Invisible Flame Imaging

As the truism goes, “where there is smoke, there is fire.” But with a device called FIRESCAPE™, firefighters can now see invisible flames from alcohol and hydrogen fires during the day and even see through smoke.

An electronic flame imager, originally developed by NASA for rocket engine testing, is being manufactured and sold to firefighters by SafetySCAN, LLC. of Buffalo, New York. SafetySCAN, a company that specializes in opto-electronic sensor and display systems for firefighters, calls FIRESCAPE the first affordable commercial product for invisible (or ashless) fire imaging.

The technology was developed by John C. Stennis Space Center to visually assess the presence, location, and extent of hydrogen fires. The need for such equipment was generated by the center’s use of more than one million gallons of liquid hydrogen per month in its rocket engine test programs. Indeed, hydrogen fires are a significant risk.

Previously, firefighters responding to a hydrogen fire had to give the suspect area “the broom test” by carefully probing the suspect area with a corn straw broom to determine the presence and location of a fire. This technique has significant safety and accuracy shortfalls, particularly in windy outdoor conditions where flames can easily change direction.

“There was a huge gap in technology between the $3 broom and the $30,000 thermal imagers,” says Heidi Barnes, a Stennis engineer who, along with colleague Harvey S. Smith of Lockheed, originally developed the device. “Firefighters need a reliable but economical device to assist them in their work. The technology was there; it has just been a matter of developing something relatively simple to use and getting it out there to them,” Barnes says.

The NASA-developed equipment detects and images the infrared emissions from the final combustion process, providing a true depiction of the fire size. Heat from vapors or surfaces is ignored, while the flames can easily be identified in the context of the unaltered surroundings. Sunlight, fog, smoke, or mist do not significantly diminish imaging capabilities. The hand-held hydrogen fire imager can detect invisible flames of hydrogen and alcohol fires, but is also helpful for firefighters in controlling conventional fires.

As a result of a market assessment performed by Research Triangle Institute (RTI) for Stennis, the fire imaging technology was determined to have commercial benefit. Based on this information, NASA applied for a...
The Stennis Space Center fire department illustrates how the fire imager can be used to see through dense smoke to find a staged victim trapped in the building.

Stroze adds that, ultimately, the fire safety market will be an even bigger winner through the potential of greater loss prevention. "And we are proud to say it all came about through the dedicated efforts of NASA, its affiliates and SafetySCAN personnel," he says.

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