The Attack Hose Line:
Three Things You Need to Make It Go!

By Jeff Shupe

"We're getting farther away from the job everyday" is what I heard just the other day from a conversation with a chief officer and I agreed with him. I had to, because I know I've said the same thing myself! But what is it that causes us to say something like this? I know the attitudes are the same in many departments all over the country. Is it how the older firefighters view the changes in their departments, their workload and the changing needs for the fire service to be something more than just a fire department? Is it because these non-fire calls (that now dominate many departments' workloads) take firefighters away from the mental aspect of firefighting, meaning they are not in the right frame of mind? Or, is it that the fires just aren't there like they were in the '70's and '80's? Only the older, senior members on the job would know about that era!

Is all this having an impact on fire-company and fire-ground operations? In many departments it is. There are officers in the job who possess a mindset to answer every non-fire emergency and "customer service" call their fire department receives. Consequently, the "frame of mind" may not be right when a structural fire comes in. I'm sure the firefighters can be very effective if conditions allow them to be. However, they must have a plan; and they must have three things going for them: **Training, Teamwork,** and **Experience!**

But wait! We're talking about the fire-attack hose line and the three things necessary to make ***it*** work. Those items are:

1. Proper Nozzle Pressure.

2. Nozzle Mechanics.

3. Hose Line Management.

PROPER NOZZLE PRESSURE

The engine company chauffer/pump operator is the only person in the engine company who should be responsible for getting water, and keeping water flowing to the attack team. This person is also responsible for obtaining the right nozzle pressure. Too much pressure and the hose line will be unmanageable and possibly dangerous. Too little pressure and the attack team might not have enough water to do the job, with the possibility of being over-powered by the fire and burned. This means that the chauffer/pump operator needs to know the kind of nozzles being used, their operating pressures, and flow characteristics. Here's a quick synopsis of a few different nozzles and their properties:

Different Kinds and Sizes of Nozzles

- **Solid Bore —** These are fixed-stream nozzles. Whether this nozzle is used on a 1¾-inch or 2½-inch attack line, the nozzle pressure is the same: 50 pounds per square inch. That's all you need — no more! The nozzle pressure remains 50 p.s.i. no matter what size tip is being used. It is just a simple, uncomplicated nozzle that gives an excellent stream at 50 p.s.i. Firefighters and officers should know the different flows from the different size tips — and yes, at 50 p.s.i.! This will determine your friction-loss calculations. You can even make a mistake in calculation and under pump it by 5 p.s.i. and still achieve excellent flows. Some departments will use only 45 p.s.i. nozzle pressure with good results, but it should not be any less than that. Stick with 50 p.s.i. nozzle pressure, and do your own field testing with a flow meter to see the results for yourself. Remember what District Chief Dave McGrail from the Denver Fire Department said about the solid bore nozzle: "It creates a LOW-pressure, HIGH-volume attack line!"
- **Low Pressure —** Low-pressure nozzles are fog type or combination nozzles that have a lower operating pressure than standard fog nozzles. Some are manufactured to give their flows at 75 p.s.i. while others will work at 50 p.s.i. There are low-pressure break-apart nozzles in the field too, where the low pressure fog tip can be removed and then the nozzle becomes a solid bore. It has a "slug" in the valve assembly for a solid stream. The diameter of the bore (3/4-inch, 7/8-inch, or 15/16-inch) is chosen by the fire department making the purchase.
- **Standard Fog Nozzle —** This nozzle is different from other newer-style fog or combination nozzles. This is the old adjustable stream nozzle that requires 100 p.s.i. nozzle pressure. Most have a "fixed" gallonage or "set" gallonage at 100 p.s.i. An example of this is a 1½-inch nozzle designed to flow 125 gallons per minute at 100 p.s.i. That's what it is designed to flow. Not meeting the correct nozzle pressure means a nozzle not flowing its potential. "Over-pumping" will put a tremendous amount of back pressure into the nozzle that will make it hard for the operator to control. There will not be a corresponding increase in gallons discharged.
- **Automatic Fog Nozzle —** This too is an adjustable-stream nozzle and has been the topic of conversation in the fire service for some time now. The belief in many cases is that all the pump operator needs to do is produce 100 p.s.i. pump

discharge pressure at the outlet! Salespeople told the fire service that the nozzle would adjust itself to 100 p.s.i. nozzle pressure. In some areas, this was called the thinking nozzle. It was said that *it* would do the work for the pump operator, and hydraulics became something we didn't have to worry about anymore. Consequently, there WAS and still ARE a lot of low-volume fire streams out there! The promise was that this nozzle will flow any volume of water in a pre-engineered flow range like for example 50 gallons per minute to 350 gallons per minute. It may be true, but the pressure needed to achieve those higher volume flows (especially when using 1¾-inch or 2-inch hose) might be too much for a couple of firefighters to handle. And the pressure in 1¾-inch hose approaches your annual service test pressures, too! That brings about a safety concern. Once again, do your own flow testing for results.

- **Select Flow Nozzle —** These types of nozzles require 100 p.s.i. at the nozzle but have a flow selector ring where the nozzleman can choose what volume he wants to discharge. This selection needs to be communicated to the chauffer/pump operator so he can determine the friction for the volume of water flowing and thus get the right pump pressure. An example might be a nozzle selected to flow 150 gallons per minute. However, the pump operator only pumps at 125 p.s.i. for a 200-foot-long hose layout. What do you think the flow will be? There have been situations where firefighters have taken a 1¾-inch attack hose line into a structure and have not had enough water to do the job. After they were driven out of the structure, their nozzle was examined and found to have been set at the lowest possible flow setting on the selector ring, which was letting them flow in the neighborhood of 30 to 40 gallons per minute. That is the equivalent of taking a booster line in to a working fire!

As you can see, if you're the pump operator, you need to know your nozzles. The next thing is to determine friction loss in your hose lines. Friction loss is predicated on flow. It's as simple as that! And flow and friction loss varies in different size hose lines.

So, the first part of our hose-line equation is *proper nozzle pressure*. Know the kind of nozzle being used, the flow (volume) wanting to be discharged, and the hose layout — the length and size of hose used to flow water through.

NOZZLE MECHANICS

The second item is for the nozzle operator to hold and support the nozzle and hose line properly. In doing this, it will allow the nozzleman to be more effective in fire control efforts. This is what we call ***nozzle mechanics***. In too many instances, people attending basic fire training academies are not taught this very important function. Older firefighters who have developed their own habits or bad habits will need to have open minds about learning this method. Once everyone is on the same page, they will see the importance of and how beneficial it is to use good nozzle mechanics. The results will be better control and safety.

When making an interior attack on a fire and the heat is so intense that you must lie on the floor, you must first get the nozzle out in front of you. Your body will most likely be lying on the hose line and that will help you to control it. There shouldn't be much of a problem controlling the hose line here — only that the stream may be restricted in its movement until the heat is reduced and you can get up onto your knees or into a squatting position and then move the nozzle stream around more.

However, when making an attack from a standing or kneeling position, the key is for the nozzle operator to first make sure he has the nozzle supported and that there is about 1½ feet of hose in front of him. Then he holds the hose under his arm and pulls it into his body. The hand on the side of his body being used, grasps the hose line about a half-foot to a foot back from the coupling. After a quick check to see if his back-up firefighter is ready, he then leans slightly forward, grabs the bail with his other hand, opens it gradually, and once the nozzle is fully opened and discharging, takes his hand off the bail and grabs the coupling. This positioning of hands allows the nozzle operator to move the nozzle without any restrictions, keeping it out in front of his body. Now he can let the stream do as much work as possible. Should there be a surge in pressure and the nozzle is tearing away, the bail is readily accessible to throttle down to regain control.

Many departments use "pistol" type grips on their nozzles. The inherent problem with them is that when the nozzle operator uses the grip he usually lets the nozzle pull back into his body, thinking it is more comfortable. Just try holding a nozzle with the grip using one hand for an extended period of time! With the nozzle drawing in close to the operator's body, it thereby reduces nozzle mobility and access to the bail. It has also been witnessed many times where the nozzle operator had too much pressure and was struggling to control the nozzle. He was using the pistol grip to try to control the nozzle, but it was pulling back into his body. As he was struggling, the bail was becoming partially closed. This too, is a bad situation.

The proper method of holding and supporting the hose line and nozzle is illustrated here. The nozzleman has mobility to maneuver the nozzle stream and be more effective on attack when the nozzle is out in front of his body.

Nozzle mechanics allow the operator to make better use of the fire stream by being more mobile. In many challenging fire situations the operator cannot make a good knockdown of the fire because the stream is not moved about the fire area. I'm sure you've been in the fire where the location of the fire was just around the corner. There was probably a lot of flame and a lot of glow and a lot of brightness and the nozzle stream was shooting straight ahead! And yet the flames weren't darkening, nor was the heat subsiding. Nozzle mechanics must be emphasized starting in basic training and that simply shooting a

stream of water into flames will not always achieve control or extinguishment. The operator of the nozzle can be more efficient, but *he/she* must make the stream do the work!

HOSE LINE MANAGEMENT

This the third part of our equation. Managing the hose line is simply having somebody in place on the hose line to relieve the nozzle operator of back pressure.

For the most part, this is a teamwork/discipline issue. How many times have you witnessed a fire where two or three firefighters were standing around while one firefighter was holding a hose line by himself, squirting water into a fire? What's really interesting is at a large fire where this takes place and the size of the hose line is 1¾-inch diameter! Talk about "high volume flow" for big fires! After a while, the firefighter doing the work is probably going to get a little tired and ask his officer to have the pressure reduced so the back pressure is not so much to hold! So much for volume of water!

Hose-line management is extremely important to the success of the attack line because, without it, mobility, safety and control can be lost. Teamwork is broken, and the work load becomes greater for the one person holding the line — the nozzleman.

Proper nozzle mechanics coupled with good hose line support mean a very manageable hose line." Notice the position of the hands on the nozzle. The back-up firefighter is using the "tank-to-tank" method of supporting and managing the hose line.

Supporting the hose line can be done in several ways. With two people on a 1¾-inch attack line, it most likely will be a nozzle firefighter and the company officer. In this case the officer has a dual role — supervising the attack and backing-up the nozzle operator at the same time. The officer must also monitor the radio for communications from other companies or the incident commander. To support the nozzleman when he is kneeling, the officer can simply put his knee on the hose line about three or four behind the nozzleman, keeping it straight and pinning it to the ground/floor. Keeping the hose line straight and lower than the nozzle is good, because the nozzle will be shooting upward most of the time. Supporting the back pressure will be easy.

Another position for the back-up firefighter or officer is to grab the hose behind the nozzle operator with both hands, hold the hose against his body and lean towards the nozzle operator, keeping himself in a position to look ahead and over the shoulder of the nozzleman and over the entire fire area. This position is known as "shoulder-to-

shoulder." Remember, you must keep the hose lower than the nozzle, otherwise it will work against the nozzle and the operator will have to struggle to keep control of it.

The back-up firefighter or officer should also remember to keep the hose line as straight as possible behind the nozzle operator for five to 10 feet. This will make the line easier to control because much of the back pressure will be "absorbed" into the hose. I am sure most of you know what it's like to have a sharp bend in the hose right behind the nozzle. The pressure wants to counter the bend and that causes the hose to want to pull away from the nozzleman. But once the hose is straightened again, that force releases.

This back-up firefighter is keeping the hose line straight while feeding it to the attack crew as they call for it.

When it comes time to advance the line or move it about, simply shut or throttle down the nozzle bail and communicate with those on the line what you want to do. Those members on the line should be spaced at intervals along the line and at bend points, like at stairway landings or corners or posts to help "feed" the hose line to the nozzle team. Once the line and nozzle are in the new location, simply take your positions, check to see that back-up member(s) are ready, then open the bail gradually, and resume attack. Too many times, nozzle firefighters have rushed to get to a new location, and without checking to see if their team was ready, "ripped" open the nozzle bail, only to lose control and have the pressure throw them about. Sometimes a situation does need quick application of water. However, for your safety, try to slow the process down a little to avoid losing control.

Another reason to avoid opening a nozzle quickly (besides wanting to avoid water hammer) is that sometimes the pressure in a hose line can climb upward during the time the nozzle is closed. This may be due to any number of reasons or factors, such as another line shutting down. Opening the bail gradually will let you know if there is too much pressure in the line for you to handle. Before you have the bail completely open, you will be able to tell, so you can now close it back down to maintain control of it.

So, there are the three components of putting an attack line in service. It requires teamwork, training, and experience. Efficient fire attack is the basis for good fire control efforts. With every member doing their job, there's no reason why an attack line cannot be managed properly and be mobile and effective on the fire ground.

Remember, stay safe!