FIRE PROTECTION

Engineering

1ST QUARTER 2014

Issue No. 61

MARRIOTT INTERNATIONAL, INC.:
APPLICATION OF A

GLOBAL FIRE PROTECTION PHILOSOPHY

PO Box 12901 Overland Park KS 66282-2901

CHANGE SERVICE REQUESTED

PRSRT STD
U.S. Postage
PAID
Penton
Media, Inc

THE OFFICIAL MAGAZINE OF THE SOCIETY OF FIRE PROTECTION ENGINEERS

CONTENTS

FIRE PROTECTION **Engineering**

8 COVER STORY

Features

1ST QUARTER 2014

Departments

FIRE PROTECTION **Engineering**

Online versions of all articles can be accessed at **magazine.sfpe.org**.

SFPE

Invitation to Submit Articles:
For information on article submission to *Fire Protection Engineering*, go to *www.sfpe.org/GetInvolved/SubmitanArticleforPublication.aspx*.

Subscription and address change correspondence should be sent to *Fire Protection Engineering*, Penton, 9800 Metcalf Ave., Overland Park, KS 66212 USA. Phone: 913.967.1670. Fax: 913.514.7148. Email: sonja.cheadle@penton.com

From the TECHNICAL DIRECTOR

Fire Protection in Historically Significant Buildings

Historically significant buildings represent a fire safety dichotomy. On one hand, it is necessary to reduce the vulnerability of the site to fire. Reducing the vulnerability to fire might involve installing fire safety measures, such as detection systems, suppression systems, or fire containment. On the other hand, it is necessary to avoid fire safety upgrades that would damage the historic fabric of a heritage site. One desires to avoid fires that could damage or destroy a building that is quite old; similarly, well-intentioned fire safety features should not damage or destroy the very features that are intended to be protected.

For existing buildings that are not historically significant – like a modern nightclub with high occupancy – requiring fire safety upgrades is only a matter of financial and safety concern between the owner and the regulators. If deemed necessary, the installation of fire safety upgrades, like a sprinkler system, would not alter the function of the facility. However, for heritage sites, the historic fabric is an embodiment of the purpose of the building.

For a typical building, there are two main parties involved in the design: the design team itself, which represents the owner, and the code officials who review the design. The design team is responsible for preparing a design that meets their client's needs and provides an acceptable level of safety. An acceptable level of safety is usually provided via compliance with the applicable codes and standards. In the case of a heritage site, it is useful to have a third party involved – one who is responsible for maintaining the historic nature of the building. This person would verify that any upgrades do not permanently damage the historic elements of the building, or if damage is deemed necessary, that the damage is minimized.

Several publications worldwide address preservation of historically significant buildings, and they share many common elements.[1, 2, 3] Paramount is a desire to preserve these buildings for future generations, both by reducing the risk of loss to fire and by avoiding damage by the installation of fire safety components.

Prior to beginning any fire safety upgrades, it is first necessary to gain an understanding and appreciation for the historic nature of the building. Through this understanding, it is possible to avoid measures that would – although well-intentioned – cause irreparable damage themselves.

Also, the design team should include a historic preservation officer. This is a person who would generally be distinct from the fire safety engineer and the fire enforcement official. This person would represent the interests of the historic aspects of the building, and would balance the desires of the other members of the design team.

Another common element is flexibility. The same fire safety approaches that are used in a new building or in the renovation of an existing, but not historic, building may not be feasible in a historic property. It may be necessary to look at alternate measures of achieving fire safety goals. In some instances, preservation of the historic fabric itself may be deemed more important that simple code compliance.

Historically significant buildings will rarely comply with modern fire safety requirements. Additionally, it is usually not possible to bring historic buildings into full compliance with existing fire safety requirements without damaging the historic nature of the building itself. Therefore, flexibility is necessary. This is alluded to in the historic preservation guidelines.

Watts[4] identified five common problems associated with meeting fire safety requirements in historic buildings:

- Meeting dimensional requirements
- Achieving required fire resistance
- Meeting egress requirements
- Addressing problems with installed features
- Avoiding aesthetic intrusions

Generally, a performance-based design is necessary to meet both the life safety goals for a historic building while also preserving the historic elements. The design could either be done on a true performance basis, where the focus is solely on meeting goals and objectives, or on a comparative basis, where a prescriptive code will be used, but alternative measures will be used to meet provisions for which strict compliance is impractical. The latter is still a performance-based design, albeit with a more narrow focus.

References:

1 "The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance," Australia ICOMOS, Deakin University, Burwood, VIC, 1999.

2 International Charter for the Conservation and Restoration of Monuments and Sites (Venice Charter 1964) International Council on Monuments and Sites, Paris, 1964.

3 NFPA 914, *Code for Fire Protection of Historic Structures*, National Fire Protection Association, Quincy, MA, 2010.

4 Watts, J. "Rehabilitating Existing Buildings," *Fire Protection Engineering*, Spring, 1999, pp. 6-15.

Morgan J. Hurley, P.E., FSFPE
Technical Director
Society of Fire Protection Engineers

Fire Protection Engineering welcomes letters to the editor. Please send correspondence to *engineering@sfpe.org* or by mail to *Fire Protection Engineering*, 7315 Wisconsin Ave., Ste. 620E, Bethesda, MD 20814.

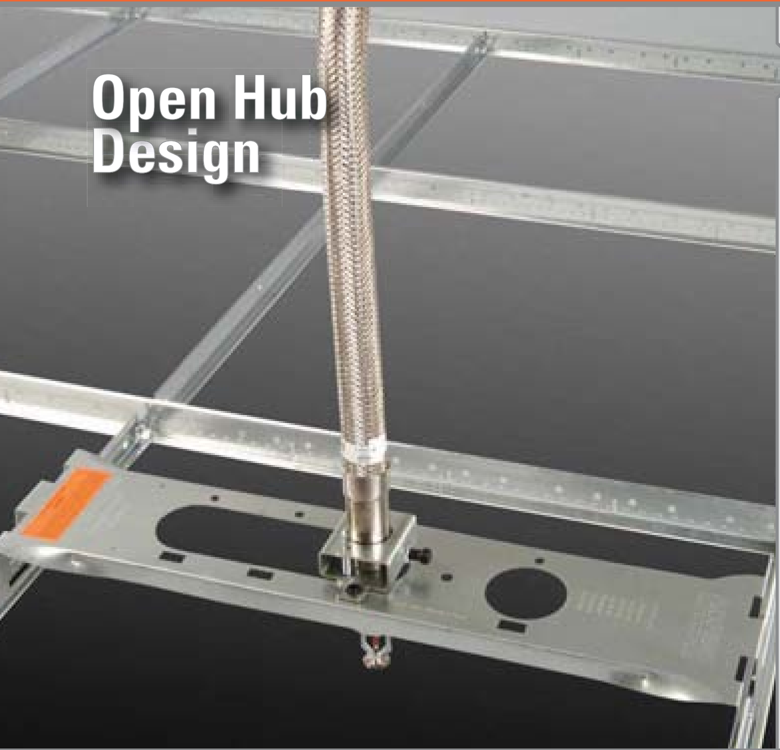
FLEXHEAD® OPEN HUB DESIGN

FLEXHEAD INDUSTRIES

A PART OF atkore INTERNATIONAL

We invented the concept of Flexible Fire Protection™

For more information, please visit www.flexhead.com



DESCRIPTION

- Fully assembled out of the box for ease of installation
- No loose parts
- Allows the sprinkler head to be installed prior to bracket installation
- Optional factory installed sprinkler head
- Compatible with any sprinkler head on the market
- Stable 6" width mounting bracket
- Hoses available in 24", 36", 48", 60" and 72" lengths

FM APPROVED

UL

56 Lowland Street, Holliston, MA 01746
Toll-Free 800-829-6975 • Fax 508-893-6020

By Meghan Housewright, Casey Grant, P.E., FSFPE, and Don Bliss

After the horrific nightclub fire in Santa Maria, Brazil in January last year, Brazilian officials knew they needed to improve fire safety in their country. Instead of building their fire safety program anew, they turned to century-old expertise at the National Fire Protection Association. NFPA staff and Brazilian officials are now collaborating to translate the needed documents and ensure they meet the needs of that country.

Standards represent the knowledge and experience of the experts that develop them. As trade and communication technology erode national borders, the reach of this knowledge and experience should not be confined by geography.

With the U.S. and the European Union in the first round of negotiations for a Transatlantic Trade and Investment Partnership (TTIP) deal, this issue is ripe for discussion. These negotiations will cover many topics, from tariff levels to rules for investment ventures. One topic, though, stands out for standards developers: regulatory cooperation. In dozens of economic sectors, differences between regulatory schemes in the U.S. and the E.U. create non-tariff barriers to trade that result in billions of dollars of lost trade revenue, without necessarily improving the health and safety of the citizens on either side of the Atlantic. Standards, as the basis of many regulations, have therefore become a topic of interest among negotiators and stakeholders.

Although both U.S. and European standards are used throughout the world, they are developed through two very different systems. The three European standards bodies – European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC), and the European Telecommunications Standards Institute (ETSI) – have a close relationship with the E.U. government. Furthermore, participation in these bodies is limited to European national players. In contrast to the E.U.'s top-down approach, the U.S. standards system lives in the private-sector. Several hundred organizations, both big and small, develop standards to meet the needs identified by their stakeholders. The process is open for anyone to participate. Over the years, government involvement in this process, and use of these standards, has led to a very effective public/private partnership.

While the two systems meet different needs, in a globalized economy their differences can pose a challenge to free trade. Manufacturers, and others, may strongly prefer a single standard, applicable worldwide, but governments have the right to set health and safety standards to protect their citizens as they see fit. To help ease potential conflicts, World Trade Organization (WTO) Members must consider the use of international standards in developing their regulations before resorting to nationally developed standards.

As the U.S. and the E.U. embark on trade negotiations, there is lingering contention over which standards are actually "international." Standards developed by U.S.-based organizations are used all over the world. Hotels in Dubai follow the requirements of the *Life Safety Code*,[1] international pipeline developers use ASME's *Boiler and Pressure Vessel Code*,[2] and these are just two among hundreds of examples.

Regardless of the global footprint of U.S. standards, the E.U. narrowly defines international standards as those developed by the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), or the International Telecommunication Union (ITU). WTO rulings that international standards can be any that are developed under open, transparent, and balanced systems have not changed the E.U.'s position.

If the trade negotiations are to put the U.S. and the E.U. on a path toward greater regulatory harmonization and cooperation, standards must be part of the discussion. As the current situation in Brazil shows, regulators must have the choice to pick the standards they believe will best protect their citizens. And, if regulators are to have a choice, the global standards system must thrive. As stakeholders in the TTIP process, NFPA and other U.S.-based standards developers have been vocal in educating U.S. negotiators about the benefits and vitality of our system. While the E.U. has adopted a top-down approach, the U.S. system relies on flexibility and autonomy for both the private sector and the regulators. It also relies on open, transparent, and increasingly global, participation.

How does this impact the fire protection engineering community? Safety codes and standards are developed and maintained by subject matter experts, like fire protection engineers, and they reflect the will of society on complex technical subjects. The example here is fire safety in nightclubs. Working together, we can seek to mitigate and eradicate fires like the recent one that occurred in Santa Maria, Brazil. To paraphrase the great philosopher George Santayana, if only we can learn the lessons of history, we will not be condemned to repeat them.

Meghan Housewright, Casey Grant, and Don Bliss are with the National Fire Protection Association.

References:

1 NFPA 101, *Life Safety Code*, National Fire Protection Association, Quincy, MA, 2012.
2 *Boiler and Pressure Vessel Code*, ASME, New York, 2013.


VicFlex™
SPRINKLER FITTING SYSTEMS
SUSPENDED CEILINGS
HARD-LID CEILINGS
SPECIALTY APPLICATIONS
PRE-ASSEMBLED SYSTEMS
The Clear Choice for fast, dependable sprinkler installation.
Style AB6 Assembly
confidence
speed
performance
› FOR COLD STORAGE APPLICATIONS
› UP TO 4× FASTER THAN RIGID PIPE
› ELIMINATE NEED TO MEASURE AND CUT HARD PIPE, OR WAIT FOR SEALS TO DRY
Visit www.victaulic.com/vicflex to learn more about the VicFlex system.
© 2014 VICTAULIC COMPANY. ALL RIGHTS RESERVED.
Victaulic®

New Paper Focuses on System Sprinkler Effectiveness

Fire Science Reviews announces the availability of a new online report titled, "A Review of Sprinkler System Effectiveness Studies."

Prior to writing the report, the authors compiled and tabulated sprinkler system component data and effectiveness estimates from system-based studies. In the report, they compare the merits of two approaches: component-based approaches using a fault tree of similar method, and system-based approaches using fire incident data where sprinklers were present.

The report includes recommendations for using the data for design purposes, including considerations for uncertainty and using a hybrid system/component approach for specific sprinkler system comparisons; the recommendations provide input on the reliability of systems in the development of performance-based fire safety design methods.

The report can be found at *http://firesciencereviews.com/content/2/1/6.*

Fire Dynamics Simulator and Smokeview Version 6 Officially Released

Fire Dynamics Simulator and Smokeview (FDS-SMV) version 6 is now available. This release represents more than 10,000 changes since the last major release of FDS-SMV in 2010 (FDS version 5.5.3), including modifications and improvements to the hydrodynamics and turbulence models, species and combustion routines, aerosol deposition capabilities, Lagrangian particle features, solid phase heat transfer and pyrolysis submodels, new HVAC functionality, radiation improvements, multi-mesh components, control functions, and devices and outputs.

Downloads and documentation for FDS 6 are available at *http://fire.nist.gov/fds.*

Online Videos Explain Fire Sprinklers to Consumers

The nonprofit Home Fire Sprinkler Coalition (HFSC) has made new online content available to consumers looking for information about the benefits of fire sprinklers. Available for free at the HFSC website, the new Ask for Them! interactive guide provides consumers with 11 brief video segments in a menu format. All of the content is free, noncommercial, and has no advertising.

Access the guide at *www.homefiresprinkler.org/index.php/Consumer/quick-guide.html.*

FM Global Awards Fire Prevention Grants

Last year, FM Global awarded 160 fire service organizations in the United States, Canada, and India with grants of $2,300 each. Fire prevention education, emergency response planning, and investigation efficiencies are just some of the ways fire service organizations will use the funds.

"When awarding these grants, we seek to help fund programs that have the most demonstrable impact on preventing fire, or mitigating the damage fire can quickly cause," says Michael Spaziani, manager of the fire prevention grant program.

Now in its 38th year, FM Global's Fire Prevention Grant Program has contributed millions to fire service organizations worldwide.

FM Global is accepting applications for 2014 fire prevention grants. To learn more or to apply, please visit *www.fmglobal.com/grants.*

CORPORATE 100 SFPE

The SFPE Corporate 100 Program was founded in 1976 to strengthen the relationship between industry and the fire protection engineering community. Membership in the program recognizes those who support the objectives of SFPE and have a genuine concern for the safety of life and property from fire.

BENEFACTORS

Aon Fire Protection Engineering
Arup Fire
FM Global
Koffel Associates, Inc.
Poole Fire Protection, Inc.
Rolf Jensen & Associates, Inc.
Siemens Building Technologies, Inc.
SimplexGrinnell
Telgian Corporation
Tyco Fire and Building Products, Inc.
Underwriters Laboratories, Inc.
Xtralis

PATRONS

Bosch Security System
Code Consultants, Inc.
Gentex Corporation
Harrington Group, Inc.
International Fire Safety Consulting
JBA Consulting Engineers
Mircom Group of Companies
National Fire Protection Association
The Protection Engineering Group
The Reliable Automatic Sprinkler Company
S.S. Dannaway & Associates Inc.
Swiss Re
System Sensor

MEMBERS

AGF Manufacturing, Inc.
Arora Engineers, Inc.
Automatic Fire Alarm Association
Baker Engineering and Risk Consultants, Inc.
Chemetron Fire Systems
en-Gauge Technologies
Fireaway, Inc.
FireLine Corporation
Gagnon Engineering
HSB Professional Loss Control
James W. Nolan, Emeritus
Leber/Rubes, Inc.
Liberty Mutual Property
Lubrizol Advanced Materials, Inc.
Micropack Detection Inc.
National Fire Sprinkler Association
ORR Fire Protection
Osho Ingenieria
Phoenix Fire Systems
Professional Loss Control
The Protectowire Co., Inc.
Randal Brown & Associates, Ltd.
SFFECO
Terp Consulting
The University of Maryland Online Master's Degree Program
XL Global Asset Protection Services

SMALL BUSINESS MEMBERS

Allan A. Kozich & Associates
Antal & Associates
Bourgeois & Associates, Inc.
Delta Q Fire & Explosion Consultants, Inc.
FireLink, LLC
FIREPRO Incorporated
Fire Suppression Systems Association
Fisher Engineering, Inc.
Foster Engineering
Futrell Fire Consult and Design, Inc.
Granger Consulting, Inc.
J.M. Cholin and Associates
Jaeger & Associates, LLC
LeGrand Engineering, Inc.
Lozano & Asociados
Rollinger Engineering, Inc.
SDI Fire
Sebench Engineering, Inc.
Seneca Fire Engineering, LLC
Slicer & Associates, LLC
Thunderhead Engineering
Tom Christman
WPI – Distance Learning Program
Willseal

MARRIOTT INTERNATIONAL, INC.: Application of a Global Fire PROTECTION PHILOSOPHY

By Stacy N. Welch, P.E.

With hotels around the world, Marriott works in areas with varying building codes and differing infrastructure while focusing on Marriott's loss objectives. Marriott owns less than 10 Marriott branded hotels and therefore works closely with numerous owners around the world. The vast majority of Marriott hotels are either operated by Marriott under long-term management contracts or operated by third parties under authority of a license granted by Marriott, but all are subject to Marriott's brand standards.

Marriott customers expect consistently excellent customer service and quality hotels wherever their travels take them. Part of meeting those expectations is focusing on standards for a safe environment at Marriott hotels around the world.

A GLOBAL STANDARD

John F. "Sonny" Scarff led Marriott's Fire Protection & Life Safety Department for 38 years beginning in 1974. Scarff and his team shaped and refined Marriott's fire protection and life safety standards. These standards evolved based on years of accumulating experience, advancing technologies and progressing codes and standards. The current Marriott standard, known as Module 14, references several NFPA standards, including NFPA 101,[1] NFPA 13,[2] NFPA 72,[3] and NFPA 92.[4] Module 14 also includes submittal requirements, testing performance criteria, and additional sprinkler system, fire alarm system, smoke control system, and kitchen hood suppression system requirements. In some cases, the Marriott requirements are more stringent than the requirements of the jurisdiction where the hotel is located.

When Scarff started with Marriott, the company had 15 hotels. As the company grew, it not only added hotels but other ventures. Over Scarff's career, he worked on restaurants, cruise ships, theme parks and assisted living facilities. And Marriott continues to evolve, with current focus primarily on the hospitality business.

As the number of hotels increased each year, it was necessary to hire associates to meet with owners and local authorities, review drawings and inspect hotels. In addition to working on new hotels, an annual inspection program for existing hotels was started for the Courtyard by Marriott brand in the early 1990s. This program included annual sprinkler and fire alarm system inspections while providing building audits and training for hotel employees. This inspection program has grown to all Marriott-managed hotels in the United States. Now, the fire protection team consists of fire protection engineers, mechanical engineers, NICET-certified plan reviewers, fire inspectors and fire protection specialists.

When Marriott developed its first hotel outside of the United States, company leadership knew it was important to draw upon the established standards of quality and safety. But, implementing standards in other parts of the world where different codes and standards are adopted is challenging.

When Marriott developed its first hotel outside of the United States, company leadership knew it was important to draw upon the established standards of quality and safety.

EDUCATION AND NEGOTIATION

Marriott has more than 600 properties outside of the

ZW4000G

350ASTAR

The ZW205FP Fire Relief Valve is designed for Fire Suppression Systems to relieve high system pressures. The pilot assembly reacts quickly to the increase of upstream pressure to prevent damage to system piping, valves, and sprinklers while maintaining positive pressure on fire pumps.

One Choice. One Zurn.

ZW205FP

Innovative fire protection solutions to ensure code compliance.

Zurn Wilkins fire protection products provide the building owner with complete fire protection solutions.
Our technologically advanced backflow prevention products, automatic control valves, and building risers ensure consistent test results and deliver Zurn Wilkins industry leading lowest life-cycle costs.
Choose Zurn to ensure compliance to fire sprinkler code requirements and first-pass annual testing.

United States, and nearly 70 percent of Marriott hotels under construction are outside of North America. Working in each new country or jurisdiction has its own learning curve. The Marriott team of engineers and specialists begins the process by meeting with the hotel owner and its design team. Marriott standards are reviewed, and Marriott representatives become familiar with the project and learn about potential areas of conflict between the standards and the local requirements. In some cases, the conflict may not be with a code, but with a common practice in the area.

For example, while working on a hotel under construction in Doha, Qatar, the Marriott fire protection representative was initially informed that to program the fire alarm system to initiate a general evacuation alarm upon activation of a single alarm device would be in conflict with local requirements. After many discussions regarding this issue, it was decided that the representative and the project engineer would meet together with the local authority, the Civil Defense Department in the State of Qatar, for resolution. When the Marriott representative explained what they were proposing and the reasons behind it, the Civil Defense indicated that although it may not be common practice in Qatar, it was not in conflict with the local requirements. The programming changes were able to be made at the property. This type of outcome is not always the result of meeting with the authority having jurisdiction, but in many cases it is.

COMMON DIFFERENCES

Many times there are disparities when working in different countries or regions of the world. The most common include:

- **Smoke sensors without sounders in hotel guest-rooms.** This NFPA 72 requirement of having sounders with the guestroom smoke detectors is a critical issue. The sounders are necessary to alert a guest in the affected room automatically without delay if there is smoke in the room. Without sounders, the hotel relies on someone noting the alarm at the fire alarm control panel and contacting the guest. This is a big issue, especially when an existing hotel joins the Marriott system. There is a significant cost associated with replacing the sensors and modifying the fire alarm system.
- **Double knock vs. single knock.** A "double knock" is when two alarm devices need to be activated before the general evacuation alarm is initiated. A "single knock" is when a single alarm device initiates the general

evacuation alarm. The purpose of the double knock is to reduce false alarms, but in many cases it will cause a delay of alarm initiation. In some instances, the two device activations are required to be in the same fire alarm zone. For example, if one detector in a corridor is on one zone and the next detector in the corridor is part of another zone, the alarm would not initiate despite two detectors activating. Although double knock sequencing is common practice in many parts of the world, it is not in accordance with NFPA 72.

- **Visual notification appliances.** Most countries around the world have varying requirements regarding fire alarm strobes or visual notification appliances for hearing-impaired occupants. The visible characteristics including light, color and pulse rate, as well as spacing and location as prescribed in NFPA 72, are difficult to achieve.
- **Alternate level elevator recall.** In most developed countries, elevator recall, where the fire alarm system through a relay module sends the elevator cars to the ground floor upon alarm activation, is readily available. However, alternate level recall, where the elevator car is sent to an alternate floor when the alarm is located on the ground floor, is not as common. The purpose of alternate level recall is to prevent the elevator car from being sent to the fire floor. NFPA 72 details the elevator recall programming requirements, while ASME/ANSI A17.1[5] includes the operational requirements of elevator recall.
- **Automatic sprinklers.** While installation of automatic sprinklers is becoming more common around the world, there are still many areas where sprinklers are not required or are not required by the local jurisdictions in certain hotels. This is an expensive retrofit when installed in existing buildings. In addition, some jurisdictions prohibit sprinkler installation in electric rooms, computer rooms and generator rooms where NFPA 13 has provisions for these areas. In some cases, where it is necessary to have suppression

Because each country has its own codes and standards as well as product listing regulations, performance-based design is necessary. With performance-based design, the systems are designed to meet set performance criteria rather than prescriptive requirements.

systems, yet sprinklers are prohibited, alternative suppression systems are installed in these areas at an increased installation and maintenance cost.

- **Smoke partitions.** Some jurisdictions have extensive requirements for building separation, including corridor separation doors to create smoke compartments. The purpose of these compartments is to limit the spread of smoke and heat from one compartment to another. This is especially critical in buildings without automatic sprinklers. While the partitions are not a problem, separate compartments can complicate smoke exhaust systems, if present, requiring multiple smoke zones.
- **Kitchen hood suppression systems.** In some parts of the world, suppression for commercial cooking hoods is not required. In other places, local codes or standard practice do not include sequencing in accordance with NFPA 96.[6] When a kitchen hood suppression system activates, the gas and electric serving appliances under the kitchen hood must shut off while the exhaust continues to run, and a fire alarm signal is sent to the fire alarm system. This is sometimes a challenge to achieve.
- **Fire ratings.** Wall and door rating requirements vary depending on local codes. In many cases, these ratings do not align with U.S.-based standards. One particular difficulty is meeting the requirement of providing 90-minute fire rated doors to access two-hour rated stairwells. A stair entry vestibule may be proposed with a 60-minute fire rated door on one side of the vestibule and a 30-minute fire rated door on the other. In this case, 60-minutes plus 30-minutes is not equivalent to 90-minutes.
- **Occupant load and egress calculations.** Marriott's standard specifies that ballroom and meeting room occupant loads are calculated using 7 ft^2/person (0.65 m^2/person) net. This is the factor for concentrated use without fixed seating from NFPA 101. When a local jurisdiction applies 15 ft^2/person (1.4 m^2/person) net or uses a seating chart to calculate occupant load, the exiting provided will not be adequate. In these cases, Marriott works with the architect and owner to provide additional exiting or to reconfigure the areas in the least disruptive manner.

PERFORMANCE-BASED DESIGN

Because each country has its own codes and standards as well as product listing regulations, performance-based design is necessary. With performance-based design, the systems are designed to meet set performance criteria rather than prescriptive requirements.

On a project in London many years ago, it was determined that providing a traditional sprinkler system would be difficult. To address infrastructure challenges and to ensure reliability of the sprinkler system, a cistern in the parking garage was required. For this project, a water mist system was implemented as an alternative to standard sprinkler systems. It saved space and addressed the infrastructure issues while at the same time it met the performance requirements of the Marriott standard.

KNOWLEDGEABLE PROFESSIONALS AND SKILLED INSTALLERS

Many projects do not have engineers or consultants that specialize in fire protection and life safety. It is even more challenging to find engineers and consultants who are familiar with NFPA codes. In these cases, Marriott works with the project teams and provides detailed guidance through meetings and reviews of design documents. It is not uncommon to review documents several times with many revisions and resubmittals needed.

In some jurisdictions, codes are adopted but not enforced. For example, one country in

With leadership, local knowledge and corporate support, Marriott Fire Protection & Life Safety brings together in-house staff and third party consultants to effectively accomplish the mission in support of the overall corporate goals and core values.

South America has adopted NFPA 101, but does not uniformly enforce it. This typically means that the buildings are not designed to comply, and the architects and engineers may not be familiar with the standard. In other areas, engineers are not accustomed to submitting plans or receiving thorough review comments.

Another challenge is finding properly trained installers familiar with specialized fire protection systems. In a hotel in the United Arab Emirates, the fire alarm system was plagued with improper wiring connections, broken terminal connectors on cards and fire alarm panels with more than 500 downloads. Not only were there problems with the fire alarm installation, there was a lack of tools and equipment necessary to make corrections. The Marriott Fire Protection & Life Safety team worked around the clock for weeks with the contractors before the hotel opened to the public.

SEE THE WORLD

Marriott has four continental regions: The Americas, including the Caribbean and Latin America; Asia-Pacific; Europe; the Middle East and Africa. With leadership, local knowledge and corporate support, Marriott Fire Protection & Life Safety brings together in-house staff and third party consultants to effectively accomplish the mission in support of the overall corporate goals and core values. Marriott Fire Protection & Life Safety contributes to corporate profitability by minimizing insurance costs by being viewed as best-in-class with underwriters, and by working with sales and marketing teams to furnish information on fire safety standards to group customers. Marriott is dedicated to providing a safe environment, worldwide, for guests and employees while simultaneously protecting the Marriott brand.

Stacy N. Welch is with Marriott International, Inc.

References:

1 NFPA 101, *Life Safety Code*, National Fire Protection Association, Quincy, MA, 2012.

2 NFPA 13, *Standard for the Installation of Sprinkler Systems*, National Fire Protection Association, Quincy, MA, 2013.

3 NFPA 72, *National Fire Alarm and Signaling Code*, National Fire Protection Association, Quincy, MA, 2013.

4 NFPA 92, *Standard for Smoke Control Systems*, National Fire Protection Association, Quincy, MA, 2012.

5 ASME/ANSI A17.1, *Safety Code for Elevators and Escalators*, American Society of Mechanical Engineers, New York, 2010.

6 NFPA 96, *Ventilation and Fire Protection of Commercial Cooking Operations*, National Fire Protection Association, Quincy, MA, 2014.

SERVING MULTINATIONAL CLIENTS GLOBALLY

By Ray Grill, P.E., FSFPE

Most fire protection engineers are sure to have the opportunity to perform international work at some point in their careers. In the context of this article, "international work" refers to working on a project outside of one's home country or for a client that is located outside of one's home country.

The idea of working on international projects can be very alluring. But there can be many pitfalls and significant unknown factors that can affect whether a project or client relationship is successful. It is important to be aware of the potential challenges before engaging in these types of activities.

EXPECTATIONS – CHALLENGES

Many fire protection engineers have had experiences working on different project types and with different types of clients, whether owners, developers, contractors, architects or engineers. Engineers and consultants routinely have opinions and expectations on how things should be handled based on their personal experiences on projects they have completed in the past. The type of project and the country or jurisdiction in which they work influences how they approach specific issues. The manner in which one has always approached fire protection or life safety may literally be foreign in some parts of the world.

When dealing with a project that is outside of an engineer's home country, it is very important that due diligence be exercised to identify and become familiar with the rules and approaches applied in the location where the project will be developed. There could be significant research required before design advice can be given or design efforts can commence.

Solutions to specific fire safety design issues may be applied on a routine basis in some jurisdictions, but they may not be understood or may be met with skepticism in a foreign location. Gaining acceptance of unique design solutions often requires extensive documentation of the solution and the presentation of existing examples of similar designs.

Communication can also be very challenging. The location of the project and the individuals executing the project are often separated by time zone differences. Email communication often becomes the default. Communicating technical information by email presents unique challenges. Individuals requesting information regarding specific design details often do not provide enough information to adequately frame the question, and responses may leave out factors that can impact the application of solutions. When communicating by email, it is critical that an appropriate level of detail be presented and that responses also address factors that can impact implementation.

Local custom or language may also present a communication challenge. In some parts of the world, disagreement in a public forum can be considered inappropriate. Design team meetings can occur where all the participating members seemingly agree to actions that don't get implemented. This can lead to significant delays or rework. There can also be miscommunications with authorities. In one instance, the design team had thought they had an understanding that a project could be designed in accordance with a model code promulgated in the United States. The authorities had told the design team that it was acceptable to comply with the model code. What the authorities did not say was that they also expected the design to comply with the local code. This misunderstanding led to significant disagreement between the authorities and the design team. The project design was delayed and performance-based solutions had to be developed and negotiated to allow the design goals to be achieved.

There are locales that allow the application of codes and standards within their jurisdiction that are developed in the Unites States, United Kingdom, or Europe all at the same time and sometimes on the same project. These countries also incorporate local requirements. Examples can be found in the Middle East and Central and South America. There are also developing countries that do not have formalized code enforcement.

In all of these cases, there can be options as to what code will be applicable to the design of a building. One of the more critical issues that can impact the overall success of a project is defining the codes and standards that will be applicable to the project early in the design process. It is even better when there is an understanding of the approach before proposals for services are even prepared. Depending on the locale of a project, it may be beneficial to join forces with a local partner to assist with issues that are specific to the jurisdiction. It may be a necessity depending on the regulatory climate and requirements for licensure to perform various consulting or design services.

Another factor that needs to be considered in selecting which codes or standards system to apply is the level of familiarity that local contractors may have. The availability of products approved under a specific standard's system may also be a factor. While use of locally available products is usually allowed, it may require a comparative analysis of the test standards and documentation of equivalency to obtain approval. This can be time consuming and have an impact on schedules if it is not anticipated.

GLOBAL APPROACH VERSUS LOCAL REGULATORY COMPLIANCE

Many multinational companies have loss prevention and fire safety standards that they apply and enforce throughout their organizations regardless of the location of the facility. The approach taken by an organization in

regard to fire protection and fire safety is usually based on the approach taken within the country of origin. As an example, many countries in Europe have strict compartmentation requirements to limit fire areas. Many European countries don't recognize sprinklers as mitigation for fire area size or compartmentation. When organizations from those countries come to the United States, they may be surprised by the large open areas that are allowed for sprinklered buildings.

Companies based in the United States that either develop projects overseas or design projects in foreign countries may be surprised by limits placed on their projects even though they may have what could be considered stringent corporate fire protection and fire safety standards. Standard design approaches often have to be modified to achieve local approval, or performance design options need to be negotiated.

They may also be surprised to find out that there are no local requirements and that local design or construction are done with no oversight. This can also create an unexpected burden. It may necessitate that the organization dedicate more resources or retain a third party to oversee design and construction in order to assure that minimum corporate life safety and fire protection criteria are met.

The level of effort required during construction can be significant. After a design is approved, site inspection is necessary to not only make sure that the required building features are implemented, but also to verify that approved products and materials are utilized. Substitution of inferior products or combustible materials where noncombustible materials are required is often discovered during site inspections.

A RECIPE FOR SUCCESS

Serving multinational clients globally can be very challenging and rewarding. There are a number of things that should be considered in order to maximize the potential for success when the opportunity presents itself.

Client Understanding

First, it is important to know the client and understand their expectations and goals. Different clients have different goals that can impact how they approach a project and therefore impact how an engineer advises the client. For example, if the client plans to build and hold a project for a long time, they will be interested in first costs and also in ongoing costs and the life-cycle costs of systems. Long-term maintenance requirements will also be more of a concern. That can impact product or system selection and design.

Getting on the same wavelength with the client is important particularly when the client is unfamiliar with the region in which the project is to be constructed. In order to be considered by a client for a foreign project, one would typically need experience in that market. Providing the client with an understanding of local issues that would affect their project before the project has begun can help to establish a framework for a mutually beneficial relationship.

Identifying and maintaining a primary and secondary contact within a consultant's organization that has the ability to engage the client and bring in the appropriate resources to fulfill various project needs is also helpful. There is nothing more frustrating to a client than not getting responses to inquiries.

Understanding Local Issues

It is critical to understand the requirements (or lack of requirements) of the jurisdiction in which a project will be developed. This is most efficiently done by having people in that country. There is no better way to know the local customs than through individuals that live in those locations. If an engineer does not have in-house resources within a specific locale, it may be appropriate to team with a local consultant.

Teaming arrangements usually work best when the team members bring different benefits and expertise to the team. The expertise should be complementary and not competitive. Teaming arrangements can be challenging, but if they are done in a manner that can produce mutual benefits, it can lead to long-term relationships.

Having the Right Team

It is equally important to make sure that the right resources and enough resources will be available. In addition to having the proper technical expertise for the design phases of a project, it may be necessary to staff the site to perform design reviews as well as site inspections to verify design implementation. Projects in regions that do not have review and inspection programs would need oversight to assure a client's requirements are implemented. Depending on the size of the project, this could require full-time site staffing for extended periods of time.

The on-site staff also needs to be experienced with a broad range of issues in order to deal with design as well as construction challenges. It can be very helpful to have off-site technical support arranged in advance to provide assistance to on-site staff. The off-site staff can provide necessary research and technical input based on information relayed from on-site staff.

Ray Grill is with Arup.

BRINGING A PRODUCT TO THE GLOBAL FIRE ALARM MARKET

By Isaac Papier, P.E.

In an ideal world, the concept of a global product would be commonplace. Economies of scale would be optimized for design and manufacturing, and a universal training program would be provided for designers, installers and service personnel, and travelers might be able to expect a comparable level of fire safety worldwide. Unfortunately, reality is far more complex.

While there are many codes and standards used throughout the world, generally these can all be grouped into one of three categories; building codes, installation standards, and product standards. While it is quite common for these to be separate documents, it is not unusual for these codes and standards in some jurisdictions to straddle these categories.

Building codes specify how the structures should be built, with the scope of requirements ranging from foundations, load bearing members, interior and exterior features, means of egress, ventilation and fire protection features, such as fire resistance, suppression and

fire detection and alarm systems. The building code is typically a series of publications, where each publication deals with specific subject matter, such as the building structure, plumbing, mechanical features and fire protection. In the U.S., building codes include the *International Building Code*,[1] NFPA 5000,[2] NFPA 1[3] and NFPA 101.[4]

These codes are not published as an instrument of law, and therefore have no statutory power in their own. However, they are deliberately crafted with language suitable for mandatory application to facilitate adoption into law by state regional and municipal authorities.

In Canada, it's the *National Building Code of Canada* and the *National Fire Codes of Canada* published by the National Research Council of Canada. As in the U.S., these codes have no legal status until they are adopted by individual jurisdictions that regulate construction. As a matter of practice, the *Canadian Building Code* is the model building code that forms the basis for all the provincial building codes. Some jurisdictions create their own code based on the *National Building Code*;

other jurisdictions have adopted the *National Building Code* with supplementary laws or regulations to the National Building Code. The concept of adopting supplementary laws and regulations throughout the world is a major factor in the complexity of the real world and often a barrier to a manufacturer's ability to produce a global product. For the FPE, it very likely means specialization in a specific region.

In Europe, it's the Eurocode, published by the European Committee for Standardization. Application of the Eurocodes in various Member states is voluntary and is envisioned to remain so in the future. "Nationally Determined Parameters" (NDP) allows the member states to make modifications that are based on geographical, geological or climate conditions as well as level of protection they wish to achieve or even traditions linked to lifestyle. This arrangement fosters national deviations that essentially prevent a truly pan-European fire alarm system.

Although one would assume that the U.S. and Europe, as major developed economies with unified building codes, may be further along with a uniform set of codes, reality is considerably less favorable.

In China, the building code known as Code of Design on Building Fire Protection and Prevention[5] is part of the building national standards developed by state agencies with input from industry, designers and municipal agencies. These regulations are administered by the ministry of public security through local and provincial level fire services. Individual cities have the authority to develop and enforce local building standards. While the Ministry of Public Security is a national entity with great powers, the latitude given to the cities to develop and enforce local standards does make for differences, but not to the extent seen in Europe.

While the goals of these codes are the protection of life and property, many were developed independently and therefore approach the same subjects in a somewhat different manner. This results in a difference in equipment design, installation and operation.

Although one would assume that the U.S. and Europe, as major developed economies with unified building codes, may be further along with a uniform set of codes, reality is considerably less favorable. For the U.S., a number of factors complicate things. First is the existence of two building (fire)

FAAST

codes. Unfortunately, most jurisdictions do not utilize the current edition of the code, and many jurisdictions are more than one edition behind. A further complication is a state by state advocacy to move the code adoption cycle from the current three-year period to six-year. While as of this writing this effort has been stopped in virtually every state where it has been proposed, this effort remains ongoing, and the situation may change.

In Europe, while the Eurocode is part of a united European initiative, in practice significant differences exist between many of the E.U. member states. One example is the unique requirement in France for a fire alarm interface for the fire services. This does drive different product requirements in specific E.U. countries.

The building code typically refers to installation standards that specify technology and devices and how to install, maintain, and test the system. For fire alarm systems in the U.S., this is NFPA 72.[6] In Canada, this is CAN/ULC-S524,[7] and in Europe this is the Construction Products Regulation (CPR) published by the European Commission. They are adopted by various jurisdictions through reference in the building code. Typically, the reference is to a specific edition, which may or may not be the latest edition. A further complication occurs where a local jurisdiction adopts a particular building code and concurrently may reference a different edition of an installation standard than the one referenced in the building code.

The model code specification identifies a process for determination of devices suitable for a specific application. This frequently involves a conformity assessment process performed by third party certification agencies. This is where product standards come in.

In the U.S., these standards are generally published by Underwriters Laboratories and

While the U.S. and Canadian standards are similar, a number of differences require products tested for use in one country be retested for the other.

FM Global. Product certification to these standards is a declaration that these devices can be installed in an NFPA 72 compliant fire alarm system. In Canada, fire alarm product standards are published by Underwriters Laboratories of Canada. Product certification to these standards is a declaration that these devices can be installed in a CAN/ULC-S524 compliant fire alarm system. In Europe, these are EN (European Norm) standards published by the European Committee for Standardization (CEN). Product certification to these standards is a declaration that these devices can be installed in a CPR compliant fire alarm system. Because of E.U. regulations, compliance with the CPR is mandatory, although the level of compliance varies among the member nations.

While U.S. and Canadian standards are similar, a number of differences require products tested for use in one country be retested for the other. Over the past 10 years or so, the National Electrical Manufacturers (NEMA) has been leading an effort to harmonize U.S. and Canadian fire alarm product standards. This has been a long and difficult process that has produced a number of "Harmonized" UL/ULC standards; unfortunately, they still include many national deviations that still make the products somewhat different.

The EN standards are different than U.S. and Canadian standards and are specifically written around the Construction Products Directive. While there have been claims that EN tested and certified products would be suitable for use in a NFPA 72 compliant system, this is really not true because of differences in specific requirements. Examples include different fire tests for smoke detectors, operating ambient temperatures for fire alarm equipment, time to report a fault and alarm condition, variable voltage operation, minimum standby power operating time, and tests that are optional in EN standards while mandatory in UL standards. Most importantly, the E.U. EN certifications can be viewed as a limited time licensing, in that there is no factory surveillance program as there is with the U.S. certification agencies.

Another major challenge for manufacturers who seek to produce a global fire alarm product is the conformity assessment process and the agencies that provide this service. In much of the world, these non-governmental organizations operate in the private sector and often compete against each other.

In the U.S., the Conformity Assessment System (CAS) providers are accredited as Nationally Recognized Test Laboratories (NRTLs) by the U.S. Occupational Safety and Health Administration. The accreditation is based on specific technical areas. Each NRTL must demonstrate its competency, both technically and facility-wise, to test and certify fire alarm equipment. Unfortunately, these NRTLs view each other as competitors and have therefore been unwilling to establish a system of data exchange that would help expedite and reduce product certification time and costs.

In Canada, the conformity assessment provider accreditation is provided by the Standards Council of Canada. Here, too, the accreditation process is based on specific technical areas, and manufacturers

While Canada and the U.S. are actively working towards harmonizing their standards, they face a formidable challenge when it comes to harmonization with ISO.

face a similar problem of the conformity accreditation agencies' willingness to accept data from other accredited agencies.

In Europe, conformity assessment bodies are nominated by their member nation governments and designated as notified bodies by the European Commission. A notified body is designated based on specific requirements, such as knowledge, experience, independence and resources to conduct the conformity assessment. Each member country has designated a notified body, and in some countries, this is the only accepted conformity assessment provider. Other nations may accept multiple notified bodies.

The European conformity assessment business is very competitive, and three agencies have emerged as dominant players that are accepted on regional bases. Although all the agencies utilize the same EN standards, there is considerable variation in interpretation, and therefore many notified bodies are not accepted outside their home country. As in the U.S., notified bodies shun data acceptance for the same reasons as their U.S. counterparts. Sharing of data between U.S. conformity assessment service providers and their European counterparts is very rare.

ISO – A POSSIBLE SOLUTION

The International Standards Organization (ISO) is a network of the national standards institutes of 148 countries. It operates on the basis of one membership per country, with a central secretariat in Geneva, Switzerland, that coordinates the system.

The primary goal of ISO is the development of international standards that serve as the basis for free and open international trade of goods and services. The standards developed by ISO cover a broad spectrum of services and devices, ranging from quality control systems, mechanical devices, and fire alarm equipment.

As the primary goal of all existing national standards is to enhance fire safety for building occupants and the built environment, it would seem that a set of international standards could be developed through the ISO process by combining best practices from each of the existing standards. While this is a noble concept, development and implementation of an international set of standards is a challenge. Politics and business interests, while not openly discussed in technical committee meetings, are key factors. These factors make committee negotiations difficult and often frustrating.

While Canada and the U.S. are actively working toward harmonizing their standards, they face a formidable challenge when it comes to harmonization with ISO because the base documents utilized for development of the ISO fire alarm equipment standards are the European EN standards. Having these standards be identical is essential for the Europeans because they have a mandate to use the ISO standards when they are published, and the Construction Products Regulation is rooted in E.U. agreements. For the U.S. and Canada, this requirement for being identical poses conflict with their respective building and model codes. Unfortunately, negotiations at the technical committee levels are difficult, and very little progress at compromise has been achieved.

The ultimate goal of harmonized international fire alarm standards, while many years away, remains a very desirable deliverable. Numerous, dedicated, hard working individuals labor diligently at the task of developing, refining and updating the standards to achieve these global best practice standards. While progress is difficult and time consuming, eventually that goal will be achieved, because it is the right thing to do so that the best products and systems become the global norm.

With the development of harmonized global standards for fire alarm systems, the remaining major hurdle for global equipment will be the conformity assessment service providers. Because of limited resources, a manufacturer must choose which markets to enter. This system is a major cost and time barrier that typically reduces the accessible market and significantly increases costs – which ultimately must be borne by the end customer.

Isaac Papier is with Honeywell Life Safety.

References:

1 *International Building Code*, International Code Council, Washington, DC, 2012.

2 NFPA 5000, *Building Construction and Safety Code*, National Fire Protection Association, Quincy, MA, 2012.

3 NFPA 1, *Fire Code*, National Fire Protection Association, Quincy, MA, 2012.

4 NFPA 101, *Life Safety Code*, National Fire Protection Association, Quincy, MA, 2012.

5 GB50016, *Code of Design on Building Fire Protection and Prevention*, Ministry of Public Security, Beijing, 2006.

6 NFPA 72, *National Fire Alarm Code*, National Fire Protection Association, Quincy, MA, 2013.

7 CAN/ULC-S524, *Installation of Fire Alarm Systems*, Underwriters Laboratories of Canada, Ottawa, Ontario, 2006.

EVERYTHING YOU NEED

Design a COMPLETE FIRE ALARM SYSTEM using Hochiki control panels, detectors and accessories.

ANALOG/ADDRESSABLE SYSTEMS

The FireNET® and FireNET Plus™ series features expandability and easy programming. The FireNET® has been awarded seismic certification. Single or double high capacity network loops can include up to 64 FireNET® and FireNET Plus™ units, and a very ample number of annunciators, analog and conventional detectors, displays, interface units, notification equipment, and specialty modules, as well as a software package. The FireFocus is our newest addition to the analog systems product line.

CONVENTIONAL SYSTEMS

Hochiki conventional systems include the all-new HCA Conventional Fire Alarm Control Panel, which features a simple, powerful, and installer-friendly configuration. Ideal for small institutional and commercial buildings, shopping malls, offices and public establishments.

Please check our website for more listing information.

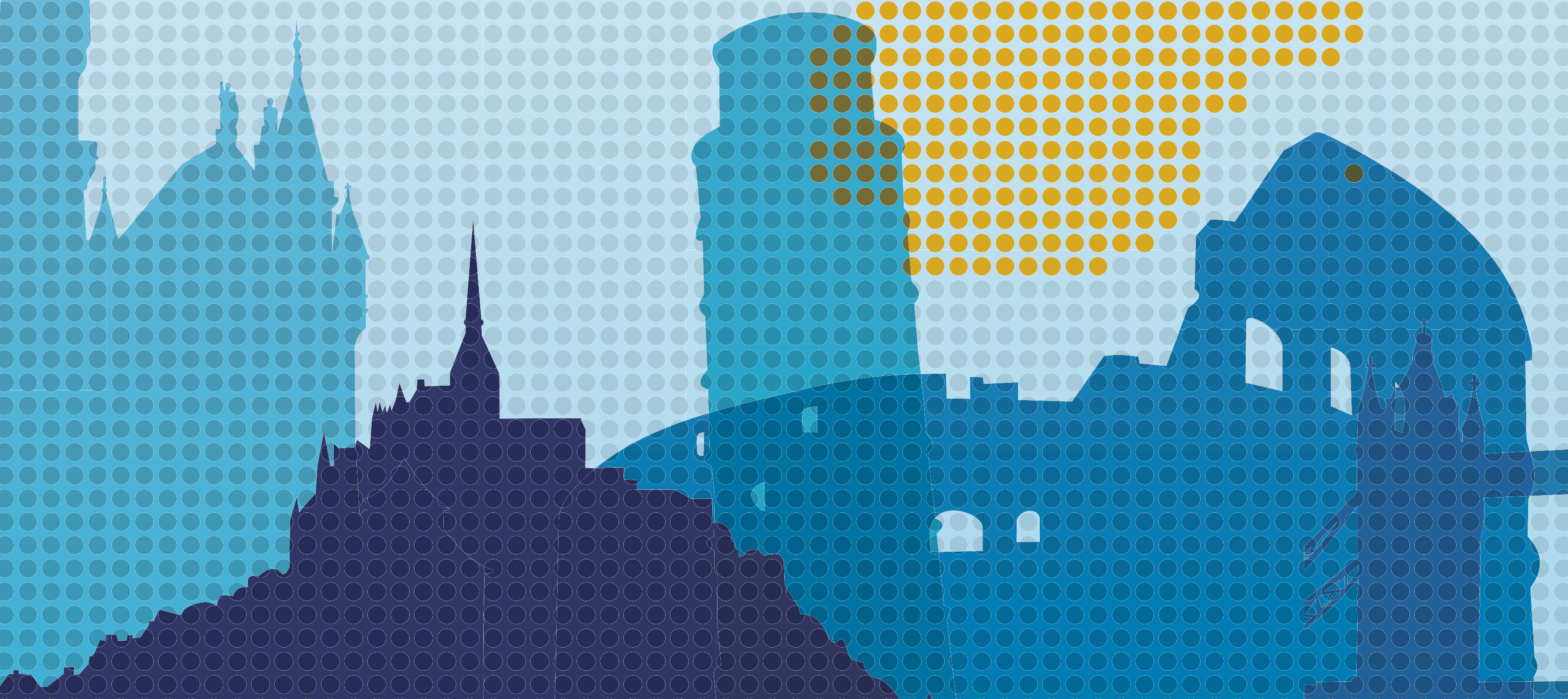
714-522-2246
sales@hochiki.com
www.hochiki.com
7051 Village Drive, Suite 100
Buena Park, CA 90621-2268 USA

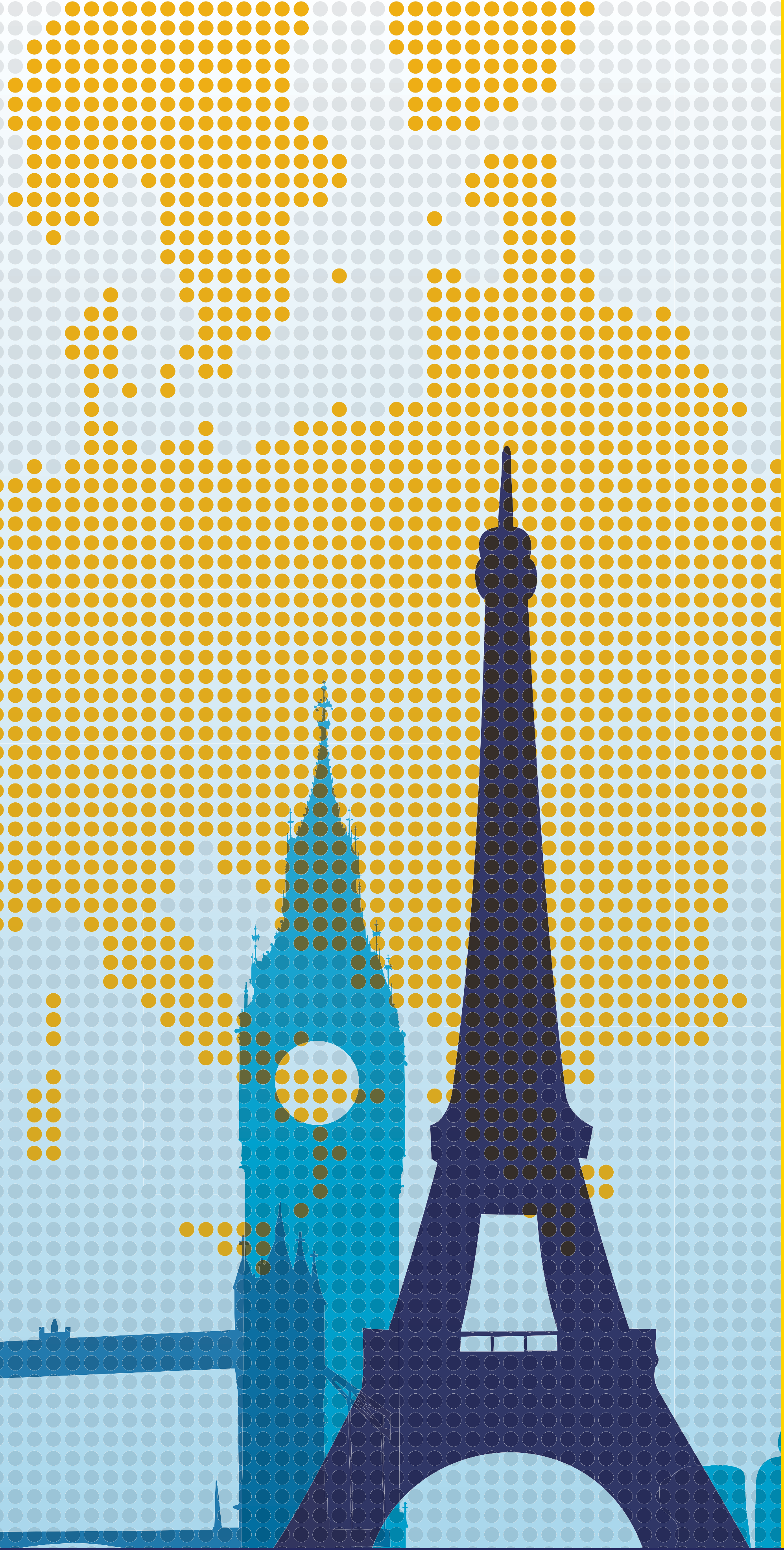
HOCHIKI america corporation

WITH SUPERIOR RELIABILITY

THE STATUS OF FIRE SAFETY ENGINEERING IN EUROPE

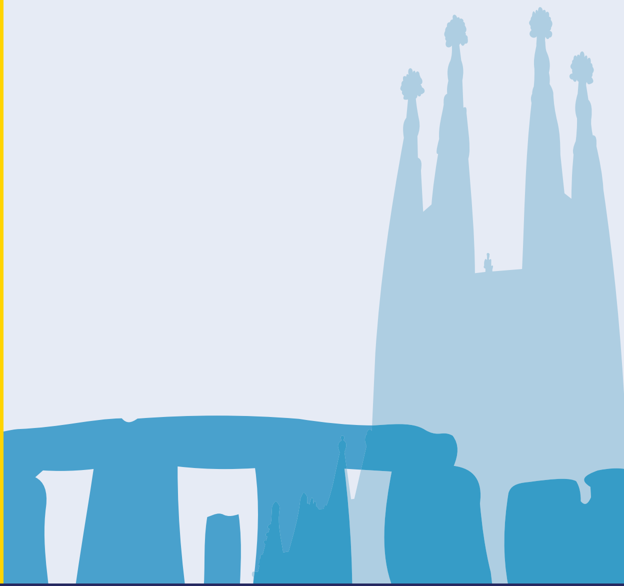
By Michael Strömgren





Fire safety engineering methods are becoming more and more common within Europe. While there are many differences between European countries, there are also many similarities. All countries face new challenges in the built environment: environmental concerns, new architecture, changing societal needs and new technology. Fire safety engineering is a tool to allow for non-traditional approaches, which is being used increasingly in Europe.

This article reports on the results of a survey conducted on behalf of European Chapters Coordination Group (ECCG), which is a part of the Society of Fire Protection Engineers (SFPE). The purpose is to identify the status of Fire Safety Engineering (FSE) in Europe and to support the activities of the ECCG. All European countries were invited to participate in the survey. In total, responses were received from respondents representing 21 different countries within Europe. The questions cover a wide range of subjects, from education and regulations to certification with the intention of identifying the degree of FSE currently in use throughout the continent.



INTRODUCTION

The term "fire safety engineering" has been used more commonly in Europe than "fire protection engineering" and will be used in this article as a synonym. Several definitions and questions in this article are based on a report about performance-based building regulatory systems.[1] To successfully facilitate fire safety engineering on a national basis, several components are recognized as vital. These are:

- Qualified practitioners, a product of education, certification programs and other measures
- A legal and regulatory environment allowing for FSE, e.g., a performance-based building system
- Appropriate guidelines for the use of FSE

The questions on the survey covered a wide range, including education, regulations and certification. The respondents were experts in fire safe ty in their respective countries. Countries that were represented in the responses to the questionnaire included Belgium, Czech Republic, Denmark, England and Wales, Estonia, Finland, France, Germany, Iceland, Italy, Lithuania, Norway, Poland, Portugal, Russia, Scotland, Slovenia, Slovak Republic, Spain, Sweden, and Switzerland. The questions and their responses are summarized in the remainder of this article.

APPLICATION OF FSE

Does the legal building regulatory system allow the application of FSE? Since when?

All of the respondents answered positively to this question, with the exception of two countries: Estonia, for which no response to this question was entered and the Slovak Republic, which does not allow FSE. Most notably, many big countries, such as Germany, France, Spain and Italy, started allowing FSE only in the last decade. See Table 1.

1975: Iceland	2004: Denmark, France, Slovenia
1985: England and Wales	2005: Scotland
1994: Belgium, Sweden	2006: Spain
1997: Finland, Norway	2007: Italy, Czech Republic
1998: Russia	2009: Portugal
2002: Germany, Switzerland	2011: Lithuania

Table 1: Years When FSE was First Permitted

Are there guidelines for FSE that are used?

Guidelines for FSE are required to be used in Iceland, Italy, Lithuania and Sweden. In Iceland, the guidelines are under development.

Do national guidelines for the use of FSE exist (even if their use is not mandatory)?

The response to this question was a little more mixed, with approximately an even split. A summary of the responses is given in Table 2.

Yes	No
Czech Republic, Denmark, Germany, Iceland, Italy, Lithuania, Norway, Poland, Russia, Sweden	Belgium, England, Estonia, Finland, France, Portugal, Scotland, Slovak Republic, Slovenia, Spain, Switzerland

Table 2: Recognized Guidelines for FSE

The status of these guideline documents (where they exist) varies. In a number of countries, documents are under preparation or revision. For example, in Spain at the time of the survey, a taskforce was being set up to produce a guideline document.

What specific guidelines (including national) for FSE are used?

Specific guidelines in use in different countries are typically comprised of common international guidelines, such as the *International Fire Engineering Guidelines (IFEG)*[2], ISO standards[3] and the *SFPE Handbook of Fire Protection Engineering*[4] and SFPE guidelines[5]. British standards[6] are also used, both within and outside UK. In addition, a number of countries publish and implement their own guidelines, which cover various aspects of FSE.

FSE EDUCATION & CERTIFICATION

Are there requirements for the qualification of practitioners of FSE?

In Norway and Sweden, a voluntary national approval system is in place. In other countries, a combination of certification and education does exist; however, in the majority of cases there is no mandatory requirement for qualification of FSE practitioners. See Table 3.

No Requirements	By Education	By Certification	Other
Belgium, Denmark, England, Estonia, Lithuania, Portugal, Scotland, Slovenia, Spain, Sweden, Switzerland	Czech Republic, Finland, Germany, Poland, Russia, Slovak Republic	Czech Republic, Finland, Italy, Poland, Russia, Slovak Republic, Sweden	Czech Republic, France, Iceland, Norway

Table 3: Requirements for Qualification

Is there an education program for FSE professionals?

In the majority of the responding countries, there are educational courses on FSE available. See Figure 1. Available through universities, they comprise either undergraduate or postgraduate level degrees. In Scotland, a degree level course has been available at the University of Edinburgh since 1974. Of the respondents to this question, this is the earliest known degree course. In Poland and Sweden, the educational programs have been in place for approximately 30 years. In other countries, academic programs are more recent introductions.

Education programs range from fire safety technology to fire safety engineering at the bachelor's, master's

Figure 1: Status of Different Types of Fire Safety Education in the Responding Countries

and doctoral levels. Fire safety technology education is focused on skills for application, installation, operation and maintenance of built-in fire safety. Introductory mathematics and science courses are included. Fire safety engineering education is focused on skills for understanding and applying the concepts and principles of fire safety science and engineering. It is geared toward development of theoretical skills, consisting of courses on engineering fundamentals and design, built on a foundation of mathematics and science courses. These definitions are based on definitions listed in SFPE publications.[7]

Is there a certification program of FSE professionals?

Although a certification program exists in the countries noted in Table 4, there is no formal requirement to achieve certification to practice. Despite this, the level of certification varies, and not all applicants pass the required standard.

Yes	No
England, Finland, Poland, Sweden	Belgium, Czech Republic, Denmark, Estonia, France, Germany, Iceland, Italy, Lithuania, Norway, Portugal, Russia, Scotland, Slovak Republic, Slovenia, Spain, Switzerland

Table 4: Countries with FSE certification

LEGAL AND BUILDING REGULATORY SYSTEM

Who promulgates the regulations?

In all of the responding countries, promulgation of the regulations is achieved at a national level, with varying levels of responsibility being handled by regional and local governments. The structure of this depends largely upon the regulatory framework of the country in question.

Who is responsible to verify compliance with the regulations?

While basically all countries have stated that fire safety engineering is allowed, the meaning of this varies. Verification responsibilities lay heavily with the authorities in some countries. For example, while Belgium has allowed FSE since 1994, it is still requiring approval by the national authority. In other countries, licensed practitioners are used. Countries such as Norway and Sweden are very liberal, with a large degree of freedom for the practitioners. See Figure 2.

Figure 2: Verification Responsibility Varies Where Several Countries Rely Mainly on Authorities

How are disputes resolved?

The mechanism for resolution of conflicts varies by country – the most common situation is decisions by the authorities having jurisdiction, negotiations or by court cases. See Table 5.

Duty Holders

While the regulations apply to buildings, it is important to note that groups and stakeholders bearing duties and responsibilities vary. The duty holders are primarily the building owners, but some countries also put a large responsibility on the design professionals. In several cases, there are also multiple stakeholders.

Insurance Perspectives

Insurance companies are rarely, if ever, involved in the building process. Since many countries primarily focus on life safety, this means that property protection may not be taken into account during the design process except in some rare cases.

The next generation of aspirating smoke detection has arrived

- Ultra-high sensitivity
- Calibration for life
- Up to 30% lower TCO
- Precision addressability
- Software analytics
- Expandable hardware

VESDA by Xtralis has always been the leader for very early warning smoke detection, protecting lives & assets for over two decades in 300+ applications in 45 markets. With VESDA-E, Xtralis value & reliability is now available for new markets, including:

HEALTHCARE | RETAIL | EDUCATION | OFFICE SPACE

www.xtralis.com/vesda-e

VESDA® E™

Government Authority Having Jurisdiction (AHJ)	Negotiation	Courts	Appointed Body	Progression From AHJ Through Appeals to Courts	Other
Belgium, England, Estonia, Germany, Iceland, Italy, Lithuania, Poland, Russia, Scotland, Slovak Republic, Slovenia	Czech Republic, Denmark, England, Finland, Germany, Iceland, Scotland, Spain	Czech Republic, Denmark, England, Estonia, Finland, Germany, Iceland, Norway, Poland, Portugal, Russia, Scotland, Sweden	England, Iceland, Scotland	England, Iceland, Scotland, Switzerland	France

Table 5: Resolution of Disputes

Michael Strömgren is with SP Technical Research Institute of Sweden.

References:

1 Meacham, B. (ed.) "Performance-Based Building Regulatory Systems – Principles and Experiences." Inter-jurisdictional Regulatory Collaboration Committee, Canberra, Australia, 2010.

2 *International Fire Engineering Guidelines*. Australian Building Codes Board, Canberra, Australia, 2005.

3 ISO/TR 13387, Fire Safety Engineering, International Organization for Standardization, Geneva, 1999.

4 Dinenno, P (ed.) *SFPE Handbook of Fire Protection Engineering*, 4th Edition, National Fire Protection Association, Quincy, MA, 2008.

5 *SFPE Engineering Guide to Performance-Based Fire Protection*, 2nd Edition, National Fire Protection Association, Quincy, MA, 2007.

6 BS 7974, *Application of Fire Safety Engineering Principles to the Design of Buildings – Code of Practice*. British Standards Institute, London, 2001.

7 Recommendations for a Model Curriculum for a BS Degree in Fire Protection Engineering, Society of Fire Protection Engineers, Bethesda, MD, 2010.

Simplex TrueAlert ES brings the exceptional flexibility of addressable technology to the design of fire alarm notification systems. You can go further with less cable and experience fewer design roadblocks. The system is reliable, cost effective and highly scalable, so it can grow as life-safety needs evolve. And, it's all backed by Tyco SimplexGrinnell and eServices, our industry-leading suite of remote diagnostics and life-safety system management tools. With TrueAlert ES notification, we're advancing safety and security—so you can offer more value to your clients.

See 7 reasons why TrueAlert ES can save lives, time and money.
www.NotificationReinvented.com.

Safer. Smarter. Tyco.™

tyco SimplexGrinnell

A YOUNG ENGINEER'S PERSPECTIVE

By Jonathan Levin, P.E.

SFPE Alliance of Young Engineers

SFPE has always been dedicated to providing young engineers with the tools and resources to succeed in their careers. To support this mission, the Alliance of Young Engineers (AYE) was formed. Comprised of SFPE members under the age of 35, the AYE is responsible for facilitating SFPE's mentoring program, planning networking events, and other activities that benefit and support aspiring engineers and those new to the profession.

I recently sat down with four members of the SFPE Alliance of Young Engineers steering committee, Cathleen Childers, Adam Paterson, P.E., Katie Pothier, P.E., and Robin Zevotek, P.E., and asked them to give me their thoughts on the profession and what advice they would want to pass on to other young or aspiring engineers. Here is what they had to say.

How did you get involved in fire protection engineering?

Robin: While I was attending community college as a computer science major and volunteering as a firefighter, one of my mentors introduced me to the industry through his work with the International Standards Organization. I realized the potential to combine my interests in fire and life safety that I'd developed through my experiences as a firefighter, combined with science and engineering principles, was an opportunity I could not pass up.

Cat: I always wanted to be an engineer even before I really had a clear picture of what engineering entailed. In high school, I attended the Women in Engineering summer program at the University of Maryland, where I not only learned about engineering, but I learned about all the programs Maryland had to offer, including the Fire Protection Engineering program. I haven't looked back since.

What field do you work in and what is a typical day at your job?

Adam: I work in the building design and construction industry as a fire protection engineer for Smithgroup JJR. I work in the company's Washington, DC office building and I provide consultation on building code and life safety design, fire alarm and detection system design, and fire suppression system design.

Robin: I work in research, specifically relating to firefighter safety. My time is split between developing and conducting testing, and writing and presenting the results. Tests are conducted both in Underwriter Lab's fire laboratory and out in the field with acquired structures.

What do you enjoy most about your career in fire protection engineering?

Katie: I enjoy the diversity. As a consultant, we're involved in so many different aspects of fire protection and life safety that you can completely shift gears from one minute to the next. In addition, I've had the opportunity to work on pretty much every type of building and have enjoyed adapting to the unique concerns associated with each one. It is always a challenge and is certainly never boring.

Cat: The most rewarding part of a career in fire protection engineering is seeing the impact your work has on the real world. I love being involved in every step of the construction process from the moment you arrive onsite and begin documenting existing conditions, through the intricacies of the design process, and finally watching your design be constructed and implemented.

What are some examples of projects or problems you've encountered that demonstrate the importance of fire protection engineering?

Cat: The project I'm currently involved in is a great example of fire protection engineering in the real world. A multi-building hospital campus has a lot of unique hazards that need to be addressed. At any given time, a percentage of the occupants are not able to self-rescue, so the staff is instrumental in evacuation and the fire alarm system is instrumental in alerting the staff.

Robin: As a fire protection engineer, I've had the opportunity to participate in research, which has implications on current firefighting tactics. These research projects have challenged the "way we've always done it" to understand the impact current fire service operations have on today's ventilation-limited fires. Results from this research are being implemented throughout the world to enhance the safety of firefighters and improve their ability to save lives.

What is your best piece of advice for a young engineer or one considering a career in fire protection engineering?

Cat: My biggest piece of advice is to get involved. Mentors have played a huge part in my professional development. As an undergraduate, I found my mentors in upperclassmen and professors. In the professional world, I've found my mentors in engineers a few years ahead of me as well as engineers with 20+ years of experience. It's important to have someone to discuss things with – from the details of NFPA 13 to how to sign up for the P.E. exam.

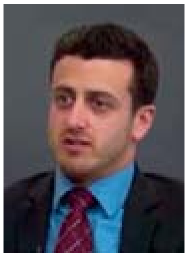
Adam: Look through the SFPE and NFPA handbooks. The handbooks hold an amazing amount of information. Fire protection engineering is a relatively new discipline compared to the traditional mechanical, electrical, and civil engineering disciplines. The people advancing fire protection research are the same people who participate in SFPE and NFPA. Also, you will see many of the SFPE and NFPA handbook authors are the same people who are working in the industry.

Why is it important to be a member of SFPE?

Katie: Our profession is still relatively unknown, so we need to be actively involved in the community in order to spread awareness of our field. In addition, the networking opportunities and field-specific education and training are invaluable. Through my involvement in SFPE, I know exactly who to turn to if I have a question that is beyond my expertise.

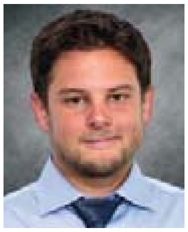
Robin: As a fire protection engineer, SFPE provides the best networking opportunities because it is comprised of individuals who have devoted their lives to the advancement of fire safety. The organization brings together many of the leaders in the field of fire protection engineering to collaborate on the future of the profession. As a member, you are given the opportunity to participate in the advancement of the profession with other passionate fire safety professionals.

The scope and activities of the AYE is continuing to grow and we are always looking for feedback and suggestions. If you have any feedback or would like more information on the AYE and its current activities such as the mentoring program, contact us at AYE@sfpe.org.



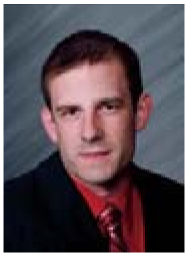
Jonathan Levin, P.E., CFPS is a technical consultant in property risk engineering at Liberty Mutual Insurance in Weston, Massachusetts. He graduated from Worcester Polytechnic Institute with a Bachelor of Science degree in Chemical Engineering, a Master of Science degree in Fire Protection Engineering, and is currently working toward his Master of Business Administration. Jonathan is a registered Fire Protection Engineer in Massachusetts and is a Certified Fire Protection Specialist (CFPS). He is the current chairman of the AYE.

Cathleen Childers is a 2010 graduate of the Fire Protection Engineering program at the University of Maryland. During her time at Maryland, she was an active member of the engineering community, including a year as president of the student chapter of SFPE. Cathleen currently lives in New York City, working for Hughes Associates, Inc. and serving as Assistant Secretary to the NY Metro Chapter of SFPE.



Adam Paterson, P.E. graduated from Virginia Polytechnic Institute and State University with a bachelor's degree in Mechanical Engineering. He specializes in fire protection in healthcare building designs with Smithgroup JJR but continues to work with all types of buildings. He is a registered fire protection engineer in North Carolina, Washington, DC, Virginia, and Maryland and is certified with NICET as a level II in low voltage systems. He is on the SFPE Licensing Committee and is pursuing a Master's degree in Fire Protection from Worcester Polytechnic Institute.

Katie Pothier, P.E. is a Senior Fire Protection Engineer at Fisher Engineering, Inc. in Johns Creek, Georgia. She is a graduate of Worcester Polytechnic Institute with a Master of Science degree in Fire Protection Engineering and a graduate of Illinois Institute of Technology with a Bachelor of Science in Mechanical Engineering with a minor in Fire Protection Engineering. Her experience includes enforcement of fire codes, life safety/building code surveys, and design, inspection and analysis of fire protection systems. She is also a member of the Greater Atlanta Chapter.



Robin Zevotek, P.E. is a research engineer with the UL Firefighter Safety Research Institute in Northbrook, Illinois. He holds a Bachelor of Science degree in Fire Protection Engineering and continues work on his Master of Science degree in Fire Protection Engineering, both from the University of Maryland. Robin is a registered professional engineer with experience in the design of fire protection and alarm systems, fire modeling and code consulting. In addition, Robin has an extensive career in firefighting, with service spanning three states and four fire departments.

RESOURCES

UPCOMING EVENTS

March 11–12, 2014
10th Annual Fire Safety Conference
Duluth, GA, USA
Info: https://sfpeatlanta.org

March 12–14, 2014
6th International Symposium on Tunnel Safety and Security
Marseille, France
Info: www.istss.se

June 9–12, 2014
NFPA Conference & Expo
Las Vegas, NV, USA
Info: http://nfpa.typepad.com/conference/

October 1–2, 2014
FIVE 2014: 3rd International Conference on Fires in Vehicles
Berlin, Germany
Info: www.firesinvehicles.com

October 12–17, 2014
SFPE Annual Meeting – Professional Development Conference & Exhibition
Long Beach, CA, USA
Info: www.sfpe.org/SharpenYourExpertise/Education/2014SFPEAnnualMeeting.aspx

February 2–4, 2015
Fire and Materials Conference 2015
San Francisco, CA, USA
Info: www.intersciencecomms.co.uk

The Society of Fire Protection Engineers (SFPE) is offering our members our new ***Innovations Series*** *with CEU credits: an exclusive series of online technical sessions focused on helping SFPE members strengthen your professional skills and stay on top of industry trends. Professional expert instructors will lead the webinars, highlighting top technical content that is essential for keeping your skills up to par.*

All webinars are archived and available after the live event date on the SFPE YouTube channel, ***youtube.com/user/SFPEorg****.*

Earn CEUs!
Earn .1 CEUs per webinar. Taking all in the series earns you 1.2 in 12 months.

Mark your calendars for our first 6 innovations sessions:

January 23, 2014 (archived)
FIRE SAFETY FOR VERY TALL BUILDINGS
with Morgan Hurley, P.E., FSFPE,
Technical Director, SFPE

February 18, 2014 (archived)
EVOLUTION OF THE RESIDENTIAL FIRE ENVIRONMENT
with Stephen Kerber, P.E.,
Director, UL Firefighter Safety Research

March 18, 2014, 11am–12pm EST
FIRE SAFETY ENGINEERING IN EUROPE – OPPORTUNITIES AND CHALLENGES
with Michael Strömgren,
Fire Safety Engineer, SP Technical Research Institute of Sweden

April 21, 2014, 11am–12pm EST
VOICE INTELLIGIBILITY
with Jack Poole, P.E., FSPFE,
Principal, Poole Fire Protection

May 20, 2014, 5pm–6pm EST
TUNNEL FIRE SAFETY – PERFORMANCE BASED DESIGN
with David Barber,
Principal, Arup

June 17, 2014, 11am–12pm EST
THE ROLE OF FIRE PROTECTION ENGINEERING IN SUSTAINABLE DESIGN
with Raymond A. Grill, P.E., FSFPE,
Principal, Arup

Registration opens two weeks prior to each session, so look for more information on the SFPE Blog to sign up. We look forward to your participation!

Be a top professional – innovate and learn with SFPE.

BRAINTEASER [Problem / Solution]

Problem

A girl buys a bat and a ball. The total cost for both is $11.00. If the bat cost $10.00 more than the ball cost, how much did the ball cost?

Solution to Last Issue's Brainteaser

A farmer has a circular plot of grass of radius R. The farmer wants a sheep to graze on the circular plot, but the farmer doesn't want the sheep to eat more than half the grass. If the farmer attaches the sheep's leash at the center of the circle, how long should the leash be?

Answer: If the leash is radius r, then the area of grass that the sheep can eat is ϖr^2. For this area not to be more than half the area of the plot, then $\varpi r^2 = \frac{1}{2} \varpi R^2$. Solving for r yields $r = 0.7R$.

Aerosol Fire Suppression

Stat-X fixed systems are automatic condensed aerosol fire-suppression solutions deployed in tough conditions worldwide, including surface and underground mines, military vehicles, long-haul buses, rolling stock, remote telecom sites, wind turbines, power substations, electrical cabinets, and various marine and off-shore settings. Capable of being manually, thermally, or electrically activated by industry-standard control panels.

www.statx.com
—Fireaway Inc.

Updated Accesspoint Firmware

Reliable Controls has released firmware version 2.10 for the SMART-Sensor EnOcean Accesspoint (SSEA) product. The update provides added functionality to the SSEA, with the most notable change involving the ability to transmit as well as receive, opening the door for communications with many additional devices.

www.reliablecontrols.com
—Reliable Controls

New FAAST Aspiration Smoke Detection

NOTIFIER introduces a new intelligent version of its FAAST (Fire Alarm Aspiration Sensing Technology) detector, designed to provide very early warning of smoke for high-value and critical facilities, as well as within extremely challenging applications. The intelligent FAAST detector's ability to directly integrate with NOTIFIER fire alarm systems enables it to supply more detailed alarm, fault, and trouble information.

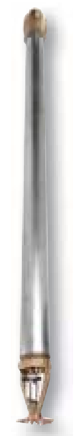
www.notifier.com
—NOTIFIER

Low-Frequency Notification Sounders

System Sensor's SpectrAlert Advance low-frequency notification appliances meet the 2014 NFPA 72 requirements for commercial sleeping spaces. The new devices, which integrate directly with fire alarm control panels, produce a tone centered around 520 Hz, which has been found to be more effective at waking sleeping individuals, including those with mild to severe hearing loss.

www.systemsensor.com
—System Sensor

Dry Type Pendent Sprinklers



Tyco has received FM Approval for its Model ESFR-17 Dry Type Early Suppression Fast Response (ESFR) Pendent Sprinkler, which is designed for use in wet-pipe systems protecting cold storage facilities where the system piping is installed in a heated space above the freezer area. The FM Approval is in addition to the existing UL Listing for the sprinkler. In addition to the existing 36-in. lengths, new 30- and 23-inch versions have been added to the line.

www.tyco-fire.com
—Tyco Fire Protection Products

Aspirating Smoke Detectors

Xtralis announces VESDA-E, the next-generation of VESDA aspirating smoke detectors (ASD). VESDA-E surpasses VESDA with 15 times greater sensitivity to smoke and double the longevity, with 4 percent less power consumption. Xtralis will continue to offer VESDA for a wide variety of applications, while initially targeting VESDA-E to retail, healthcare, education, and office building segments.

www.xtralis.com
—Xtralis

SOCIETY OF FIRE PROTECTION ENGINEERS

Engineering Guide: Fire Safety for Very Tall Buildings Published

This new guide, co-published by the International Code Council (ICC) and Society of Fire Protection Engineers (SFPE), identifies critical fire safety challenges unique to very tall buildings. *Engineering Guide: Fire Safety for Very Tall Buildings* examines how these special challenges can be addressed worldwide through an integrated performance-based design.

This engineering guide was written in response to an increase in the global design and construction of very tall buildings. Building codes in some countries may not contemplate all aspects of fire safety in very tall buildings—some of which approach a half mile, or 800 meters, in elevation. Buildings that are hundreds of meters tall pose challenges far different from those in average-sized tall buildings.

The guide emphasizes the importance of taking an integrated approach to the design of fire safety in tall buildings based on expected fire performance. This integrated approach looks beyond compliance with codes and standards, and considers how the height of the structure impacts fire safety and how various fire safety systems complement each other to achieve fire safety goals. These systems include smoke control, fire suppression, building evacuation, structural fire resistance and fire fighter access.

The *Engineering Guide: Fire Safety for Very Tall Buildings* recommends performing a fire risk analysis to determine how best to address the fire safety challenges unique to a specific building. Although fire hazards in very tall buildings are similar to those in shorter buildings, the consequences of a fire can be more severe given the large numbers of occupants, the inherent limitations in egress, and the sheer height of the structure. The risk analysis will identify which hazards should be addressed by the design, where the hazards may include accidental fires, fires following earthquakes, or terrorist threats.

Engineering Guide: Fire Safety for Very Tall Buildings
is available for purchase in hardcopy

$49.95 for SFPE Members ($59.95 for non-members)

Engineering Guide: Fire Safety for Very Tall Buildings
MAIL to SFPE at 7315 Wisconsin Ave., Suite 620E, Bethesda, MD 20814 or FAX to 301-718-2242

- ❑ I am an SFPE member
  membership number____________
- ❑ I am not an SFPE member
- ❑ I am not an SFPE member, but would be interested in more information about the SFPE

Method of Payment
❑ Enclosed is my check made payable to SFPE
Please charge my ❑ American Express ❑ MasterCard ❑ VISA

Credit card number: ________________________________Expiration date: ____________

Signature: ____

Print Full Name: ____

Address: ____

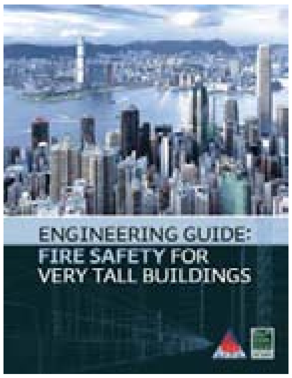
City/Town: ____

State/Province: ______________ Postal Code: ______________

Country: ____

Company: ____

Phone Number: ______________________Email: _______________________________



Sales Offices

HEADQUARTERS
FIRE PROTECTION ENGINEERING
1300 East 9th Street
Cleveland, OH 44114-1503
216.931.9934
fax 913.514.6863

NEW JERSEY/ NEW YORK/ PENNSYLVANIA/ MARYLAND/DELAWARE
BILL BOYADJIS
District Manager
P.O. Box 762
Morris Plains, NJ 07950
973.829.0648
fax 913.514.6380
bill.boyadjis@penton.com

REMAINING U.S./GLOBAL
JOE DAHLHEIMER
District Manager
745 Damon Drive
Medina, OH 44256
330.289.0269
fax 913.514.6481
joe.dahlheimer@penton.com

INSIDE SALES
DAVE KENNEY
1300 East 9th Street
Cleveland, OH 44114
216.931.9725
fax 913.514.6663
david.kenney@penton.com

GROUP PUBLISHER
DAN ASHENDEN
330 North Wabash Ave.
Chicago, IL 60611
312.840.8402
dan.ashenden@penton.com

FIRE PROTECTION Engineering

Index of Advertisers

CORPORATE 100 SFPE — **Corporate 100 members in red**

FIRE PROTECTION Engineering

Fire Protection Engineering (ISSN 1524-900X) is published quarterly by the Society of Fire Protection Engineers (SFPE). The mission of *Fire Protection Engineering* is to advance the practice of fire protection engineering and to raise its visibility by providing information to fire protection engineers and allied professionals. The opinions and positions stated are the authors' and do not necessarily reflect those of SFPE.

SFPE

Penton Marketing Services
WE KNOW YOUR CUSTOMERS




The True Clean Agent Suppressant — Nitrogen

CAFex By CHEMETRON Fire Systems™

CAFex™ Nitrogen clean agent systems are a great choice when protection requirements include high value assets, occupied spaces and zero tolerance for collateral damage that might result from other suppression solutions. Pure N_2 has no synthetic chemicals, agent blends or environmental concerns. No global warming or ozone depleting impact makes CAFex nitrogen the choice of users with the highest environmental standards. CAFex Nitrogen systems are…

- Safe for the environment
- Safe for people
- Won't damage property
- Economical to install
- Easy to service as replacement gas is readily available
- Backed by the Chemetron brand and a worldwide network of highly qualified distribution partners.
- Nitrogen is the only people safe, completely natural fire suppressant gas available.

www.chemetron.com

Predict. Prevent. Protect.