3.5" wide by 3.75" tall. It is powered by a single AA battery that will last approximately one month if the Burn Saver is used 3 to 4 times a week. The Burn Savers are water and dust resistant and have been exposed to 1000° temperatures while continuing to log temperature data and send alarms. The white, sheet metal covers make the Burn Savers very tough and are coated with a ceramic glaze



developed for automotive exhaust parts. The Burn Saver has a patented sensor array, which permits directional tracking of thermal hazards and the ability to integrate heat loads over time. Without directly measuring the temperature of an SCBA facepiece lens, the Burn Saver can accurately predict its temperature and time before thermal degradation. The Burn Saver's predictive ability takes responsibility off firefighters to continuously monitor their accumulated heat loads, allowing them to focus on their jobs.

ALERT METHODS ARE CONFIGURABLE

The Burn Saver can be configured to provide more or fewer alerts based on firefighter preferences. It can be connected to Land Mobile Radios and HUD systems on smart SCBA packs. SCBA manufacturers can easily integrate Burn Savers into their PPE suites with minimal programming changes. The Burn Saver can use Bluetooth protocols from 1.2 to 5 and have alert LEDs that function well as buddy alarms.