

Turning robots into thinking firemen

1 Firefighter training in the early 2000's

Basic firefighter training was limited to 90 hours in the early 2000's. A significant part of the course was dedicated to hose deployment. Typically a crew of six in one apparatus was used: One driver-pump operator, one officer and four firefighters. We were taught to deploy a high pressure booster line. Deploying two lay flat hoses of 45 mm was also trained. The instructors did an amazing job within the limited timeframe available to them.



Figure 1 Firefighters performing a training drill. If this is a training about interior firefighting, then the wrong impression is given that interior firefighting is done standing up. Every drill should be done while kneeling or crouching. Firefighters will stand up automatically in reality when conditions allow for it. (Photo: Pierre-Henri Demeyere)

There was one consistent factor in both (high and low pressure) deployment systems. Both an attack and a supply line were deployed every time. Another thing that was typical is that at the end of the drill, firemen were flowing water while standing up. Usually they were using a solid jet stream as well.

One year later I started basic training as a recruit in the Brussels Fire Department. For years now, the Brussels Fire Department has been training their recruits at a higher level than that which was provided in the standard official course. Back then more time was spent than the obligatory 90 hours. Now that the official course has been raised to 130 hours, even more training hours are used. A lot more time was dedicated to different hose deployment

systems. The fire service of Brussels has hose deployment systems for a single HP, for two HP lines, for a single 45 mm, for two 45 mm lines, for a single 70 mm, for dividing the 70 mm back into two 45's, for deploying a ladder, for deploying hose lines on the ladder, ... There was and still is an enormous amount of time being spent on these drills, which has produced very good results on the fire ground.

Still there was that aspect that remained the same no matter what: both an attack and supply line were deployed every time. And on top of this, every hose deployment exercise ended with fire crews flowing water while standing up ...

2 Critical afterthoughts

2.1 Flowing water while standing up?

In Brussels we no longer let our recruits stand up when they're flowing water. We decided that allowing them to stand was indirectly and unintentionally giving them the wrong impression. Recruits enter the fire service as a blank page. If we let them stand up when

flowing water, they get the idea that firefighting is done standing up. And that it is done using a continuous solid jet stream.

In fact it shouldn't come as a surprise that on the fire ground we had firefighters standing up on stairway landings. Fire crews that were standing up in hot dense smoke, while one meter lower towards the floor there was decent visibility and cooler conditions. Firefighters were trained to do so in their basic training.

Standing up has its uses in exterior firefighting. Most of the time there's no hot smoke layer you to get under to increase visibility and escape the heat. Extinguishing fires while standing up is something you don't have to teach to anyone. Just take two average adult males who are looking at a fire scene. Give them a 45 mm hose line and tell them to flow water on the flames. They'll probably do almost as good of a job than the firefighters on scene.

Interior firefighting demands a whole lot more of our firemen. They have to look around, observe and form a picture of the situation they're in. Then the nozzle man has to react to the fire and cool smoke gas. He needs to adjust the duration (long – short) of his pulses to the situation at hand, as well as the angle of the nozzle to the floor and the angle of the fog pattern. The attack crew has to advance the hose line, pass through doorways and attack the seat of the fire. Usually this won't be done standing up or with a solid jet stream.

Nowadays recruits are asked to practice nozzle techniques at the end of a hose deployment exercise. These two aspects of firefighting are after all logically connected to each other. First you have to deploy the hose line and then you advance into the building. Explaining nozzle techniques should be done in a kneeling position whenever possible. Doing this will avoid creating the image of the standing firefighter and at the same time enforce the image of a firefighter crouching down.



Figure 2 Teaching nozzle techniques is done while everyone is in a crouching position. (Photo: Roel Vandenboer)

2.2 The "supply line" fixation

The fire service has undergone a rapid evolution in the past 10 years. Ten years ago firefighters were still being trained without live fire training available to them. Luckily this is a thing of the past. Ten years ago nozzle techniques weren't included in the course contents. The training "ended" after being able to open the nozzle. It goes without saying that firemen trained like that, weren't very efficient with the water they were using.

Fortunately large steps have been made in improving the quality of training. In one particular service, something went wrong when alerting their people about a year ago. An engine was sent to a chimney fire while not fully staffed. The reported chimney fire turned

out to be a pre-flashover compartment fire. Three voluntary firefighters (of which two were probationary and had just finished basic training) started an interior attack. And they kicked it! The more experienced firefighter (with the inferior training from back in the days) took the thermal imaging camera. The two younglings were gascooling. They advanced the hose line, found the seat of the fire and extinguished it. It was a by the book operation. Even though it's not preferable for inexperienced probationary firefighters to perform an interior attack in dangerous circumstances without an experienced officer, this anecdote is a testimony to the recent improvement of the quality of firefighter training. The guys can be proud of their achievement. They applied what they were taught in difficult circumstances. The senior firefighter who was with them at the scene deserves praise as well. He put trust in the superior training of his colleagues and coached them to the best of his abilities.



Figure 3 A fully developed fire in a room should be put out using under 500 litres of water. (Photo: Moeskroen Fire Department)

The improvement in firefighter training has caused us to look differently at firefighter performance on scene. Imagine the fire service arriving on scene at a row house. The building has multiple floors (ground floor and some additional floors). The room located at the street end on the ground floor is fully developed. Flames are exiting the building through a failed window. The rest of the ground floor is filled with hot smoke but so far there's no fire extension. Suppose a firefighter needs over 500 litres of water to knock down that fire (and subsequently start overhaul). Do we consider that person to be a good firefighter? A well trained fireman should be able to achieve knockdown in a 15 to 20 m² room with less than 100 litres of water.

The fire service usually arrives on scene with an engine carrying a 2500 litre water supply on board. These are fire scenes where we think 100 litres of water is sufficient to handle the problem. Still, two firemen are sent out to find and set up a supply line as quickly as possible. Still, we choose to direct our limited staffing to perform a task that proves to be futile most of the time. This is what I call the "supply line" fixation.

3 Fire in a castle

The fire service of Brussels was recently dispatched to a basement fire in a castle. The nearest fire station arrived quickly on scene and initiated a fire attack using two high pressure lines. The castle was located in a park. While the majority of the firefighters on scene were engaged in size up and firefighting operations, the rest of the crew was setting up a supply line. The captain on scene quickly asked for an additional water tender. He knew that setting up a supply line could take a while out here. Over 100 m of supply line is easily needed in a castle park.



Figure 4 Aerial photo of the castle. The distance from the castle to the street is about 100 m. (Photo: Google)

When the chief officer arrived on scene together with the apparatuses of the main fire station, firefighting operations were fully up and running. The supply line had not yet been deployed. At that time, the onboard water supply of the first engine was at half level. This means there was still 1.250 litres left. The second engine was used to supply the first engine while awaiting the completion of the supply line and the arrival of the water tender.

At this fire scene, crews need not have worried about supply lines. Or alternatively: too much attention was put into water supply. It was not a problem here. The castle was uninhabited and the fire happened at night. The first arriving crew quickly deployed two HP lines and acted in a professional manner. There weren't any other immediate things to take care of except extinguishment and water supply.

But ... what if?

What if search and rescue needed to be done in the castle (or in the row house above)? In such cases search and rescue is often postponed until after the supply line has been deployed, which more often than not is futile. I'm convinced that the fire service often is not performing at its best because one crew (two people) is used to supply the engine while there are other more pressing and more important tasks at hand.

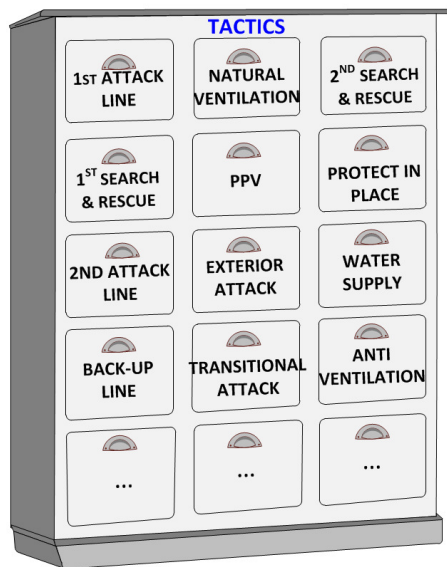
Does this mean that immediately deploying a supply line shouldn't ever be done anymore? No of course not, firefighting isn't a case of black and white. A good way to put it is that the supply line will be deployed by the crews of the engines arriving later on scene, except in a limited number of exceptions. First arriving crews laying out supply lines will become the exception rather than the rule.

4 The thinking fire service

The section above describes the "robot behavior" we sometimes find in the fire service. People do certain things because they have been taught so and because they have always done them in that way. The situation has changed but the fire service hasn't. Well,

circumstances will continue to change. Our society is evolving and we, the fire service, do not question ourselves enough.

That's why we need to turn our robots into thinking firemen. Moving away from systematically deploying supply lines is but one example of this evolution. Replacing the term SOP (standard operating procedure) with SOG (standard operating guideline) in the Anglo-Saxon community is another one. This change in wording means that the fire service wants its members to think when operating on the fireground. A procedure has to be viewed as a guideline from which it's possible to deviate.



Figuur 5 The cabinet with drawers as a model for tactics on the fireground. (Figure: Bart Noyens)

Tactical options in firefighting have to be looked upon as a cabinet with drawers. The first drawer at the top is most definitely "the primary attack". In 90% of the cases this will be the most tactically sound option. Both crews (2 x 2) will start deployment and once finished, the IC will need to determine what to do with the leftover crew. He will have to open another drawer. This can be: secondary attack, back-up team, ventilation, water supply, primary search, secondary search, recon, logistical support, EMS for victims, assisting other EMS crews, BA management, ...

It's up to each and everyone in the fire service to know their tactical cabinet. Everyone should know what's in each drawer. That way, the IC just has to give a simple command (e.g.: "You're going to do a primary search on the ground floor"). The crew will then know what to do without needing it explained to them in detail.

This way the fire service will become both more effective as well as more efficient. Everyone has to think about their specific tasks on their level. A debriefing has to be held afterwards. Knowledge and experience have to be shared. That's what will help improve the fire service.

5 Acknowledgements

I started this article by referencing my own basic firefighter training and would like to take the opportunity to thank some of my instructors for helping me find my way in the fire service and for inspiring me. They are too many to name them all. For my basic firefighter training I would like to thank former firefighter and current sergeant-major* Geert Phyfferoen. For my recruit training in Brussels I would like to thank former sergeant and current Captain* Maurice Grumeau, who has been my mentor for years. Both men are top class individuals; two firemen who give their very best as instructors to share knowledge with younger generations of firefighters.

* Sergeant-major is a Belgian rank that would fall between lieutenant and captain in the US ranking system. The Belgian captain corresponds with the battalion or division chief in the US.

In fact I would like to thank everyone involved in firefighter training. Everyone involved in teaching, motivating and inspiring students. For those are all ingredients for a better fire service.

It's my goal to share knowledge by writing articles. Colleagues that want to read up on job related topics, can visit www.cfbt-be.com. This site hosts a number of texts. There's also a weekly newsletter. Something new is added to the site each week. People who want to register for the newsletter can send an e-mail to karel.lambert@skynet.be .

6 Bibliography

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- [2] *John McDonough, personal talks 2009-2014*

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