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PAUL GRIMWOOD

SPECIAL EDITION

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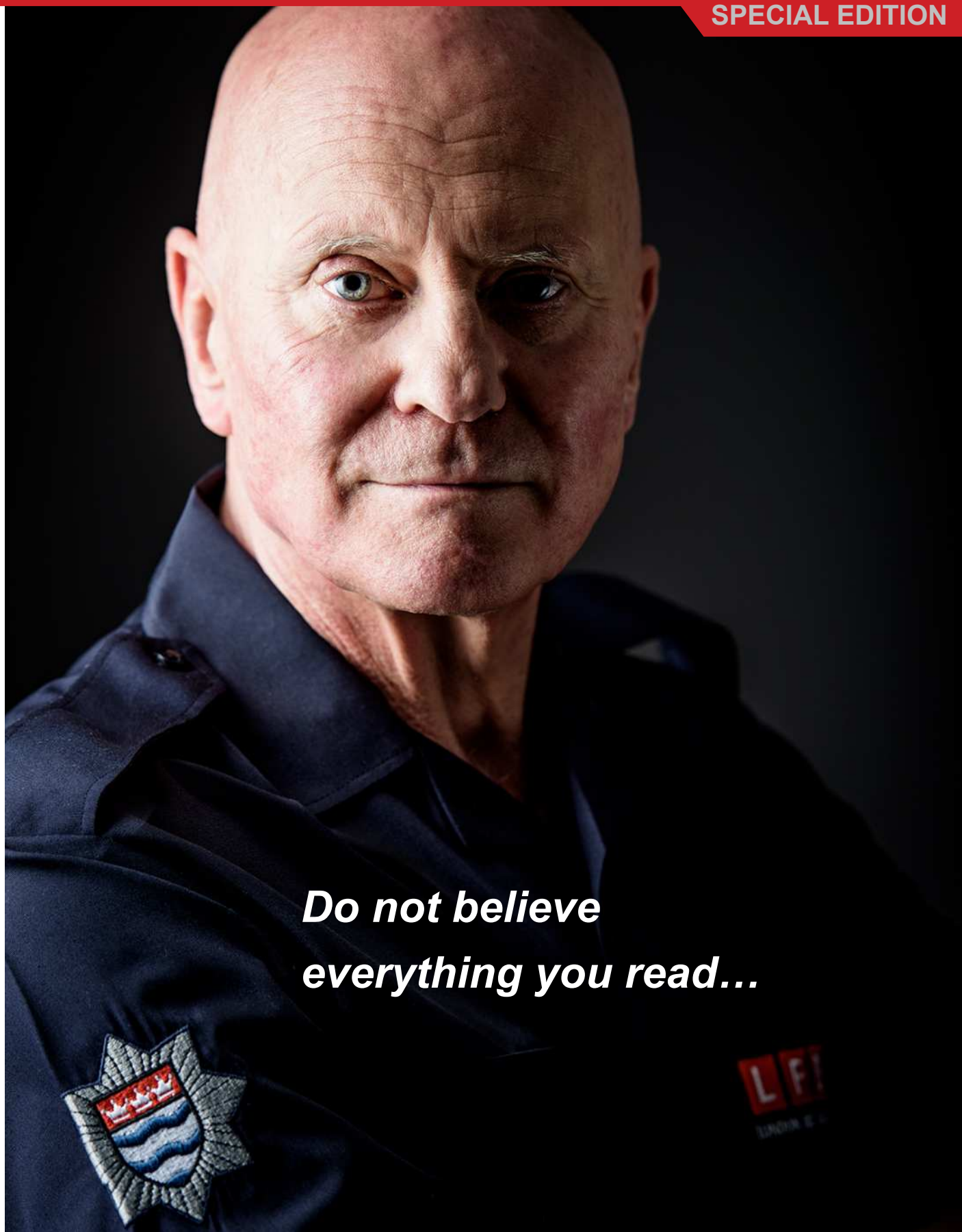

EDITORIAL

INTRODUCTION

BrandweerNet's goal is to make the background of (new) developments in our field visible. Where do new insights and techniques come from? Who researched this and on what basis were made choices in the past that we now take for granted? Clearly, we all stand on the shoulders of our predecessors who shaped our field. Who are these people and what wise lessons can we learn from them? BrandweerNet visits these colleagues and talks to them.

In this first episode I interview Paul Grimwood. I have been following Paul's work closely for years. Thanks to his enormous contribution, I have been able to develop myself as a fire fighting researcher and teacher. His work answered many of the questions I had...

Grimwood has been active as a firefighter, researcher and developer of our field for almost 50 years. That is more than a working life.
Many of his publications, books and articles have appeared. He has inspired many colleagues and helped them to understand the field of fire fighting and Fire Safety Engineering (FSE).

That is a great achievement for which we are grateful to him. And luckily, he is still not done sharing his knowledge and experience. In this interview he shares his insights.

Edward Huizer (BrandweerNet)

||||| PAUL GRMWOOD

PhD; FIFireE - Principal Fire Safety Engineer at Kent Fire & Rescue SHQ

IN SHORT

Paul Grimwood is a pioneer in innovative firefighting techniques and deployment tactics. His work has led to new fire safety designs in the UK and improving the safety of firefighters and residents, both nationally and internationally.

Grimwood (second from the left) London 1972

IN CONVERSATION WITH PAUL GRIMWOOD

DO NOT BELIEVE EVERYTHING YOU READ!

A personal message from Paul Grimwood to everyone reading this...

"Every day I learn something that makes me a better firefighter. Learning that is now easier than ever, because you can access new fire brigade knowledge at any time and at any place. So if you want to develop in this area, you can start today. But don't believe everything you read! First, research the background of an article, for example with the help of the sources to which the article refers ".

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PAUL GRIMWOOD

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LONDEN METROPOOL

You have those people who are already a monument of their field in life. Paul Grimwood (67) is one of them. Feel free to call him the international conscience of firefighting. Paul joined the London Fire Brigade as soon as his age allowed it. He was just one day 18 years old at the time. And still connecting theory to practice there. His deepest motivation: getting the best out of yourself and other firefighters, because the fire brigade can make the difference between life and death.

Next year, Paul Grimwood will be a 50-year firefighter. A great moment for a special about this man who means so much to the international fire department. BrandweerNet interviewed him remotely, as it should be during corona times. If you want to know more about Grimwood's current developments in our firefighting profession and what he thinks is the most important spearhead for future firefighting research, please read on.

Euro Firefighter and Fog Attack

Grimwood garnered international praise and recognition with his three standard works Euro Firefighter 1 and 2 and Fog Attack. He also co-wrote with other leading publications such as 3D-Firefighting. In combination with his (scientific-) articles, these publications form an "evidence based" foundation under insights and concepts such as smoke gas cooling, tactical ventilation and tactical/critical flow rate. Many important developments in Dutch firefighting and teaching materials - such as that of the Fire Service Academy - since the late 1990s can be traced back to Grimwood's work. Paul modestly emphasizes that he stands on the shoulders of many other colleagues, such as fire researchers from Sweden and America. However, his research and publications bring his colleagues into line and often dot the i's.

From curious boy to professional

Paul Grimwood's career resembles the classic story of a little boy who is crazy about everything that has to do with the fire brigade and who falls with his nose into the butter by getting started by working for a fire brigade in a metropolis. So far little news and nothing special about this firefighter. But where many - in any field - lose their childish curiosity and youthful passion as soon as they turn their hobby into their profession, Grimwood continued to explore the world around him with passion and drive.

"My academic ambitions came late, but I have always been interested in technical subjects. I like to research new ideas, innovations and studies, even when they have nothing to do with the fire service. Actually, I am a generalist who knows something about a lot of things, but not much about anything, "says Grimwood.

But it also turned out well for the academic

Grimwood, thanks to a Masters in Fire Engineering that he was able to extend with a doctoral research. In this way he also obtained his doctorate (PhD, Doctor of Phylosophy).

Despite the necessary promotions and related positions with the London Fire Brigade, his highest rank and position was that of an officer. That he never became commander, however, is a conscious choice. "Anyway, I wanted to stay on a fire truck. Because I love firefighting (the real thing). I still strive for improvement every day in all areas of the fire department, even though I am no longer in active service. I see every incident and every exercise as an opportunity to get better. I encourage my colleagues to approach their profession in this way. I try to inspire them to become fitter, faster and smarter in their work. But also to enjoy what you do together, because that is the most important thing". By which he means that pleasure and professional development go hand in hand and need each other.

Learn from the New York Fire Department and a hundred Fire stations

Grimwood has spread its wings internationally since the 1970s. Generalist or not, firefighting has his heart and it is this area in which he specializes as a researcher. And on which he also reflects most from his daily experience as a firefighter on the front line. But he does not do that alone. Paul has visited over a hundred fire stations worldwide. He did research there, gained knowledge and shared it with other fire brigades. He learned most from the people he worked with: "real role models". He also read a lot about the experiences of former fire chiefs such as Massey Shaw and James Braidwood of London, Bill Clark and Vinny Dunn of New York, John Mittendorf of Los Angeles and Krister Giselsson and Mats Rosander of Sweden. It indicates that Grimwood places the development of his field in a historical context. This helps him to better interpret the present and perhaps also better predict the future.

> **"I see every incident and exercise as an opportunity to get better!"**

Not long after his appointment with the London fire brigade in 1971, Paul started researching at the New York fire brigade. And there he discovered new

dimensions of fire and fire development. "The firefighters' knowledge and deep understanding of firefighting fascinated me immensely. They really thought about the concept of flow rate: the cooling capacity of water per square meter per minute.

Rapid Water

When I got there, they were just working on Rapid Water, an innovation with a chemical addition to the extinguishing water. This increases the cooling capacity to such an extent that you need less water for the same flow rate. This allowed the 65 mm hoses to be exchanged for ones with a diameter of 45 mm. Ultimately, this innovation was intended to cut staff costs. Because the chemical addition made the soil on which the extinguishing water ended up quite slippery, the innovation was mockingly called Slippery Water. The stuff caused the necessary slips and falls. The firefighters soon realized that the innovation was at the expense of their employment. For this reason in particular this innovation was not popular there".

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New York Fire department 1972

Learning from each other and sharing knowledge is the best way to make us better at what we do. Chief Forest Reeder couldn't describe it better:

Let's make ourselves Better, Faster, Safer, Smarter!

Fire Department New York

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PAUL GRIMWOOD

ENOUGH COOLING CAPACITY

Paul Grimwood has done a lot of research over the past 40 years into the effect of extinguishing methods and smoke gas cooling. Based on his knowledge and experience, he sees clear advantages in the high-flow strategy (low pressure) compared to low-flow (high pressure). Read what he learned and advises us!

Small water droplets or large cooling capacity?

Popular or not, partly due to innovation such as Rapid Water, Grimwood has given thought to the essence of cooling capacity in relation to fire load and (potential) Heat Release Rate (HRR). It is partly thanks to his thinking that today these are two core concepts in the basic principles of firefighting. In fact, both terms occur in basic principle 5*: estimate the potential burning power and take sufficient cooling capacity with you (*Netherlands).

Grimwood also learned to place fires in New York more and more in the context of their environment: the fire room, the building and its characteristics: "I became aware that there are different ways in which a fire can develop within different rooms and buildings. The building characteristics have an influence on the fire regime in the fire room and thus on the development potential of that fire in the building. This includes the behaviour of smoke layers under the ceiling, the influence of pressure differences on fire development, rapid fire spread in corridors, fires in small spaces, fires in large open-plan offices and fires in warehouses with a high vertical fire load". He discovered that all these aspects can lead to different fire scenarios and that each scenario requires not only a specific strategy and tactics, but also special nozzle techniques. And so he discovered in the 1980s innovations in Sweden with 3D smoke gas cooling: the use of a spray jet with small, finely distributed water droplets that are introduced into the smoke layer under the ceiling with short pulses.

The Swedish approach

In the Swedish approach, the focus was more on preventing fire propagation from smoke gas cooling, since smoke is fuel and the temperature of that fuel must remain below auto ignition temperature. Much of Grimwood's research between, say, 1980 and 2000 aims to substantiate the necessary cooling and extinguishing capacity with flow rate calculations. What conclusion does Grimwood draw from this? "I've seen firefighters die because the cooling capacity of their nozzle was unable to withstand the

fire. Those images are still on my retina. If I have to choose between fine water droplets or high flow rate? Without doubt: give me that high flow rate! ".

The Dutch Fire Service Academy has also made this choice in terms of both the basic principles of firefighting and the current teaching and learning material for firefighters, commanders and officers.

> **"I've seen firefighters die because the cooling capacity of their nozzle was unable to withstand the fire"**

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PAUL GRIMWOOD

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FROM THEORY TO PRACTICE

Firefighters do not die because they have too little knowledge and understanding of fire, but because of the wrong deployment tactics!

Looking for action perspective

Over the past twenty years, the number of topics Grimwood is researching has steadily expanded: fires in tall buildings, security of stairwells and other escape routes, under ventilated fires, flow paths and tactical ventilation. He builds on the knowledge he previously gathered and enriched about cooling capacity, fire load, fire regimes, the interaction between fire and building, fire gas cooling and nozzle techniques. What remains in the Grimwood funnel after all this research? And what new insights in fire development and firefighting has he developed?

The answer to these questions shows how crisp Grimwood is: "In retrospect, we've spent too much

time on the understanding fire development and the complexities associated with it, and too little time developing effective deployment tactics. Firefighters usually do not die because they have too little knowledge and understanding of fire, but because of an incorrect deployment tactic. Take a wind-driven fire. It killed firefighters because they were deployed on the wrong side of the building. If we do not understand the basic principles of safe repressive action, it makes no sense to delve into, for example, a flashover, backdraft or smoke gas explosion".

> **If we don't understand the basics, there is no point in deepening!**

According to Grimwood, theoretical training does not help the fire service further if it is not directly linked to a risk-oriented, scenario-oriented and practical action perspective.

An insight that fits in nicely with the discussion in recent years in the Dutch Fire Service about whether we have made our field too complicated. That discussion has since led to a simplification of the BE-SAHF model; this has now been reduced to the fire triangle in the core, with the focus on the observable signals of smoke, airflow and heat. Firefighters are now being taught to look closely at the presence of smoke (fuel), air supply (oxygen) and heat during the 360. And no longer to aspects that are less visible. The new BE-SAHF model has thus become a practically applicable and thus useful action perspective for the exploration. In a more abstract sense, the basic principles of firefighting are an action perspective for just about all components of strategic, tactical and technical firefighting. Certainly in combination with other decision-making models (such as the core brand scheme and quadrant model in the Netherlands).

Fire development in high rise building

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PAUL GRIMWOOD

IMPROVE COMMUNICATION

Grimwood believes that good communication is one of the most important learning goals for firefighters. With this, the difference can be made between success or no result and sometimes even life or death.

People, organization and incident

For someone who visits, studies and follows fire departments around the world, the insights cannot of course be limited to only 'hardcore' knowledge of fire development and firefighting. Such a person almost automatically develops a vision of the "soft" sides of firefighting: people and the organization. Together with the incident, these form the three pillars of the field. What is Grimwood's view on these aspects?

As far as the human factor is concerned, Grimwood emphasizes communication and language use. "If I have learned anything in the past 50 years, it is that critical information is not properly picked up or translated during incident response, so that the essence of the message is lost. The cause of this is poor communication. Suppose someone says something based on his or her practical experience and that information can be life-saving. That message must then be shared with all involved incident fighters or responders involved and understood by them. In my experience, the core and importance of the message is rarely well received and interpreted."

Grimwood illustrates his thesis on communication with a recent study during a training. "In a training session with more than sixty British fire officers, the trainer emphasized a specific point of attention in his presentation. Immediately afterwards, a table-top exercise was done. The aim of this exercise was actually an investigation: they wanted to know to what extent the participants in the exercise use the critical information - the specific point of attention - from the previous presentation during the exercise itself. The participants were not aware of this goal. They worked together in small teams during the exercise; only five percent of them used the critical information. Suppose it was not an exercise, but a real incident and the information in question makes the difference between life and death. The consequences can be guessed. I conclude from this that the core of the message has to be repeated over and over and also learned over and over again."

Grimwood considers communication one of the most important learning objectives for firefighters. "People are not good communicators. We don't listen well

and formulating a clear message under stress is very difficult. Perhaps the greatest challenge in our lives is how we learn to communicate more effectively. That is why everyone at the fire brigade must focus on that learning objective; in our procedures, training, operations and personal relationships".

Critical information is not properly picked up during incident response

Grimwood also has a clear view of the organizational side of the fire brigade. "Large (fire brigade) organizations often function slowly and struggle with changes. But never give up! The fire brigade is constantly changing, wherever in the world. New insights, (technical) possibilities and social circumstances influence both our organizations and our operations. This influence is often positive, but not always. The main challenge is therefore on our own plate. And that is that we must always be open to change and innovation and at the same time strive for what is best for our profession and the society we serve."

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Giving a clear message under stress is very difficult

About listening

When you talk, you repeat what you already know yourself. That doesn't make you any wiser. By listening carefully you can learn what you don't know and hear what isn't being said. You can ask questions about this. Good communication starts with listening!

PROTECT THE ESCAPE ROUTE

Priority and red line: escape route protection in high-rise fires

What spot does Paul Grimwood see on the horizon, what ambition does he still have after such a long career as a firefighter and researcher?

"My priority is also a red line in my previous research: a strategy for the protection of stairwells and other escape routes, as part of an integrated approach to fires in tall buildings. I build on what I learned about this at the beginning of my career in the United States, "says Grimwood of his current research and development agenda. According to him, stairwells should be secured immediately upon arrival as an escape route for both the people still in the building and the fire brigade itself. "Unfortunately, many fire departments do not yet realize that this is a primary deployment target."

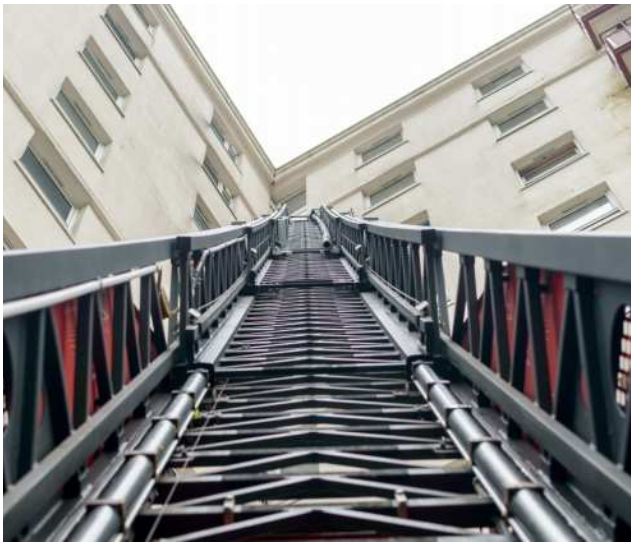
On June 14, 2017, 72 people died in a fire in the Grenfell Tower, a residential tower in West London. Research showed that lives could have been saved if the fire brigade had previously evacuated. However, the fire brigade instructed residents too long to stay in their apartment. Although Grimwood - perhaps out of respect for his colleagues who were deployed there - does not mention this disaster specifically, he does say that this kind of harrowing tragedy in fires in tall buildings motivates him to continue his research in this area. "Even in buildings where residents have to stay in their apartment while we fight the fire, there will always be people who want to go out via the stairs. Our people must be able to go there as soon as possible, so that they can help these people".

It is therefore important that there are perspectives for action for keeping stairwells smoke-free or making them. Fortunately, Grimwood is not alone in this ambition. Michael Reich from Stuttgart, Germany, designed the smoke stopper, a simple but useful tool to limit the spread of smoke and simultaneously fight the fire.

Smoke spread research

In the Netherlands, the Fire Service Academy recently conducted in-depth research into the spread of smoke in an apartment complex; the data is currently still being analyzed.


stairwells should
immediately
Secured!



Special procedure high-rise buildings

Escape route security for stairwells is the most important project he is currently working on for Paul Grimwood. He wrote the national guideline and standard operating procedures (SOP) for this. Grimwood: "It will finally be a national procedure in England".

When Grimwood worked on an assignment with the New York Fire Department in 1990, he became increasingly aware of why there was a special deployment procedure for high-rise buildings. For example, stairwells (escape routes) must be checked, protected and monitored immediately upon arrival to prevent or limit smoke spread and fire spread. He discovered that this drastically increases the chance of an effective evacuation, rescue and fire fighting. Checking the stairwell also means that floors above the fire can be explored and cleared (faster).

In 2003, a major fire killed six people in a stairwell of a 35-story office building in downtown Chicago. Several people were injured. "At the time, I was very closely involved in this fire as an investigator and expert witness. It was clear that these people should never have died ". The Chicago Fire Department took full responsibility for this tragic loss. After the investigation, the fire service there introduced Rapid Ascent Teams (RATS). These are special forces equipped and trained to quickly search and protect high-rise stairwells.

After the Chicago incident, Grimwood helped develop the deployment process for RATS teams and spread knowledge about it. For example, in 2008 he introduced the RATS procedure in Kuala Lumpur, where he trained the fire brigade in securing stairwells in high-rise buildings. When he was appointed at Kent Fire and Rescue in 2009, he further developed the procedure for staircase security. "In retrospect, this strategic concept was based on what I learned in Manhattan New York City in 1990". The fact that Grimwood has been engaged in this way of thinking for a long time is also reflected in the books and articles he has written below.

Grenfell

Just when a stairwell protection policy was introduced to nine fire and rescue services in the South East of England in 2017, things went wrong. It was then that the Grenfell Fire took place in London. "I was devastated to see the consequences of this fire with so many victims". Grimwood is not yet in a position to comment on this as the fire in Grenfell is still the subject of ongoing legal investigations ".

In the UK, a national directive has come into effect allowing the deployment of special teams to safeguard high-rise stairwells.

2019: Back to New York

At the end of 2019, Grimwood returned at the invitation of the New York Fire Department (FDNY) to present his books EuroFirefighter 1 and 2. A special moment in itself, of course, but what made it special is that he was then also able to present the Kent FRS strategy for stairwells. A strategy that he was able to develop in part on the basis of the knowledge and experience he had gained there. In fact, this closed the circle years later, where it all began...

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GRENFELL FIRE June 2017

PRESENTATIONS | ARTICLES

More information about the topics in this interview can be found in the information sheets below and under downloads.

2011
Acces design: Smoke Control in Extended Corridors

2019
High-Rise Firefighting: Evidence based Research 1990-2019

2019
Report from New York: High-Rise Stair Search Strategy

2020
Stairwell Protection Teams in High Rise Fires

2020
Adequate Fire Fighting Water (Flowrate)

2017
Euro Firefighter 2: Firefighting Tactics and Fire Engineer's Handbook

SHARING KNOWLEDGE

An ancient wisdom says that knowledge is only of value when it is shared and used. And that is exactly what Paul Grimwood has been actively doing for years. He is an example of how it should be done. Do you want to know more about Grimwood's work? Then visit his website www.eurofirefighter.com. There you can not only find more information, but you can also download the most current articles and books for free.

The information sources relevant to this article can also be downloaded directly from this page. To do this, click on the file name in the table or on the images of the information sheets.

Downloads	Year
Flashover Nozzle Techniques	2002
3D Firefighting	2003
Euro Firefighter	2008
Smoke Control in Extended Corridors	2011
Firefighting Water Flow (US version)	2014
Euro Firefighter 2	2017
Travelling Fires	2018
Sardqvist-Grimwood Flow-Rate	2018
Reversing the 'Stay-put' in High-rise Buildings	2019
Kent FRS Tall Buildings High Rise Firefighting	2019
Report from New York: Stair Search Strategy	2019
Flowrate: Adequate Fire Fighting Water	2020
Stairwell Protection Teams (Collection of Papers)	2020

Euro Firefighter 2

Since 1992, Grimwood has written four books on international firefighting strategies and tactics, which he has been extensively researching since 1975. His latest book EuroFirefighter 2 was released in 2017. Grimwood shares his most important findings based on 6701 building fires and current (international) insights into firefighting and fire safety.

Website Paul Grimwood: www.eurofirefighter.com

1992

2008

2017

6701 FIRES IN BUILDINGS

Between 1984 and 2016, Paul Grimwood investigated 6,701 building fires in the UK. What can the fire service learn from this? A short summary...

Building fires are developing faster and getting hotter than 30 years ago. The influence of ventilation determines the fire size and water requirement. If no or too little extinguishing water is available, limit the air supply. Rapid water supply not only limits the size of the fire but also the fire damage. Use tactical ventilation carefully and only when safe to do so. 3D smoke gas cooling supports fire fighting, it is not a substitute for other extinguishing techniques.

The basic principles for determining sufficient extinguishing water are often not well understood. (New) risks in building fires are increasing, building regulations and operational procedures (SOP) are lagging behind. Realistic fire drills have not resulted in fewer casualties for the fire service, this has even increased. Knowledge about Flow Path and influence of air supply must be improved.

Want to know more about these research results? All are in the book EuroFirefighter 2

NEXT INTERVIEW

Who should be our next guest?

This is someone who has made an important (international) contribution to making our field safer and more effective. Who do you think this should be? Let us know! We also asked Paul Grimwood who he thinks this person is. Are you also curious? We will announce this in the next episode!

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Backstage

BrandweerNet goes backstage. Join us on a behind-the-scenes tour of fire engineering research and development. Through interviews with (international) fire service colleagues, researchers and experts, we immerse ourselves in the background of our profession. Obviously, this is not only interesting for students from, for example, the Fire Service Academy, but for anyone who is interested in new developments in the fire service and their backgrounds.

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