

Complacency with Technology **By Kara Wehmeyer**

Technology has slowly become a part of our everyday lives. Some people joke that our lives depend on technology, but for firefighters, that is the case. America's first fire department was started near Boston in the late 1600s. The equipment used and the fire service itself have grown tremendously since then. All of these changes leave citizens and public safety officials with one thing to consider, are firefighters relying on technology too much.

The story of the first recorded fire of America started with the Pilgrims in May 1607. Few had survived the harsh winter of Jamestown, but the arrival of Captain Christopher Newport and 80 new colonists raised morale. The newcomers brought with them gunpowder, tools, and food. These supplies did not last as long as expected. Just days later, a fire destroyed the supplies and many of the homes in Jamestown. The response to this misfortune is seen time and time again throughout America's history. For example, creating laws only after a serious destruction of either life or property occurred, rather than planning safeguards ahead of time. The Pilgrims did not have a fire service, but rather made changes to the way they constructed their buildings by using denser materials that could better withstand fire.

Due to technology advancements, firefighters of today are better equipped than those of the late 1600s. The first fire department was serving the community before the invention of cars; therefore, water could not easily be transported to the house. Instead, homeowners were required to have buckets of water and ladders close by. This is the same principle as fire extinguishers today. When a firefighter arrived on scene, he would climb to the highest point of the building and smother the fire with the bucket of water.

The protective clothing consisted of a thick layer of wool. As rubber development progressed, it was used to cover the wool as an added layer of protection and to keep the wearer dry. Air packs were not yet used, if someone was in the building, firefighters would drench their beards in water and bite them, while breathing through their mouth. This acted as a small filter, but they would still be choked up by the fire's byproducts.

Again, many lives were lost before it was discovered that entering these smoky atmospheres was detrimental to the firefighter's health. In 1863, a patent for an "improved respiring apparatus" was granted (Lewis). This was the first self-contained breathing apparatus, meaning the firefighter was not connected to the outside by a hose. The mechanism consisted of an airtight bag made of two layers of canvas separated by a lining of rubber. It was attached to the firefighters' back by two shoulder straps and a waist strap. The bag was filled with pure air through a pair of bellows and came in different sizes for air durations of 10 to 30 minutes. A rubber tube ran from the top of the bag to a mouthpiece and was held in place by biting down with the teeth. This device came with a pair of goggles to protect the eyes from smoke, a rubber clamp for the nose, and an air whistle used to signal for help.

With the enhanced technology, firefighting actions were able to expand. Firefighters were able to make interior attacks on the fire, meaning they could enter the house and extinguish the blaze from a different angle. They were also able to search for victims, potentially saving more lives. Along with these new opportunities came three tactical priorities every firefighter is taught to live and work by life safety, incident stabilization, and property conservation. The measures taken to fulfill each goal have changed since the initial introduction.



Fire extinguishing measures are taken so much sooner than before. Many fire departments are able to conduct pre-incident surveys on the buildings in their jurisdiction. This allows fire crews to take notes of special precautions they may need to take before making entrance if ever called to the building. Pre-incident surveys make extinguishing the blaze much easier; firefighters already know what hazards they are facing and how to control these threats. The collaboration between the fire department and homeowner also decreases the chance of fire for that building.

While technology was developing more hazards for fire crews, it was also finding ways to better protect them in these hazardous situations. One item that is continually being tested and updated is the firefighter's personal protective equipment, or PPE. Firefighters started with only wool coats and pants. Today, the National Fire Protection Association (NFPA) requires fire gear to have three layers: outer shell, moisture barrier, and thermal barrier. The outer shell is the first line of defense. This layer provides flame resistance as well as protects the skin from cuts and abrasions. The moisture barrier provides resistance to water, chemicals, and viral agents. The thermal barrier is the layer closest to the firefighter. It soaks up the sweat, but it also reduces heat stress on firefighters and provides comfort and moisture management. All three of these layers are key to keeping a firefighter safe in dangerous conditions.

Another important, but often forgotten, piece of a firefighter's PPE is the hood. Even though the hood protects the ears and neck, it puts the firefighter's life in more danger. The use of technology has produced hoods that keep heat out

so well that firefighters do not realize how hot it is until it is too late. Before the use of hoods, firefighters relied on their ears to tell them how hot the fire was. If their ears started to burn, they knew that they needed to back out. With this sense of heat detection gone, firefighters are making their way well past the safety point in fires. While their ears may not be suffering, other parts are. Particles from the burning material attach to the hood, causing problems later. These particles can permeate the skin, causing thyroid cancer, or particles can also be inhaled, building up in the lungs over time and leading to lung cancer.

Clothing is not the only part of a firefighter's protective equipment. The SCBA has made vast improvements over the years. The first apparatus was developed as a replacement for the beard-biting technique in fires. In the early 1980s, firefighters began entering fires with Personal Alert Safety System, or PASS devices, attached to their SCBAs. Firefighters would sound their PASS device if they became lost or trapped. Fellow firefighters would follow the sound until they found and rescued the down firefighter. The effectiveness of these devices was proven by the decrease of firefighter fatalities. The next step was taken years later when the PASS device would sound if a firefighter did not move for 30 seconds. This benefited firefighters who might have lost consciousness in the fire. Today, technology has made it possible to track the firefighters from outside the fire. The incident commander can keep track of each firefighter's air supply and where they are located in the building. These enhancements allow rapid intervention teams to provide help for down firefighters sooner, potentially saving lives.

This picture depicts an extreme but all too common issue in the fire service. Against all teaching in the fire service, firefighters develop tunnel vision inside the blaze. They focus on finding the fire and survivors that they do not notice what is going on around them until it is too late. Failure of the lens, as represented in this picture, exposes a firefighter to toxic gases and can result in burns to the respiratory tract and asphyxiation-death by suffocation. While the firefighter failed to recognize the rapid deterioration of the scene, deadly events such as flashovers are becoming more of an issue. Typically, flashovers occur when firefighters make entry, allowing the heated objects oxygen and the opportunity to ignite. Entering situations like these are costly. Firefighters have mere seconds to escape before being burned alive. Everything igniting at once causes the temperature inside the room to skyrocket. The human body can handle up to 200°F before it shuts down, and the equipment protecting the firefighter tends to give way around 500°F, but flashovers can cause conditions that exceed 1000°F.

Flashovers are becoming more of a problem. One reason is firefighters started making interior attacks after they had the proper equipment to do so. In addition, more energy-efficient homes with higher fuel loads prevent proper ventilation of smoldering objects and cause temperatures to increase. Another cause is the development of synthetic materials, objects that are more common than would be ideal. While synthetic materials are often more affordable and versatile. These materials tend to have lower ignition temperatures than natural materials and burn quicker. Melting can go undetected for extended amounts of time, steadily raising the objects' temperature, as well as transferring heat to surrounding objects. Many homes today are being constructed with synthetic materials. These lightweight homes are more energy efficient, but they are a total loss if they ever catch fire. A study was presented during my firefighter 1&2 class that showed a home constructed from



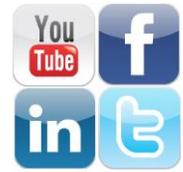
natural fiber burned for about 30 minutes before it flashed-over. In a home of the same size constructed with synthetic materials flashed-over in less than five minutes. Fiery blazes can tear through these homes before fire crews arrive on scene. In some cases where firefighters arrived on scene in time to make interior attack, they did not always make it out. Eight firefighters died in 2013 due to building collapse (Fahy).

A book titled *The Volunteer Fire Company* quoted a report from a 1975 Connecticut committee stating, "Firefighting machines have become infinitely more powerful and sophisticated... Yet in so many ways things have not changed" (Earnest 184). They reasoned this claim with the fact that the duties of the fire companies have remained the same from the beginning to now. The first priority is to remove people from the burning building, and the second is to put water on the fire. Throughout the years, the nozzle men have been shouting for the same thing: more water. While technology has enabled homeowners to call in sooner and shorter response time for fire crews, homes are not lasting as long due to change in building construction. We should not be giving up safety with the development of technology.



Many homeowners have been using smoke detectors to alert them of the presence of fire. Following a series of devastating textile mill fires over a hundred years ago, New England businesses developed sprinkler systems to save their property. Since then, many commercial buildings have been using this technology. Recently constructed houses have had similar systems installed. According to the National Fire Protection Agency, the activation of just one sprinkler head has the ability to catch the fire in its smaller, beginning stages, slowing the fire damage tremendously.

While technology is making our lives easier, it is making a firefighter's job more dangerous and often deadly. They are not superheroes, but rather ordinary people who consciously put themselves in extraordinary situations. Firefighters do not choose to put their life on the line, but as part of the culture defined by the International Fire Service Training Association, they will risk their life to save a life. On a fire scene, it is the firefighter's job to put their training into practice and keep themselves and their team safe. While technology has made the inherently dangerous job safer for firefighters, it is the duty of the firefighter to remember that he or she is not invincible. The opportunity cost will never be greater than the life of a firefighter, no matter how much we begin to rely on technology.



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