Transitional Fire Attack

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The perils of lightweight construction and rapid fire growth associated with synthetic combustibles have been discussed extensively throughout the fire service over the past two decades. As firefighters, we've been inundated with reports and statistics detailing these hazards, intended to raise our collective awareness so we don't become the subject of the next National Institute for Occupational Safety and Health (NIOSH) firefighter fatality investigation report. The messages are often "Know your district," "Train more," "Be a craftsman," and so forth. Although these are tried-and-true pearls of wisdom for firefighter success, they fail to provide a specific, tangible approach to safely and effectively mitigating two of the greatest threats to firefighters today: lightweight building construction and the increased use of synthetics in finish materials and furnishings.

All too often, firefighters find themselves inside buildings that have collapsed "prematurely" or caught in flashovers because of rapid increases in heat and smoke conditions. Interior structural firefighting tactics have changed little in the past quarter century, whereas the conditions within burning structures and the hazards presented have changed significantly. With these factors in mind, it begs the question, "Is there a way for firefighters to slow fire growth and increase interior structural tenability prior to making an offensive fire attack?"

With regular self-contained breathing apparatus (SCBA) usage and improved turnout gear performance over the past 25 years, offensive fire attack is the tactic of choice for confining fire and effecting victim rescue inside burning structures. However, offensive attack is often called for reflexively, without a complete size-up of the structure and fire conditions and sometimes without first confirming with the business owner or homeowner outside that everyone is out of the building and safe.

(1) A firefighter directs the transitional stream to “put the fire back in the box,” reducing the chance for extension to exposure occupancies and structural components. (Photos by Steven “Smitty” Smith, CSFD, IFPA.)

It would be a tragedy for a firefighter to be seriously injured or killed performing an offensive attack and search inside a structure while all the occupants stand outside and watch. Although it is often necessary for firefighters to enter burning structures and place hoselines between the occupants and the fire, it should be done only when reliable information and/or fire conditions warrant it—i.e., when the risk to firefighters is worth the benefit.

When the time required to place an offensive line in place will allow the fire to grow significantly and, in the absence of an imminent rescue, the fire and smoke conditions create undue risk to firefighters if they conduct an offensive attack, shouldn’t you consider an alternative tactic? Additionally, modern interior finishes are mostly synthetic materials with a high rate of heat release, and most residences built since the 1980s feature lightweight construction. At today’s structure fires, these two factors have reduced the time to flashover and collapse. As a result, the available time for interior operations is less, greatly increasing the risk to firefighters and civilians. It is with these factors in mind that we will define and provide empirical evidence for the effectiveness of “transitional attack.”

BACKGROUND

In 2002, Deputy Chief (Ret.) Stewart Rose of the Seattle (WA) Fire Department provided strategy and tactics training to the Colorado Springs (CO) Fire Department (CSFD). As a result, our organization began using the "transitional" mode of fire attack. At the CSFD, this is defined as a quick knockdown from the exterior with a straight stream directed off the ceiling to hold a fire in check, coordinated with a subsequent offensive attack. The CSFD has used this tactic effectively at dozens of structure fires and at more than 100 live-fire training evolutions in acquired structures. Our experience in using this tactic has shown that it is effective in slowing fire progression without negatively disrupting the thermal balance or pushing the fire to uninvolved areas inside the structure. This tactic also allows firefighters to perform an offensive fire attack under conditions that are more tenable for victims and safer for the fire attack crew.

Although in fire service literature, "transitional" typically describes a fireground strategy change from offensive to defensive, this is not how we are using it here. We use it to describe an exterior knockdown that "transitions" to an offensive attack. Additionally, transitional attack is not an indirect or combination attack, both of which have somewhat confusing and conflicting definitions in fire service literature. An indirect attack introduces a fog pattern from the exterior of the structure into an enclosed space fire and uses steam conversion to cool and extinguish the fire.[1] A combination attack is a straight stream technique used during an offensive attack whereby water is initially directed to the ceiling to cool the upper levels of the fire room and then lowered and directed onto the burning materials.[2]

THE TEST

The CSFD set out to obtain quantitative data to add to our qualitative experiences to validate or refute the effectiveness of a transitional attack (photos 2-5). The CSFD Training Division acquired a two-story, terrace-style motel slated for demolition that was of concrete block and wood-joist construction (Type III, ordinary construction). We created second-floor room-and-contents fires that were compliant with National Fire Protection Association 1403, Standard on Live Fire Training Evolutions, deploying a single four-person engine company to use a transitional fire attack for extinguishment. Inside the 350-square-foot rooms, we placed one thermocouple 32 inches above the floor and a second one 84 inches above the floor to capture floor and ceiling temperatures during fire growth and extinguishment operations. The fuel loading for each fire consisted of five wood pallets and a bale of straw placed near the front window.

(2) The fire breaks through the window, and the engine company is dispatched.

(3) The engine company arrives and deploys the transitional hoseline and the offensive hoseline.

(4) The transitional hoseline has knocked down the fire and is shut down while the offensive attack line is placed in position

(5) The offensive attack is in progress, and the fire is completely extinguished.

Once the fire breached the window, the engine company was dispatched. On arrival, a single firefighter deployed the transitional stream, a 1¾-inch handline, directing a 175-gallon-per-minute (gpm) straight stream from ground level through the window of the fire room. The stream was deflected off the ceiling, flowing for approximately five seconds to extinguish the main body of fire. As this was happening, two other crew members deployed a second 1¾-inch handline to the doorway and prepared to make

entry. Shortly after the transitional stream was shut down, the second handline team made an offensive attack and completely extinguished the fire.

RESULTS

Figure 1 shows the results of eight fires conducted in this manner. Prior to applying the transitional attack, ceiling temperatures were at 1,050°F, dropping to 150°F after its application. The floor temperature dropped from 387°F to 115°F with the transitional attack. The fire then began to redevelop until the offensive attack was made but not nearly to the degree it had prior to the transitional attack.

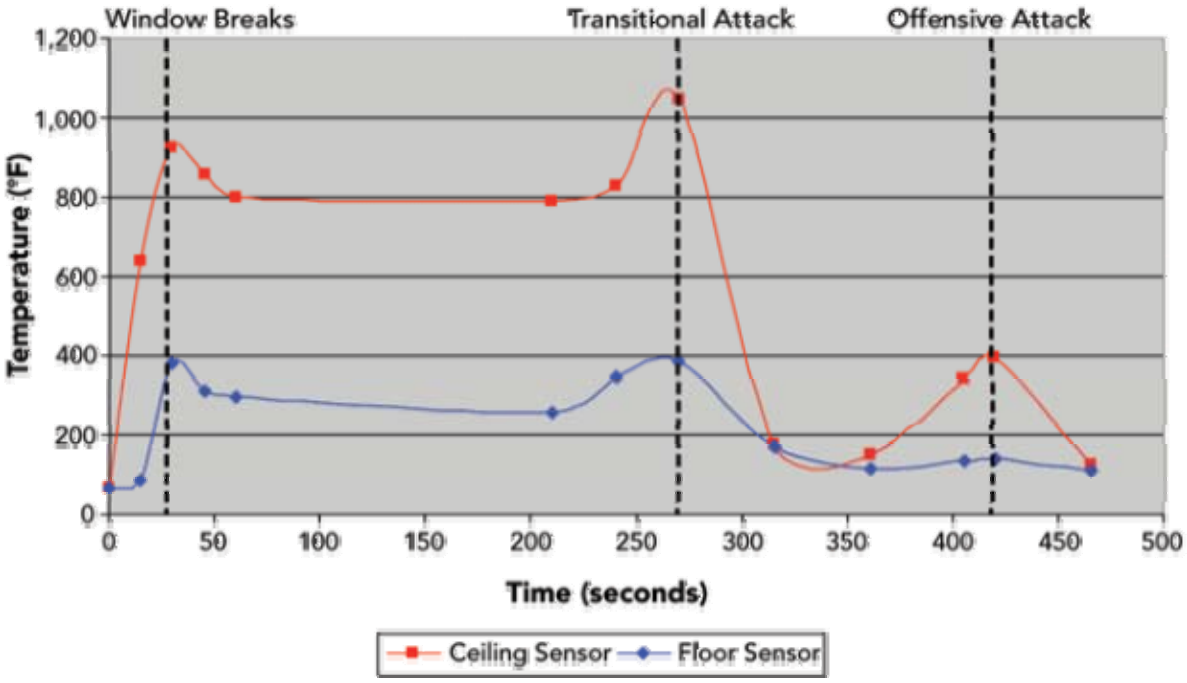

Figure 1. Temperature Changes During Transitional Attack
Source: CSFD Training Division

Critics have voiced two primary concerns with this tactic:

1. It negatively disrupts the thermal balance.

2. It pushes fire to uninvolved areas of the structure.

The data show that a straight stream deflected off the ceiling from the exterior does not negatively disrupt the thermal balance, since both the floor and ceiling temperatures are reduced. It is important to note that firefighters must keep the stream straight and avoid excessive nozzle movement. Hitting the windowsill or anything else that will break up the stream before it strikes the ceiling above the fire will reduce the tactic's effectiveness.

Another key to the tactic's effectiveness is that the stream should flow only until the bulk of flames is reduced and no longer. It is believed that applying the water with a straight stream through an existing opening allows the heat at the upper levels of the room to escape while the water deflects off the ceiling and extinguishes the fire, reducing heat production.

Safety crews and members of the training staff observed this tactic from a hole created in the wall of an adjacent occupancy and noted during each evolution that the fire was never pushed toward them or into uninvolved areas of the room, since the transitional stream extinguished the bulk of fire. These crews described feeling hot water droplets on their flash hoods but no increase in the ambient room temperature. They also observed a disruption in the stratification of the smoke and reduced visibility at the lower levels of the room as the smoke and steam conversion moved to the floor level. The reduced visibility at lower levels is an unavoidable downside to this tactic, but this also occurs during properly applied offensive attacks, since any water placed on a fire will create steam, expand, and move smoke inside a structure.

Based on the CSFD's experience with this tactic over the past eight years, we've provided a quick reference for the applicability of a transitional attack (see "Applying Transitional Attack"). Generally speaking, when flames are venting from one or more openings, and the fire is either pre- or post-flashover, a transitional attack may be indicated. It is not appropriate to create openings simply to direct a stream from the exterior. A fire that is not advanced enough to cause failure to most windows is probably still in the incipient stage, and an offensive attack would most likely be the preferred tactic.

When an offensive attack can be made safely and effectively and it's warranted based on a solid risk vs. benefit analysis, then a transitional attack may not be the first option. A transitional attack should also not be made when the fire location is unknown; directing a stream from the exterior into smoke with no visible flames is not advised because of the unknown effects on interior conditions.

Although we recognize the limitations of the quantitative data collected during these training evolutions (e.g., NFPA 1403-compliant fuel loading isn't representative of modern synthetic fuels, only two thermocouples were used), we believe these data corroborated our previous observations and experiences in validating the transitional attack as a viable, effective tactic.

The benefit of quick deployment and water application on a fire from the exterior must be weighed against the fire's growth and structural conditions resulting from the potential delay in making an offensive attack. The primary goal of the transitional attack is to hold the fire in check so that an offensive attack can be made under more tenable conditions. This tactic is not for every fire situation; it is just another tool in the toolbox for the first-arriving officer to implement when fireground conditions warrant it. As we all know, the most effective way to minimize the threat to life and property is to eliminate the fire and remove the smoke as soon as possible. Based on our experiences and data collected during this training, we believe that the benefits of a transitional attack make it a viable fireground option.

Applying Transitional Attack

Transitional attack is appropriate when

- A structure fire is pre- or post-flashover with visible flames venting from one or more openings.
- The time required to make an offensive attack will allow the fire to

  —reach flashover, or
  —extend to uninvolved rooms, or
  —extend to structural components.

- In the absence of an imminent rescue, resources are insufficient to comply with "two-in/two-out."

Transitional attack is not appropriate when

- an offensive attack can be made safely and effectively, or
- an offensive attack is needed to effect a rescue, or
- the location of the fire is unknown.

Endnotes

1. Layman, Lloyd, *Attacking and Extinguishing Interior Fires.* (National Fire Protection Association, 1952) 32-33.

2. Norman, John. *Fire Officer's Handbook of Tactics, Third Edition*. (Fire Engineering, 2005) 30.

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