FIRE PROTECTION

Engineering

WINTER 2008

Issue No. 37

Millenials

The New Source of Young Talent

Engineering Bachelor Degrees Continue to Climb

Smokeview: Understanding Fire Dynamics

100 Years of Engineering Licensure

SFPE

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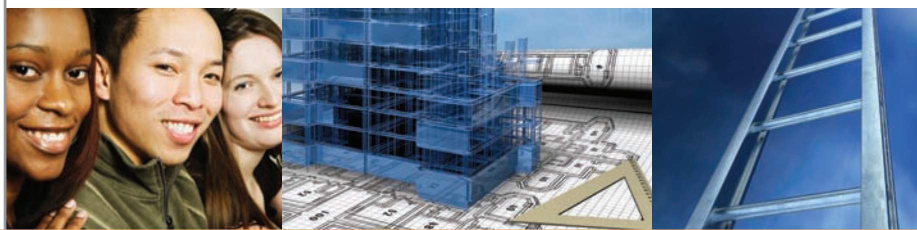

FIRE PROTECTION Engineering

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From the TECHNICAL DIRECTOR

Help SFPE Enlighten the Masses

SFPE has just completed the Chemistry of Fire curriculum kit. The Chemistry of Fire curriculum kit was developed to teach high school students basic fire science. By better understanding fire science, the students will better understand the importance of fire safety.

The Chemistry of Fire curriculum kit was integrated with U.S. science curriculum standards to maximize the likelihood that it will be used in the classroom. Additionally, the kit was developed collaboratively with Discovery Education. Discovery Education and the products that they develop enjoy an excellent reputation among science educators, which will also help ensure that the kit will be used in the classroom. This kit has been distributed to all high schools in the United States. Additionally, each member of SFPE has been sent a copy. More information on the Chemistry of Fire curriculum kit can be found in a previous edition of this column or by visiting *www.discoveryeducation.com/firechemistry/*.

Aside from the goal of teaching students about fire science, the Chemistry of Fire curriculum kit was developed to increase the recognition of fire protection engineering and attract additional students into the profession. In addition to providing instructions and demonstrations of a series of experiments, the kit contains video segments about fire safety in buildings, careers in fire protection engineering and profiles of fire protection engineers.

SFPE has long relied on its members to help recruit students into the fire protection engineering profession at the local level. Fire protection engineers have visited their local high schools to participate in career fairs and meet with guidance counselors and technically oriented students. These local efforts have been an invaluable part of SFPE's recruitment and recognition efforts, and the Chemistry of Fire curriculum kit complements these efforts.

While creation of the Chemistry of Fire curriculum kit was a major accomplishment that promises to make significant progress towards SFPE's recruiting and recognition goals, there is more that can be done to help insure that it has the maximum possible impact. There are many ways that SFPE members can help.

The easiest thing to do would be to contact the chemistry department at a local high school and make sure that they received the Chemistry of Fire curriculum kit and discuss how it will be used in the classroom. Fire protection engineers can offer to meet with chemistry teachers and their classes to bring to life the concepts that are presented in the kit. During this meeting, topics can be discussed such as how fire protection engineers use science in their jobs, careers in fire protection engineering and how one could study to become a fire protection engineer.

This kit was developed with support from the U.S. Department of Homeland Security. Because of the nature of the funding source, these efforts have been focused on an audience of students in the United States. However, the information contained in the Chemistry of Fire curriculum kit and the follow-up activities that are proposed could be used anywhere. SFPE is also exploring means to bring these products to other countries. For example, the New Zealand chapter of SFPE has procured copies of the Chemistry of Fire curriculum kit for distribution in New Zealand.

SFPE members and chapters can reach out to local schools and students to extend the reach of the Chemistry of Fire curriculum kit. SFPE is optimistic that this product will attract more students into the fire protection engineering field, and establishing local contacts would be of great assistance to this effort.

Morgan J. Hurley, P.E.
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., #620E, Bethesda, MD 20814.

LETTERS to the EDITOR

Dear Editor,

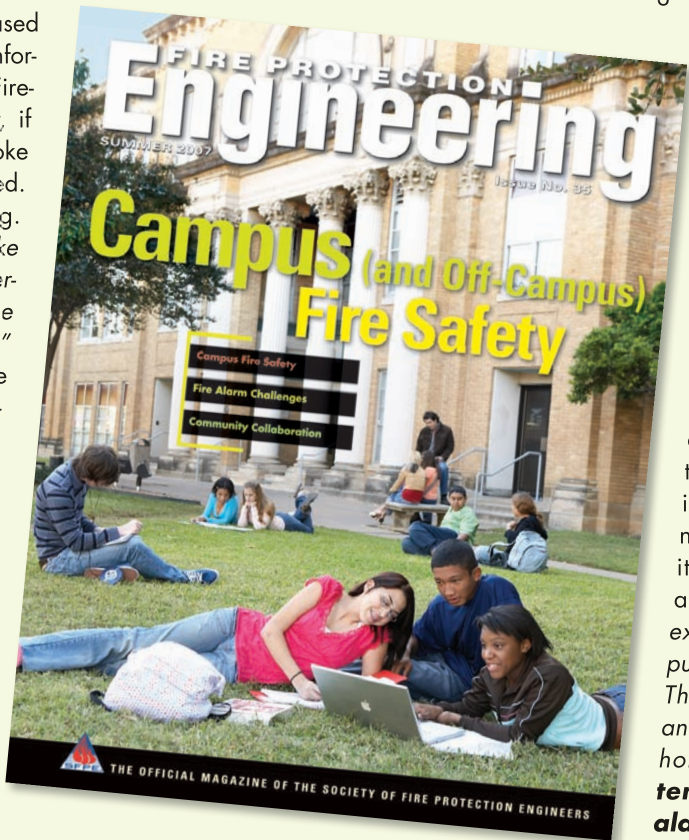
Regarding the article titled "Campus Firesafety – A U.S. Overview": Campus Firewatch has an excellent database of recent fires and based on this information, the article listed several "common factors."

- Off-campus housing.
- Lack of sprinklers.
- Missing or disabled alarms.
- Impaired judgment from alcohol.

My analysis of these fires, based on news accounts as well as information contained at Campus Firewatch, indicates that in many, if not most, of these fires, the smoke alarms were present and worked. This should not be surprising. According to the USFA, *"Smoke alarms are more likely to operate in fraternity/sorority house fires than in all residential fires."* ("Fraternity and Sorority House Fires," *Topical Research Fire Series*, USFA, November 2001). Here are some examples.

Miami University of Ohio – 04/10/2005: Three students died in a fire started by a cigarette on a couch. The ionization smoke alarm was installed in the proper location and did operate, but according to the student who called 911, the smoke was too thick to allow for safe egress by the time he woke up.

University of Nebraska, Lincoln – 12/14/2006: A student who was due to give birth later that day died in a fire started by an electrical malfunction. (Investigators assume it smoldered for some time.) Although the ionization alarm was not located in the bedroom, it was located just outside, and the door was open, allowing smoke to spread to the hallway. It is interesting to note that the fire was reported by neighbors who awoke to smoke so thick in their apartment that they thought the fire was in their apartment. Their smoke alarm was not sounding, but they could hear the smoke alarm operating next door. They attempted to rescue the student, but the smoke at the door was too thick.



Alcohol was not a factor in the Lincoln, Nebraska, fire, but it was cited as a factor by Campus Fire Safety in the Ohio fire. (Actually, disabled detectors were also cited as a factor in this fire.) However, the student who called 911 had been at work until late and had not been at the party. Once the egress paths were blocked, being impaired would affect one's chances of survival. However, if this had been a photoelectric or combination detector, it isn't likely, based on the results of the NIST Home Smoke Alarm Tests, because the student who originally called 911 would have been alerted 30 minutes earlier. This would have allowed plenty of time to alert the occupant prior to untenable conditions along the egress path.

I would disagree with the following quote from this article. *"In the late 1980s and early 1990s, there was a significant drop in the number of fire deaths across the nation, primarily due to the widespread use of smoke alarms."* In fact, fire deaths were decreasing before the early '80s and continued to decrease throughout the late '90s. If fire deaths were reduced due to smoke alarms, then it should have taken place in the late '70s and early '80s, not when the author believes it occurred. Other researchers agree: *"Smoke alarms usage exploded in the '70s, and most purchases were made voluntarily. The building codes came along and mopped up the relatively few holdouts. ... **Most of the potential benefit from smoke alarms occurred with the initial acquisitions."*** (Dr. John Hall, Letter to the Editor, *Fire Protection Engineering*, Spring 2005.) Obviously other factors were responsible for the decrease noted by the author.

I would also disagree with this quote, *"There really isn't anything else on the horizon (other than sprinklers) that will bring about the next quantum drop in fire deaths."* Between 1990 and 2001, the percentage of fire fatalities that occurred with operating smoke alarms, according to the USFA, practically doubled (approximately 19% to 38%). This increase coincided with the gradual introduction of ionization smoke alarms that had been desensitized to meet new requirements in

My analysis of these fires, based on news account as well as information contained at Campus Firewatch, indicates that in many, if not most, of these fires, the smoke alarms were present and worked. This should not be surprising.

UL-217 (These were put in place in 1988 to reduce nuisance alarms). At the same time, the requirements of the UL-217 smoldering fire test were relaxed. It seems clear that these desensitized smoke alarms were responsible for most, if not all, of this increase in fire deaths that were occurring with operating smoke alarms. The data from the NIST Home Smoke Alarm Tests supports this hypothesis, since it documents that the ionization alarms are often providing negative ASET in smoldering fires. As a consequence, it is possible that switching to smoke alarm technology that utilizes photoelectric technology, alone or in combination with other technology, could reduce fire deaths by 20% or more. There would also be the benefit of reduced nuisance alarms. I would describe this as a "quantum drop" in fire deaths.

Regarding the article titled, "Community Collaboration: College Administrator's View of Campus Firesafety":

When I was a Captain, I served on a Ladder Truck near several colleges. Every year, we would have several hundred responses to college dorms. When I became Fire Marshal in 1995, I decided to make it a priority to solve the problem. I told all of the universities that I was going to take them to court for failure to maintain their alarms systems. I informed them that a system that went into alarm so often that it was ignored was no better than a system that was broken. In response to this, the universities implemented several new policies:

- Criminally charge students who are caught.
- Immediately expel students who are caught.
- Provide rewards for students who testify against other students.
- Fine every student on that floor $50 for every false alarm. (This becomes self-policing.)
- "Booby trap" pull stations with paint and use alarm covers that require a student to stay at the alarm while cover is sounding.
- Install cameras.
- Have security check in all visitors.
- Have fire dept. keep all students out of the building until every room has been checked. (1–2 hours)

While the system is not perfect, here are some recent statistics for the last school year (9/06–6/07).

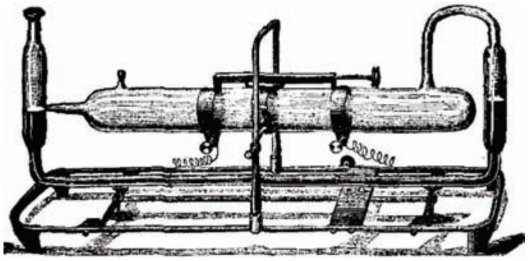
- 10 Somerset Street, Emerson University *(345 students) — 2 Alarms.*
- 21 Forsythe Street, Northeastern University *(400 first-year students) — 1 Alarm*
- 700 Commonwealth Avenue, Boston University *(1,800 students) — 7 Alarms (not all were nuisance alarms)*

I sometimes think schools do not want to punish students for what they view as a prank. But if "protecting" students from criminal penalties increases their risk of dying in a fire, what is that protection worth?

Joseph Fleming
Deputy Chief
Boston Fire Dept.

Correction

This illustration of Pritchett's Electric Fire Alarm was inadvertently omitted from the "It's Not Your Father's Fire Alarm Code Anymore" article in the Fall 2007 issue:



Source: *The Project Gutenberg e-Book of Scientific American Supplement No. 441, June 14, 1884.*

VIEWPOINT >

Review of Egress Design Solutions – A Guide to Evacuation and Crowd Management Planning by Jeffrey S. Tubbs and Brian J. Meacham

By Harold E. Nelson, P.E., FSFPE

This text is based on the premise that while life safety during emergency is a key aspect of facility design, historically, designers have not always given it the level of attention deserved. This situation is changing, however, since the recent tragic events in the September 11, 2001, attack on the World Trade Center, the major loss of life fire in the Station nightclub fire, the deaths in the Cook County Administration Building fire and other events. The authors believe that there are few comprehensive references covering the full scope of the problem, resulting in a gap in coverage. The intent of this book is to fill that gap. The resulting book is presented as a comprehensive review of egress design and analysis covering egress fundamentals and strategies, performance solutions, human behavior, evacuation modeling, evacuation planning and crowd management.

The book, essentially, achieves the objective of a comprehensive presentation. While the book does not provide the user with all of the detailed requirements, data and computational procedures needed for an actual design, it provides ample direction, notes, references and recommended readings to extend the concepts. *Egress Design Solutions* is a text that would enhance the resource capabilities of design and engineering offices as well as the private collections of individual fire protection engineers.

An introduction lays out the organization and subject coverage of this book. It divides the text into the four parts: background, egress system fundamentals, human behavior and performance concepts, and evacuation planning and design. Each of the parts is made up of two or three chapters as discussed below.

Part 1, Chapter 1, Building Codes and Regulations. This chapter provides useful discussions of the historical background of building codes. There are also informative discussions of the development of performance based design activities in nations other than the United States.

Part 1, Chapter 2, Historical Events. This chapter consists of overviews of 17 events ranging from the Iroquois Theater fire of 1903 to the Station Nightclub fire of 2003. Most of the incidents involved fire but some, such as the crowd crushing tragedy at the 1979 Who Concert, described incidents involving people flow tragedies not involving fire.

Part 2, Chapter 3, Egress Concepts and Fundamentals. This chapter address, from the standpoint of egress design, current concepts under discussion for protection of occupants exposed to fire. Concepts such as protect in place, phased evacuation, relocation to a safe place and general evacuation are discussed. Design for occupants with disabilities is also covered in this chapter. The use of elevators as a means of egress and the emergence of egress strategies related to terrorism and security is reviewed, as is the concept of evaluating safety on the comparison of evacuation time versus time to untenable conditions.

Part 2, Chapter 4, Prescriptive Egress Conceptive Egress Concepts. This chapter details the implementation of many of the prescriptive requirements. This chapter is useful, but a user might be better served with a handbook directly tied to the specific code being implemented.

Part 2, Chapter 5, Supporting Systems. As pointed out in the text, the safety of occupants relies on many safety systems other than the dedicated egress system. These systems, reviewed in this chapter, include basic building construction, fire suppression, fire detection and emergency communication.

Part 2, Chapter 6, Human Behavior. This chapter addresses key human factors to be considered in the design of egress systems. The chapter is concerned with individual factors such as receiving cues (e.g. hearing alarms), individual and group response to the initial and subsequent cues, and the input and impact from others persons. This chapter discusses crowd dynamics as a special form of egress design consideration. The chapter concludes with a list of occupant risk factors to aid egress design. The stated list is helpful but not necessarily complete for any specific design.

Part 3, Chapter 7, Performance Egress. This chapter covers performance design of emergency egress based on exposures and avoidance of harm to occupants. The approach considered is based on the current approaches recognized by or under development by the ICC, NFPA and SFPE. These approaches all involve the analysis of fire scenarios. One or more egress models are also generated covering the human response to the fire scenarios.

Part 4, Chapter 8, Emergency Planning. Having an effective evacuation (emergency) plan is part and parcel of a complete fire safety design. The actual plan often includes coverage of other extreme events, including natural and man made threats. The chapter also contains an interesting section on crowd management.

Part 4, Chapter 9, Design Solutions. This chapter presents egress challenges and design approaches for meeting these challenges in a wide range of occupancies and situations.

While not disclosed in the text, the solutions are assumed to be in the professional history of the authors or their colleagues. They all are informative and interesting examples of both compliance and innovation in applying both prescriptive and performance approaches to egress design. It is expected that these solutions will be useful to the users of this guide.

Appendix. The appendix is separately authored by Erica Kuligowski and Richard Peacock. The appendix consists of information on 18 different movement and behavior models. Important data on the purpose, form and validation are provided in a format that will assist those who desire to use and existing model in their design analysis.

The text along with its extensive references and recommended technical reading lists would provide a useful aid in developing egress design solutions for specific facilities.

Spain Studying Railway Station Fire Safety

Under a cooperative agreement between the Railway General Department of the Spanish Transport Ministry and the University of Cantabria, a "Study of Fire Protection Engineering in Passenger Railway Stations" is currently underway. The purpose is to provide an updated vision of the different fire safety systems used in railway stations by analyzing the latest technologies, trends and technical elements for improving safety in these facilities.

Railway stations do not have specific established norms in Spain that settle the conditions for fire safety to define appropriate safety levels. Therefore, an essential part of the study is to analyze risk factors to propose action plans.

During the initial phase, field research will be conducted on 30 stations in different countries. In the second phase, computational simulation and modeling will be used to verify a series of requirements on passive and active fire protection as well as the determining factors for evacuation. The third phase will comprise preparing the final documents with the requirements and safety criteria proposed, which will be based on the final results and conclusions derived from the research work.

For more information, go to *www.groupos.unican.es/GIDAI.*

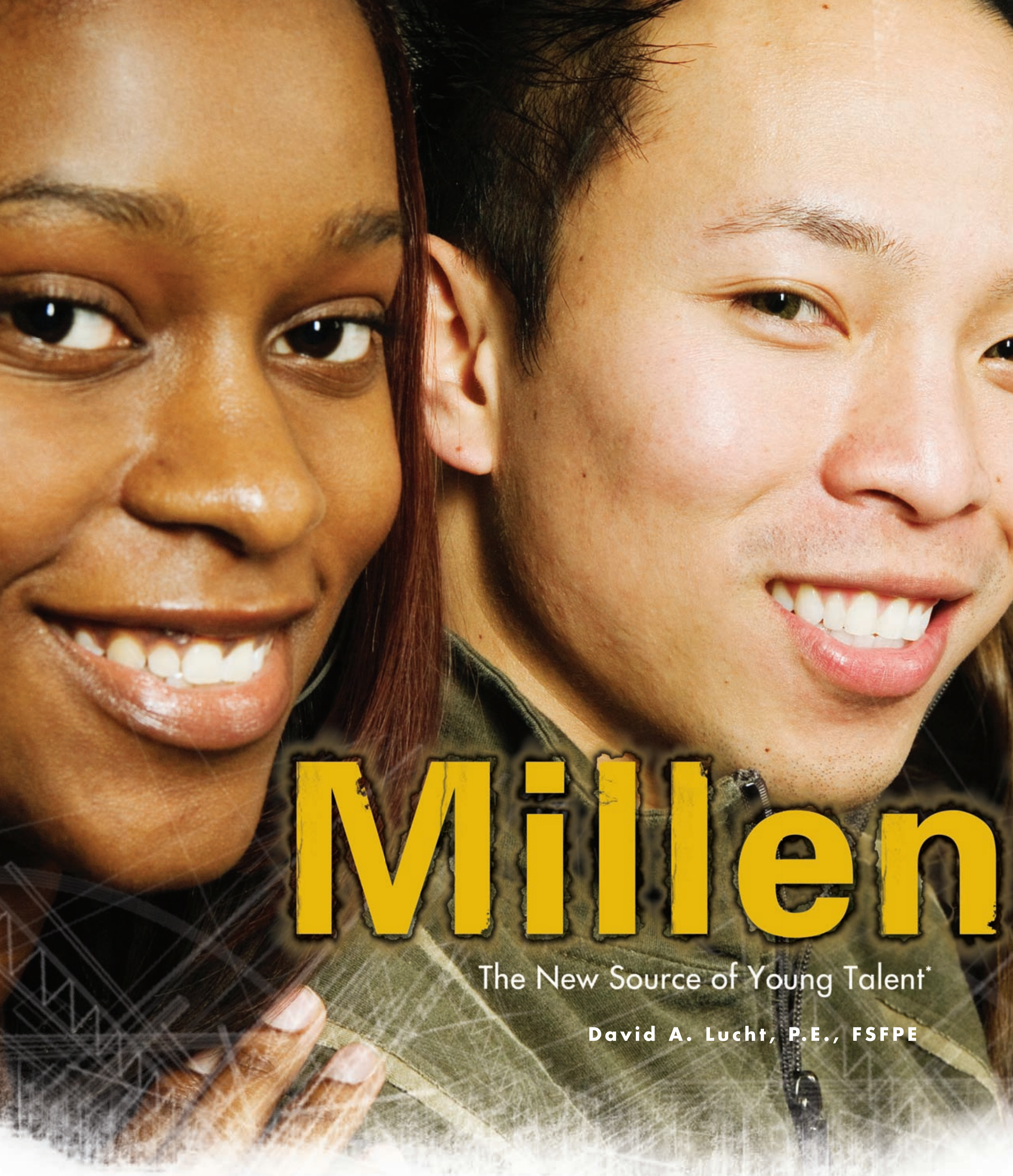
USFA Releases Two Reports on Fire Department Runs

As part of its Topical Fire Report Series, the U.S. Fire Administration (USFA) has issued two special reports examining fire department responses to all types of emergency situations. In addition to fighting fires, fire departments respond to emergency medical service (EMS) calls, technical rescues, explosions, hazardous threats and conditions, natural disasters and false alarms. Fire departments are also called upon to respond to a wide variety of nonemergency situations. The two reports, the *Fire Department Overall Run Profile* and the *Fire Department Fire Run Profile*, were developed by the National Fire Data Center, part of USFA. To understand the full role fire departments play in a community, these reports explore fire department run activity as reflected in the 2004 National Fire Incident Reporting System (NFIRS) data.

The reports show that 55% of department responses require EMS and rescue services. False alarms account for 12% of all fire department runs, followed closely by good-intent calls at 10%. About 8% of all calls actually involve fire. 42% of all fire runs are to incidents involving structures, followed by outside fires at 35%.

Each report briefly addresses the nature of the specific fire or fire-related topic, and highlights important findings from the data.

To download the reports, go to *www.usfa.dhs.gov/statistics/reports/index.shtm.*



Millen

The New Source of Young Talent*

David A. Lucht, P.E., FSFPE

Many in the fire safety business have long lamented a perpetual question – "Why don't more young people sign up for FPE careers?" After all, there have always been plenty of interesting, challenging and good- paying jobs out there. Yet, the FPE schools have historically reported that job openings far outstrip the number of graduates, year after year. This has probably been so since the first FPE degree program was started at Illinois Institute of Technology over 100 years ago. It has been said more than once: "They should be beating down the doors."

The good news is that there has never been a better time to attract students into fire protection engineering. Generational research studies reveal that today's young men and women have key characteristics that match them perfectly with what fire protection engineering has to offer. Known as the "millennials," these students are very different from any generation in recent memory. This article will summarize what is known about this unique cohort of young people and discusses some strategies for attracting larger numbers into fire protection engineering careers.

Neil Howe and William Strauss are among the most frequently cited authors of contemporary generational literature. In addition to their own original work, Howe and Strauss have assimilated data from a plethora of sources ranging from the National Center for Health Statistics, the U.S. Department of Education, the Bureau of Census and the U.S. Bureau of Justice Statistics to the National School Safety Center, Primedia/Roper National Youth Opinion Survey, the U.S. Substance Abuse and Mental Health Services Administration, the College Board and the University of Michigan Institute for School Research. The result is a remarkable composite picture of the current generation of young people as well as important insights into generations past.

This article is adapted heavily from Howe's and Straus's most recent book, *Millennials Go to College*.[1] This resource can provide valuable tools for not only understanding the current generation but also improving strategies for employee recruiting and retention in the workplace.

GENERATIONAL DIFFERENCES

The literature classifies generational groupings as follows:

G.I. Generation
(Born 1901–1924, now age 83 and older)

Silent Generation
(Born 1925–1942, now age 65–82)

Boom Generation
(Born 1943 –1960, now age 47– 64)

Generation X
(Born 1961–1981, now age 26–46)

Millennial Generation
(Born 1982–now 25 years and younger)

Tom Brokaw's book, *The Greatest Generation,* tells the wonderful story of the men and women of the G.I. Generation who "came of age during the Great Depression, when economic

The G.I. Generation – Pearl Harbor Attack, December 7, 1941.
Source: Online Library of Selected Images, U.S. Naval Historical Center

The Boom Generation – Kent State University students killed by Ohio National Guard, May 4, 1970.
Photo by John Filo. Reprinted with permission.

despair hovered over the land like a plague."[2] They witnessed the bombing of Pearl Harbor and fought WWII. Epic life experiences made these individuals very different from generations that preceded and followed them. After the war they became "a new kind of army now, moving into the landscapes of industry, science, art, public policy, all the fields of American life, bringing to them the same passions and discipline that served them so well during the war."[2] Brokaw ranks the contributions of the G.I. Generation alongside the great Americans who formed the nation, wrote the Constitution and settled the Civil War. There has been no generation like them since.

The Silent Generation grew up in the post-war economy and in the wake of the Great Depression. Sometimes referred to as the "lonely crowd," they were in between the war heroes and the war protesters.

Then along came the Boom Generation, teens during the Viet Nam war. They were the antiestablishment counterculture, era of the hippies, beatniks, flower children and the great Woodstock happening. And it was their on the Kent State University campus by the Ohio National Guard.

Generation X was too young to remember Vietnam or the assassination of President John Kennedy. They were risk-takers and often referred to as "slackers." They ended up being known as "latchkey kids," seemingly neglected by parents when compared to previous generations.

Each of these generations had unique life experiences that helped define who they became. The entire age group was impacted by defining historical events of profound proportions.

THE MILLENNIALS

The Millennials cohort first graduated from high school at the turn of the millennium, year 2000. Like the other groups, the Millennials (aka Generation Y or Echo Boomers) have been encoded by defining historical events that will affect them for their lifetimes. Among the most significant was the 1999 shooting spree at Columbine High School in Jefferson County, Colorado, resulting in the deaths of 12 students and a teacher. This happened when the oldest of the Millennials were themselves high school students; it had major psychological impact. The incident played a key role in instilling a sense of concern among young people and parents over the issue of personal safety ... exacerbated by other traumatic incidents of violence including the terrorist attacks of 9/11/01, the global "War on Terror" and certainly the more recent student massacre at Virginia Tech (4/16/07).

In fact, the concept of "safety" pervades the consciousness of Millennials and their parents. While the preceding Generation X youngsters were referred to as "latchkey kids," overall thought to have been neglected, the Millennials have been doted over and highly protected like no others. Many will remember the bright yellow "Baby on Board" signs in automobile windows ... telling other drivers to keep their distance. This started in 1982, the beginning of the Millennials era. Then there was the Tylenol scare of 1982, which led to hysterical concern over tainted Halloween trick-or-treat candy. During the Millennials'

> Given the pervasiveness of a safety culture among this generation, Millennials can be expected to show interest in safety-related professions like FPE.

formative years, nanny cams came into use to guard against child abuse, and Megan's Law was adopted requiring public registration of child sex offenders. The U.S. Amber Alert system was established after the 1996 abduction and murder of 9-year-old Amber Hagerman in Arlington, Texas. And kids began to wear safety helmets when riding tricycles in the driveway. Wow!

Given the pervasiveness of a safety culture among this generation, Millennials can be expected to show interest in safety-related professions like FPE. And there are other reasons to be optimistic.

Millennials also tend to be interested in helping others and making the world a better place. This stems partly from community service

> …In 1984 only 27% of public schools required community service of its students, by 2000 fully 83% required some form of community service experience. Surveys show that an increasing share of high school students say that "making a contribution to society" is extremely important or quite important.[1]

The Millennial Generation – Columbine High School Students, April 20, 1999.
AP Photo/Kevin Higley. Reprinted with permission.

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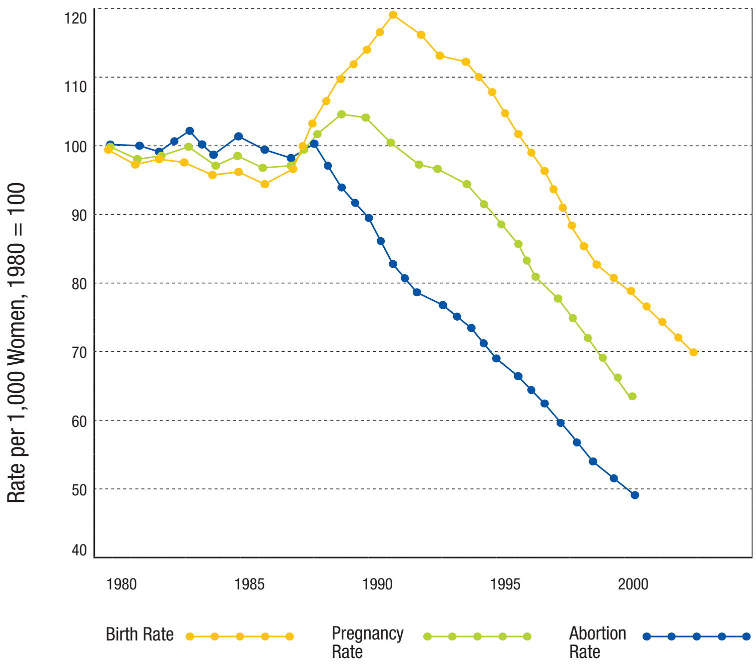
experience mandated by high school curricula. Howe and Strauss report that, while in 1984 only 27% of public schools required community service of its students, by 2000 fully 83% required some form of community service experience. Surveys show that an increasing share of high school students say that "making a contribution to society" is extremely important or quite important.[1]

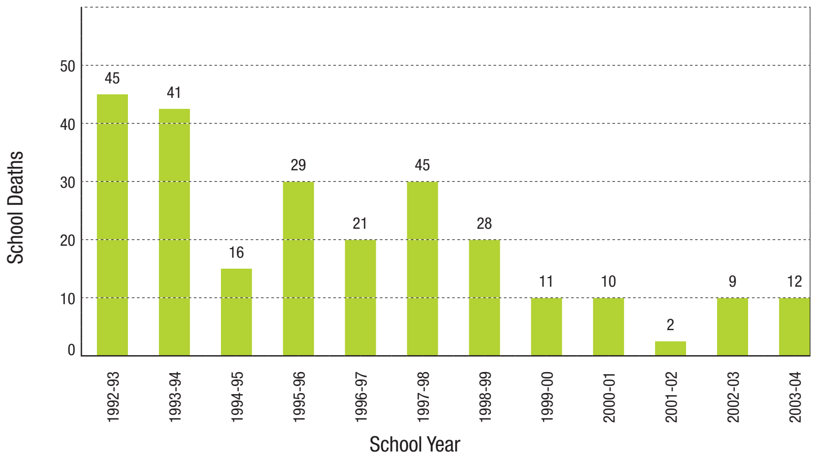
It's common to find daily media reports of teens doing remarkable things for the public good. Recently, CNN featured 15-year-old Zach Hunter as its "Person of the Week." Committed to abolishing modern-day slavery in his lifetime, Zach initiated a national movement called Loose Change to Loosen Chains, collecting spare change from students to help to end oppression. He has raised over $20,000 so far. Last year, Baltimore teenagers Greg Baker and

Community service – 15-year-old Zach Hunter sets out to end modern-day slavery worldwide…in his lifetime.
Photo courtesy CNN ImageSource. Reprinted with permission.



Source: NCHS; Alan Guttmacher Institute (2004)

Figure 1. Rates of Pregnancy, Abortion and Birth for Girls Aged 15-17, 1980 to 2002.
Reprinted by permission from Howe & Strauss



Source: NCHS; Alan Guttmacher Institute (2004)

Figure 2. Annual Number of Killings by Students, K-12, at all U.S. Schools, 1992-2004.
Reprinted by permission from Howe & Strauss

Michael Swirnow together raised $88,000 to sponsor a Habitat for Humanity house project. Now, Swirnow says, "We want to teach what we learned to other kids and want them to get the same experience we did because it was great."[3] The community service orientation of the Millennials harmonizes with the FPE culture.

In 2002, General James Jones, Commandant of the U.S. Marine Corp, said, "We're seeing a huge cultural shift away from the word 'I' to the word 'we' in this new generation of young people coming in."[1] The Millennials naturally seem to gravitate toward teamwork. While they are concerned about the public good, they tend to form relatively quiet groups of "can-do" problem-solvers rather than stage noisy protests.

Finally, there is a growing interest in academics and specifically science, engineering and technology. Eight out of ten teens say it's cool to be smart, and 84% believe they are science-literate. Eighty-six percent believe someone in their generation will become the next Bill Gates, 66% believe they know such a person, and 25% believe they are that person![1]

Millennials want to apply technology to big social problems like global warming and world governance. Ninety-three percent believe science and technology will play an important role in meeting terrorist threats (67% believe a very important role.)[1] It shouldn't be that much of a stretch for these young folks to be inspired by the idea of using science and technology to prevent fire and explosion disasters.

Overall, the Millennials are a pretty special and unique cohort of individuals. The bulk of the majority – the wide center of the bell curve – show trendlines in a positive direction. In addition to their safety orientation, concern about the public good and interest in science and mathematics, their "social indicators" seem to be headed in a good direction as well (Figs. 1-4). Teen alcohol, tobacco and drug abuse overall are down significantly as are teen pregnancies and abortions. Teen suicide rates have declined, and despite Columbine, the number of killings by students in grades K-12 has declined as well. Howe and Strauss have referred to the Millennials as having the potential to be the "next greatest generation," filling the void left by their great-grandparents, the G.I. Generation.

IMPLICATIONS FOR FPE

Why don't more young people sign up for FPE careers?

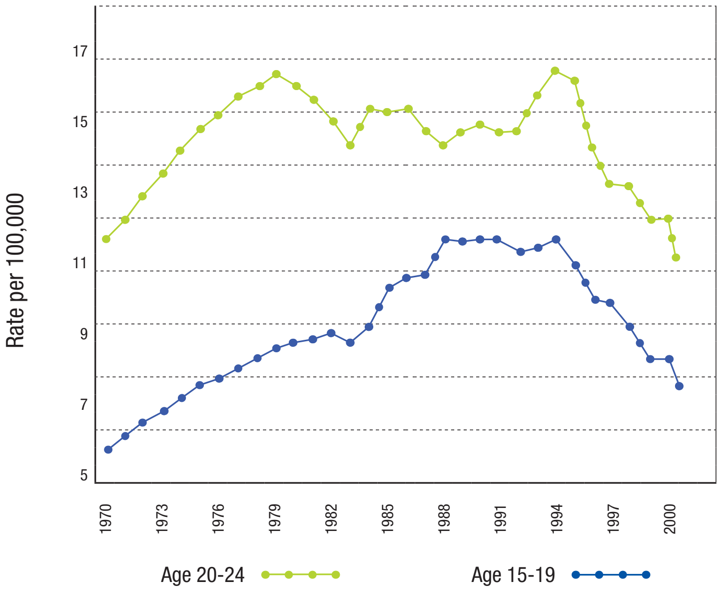
The answer has been the same forever … most families have never heard of fire protection engineering. And many who do hear the words really don't understand what it's all about. Laypeople often assume it has something to do with fire trucks. This is a marketing problem.

The numbers

Of some 3 million U.S. high school graduates each year, well under 100 find their way to FPE schools. The SFPE, its committees, chapters and individual members have done exceptional work in preparing career materials, a careers Web site, participating in local career days and a host of other strategies. But penetrating such a large population can be like finding a needle in a haystack for such a small community of practitioners.

Establishing relationships

The most successful approaches for delivering the message probably involve personal contacts and relationships. Local members of SFPE can effectively promote careers in collaboration with community groups that focus on community service, even safety. For example, the national Learning for Life program involves some 35,000 youth in local Fire and Emergency Services Explorer programs involving more than 3,000 fire departments and other organizations throughout the United States. These are groups of Millennials, ages 14 through 20, who have been "prescreened" for their interest in fire safety and an exceptional commitment to community service. (To find a local program, go to *www.learning-for-life.org.)* Local SFPE chapters or employers



Source: U.S. National Center for Health Statistics (2003)

Figure 3. Suicide Rates for Youth, Aged 15-19 and 20-24, 1970 to 2001.
Reprinted by permission from Howe & Strauss

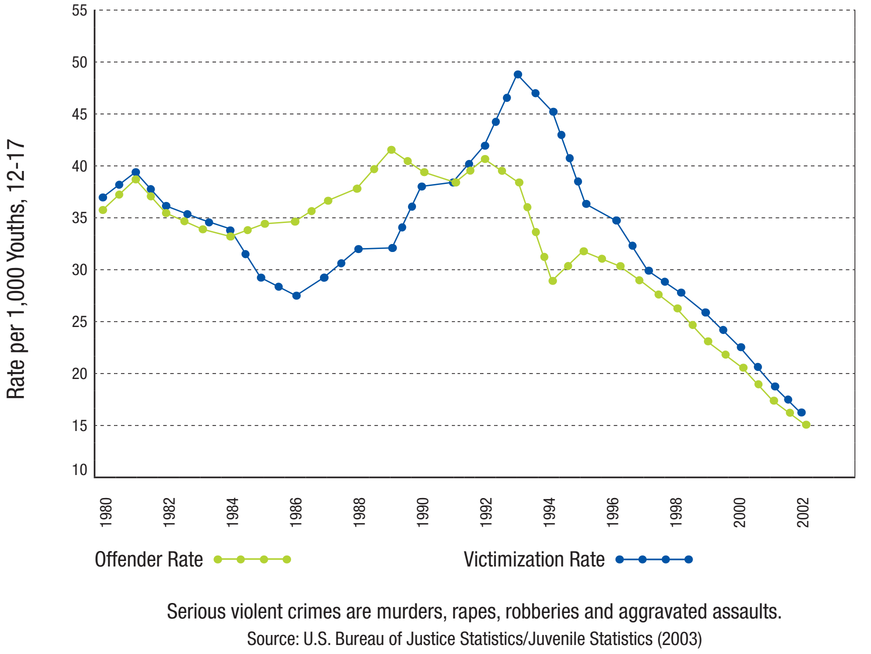


Figure 4. Serious Violent Crimes, Rate of Offenders and Victims, Aged 12-17, 1980-2002.
Reprinted by permission from Howe & Strauss

Community Service – 16-year-olds Greg Baker and Michael Swirnow raised $88,000 for Habitat for Humanity.
Photo courtesy The Baltimore Sun Company, Inc.

who establish relationships with these types of community service groups should consider involving their young engineers, men and women who are close to the teen's generation and speak their language.

Offering hands-on experience

These young people also thrive on hands-on experience and teamwork. Many high school and college students are looking for summer jobs … which can present golden opportunities for employers to expose them to FPE career choices. Internships and co-op opportunities for college students are great approaches as well. This gives youth an exposure to options for making the world a safer place through science and engineering.

Focus on college students

The population of college engineering students should not be overlooked, even if they are not FPE majors. From a sheer numbers point of view, it may be less daunting to try and cull a comparative handful of aspiring FPEs out of a U.S. engineering student population of 375,000 (compared to 17 million high school students). At

Many college engineering students are "undecided" as to disciplinary major, and often students change majors along the way. These young men and women are potential candidates for FPE.

the very least, it can be said that the college students have been prescreened as having a career interest in science, mathematics and engineering. In the U.S., about 100,000 high school graduates enroll as freshmen engineering students each year.

Many college engineering students are "undecided" as to disciplinary major, and often students change majors along the way. These young men and women are potential candidates for FPE. Employers can consider hiring majors in traditional disciplines like mechanical, chemical, civil or electrical engineering. Disciplinary training in FPE can be achieved via distance learning courses from the FPE schools like WPI and the University of Maryland. A mechanical engineering graduate of any engineering school who has taken four or five of the core FPE courses can make for a highly productive entry-level employee. They can always finish their FPE master's degrees as part-time distance learners after they begin their first jobs.

Engineering co-op and internship experiences can serve as highly effective recruiting strategies. Further, employers can consider offering scholarships for university students in traditional disciplines, supporting their taking an FPE course or two via distance learning … just to give them an idea of scholarly content. Typically, undergraduates taking "out of major" courses like this can count the course credits as technical electives toward their bachelor of science degrees.

A word about families

Another unique feature of the Millennials is their relationship with parents. Today's teens and parents function as partners more than any in recent memory. They consult with each other on major decisions. In fact, many commercial product and service industries purposely market to parents and their children as what they call "co-purchasers." For example, in 2004, *The New York Times* ran story "Hollywood aims to please children and their parents in the same films," citing three blockbuster hits – *National Treasure*, *SpongeBob SquarePants* and *The Incredibles* –

> Today's teens and parents function as partners more than any in recent memory. They consult with each other on major decisions. In fact, many commercial product and service industries purposely market to parents and their children "co-purchasers."

with enormous box office successes.

Howe and Strauss report that 94% of teens "mostly agree" or "totally agree" with the statement "I can always trust my parents to be there when I need them." (In 1974, 40% of Boomers declared they would be better off without their parents.) Millennials have strong family connections. Over 70% surveyed in 2001 said "raising a family is important," up from 55% in 1974.[1]

This family orientation says several things to the FPE community. One has to do with FPE retention in the workplace. Frequently, employers have noted the "homing pigeon phenomenon" where a new college graduate with family ties on the U.S. East Coast (near WPI or Maryland) is hired for a job in the Midwest or on the West Coast, then a few years later decides to move back east to be near family. Given the particular family orientation of Millennials, this problem should not be expected to go away. Success will often be enhanced by hiring entry-level engineers who have family ties near the place of work, maybe even majors in non-FPE disciplines. The family dimension also tells something about successful marketing strategies. Selling a teen on FPE is one thing; getting parent buy-in is also important. Recruiting strategies should have parents in mind too.

Electronic media

While beyond the intended scope of this article, mention should be made of electronic media and its role in promoting FPE careers among youth and young adults. There is no question that electronic media, from instant messaging and text messaging to YouTube, Facebook, blogs and Web sites are the strategies of choice for obtaining and exchanging information. Any successful career-promotion strategy will necessarily need to consider electronic media options.

David Lucht is retired from Worcester Polytechnic Institute.

* The author gratefully acknowledges the pioneering research of Neil Howe and William Strauss and their permission to use figures and other materials. Figures and statistical data are from *Millennials Go to College* unless otherwise noted.

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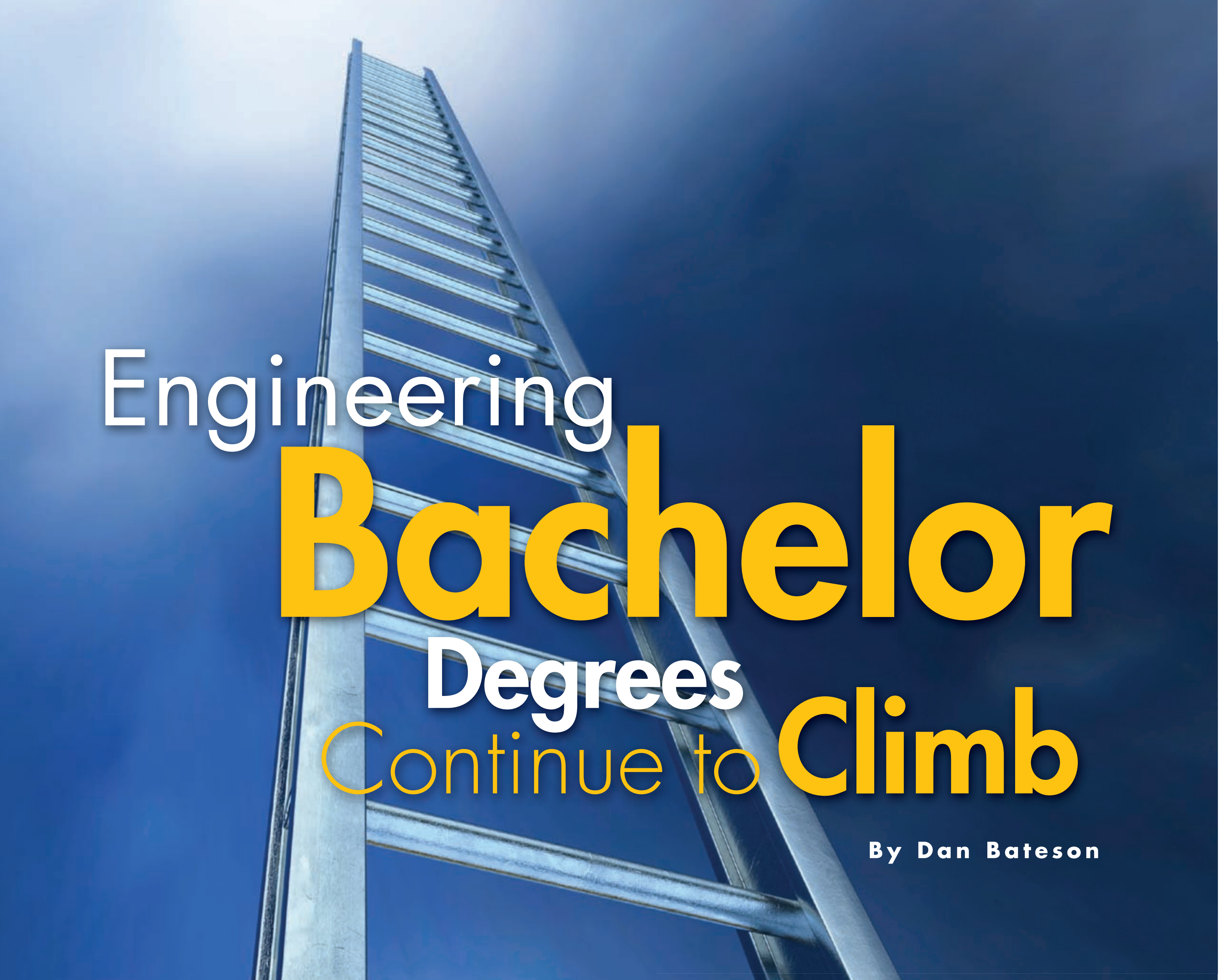

Engineering Bachelor Degrees Continue to Climb

By Dan Bateson

In 2006, the number of bachelor degrees awarded in engineering in the United States increased to 76,103, according to the Engineering Workforce Commission's survey report *Engineering & Technology Degrees 2006.*[1] This year's increase continued the growth that began in 2000 after the number of bachelor degrees had reached a 19-year low of 62,500 in 1999. Figure 1 provides a graph of degrees awarded in the United States from 1950 to 2006.

The increase in number of bachelor degrees may come to a halt soon. Freshman engineering enrollments have been in slow decline the past four years. In 1996, freshman enrollment was 85,375, and in 2002, it

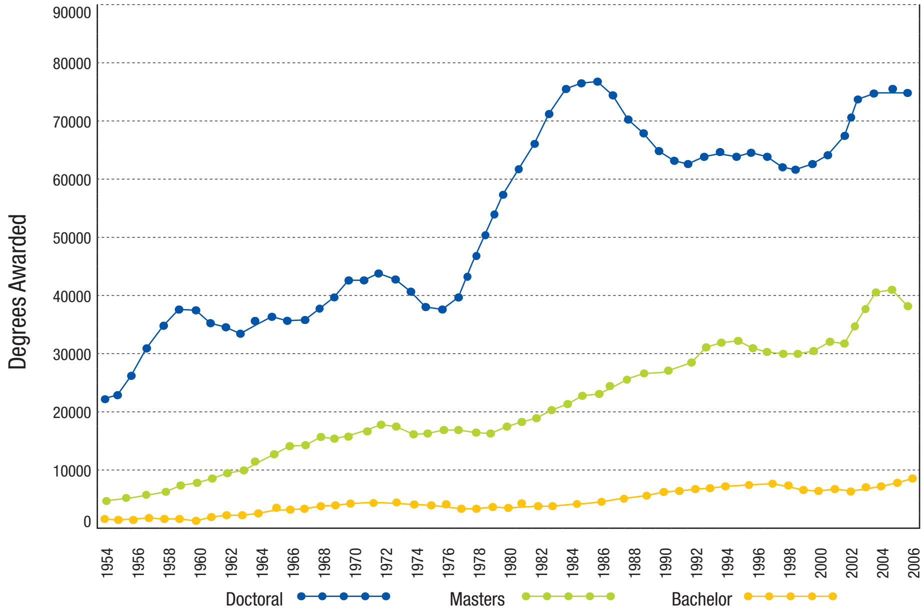

Figure 1. Engineering Degrees Awarded, All Levels, 1950 - 2006.

reached its pinnacle of 107,086. The swelling number of students explains the recent increase at the bachelor-degree level but should peak in 2007 or 2008.

While the 2006 undergraduate degree total is not a record, it comes very close to the all-time high reached in 1986 (78,178). The total of engineering masters of science degrees decreased 2,636 degrees to 38,451, while engineering doctoral degrees rose 840 degrees to 8,116. The doctoral increase is substantial, especially after some significant declines in 1998, 1999 and 2002. With the recent swell of bachelor degrees, graduate-level degree totals should increase accordingly.

DISCIPLINES

In 2006, mechanical engineering had the most bachelor degrees awarded at 15,698, followed by electrical and electronic. This total represents a fair increase from 2005's 14,835. Electrical and electronic decreased by 413 to 14,329, but this does represent an increase from 1999's 20-year low of 12,423.

In 1979, the total of computer engineering bachelor degrees was just 1,510. In 2006, computer engineering bachelor degrees totaled 14,282, reflecting an increase of 4,466 from 2000.

The next largest disciplines are civil (9,432), chemical (4,590) and industrial and manufacturing (3,810). Civil has been in fairly steady decline since 1997, when it reached an all-time high of 11,119 bachelor degrees. Since then, the discipline has remained around 8,000 until 2006's upswing. Chemical engineering has followed a similar pattern, reaching a high point in 1997 of 6,830 and then declining the next ten years. During this period of overall growth, it seems unusual that these disciplines would be decreasing. However, data from the 1980s show that both these disciplines peaked before the overall high for engineering was reached in 1986. Civil's previous high point was in 1981, and chemical's all-time

high was in 1984 at 7,685. They both declined significantly in the years following these peaks. Civil declined by almost 30% from 1981 to 1990. Chemical declined by over 50% from just 1984 to 1989, dropping to 3,711.

Bachelor degrees in industrial and manufacturing have by far remained at the most stable levels during the past decade. These totals have remained just below 4,000 during that time period.

Biomedical engineering has shown the most robust growth over the past decade. In 1997, there were 922 students who were awarded bachelor degrees in the biomedical discipline. In 2006, that number grew 228% to 3,028.

LARGEST COLLEGES

Georgia Institute of Technology produced the most engineering bachelor degrees in 2006, with a total of 1,643. Seven other colleges produced more than 1,000 bachelor degrees. University of California – Berkeley was just below this number with 986 bachelor degrees awarded.

University of Southern California again produced the most masters degrees (1,197), ahead of Stanford University by 163. Georgia Tech also produced the most doctoral degrees (315).

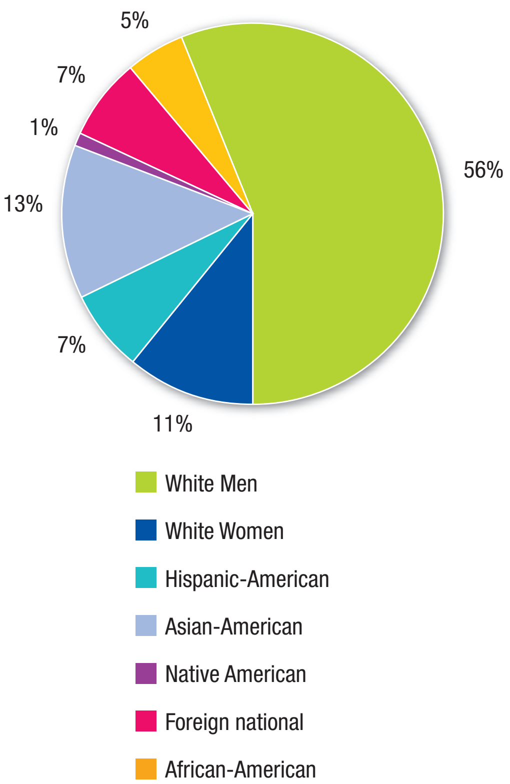

Figure 2. Percentage of degrees awarded in the United States by demographic group.

POPULATION GROUPS

For U.S. citizens and permanent residents, non-minority men continue to account for over half the engineering bachelor degrees awarded (56% in 2006). Women account for 19% of the bachelor degrees, underrepresented minority men account for 7%, and Asian-American men account for 13%. Figure 2 illustrates the percentage of degrees awarded in the United States by demographic group.

Foreign nationals earned just 7% of the degrees awarded in the United States at the bachelor level. However, at the graduate level, they account for a much larger percentage. Foreign nationals earned 40% of the masters degrees in engineering and 62% of the doctoral degrees.

Non-minority men are about one-third of graduate degree recipients (35% of masters and 31% of doctoral). Underrepresented minority men account for 4% of the masters degrees and just 2% at the doctoral level. Asian-American men account for 7% at the masters level and 4.5% at the doctoral level.

American women account for 14% and 8% of the masters and doctoral totals. Foreign national women earned nearly as many degrees: At the masters level, American women earned 5,226 degrees; foreign national women 3,505. At the doctoral level, American women earned 669 and foreign national women, 923.

While high participation levels by foreign nationals in graduate engineering is nothing new, it has been growing in the past few years. In 1996, 35% of engineering graduate degrees were awarded to foreign nationals. In 2006, that number was 44%. Most of this growth has come at the doctoral level, where foreign nationals have risen from 48% to 62%. At the masters level, foreign nationals have grown from 32% to 40%.

In the largest disciplines, computer engineering has the highest percentage of foreign nationals at 49%. Petroleum engineering is the highest at 77%. Electrical and electronic had 48% as did industrial. Mechanical and chemical also had the same percentages at 42%. Of these largest disciplines, civil had the lowest percentage of foreign national graduates at 38%.

WOMEN ENGINEERS

The number of women receiving engineering bachelor degrees declined slightly, from 14,868 in 2005 to 14,654 in 2006. This translates to a slight decrease as a percentage of total engineering bachelor degrees (19.5% to 19.25%). At the graduate level, however, women grew in number and percentage. At the masters level, women earned 8,731 engineering degrees (22.7%). At the doctoral level, women increased their degree total from 1,322 to 1,592 and now account for nearly 20% of all engineering degrees awarded at this level.

Recent engineering enrollment trends seem to indicate that long-term gains in numbers of women awarded engineering degrees are in serious jeopardy. Enrollment data shows that the percentage of women earning bachelor degrees may be decreasing in the near future. The percentage of female freshmen engineering students reached an all-time high of 19.9% in 1995. In 1996, that percentage remained unchanged, but since then it has been decreasing. In 2006, it stood at 17%.

Part of this change may have to do with the growth of computer engineering, which traditionally has not contained as many women as some of the other engineering disciplines. Computer engineering freshmen in 2006 were composed of 12% women. Since this discipline will likely be one of the dominant leaders for the future, the overall percentage of women in engineering may suffer. Of course, more women students could pursue this discipline in the future, evening out the imbalance.

In 1966, 20% of degrees earned by women were in science and engineering (a category that includes engineering; physical sciences; earth, atmospheric and ocean sciences; mathematics; computer science; biological and agricultural sciences; psychology; and social sciences).[2] In 1996, that percentage had grown to 28%. In comparison, of the degrees awarded to men in 1996, 39% were in science and engineering.

The overall growth of degrees awarded to women during this time is significant: from 222,971 in 1966

The overall growth of degrees awarded to women during this time is significant: from 222,971 in 1966 to 651,815. In 1966, women were outnumbered by men earning degrees by 78,000. By 1996, women outnumbered men by over 120,000.

to 651,815. In 1966, women were outnumbered by men earning degrees by 78,000. By 1996, women outnumbered men by over 120,000.

For science and engineering degrees, while women are still outnumbered by men, the difference is only by about 20,000 degrees. Since 1975, the number of men earning science and engineering degrees has been near 200,000 (never fluctuating more than 11,000 degrees above or below 200,000). Women, however, have steadily been earning more and more degrees in this area. In 1966, women earned 45,634 science and engineering degrees; in 1996, women earned 181,333 such degrees, a growth of almost 400%.

In the larger, more qualitative disciplines, the growth patterns are similar to each other. The social sciences continue to be the overall top choice for women in science and engineering. Psychology is close behind followed by biological and agricultural sciences.

Of the smaller, more quantitative disciplines, engineering became the most popular for women starting in 1989. Women earning degrees in engineering outnumbered women earning degrees in computer science, mathematics, physical sciences and earth, atmospheric and ocean sciences.

Dan Bateson is with the American Association of Engineering Societies.

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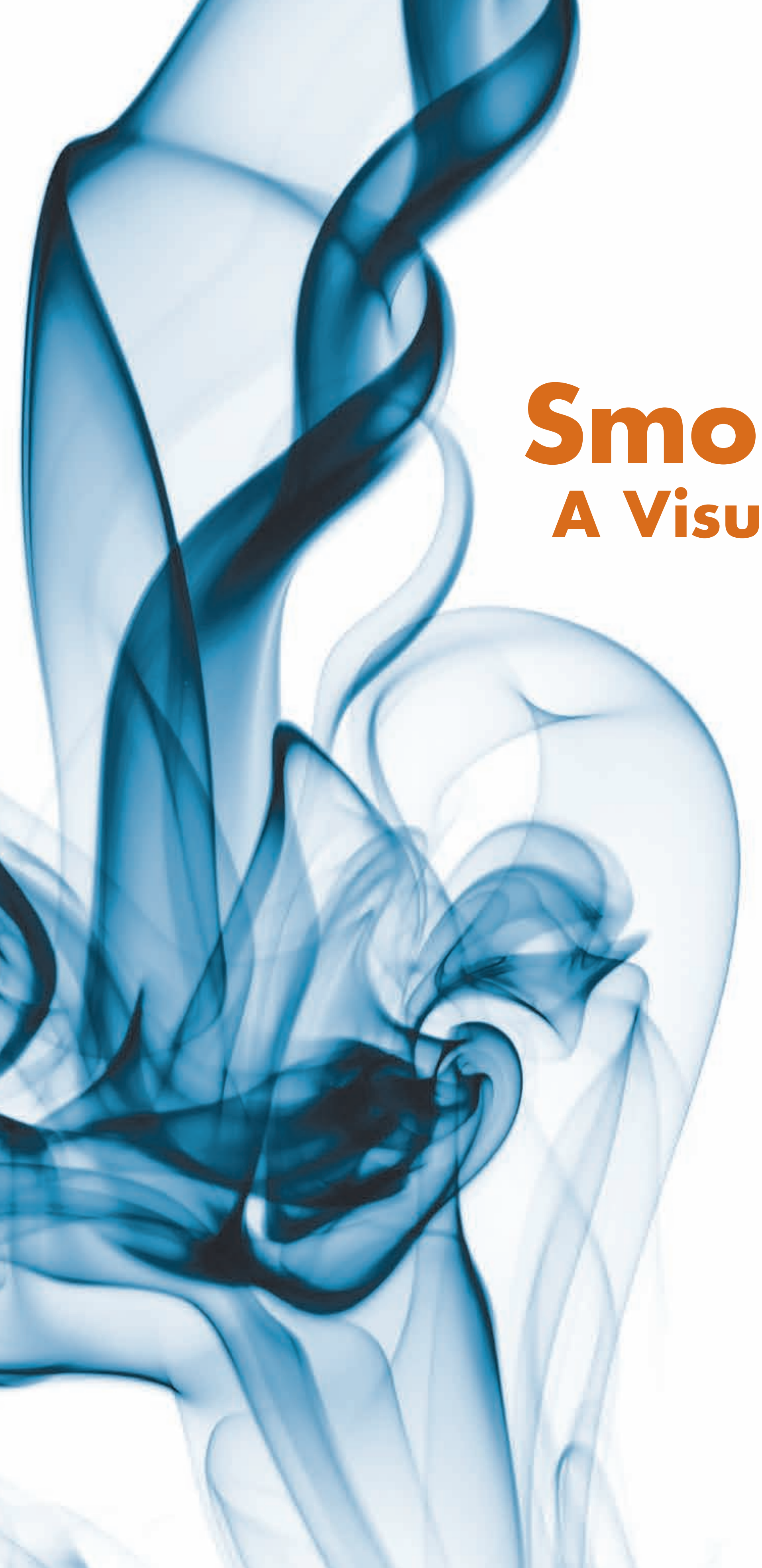


Smokeview: A Visualization Tool for Understanding Fire Dynamics

By Glenn P. Forney, Ph.D.

The purpose of fire modeling is to gain a better insight into fire dynamics and how it impacts fire safety – not to generate large amounts of data. Gaining this insight requires visualization tools that display what the numbers generated by the model represent. This article highlights some of the features that the visualization tool, Smokeview, uses to display fire effects.

Beginning in the early 1980s and continuing into the 1990s, NIST researchers Howard Baum and Ron Rehm developed the basic flow solver that evolved into the Fire Dynamics Simulator, which was publicly released in 2000. Their solution technique, known as "large eddy simulation," or LES, captures very complicated fire plume dynamics. Early attempts to visualize the calculation results consisted of nothing more than little particles swirling about in a box. This was useful to the model developers but hardly to anyone else. It just did not look like a fire.

Smokeview was written to address this problem. The first version was released along with FDS in early 2000. Along with particle-tracking as performed before, it visualized fire flow data by coloring and animating fire/smoke flow, making it much easier to interpret FDS simulation results. Immediately after September 11, 2001, work began on both FDS and Smokeview to enable them to model and visualize much larger problems. As a result, fire scenarios with several million grid cells can now be modeled and visualized using a cluster of computers.

The next big step in Smokeview's development was the implementation of an algorithm for visualizing smoke realistically. The line between FDS, which performs smoke flow computations, and Smokeview, which performs smoke flow visualization, became blurred as Smokeview now performs physics-based computations (Beer's law) in order to visualize the smoke. The present algorithm for visualizing smoke only considers the effects of absorption – how much an object is obscured by smoke. Future work involves modeling the effects of scattering – how the interaction between light and smoke effects the visualization.

A 1999 townhouse fire that resulted in line-of-duty deaths for two firefighters can be used to illustrate how scientific visualization can be important.[1] NIST was asked by the District of Columbia Fire and Emergency Medical Services Department Reconstruction Committee to examine the fire dynamics of this incident. The Committee had several questions regarding: 1) the injuries that the firefighters had sustained; 2) the lack of thermal damage in the living room where the fallen firefighters were found; and, 3) why the firefighters never opened their hose-lines to protect themselves and extinguish the fire. The major source of confusion arose from the fact that the firefighter farthest from the fire died while the one in the middle (closer to the fire) survived. Figure 1 shows that one-dimensional thinking is not always valid. This figure shows temperature contours through the center line of a basement stairwell. The heated gases moved up the basement stairs due to buoyancy and arched over the firefighters located at the top of the stairs. This visualization makes it clear that the fire dynamics was not one-dimensional and that conditions for the middle firefighter were less hazardous than conditions for the other two.

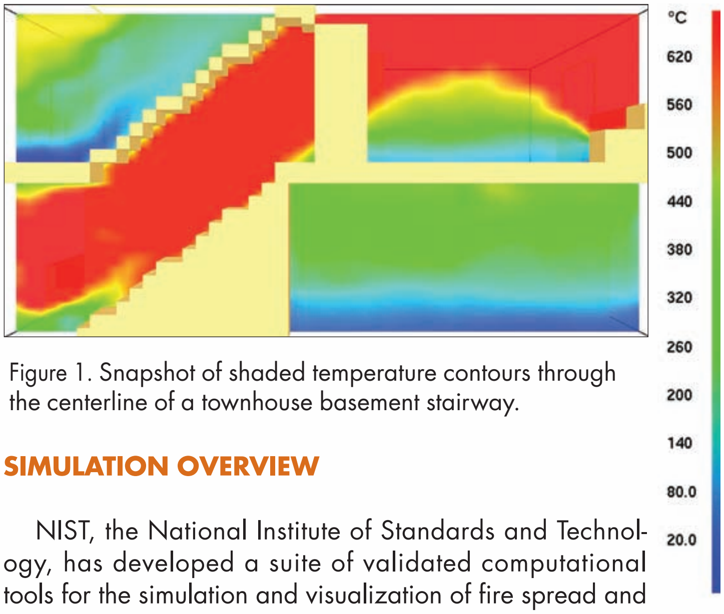


Figure 1. Snapshot of shaded temperature contours through the centerline of a townhouse basement stairway.

SIMULATION OVERVIEW

NIST, the National Institute of Standards and Technology, has developed a suite of validated computational tools for the simulation and visualization of fire spread and smoke transport. One of the fire modeling tools is called the Fire Dynamics Simulator (FDS).[2,3] Developed as a companion to FDS, Smokeview is a scientific visualization tool that converts data to images, enabling one to better understand numerically predicted fire dynamics.[4,5] These tools were developed with an emphasis on ease of use on affordable computer platforms.

FDS predicts smoke and/or hot air flow movement caused by fire, wind, ventilation systems and other factors by numerically solving the fundamental equations governing fluid flow, commonly known as the Navier-Stokes equations. FDS uses a form of computational fluid dynamics (CFD) known as large eddy simulation (LES) to predict the thermal conditions resulting from a fire. LES is a way of describing the effect of turbulence on the flow field. The fire itself is a source term in the governing equations, creating buoyant motion that drives the smoke and hot gases throughout the simulation. The chemistry of the combustion process is complicated by the fact that the fuel for the fire may include room furnishings, ceiling materials, wall and floor coverings, etc., i.e., a wide assortment of different materials. FDS makes simplifications about the combustion, essentially saying that fuel and oxygen burn readily when mixed. The rate at which energy is generated is obtained from experiments. There is no attempt to model the fundamental chemistry, which can involve hundreds of chemical reactions.

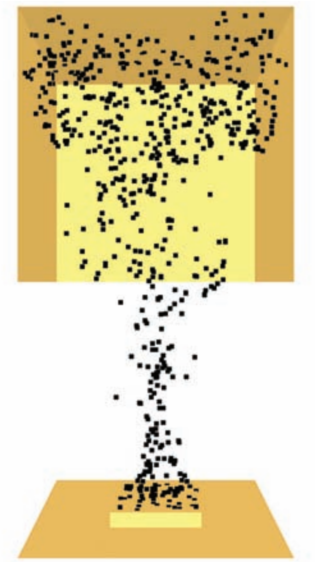
Both FDS and Smokeview would not have been possible without the recent advent of high-speed computers for performing computations, fast video cards for visualizing results and the Internet for exchanging information and ideas. These programs also would not have been possible without the research needed to develop the underlying fire models and the techniques needed to implement these models accurately and efficiently.

VISUALIZATION OVERVIEW

One of the biggest challenges in visualizing fire dynamics is how to convert the multidimensional data generated by a fire model such as FDS into a form that can be easily understood. Fire data can easily have five or more dimensions. For example, to display time-dependent scalar data would require five dimensions: three spatial dimensions to visualize position, one time dimension and one dimension to visualize the variable of interest. Time-dependent vector quantities require eight dimensions to display: three spatial dimensions, one time dimension, one dimension to visualize the variable, plus three additional dimensions to display the flow direction and speed.

A major challenge to effective visualization is that the computer screen has only two dimensions to display these data. A third dimension may be conveyed by rapidly displaying a sequence of images, with each image representing

Surrounding completely open



Upper half of surroundings blocked

Figure 2. Two plume fires visualized using particles. The different fire dynamics for these two cases are not revealed by this visualization method.

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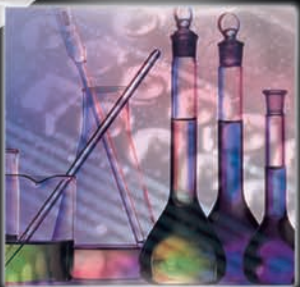

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a different moment in time. The visualization challenge is even more difficult when conveying results for the printed page.

Smokeview visualizes data in two primary ways: quantitative and realistic. Quantitative methods typically map fire-modeling data into colors representing a fire modeling variable. Interpreted with a color bar, one can make quantitative assessments about the data being examined. Some examples used by Smokeview are animated tracer particles; animated two-dimensional slices of gas phase quantities, such as temperature or smoke concentration; animated flow vectors; and animated surface conditions, such as incident heat flux or burning rates on enclosure surfaces. 3-D level or isosurfaces are also used to indicate where a particular variable takes on a specified value. Smokeview also visualizes smoke realistically by converting soot density to smoke opacity, with the goal of displaying smoke as it would actually appear to an observer. Each of these visualization techniques highlights different aspects of the underlying flow phenomena.

Visualization is essential at all stages of the modeling process. It is used before a run to verify the correctness of the scenario geometry, (e.g., locations and size of simulation features), during a run to monitor the simulation (ensuring

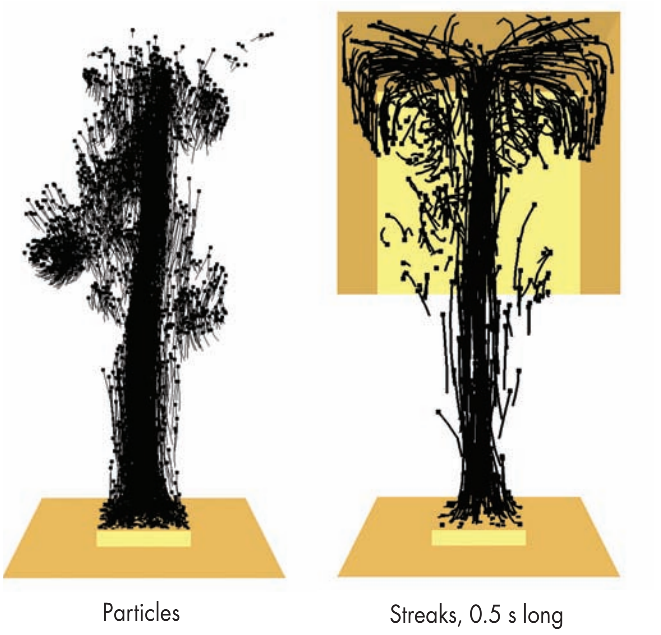

Figure 3. Two plume fires visualized using streaks. The streak paths show how the presence or absence of an exterior boundary affects the plume flow.

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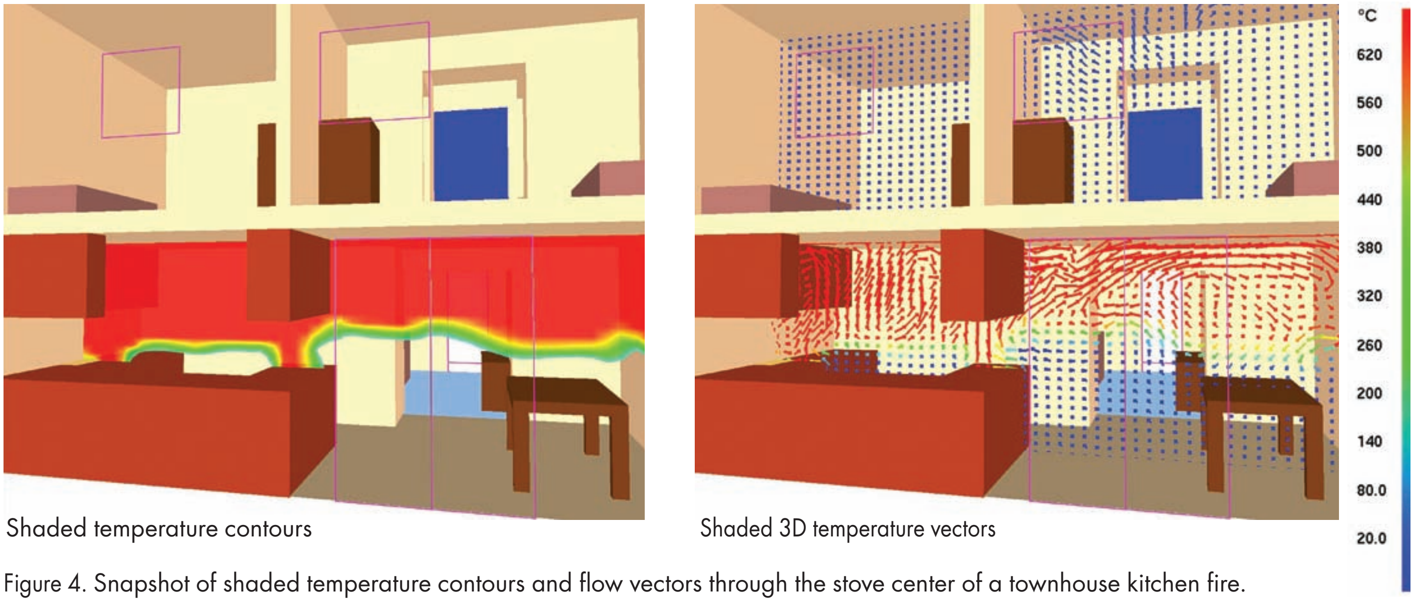


Shaded temperature contours

Shaded 3D temperature vectors

Figure 4. Snapshot of shaded temperature contours and flow vectors through the stove center of a townhouse kitchen fire.

boundary flows are behaving as intended) and after the run has been completed to analyze the results.

QUANTITATIVE VISUALIZATION

Showing motion

FDS uses particles to simulate water droplets and fuel sprays. One may also introduce particles into a scenario as tracers. All three particle types may be visualized using Smokeview, revealing the underlying flow patterns of the simulation.

Fluid motion may be conveyed by displaying a sequence of still images. A single static particle image, however, is not a good method for showing motion. The two cases shown in Figure 2 both display particles generated by a fire plume. The surroundings in the top illustration are completely open, while the upper half of the domain in the lower illustration is enclosed. The particle pattern in both cases looks similar though the fire dynamics are quite different.

Streak lines, a new feature of Smokeview version 5, are a good method for showing motion in a static image. A streak line is simply the path a particle takes due to the changing underlying flow field. (If the flow field was unchanging, then these lines would be called stream lines.) The streak lines shown in Figure 3 indicate how particles are affected by the boundary conditions. Streaks are predominantly vertical in the left illustration, since the domain boundary is completely open, while the streaks are curved near the top of the illustration on the right since the upper half of the domain boundary is blocked.

A second method for showing motion is the use of animated flow vectors. The vector's color represents the data, and the vector's length and direction show the dynamics of the underlying flow field. Figure 4 shows the fire dynamics of a kitchen fire using both solid shaded contours and a vector plot. Vector plots are better than solid contours for highlighting flow changes, especially in regions where temperatures are uniform.

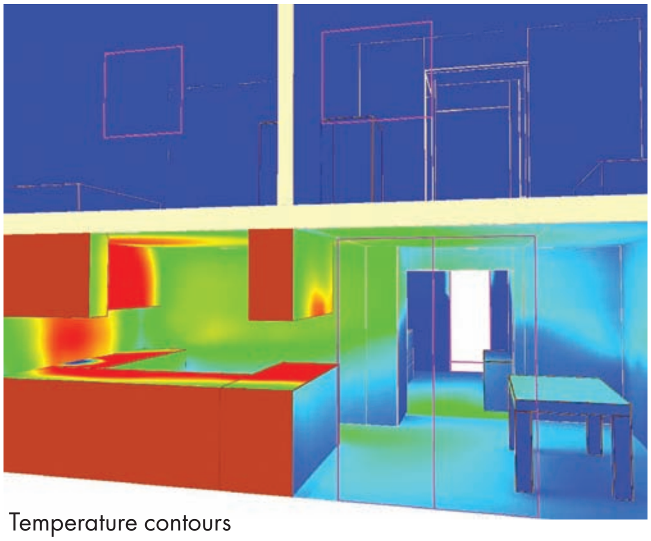
Assessing variables

Within the Gas Phase. Smokeview allows animated shaded color contours of calculated gas quan-

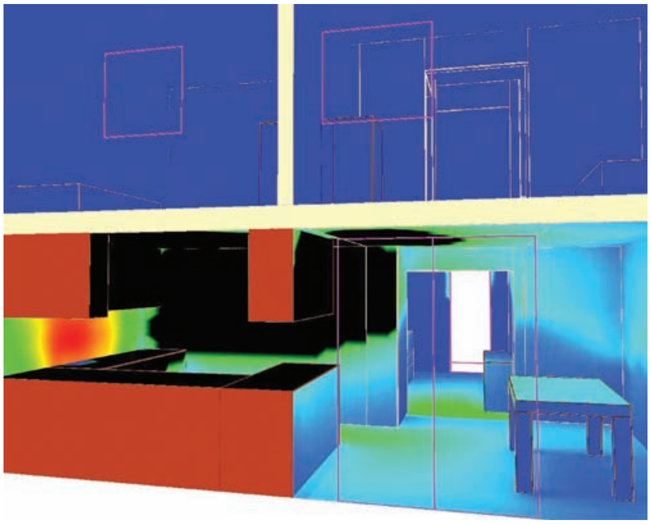
tities to be drawn at any horizontal or vertical plane in the simulation. To minimize file output, the user specifies the particular slice planes to be visualized. If disk space is not an issue, then the user may specify the entire 3D volume. Smokeview then allows the user to scroll through the 3D volume of data one slice at a time, displaying any horizontal or vertical plane. The lower illustraion in Figure 4 illustrates temperature contours in a vertical plane through the center of a static townhouse kitchen fire (not the Cherry Road case). Regions where the temperatures are below 100°C are hidden. Hiding unimportant data is a good technique for eliminating the data that is important.

On Surfaces. Boundary files contain simulation data recorded at blockage or wall surfaces. Continuously shaded contours are drawn for quantities such as wall surface temperature, radiative flux, etc. Figure 5 shows a snapshot of a boundary file animation where the surfaces are colored according to their temperature.

Regions where a surface temperature exceeds its ignition temperature (where burning has occurred) may be colored black. This is also illustrated in Figure 5.



Temperature contours



Temperature contours and ignition regions

Figure 5. Shaded temperature contours on boundary surfaces. The black region in the lower figure shows where the surface temperature has exceeded the ignition temperature for that material.

Particular Locations. Smokeview uses isosurfaces to identify where a specified level of a gas phase quantity occurs rather than how much. For example, FDS uses a mixture fraction model to simulate combustion. In this model, there is a critical or stoichimetric mixture fraction value, such that regions greater than the critical value are fuel-rich and regions less than the critical value are fuel-lean. Burning then occurs, according to the model, on the level surface where the mixture fraction equals this stoichimetric value. Therefore, it is of interest to visualize these locations.

Another application of isosurfaces is to identify where in the simulation domain a particular temperature occurs. This temperature could represent a hazard or a condition when something happens such as a smoke or heat detector activating. Figure 6 shows the region in a townhouse kitchen fire where the temperature is 100°C. The time and view point are the same as shown Figure 4.

Realistic visualization

Visualizing smoke realistically is challenging for three reasons. First, the storage requirements for describing smoke throughout the simulation scene at every time step can easily exceed the file size capacities of present 32-bit operating systems, which would typically be 2 GB. Second, the computation required both by the CPU and the video card to display each frame can easily exceed 0.1 s, the time corresponding to a 10 frame/s display rate. Finally, the physics required to describe smoke and its interaction with itself and surrounding light sources is complex and computationally intensive. Approximations and simplifications are required.

Smoke visualization techniques described previously, such as the use of tracer particles or shaded 2-D contours, are useful for analyzing data quantitatively but are not suitable for applications where realism is required. Some examples of such applications are using Smokeview as a virtual firefighter trainer or using Smokeview to examine the obscuration effects of smoke. Figure 7 shows smoke and fire displayed realistically.

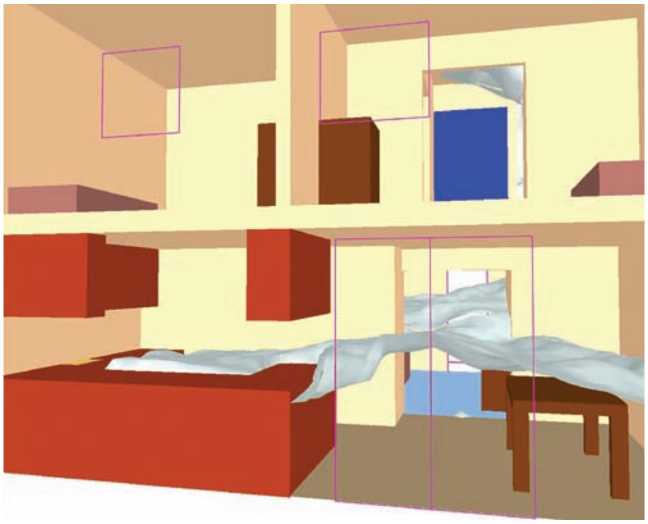


Figure 6. Temperature isosurface at 100°C.

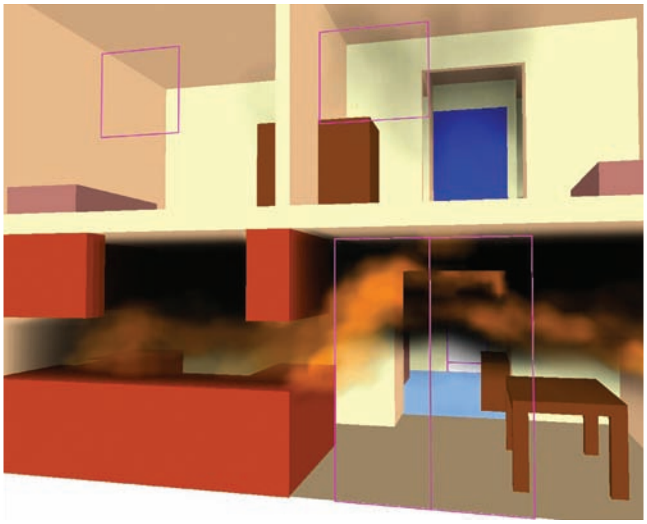


Figure 7. Realistic visualization of smoke and fire using opacities determined from FDS computed soot density.

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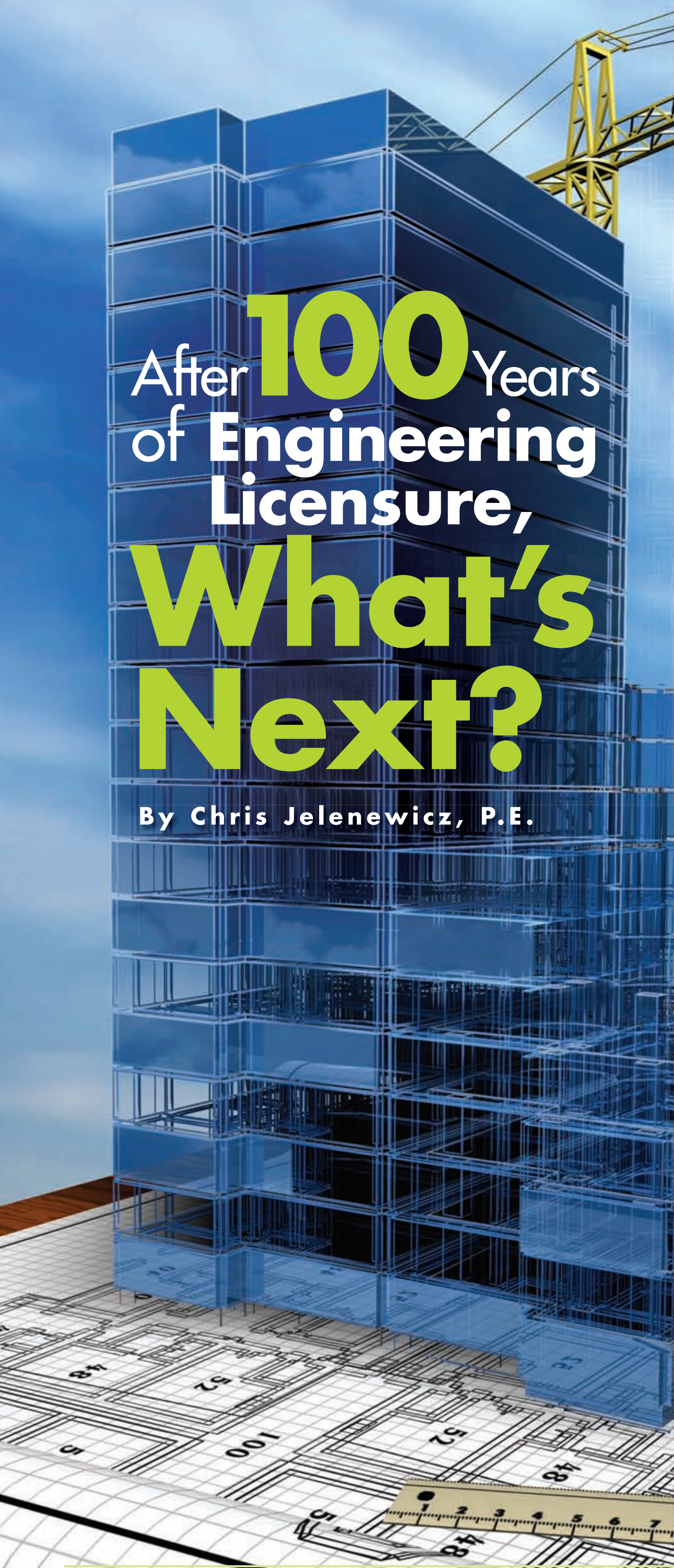

After 100 Years of Engineering Licensure, What's Next?

By Chris Jelenewicz, P.E.

Over 100 years ago, in 1907, the State of Wyoming passed the first engineering licensing law in the United States. This law mandated registration for engineers and surveyors as a way to better protect the public's health, safety and welfare from unqualified designers.[1] This law was the foundation for the engineering licensure process in the United States.

Almost 75 years later, the Fire Protection Professional Engineering Exam was offered for the first time in the United States in October 1981 by the National Council of Examiners for Engineering and Surveying (NCEES). NCEES is a national nonprofit organization composed of engineering and surveying licensing boards representing all states and territories in the United States. Before 1981, the fire protection exam was offered by several states but not at a national level. Currently, this exam is offered in 46 states and the District of Columbia.

As the engineering profession begins the next century of professional licensure, there are some important questions currently being debated by engineers and licensing boards that will impact those who practice engineering:

- **Do engineers need more education than a Bachelor of Science (BS) degree in engineering before becoming alicensed Professional Engineer (P.E.)?**
- **Should continuing professional competency be required for all licensed engineers?**
- **Should graduating engineering students be permitted to take the P.E. exam without practical engineering experience?**
- **Will programs that offer specialty certification after becoming a P.E. improve public safety?**
- **Should college engineering professors be licensed engineers?**
- **How do engineers who practice in countries that do not offer licensure programs have the opportunity to obtain a professional credential?**

Many engineers believe the answers to these questions will make the licensure process stronger, and as a result, the public will be better protected. This article will discuss how these questions may impact the future of engineering licensure and the profession of fire protection engineering.

ADDITIONAL EDUCATIONAL REQUIREMENTS TO BECOME A P.E.

In the United States, although the requirements for licensure may differ between states, becoming a licensed P.E. is generally a four-step process:

1. Graduation from an accredited BS engineering program.
2. Passing the Fundamentals of Engineering exam (FE).
3. Obtaining four years of work experience.
4. Passing the Principles and Practice of Engineering exam.

Even though the BS degree has been the standard educational requirement for engineers for over 100 years, this may change in 2015. At the 2007 NCEES Annual Meeting, the Council incorporated a requirement for additional engineering education into the Model Engineering Law. The NCEES Model Law was changed to require a BS degree plus an additional 30 credit hours of acceptable upper-level undergraduate- or graduate-level course work before a candidate can sit for the P.E. exam.[2] It is important to note that this model educational requirement must be adopted by individual states and territories before it becomes law.

This change to the model law will not take effect until January 1, 2015.

Although this may seem to be in the far distant future, this requirement will impact newly enrolled engineering students. For example, if a new engineering student starts a BS degree program in 2007, they will graduate in 2011. With four more years of experience, he or she can sit for the P.E. exam in 2015.[3]

Moreover, this change may impact the profession of fire protection engineering.[4] Presently, because the demand for fire protection engineers is much higher than the supply, employers are finding it difficult to recruit qualified engineers. In 2015, this offset in demand will only increase as fewer professional engineers will be entering the marketplace as a result of the additional educational requirements. Consequently, the fire protection engineering profession must prepare for this change.

One way the profession can prepare is to promote graduate-level distance learning programs in fire protection engineering. These distance learning programs are becoming increasing popular as a way for engineers of all disciplines to enter the fire protection engineering profession. Because all engineering graduates who are on the path towards licensure will be required to take additional courses, the new requirements combined with the distance learning programs will be a good opportunity to recruit more engineers into fire protection.

So why will engineering interns be required to take 30 additional credit hours of coursework before they can sit for the P.E. exam? First, there is a belief that "engineering education is falling behind other professions in preparing students for practice."[5] As shown in Figure 1, at the start of the 20th century, the educational requirement to become an engineer (four years) exceeded or was equal to all other professions, including doctors, lawyers, accountants and architects. In spite of this, the current educational requirements for these same professions exceed the requirements for engineering.

But more importantly, as shown in Figure 2, since the early 1900s, there has been a steady decline in the number of credit hours that are required to complete a BS degree in engineering. Before 1925, the average number of credit hours required for graduation was roughly 150. Now, it is about 128. Part of this decline is the result of individual states competing with each other to reduce the cost and the time needed to obtain a college degree. At the same time, colleges and universities have increased the requirements for nontechnical subjects in an attempt to provide a more well-rounded graduate. This has resulted in a decrease in required upper-level technical course credit hours. Furthermore, according to the National Academy of Engineering, "scientific and engineering knowledge presently doubles every 10 years. This geometric growth rate has been reflected in an accelerating rate of technology introduction and adoption."[6] Given this predicted fast rate of technological change combined with a decrease in educational requirements, it will be difficult for the current generation of graduating engineering students to be prepared to work in this fast-changing world without additional upper-level technical coursework.

CONTINUING PROFESSIONAL COMPETENCY

Currently, about 30 jurisdictions in the United States have continuing professional competency (CPC) requirements for licensed engineers.[7] The fact that many jurisdictions do not currently have CPC requirements demonstrates the diversity of opinions on this issue.

Those in favor of CPC requirements believe it improves the quality of professional practice and is a good way to protect public safety from incompetent engineers. Others think CPC increases the status of the engineering profession.[8] Additionally, the NCEES endorses the establishment of CPC requirements for licensed professional engineers.[9]

On the other hand, many say there is no evidence that shows CPC programs provide any public benefits, so the benefits of CPC do not exceed the time and money expended. At the same time, others feel the existing licensure process without CPC does an adequate job in protecting the public's health, safety and welfare.

Besides all of the perceived costs and benefits, the variability in CPC requirements presents a record keeping challenge for engineers who are licensed in multiple jurisdictions.

In most cases, jurisdictions require a licensed professional engineer to obtain 15 Professional Development Hours (PDHs) per year. A PDH is a contact hour of instruction or presentation. This criterion is often expressed as a biennial or triennial requirement. Although the requirements vary from jurisdiction to jurisdiction, usually the required PDHs may be earned through the completion of a combination of college courses, continuing education courses, distance-education courses, presenting technical presentations, teaching, authoring published papers or obtaining a patent. Specific requirements for individual jurisdictions can be found at *www.ncees.org/rcep/cpc.php*. Besides all of these variables, the lack of a uniformed reporting system between the states is another reason why engineers who are licensed in multiple jurisdictions find CPC difficult.

To simplify the CPC process, the NCEES started the Registered Continuing Education Providers Program (RCEPP). The RCEPP was developed as a means to a) promote quality and consistency in engineering continuing education; b) recognize and monitor providers against established criteria; and, c) provide a single source for licensee education recordkeeping.[10] The Society of Fire Protection Engineers (SFPE) is an approved provider in the RCEPP program. All of the SFPE seminars and the *Introduction to Fire Risk Assessment* Web-based course are approved courses. Currently, not all states that have CPC requirements participate in the RCEPP program. However, as more jurisdictions participate in the RCEPP program, engineers who are licensed in multiple jurisdictions should find it easier to navigate the CPC process.

TAKING THE P.E. EXAM WITHOUT EXPERIENCE

Allowing candidates to take the P.E. exam without having any engineering experience is an idea that is being widely discussed. In this approach, the candidate can take the P.E. exam right out of college if he or she graduated from an accredited engineering program and passed the FE exam.

Because this approach offers more flexibility for candidates, many think more students would be encouraged to enter the licensure process. Others believe it would be easier for a graduate to pass the exam as opposed to taking it four years after graduation.

Conversely, since the P.E. exam is designed to test practice-related applications, those opposed to this idea believe four years of engineering experience is needed for a candidate to pass the exam. It is also thought that if someone passes the PE exam right out of college, becoming recognized through comity in states that require the traditional approach may be difficult.[11]

In 2005, the State of Nevada started to allow candidates to take the P.E. exam without having any experience. After the first three exam cycles have been administered, there are some interesting results. For example, the pass rate for first-time examinees in all engineering disciplines with less than four years of experience is 54%. For first-time examinees with four or more years of experience, the pass rate is 48%.[12]

However, the results for the fire protection exam are different. For first- time examinees with less than four years of experience, the pass rate is 17%. For first-time examinees with four or more years of experience, it is 33%.[12] Although these data may indicate the fire protection engineering exam does a better job in testing practical knowledge, since only a small sample of candidates (21) took this exam in Nevada over this period, these results are inconclusive. Moreover, although the data from Nevada may shed some light on this argument, "it will probably take another two years before there's enough data to identify trends."[12]

CERTIFICATION AFTER BECOMING A P.E.

As opposed to licensure, which is mandated by law and administered by state licensing boards, certification is voluntary and administered by technical and professional not-for-profit organizations. Although certification started in the ophthalmology profession in 1911 as a way for licensed physicians to distinguish their unique qualifications in the care of eyes, it wasn't until 1955 that sanitary engineers who were generally trained as civil engineers started a certification program for engineers. Presently, there

ONCE A LEADER

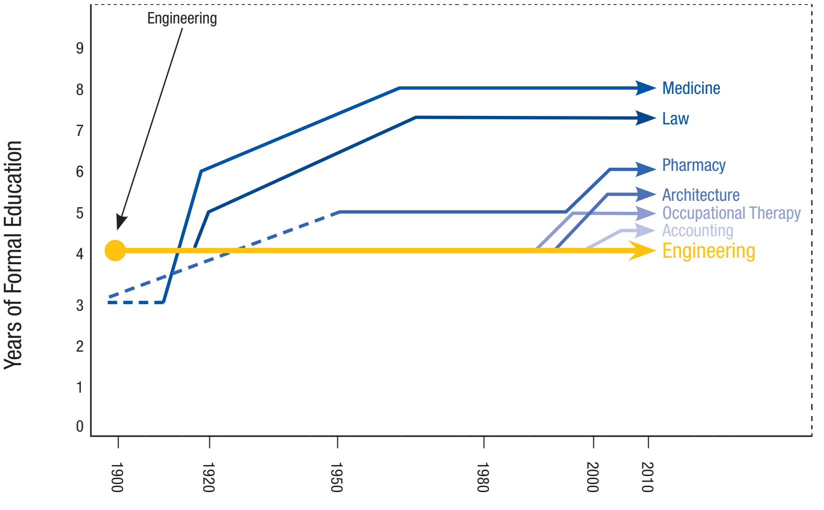

Figure 1. Education Requirements for Engineers (1900 to 2007)
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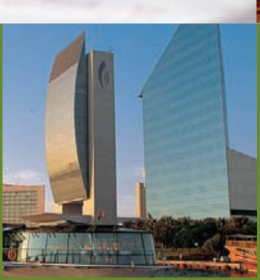

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about 70 organizations that provide certification programs for engineering and engineering-related specialties, and for engineering technicians.[13]

In 2006, SFPE surveyed the fire protection engineering profession by asking them their feelings about the need for a specialty certification program in fire protection. The proposed certification program was intended for practicing fire protection engineers who already have a P.E. registration. The purpose of this program would be to effectively measure an individual's capability to perform a specific task. For example, possible practice areas of certification could have included:

- Sprinkler System Design
- Fire Alarm System Design
- Special Hazard System Design
- Computer Fire Modeling
- Structural Fire Protection
- Performance-Based Design

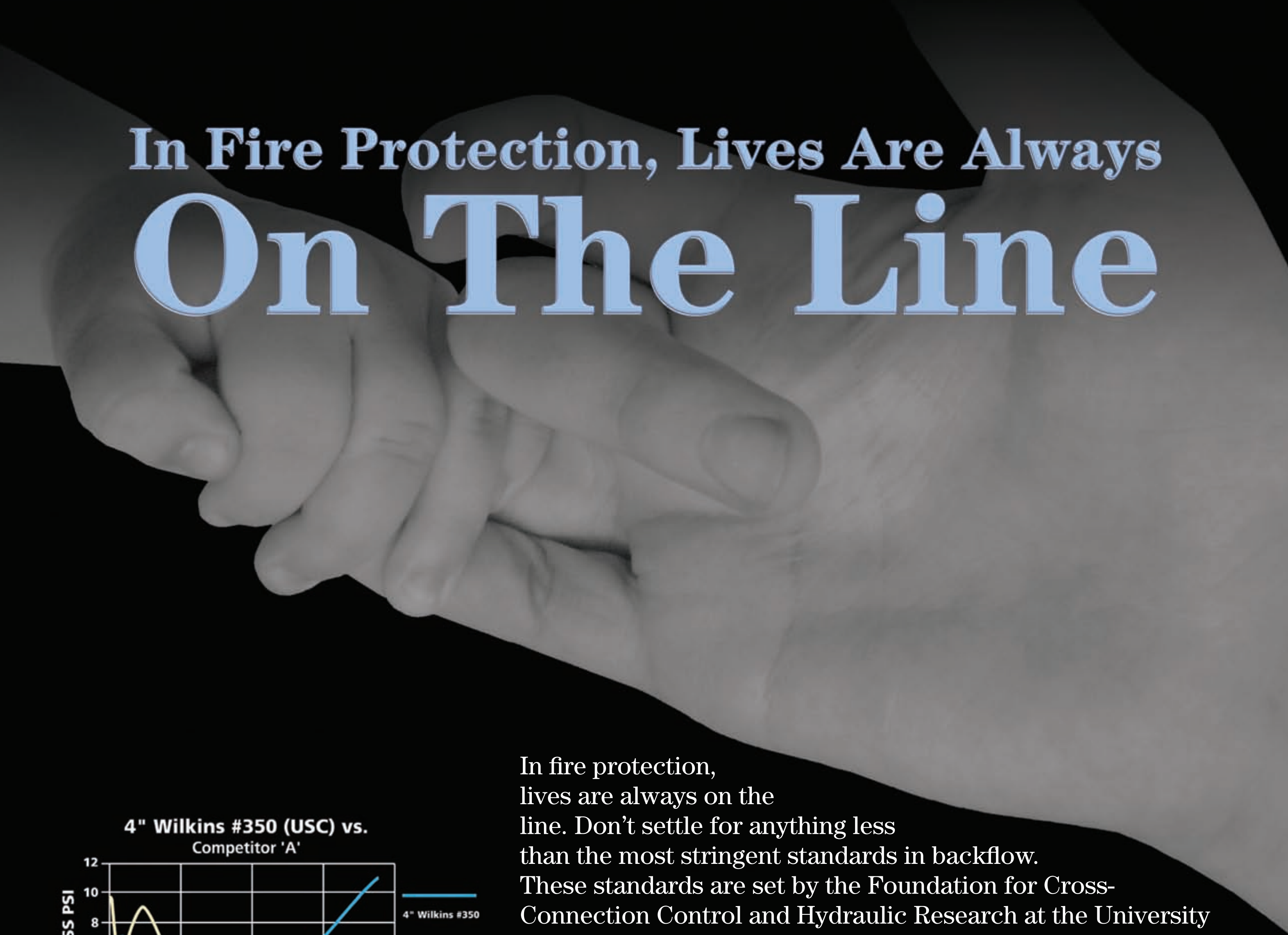
The majority of those surveyed were opposed to implementing a specialty certification program in the fire protection engineering profession. Many of those opposed indicated that, compared to other engineering disciplines, fire protection engineering is relatively a small discipline, and the general fire protection engineering P.E. exam is sufficient for our profession. Additionally, some of those in opposition did not believe there is a public need for such a program since engineers are not permitted by state licensing laws to practice in areas in which they do not have the required education and experience. As a result of these comments, the SFPE Board of Directors decided to not pursue developing a certification program for licensed fire protection engineers.

REQUIRING ENGINEERING PROFESSORS TO BE P.E.s

At one time, many engineering professors were licensed. Unfortunately, the number of licensed engineering professors has decreased. Because many of the deans and college administrators do not see the value of having licensed engineering faculty members, "trying to force faculty members to be licensed is difficult if not impossible."[14]

If engineering faculty members are not licensed, who will encourage students to get on the path towards engineering licensure? That is why many state engineering boards are considering waiving the FE exam if a person has a Ph.D. from an accredited engineering program. This should encourage engineering faculty to become licensed.

Because fire protection engineering plays a critical role in protecting society's



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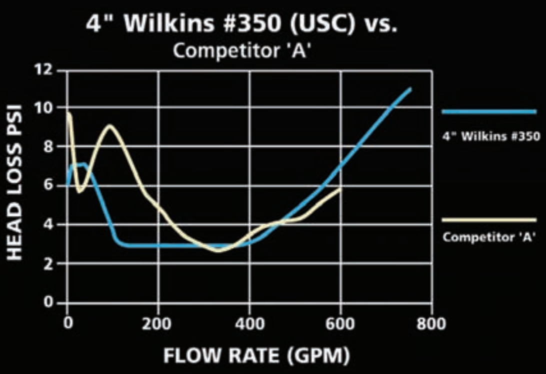

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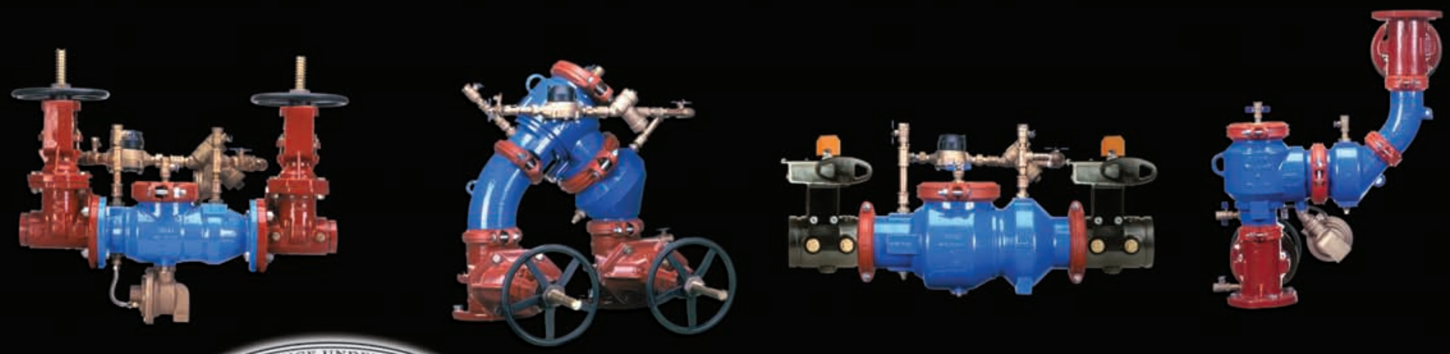

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health, safety and welfare, engineering licensure is essential in the profession of fire protection engineering. The 2005 SFPE membership survey reveals that almost 64% of all practicing fire protection engineers are licensed.[15] This is much higher than the national average in the United States of 33%.[16] Since fire protection engineering is critical to public safety, department heads at universities that offer fire protection programs should encourage faculty members to become licensed.

OFFERING THE P.E. EXAM OUTSIDE THE UNITED STATES

In October 2006, the FE exam was offered in Japan trough the Japan PE/FE Examiners Council.[17] The Principles and Practice of Engineering Exams were offered in October 2007. To take these exams in Japan, the examinee must be native to Japan.

This offering in Japan will be a significant opportunity for fire protection engineers in Japan to have an engineering credential. Additionally, if this program is successful in Japan, it could open the door for exam administrations in other countries. SFPE will work to promote the NCEES exams with the Society's membership in Japan and other countries when they are offered.

After 100 years of engineering licensure in the United States, the licensing system has done an outstanding service in protecting the public from unqualified designers. The same holds true in the fire protection engineering profession. As engineering licensure enters the next 100 years, this process will only become stronger. As a result, the public's health, safety and welfare will benefit.

Chris Jelenewicz is with the Society of Fire Protection Engineers.

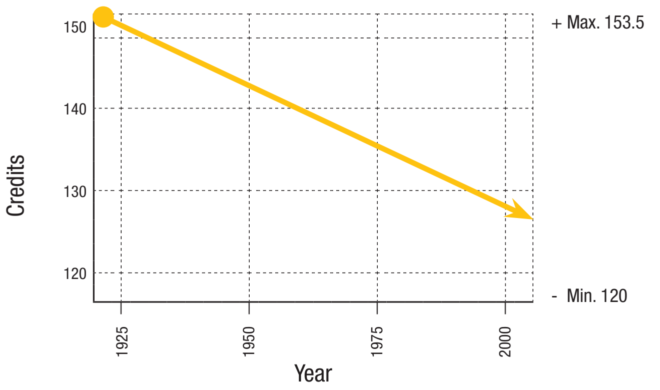

Figure 2. Credits Required for BS Degree (1900 to 2007).
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It's Not Your Father's Fire Alarm Code Anymore

Continuation of a two-part series

Setting Standards for Excellence

The first part of this article in the Fall 2007 issue looked at the evolution of the fire alarm signaling system standards and codes. This part discusses how the evolution might continue in the next ten years.

The big buzz in the signaling industry these days is not about fire detection and alarm systems, it is about Mass Notification Systems (MNS) or Emergency Communication Systems (ECS).[1] "Emergency warnings are simply not subject to the 30-s rule known to operate in Madison Avenue attempts to sell toothpaste and deodorant soap. People are information-hungry in a warning situation. They should be provided with all the information they need, and this information can be part of the warning messages."[2]

How can a bomb threat and the desired behavior effectively be communicated to occupants of a building? How can thousands of people in many different buildings and on the streets and fields of a campus or military base be reached when a chlorine tanker has overturned or when a tornado is approaching? For different hazards, there are different answers to the questions of "who to warn, when to warn and how to warn." How can occupants in a high-rise residential building be notified and convinced to stay in their apartments during a fire? How can new instructions or messages be notified and reassurance given? And how can it be ensured that these systems are both effective and continue to operate for the duration of the hazard? These are some of the challenges to be faced in the next ten-plus years as the *National Fire Alarm Code* evolves into an all-encompassing emergency signaling systems code or standard.

Why should airports, hospitals and schools be burdened with two systems that have the same function – communication to the occupants? If an "event" system that by its very nature must have manual and automatic volume control and that will be used daily for non-emergency purposes is permitted to be used for emergency communications in a stadium, auditorium or large meeting room, how can system reliability and statistical availability be ensured?

The fire alarm industry has focused on audible and, more recently, single-bit visible delivery systems for occupant notification. Different hazards require different delivery "channels" for different population subgroups. Where information is desired, voice systems have traditionally been used. Depending on the hazard and the target group, there are many possibilities for effective communication, including phone systems, large displays such as dynamic highway signs, scoreboards in stadiums, cable television and computer (Internet) override.

Given today's security risks and potential terrorist threats, most large buildings and large spaces will need hardened, secure communication systems. Can this be accomplished using a common building network infrastructure to reduce cost, boost coverage and increase statistical availability/reliability? Some systems will be connected to national or regional systems for the receipt of information. Some will require the ability to be controlled far from the threat area. Others will not require these specialized features.

From a codes and standards viewpoint, there need to be options and flexible solutions to meet different needs. Also, it is insufficient for a standard to provide options and menus of protection and notification features if the referencing codes, AHJs and designers fail to specify the required system goals and configuration. The signaling system committees must receive input from the users regarding their goals and the features that they need in a signaling system. The signaling system committees must then apply their expertise to effect reasonable and flexible solutions. Finally, there must be a feedback loop to ensure proper adoption and correlation.

For example, in the 2007 edition of *NFPA 72*, an alarm is defined as a signal indicating an emergency condition or an alert that requires action, not as a warning of fire danger as it had been defined in previous editions. However, there are other NFPA documents that use the word "alarm" when referencing any type of signal – not just danger signals.

> People are information-hungry in a warning situation. They should be provided with all the information they need, and this information can be part of the warning messages.

At a recent meeting of the Technical Correlating Committee for Signaling Systems for the Protection of Life and Property, it was acknowledged that an alarm does not necessarily constitute an immediate need to evacuate an area, a building, a floor or a room. The necessary action depends on the nature of the emergency. So, while the term "alarm" does mean emergency, the desired response may vary. Not all codes, AHJs and designers recognize this distinction. For example, a carbon monoxide signal may be an alarm or it may be a supervisory signal. It would be an alarm when the intent is to warn occupants in the immediate area of the imminent danger (emergency) because of the presence of increased levels of CO. The desired response may not have to include immediate evacuation. On the other hand, a CO signal generated by a detector in a rooftop mechanical space may sometimes be more appropriately categorized as a supervisory signal – a signal indicating the need for action in connection with the maintenance features of related systems.

How can a signaling standard be crafted in such a way that other codes or AHJs can pick and choose the features they want for certain occupancies or risks? The signaling systems committees (including *NFPA 72* and *NFPA 720*) are addressing these challenges, while never forgetting that the largest percentage of users simply need to know what is needed for a small, simple fire alarm system.

Trying to write and correlate separate documents for different risks has historically been proven difficult. Extraction of text from one to another, duplication of requirements and sending users from one document to three or four others to put a system together results in confusion, issues of jurisdiction and, ultimately, the potential for error. *NFPA 72* is evolving to address all of these signaling needs, not just fire alarm. No, it's not your father's fire alarm code anymore.

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7th International Conference on Performance-Based Codes and Fire Safety Design Methods

Langham Hotel, Auckland, New Zealand, April 16-18, 2008

Since the first conference on performance-based codes and fire safety design methods was held in 1996, many countries have developed, or are in the process of developing, performance-based codes and design methods. However, use of these approaches has generally been limited to high-end projects, and the percentage of projects where performance-based design is used varies among countries.

This conference will present the state-of-the-art in performance-based code approaches and engineering design methods. Papers will be presented on newly emerging technologies, as well as perspectives on approaches that have worked well and approaches that have not worked as well as originally desired. The conference will be held in New Zealand, which was one of the first countries to adopt a purely performance-based building code.

Over the last 12 years, this conference has earned a reputation among the fire protection engineering community as the preeminent event for information on the leading-edge technology in the areas of performance-based codes and engineering design methods.

See *www.SFPE.org* for a complete conference program and hotel and registration information.

Registration Fees

Advance registration fees
(Must be received by March 7, 2008)

- US $825 for SFPE/CIB/SFS Members
- US $950 for non-members

Late registration fees
(Received after March 7, 2008)

- US $925 for SFPE/CIB/SFS Members
- US $1,050 for non-members

Gala Dinner ticket

- 1 Gala Dinner ticket included with registration fees
- Additional tickets are US $100

UPCOMING EVENTS

February 27–29, 2008
4th International Conference on Pedestrian and Evacuation Dynamics
University of Wuppertal, Germany
Info: www.ped2008.com

March 11–13, 2008
Suppression and Detection Research and Applications (SUPDET 2008)
Orlando, Florida, USA
Info: www.nfpa.org/foundation

March 12–14, 2008
3rd International Symposium of Tunnel Safety and Security
Göteborg, Sweden
Info: sp.se/fire/ISTSS2008

April 2–3, 2008
International Tunnel Safety Conference
Munich, Germany
Info: www.iwma.net

April 16–18, 2008
7th International Conference on Performance-Based Codes and Fire Safety Design Methods
Auckland, New Zealand
Info: www.sfpe.org

May 4–6, 2008
2nd Algeria Fire, Safety & Security Expo
Algiers, Algeria
Info: new-fields.com/afsse2/index.php

May 19–21, 2008
International Symposium on Fire Investigation (ISFI)
Cincinnati, OH, USA
Info: www.isficonference.com

May 20–28, 2008
5th International Conference – Structures in Fire (SiF '08)
Singapore
Info: www.ntu.edu.sg/cee/SIF-08/

June 2–5, 2008
NFPA World Safety Conference and Exposition
Las Vegas, Nevada, USA
Info: www.nfpa.org

June 9–11, 2008
19th Annual Conference – Recent Advances in Flame-Retardancy of Polymeric Materials
Stamford, Connecticut
Info: www.bccresearch.com/flame2008.htm

September 21–26, 2008
9th IAFSS Symposium
Karisruhe, Germany
Info: iafss.org/html/events.htm

October 12–17, 2008
SFPE Progessional Development Conference and Exposition: The Annual Meeting
Charlotte, North Carolina, USA
Info: www.sfpe.org

November 2–3, 2008
2007 International Symposium on Elevator Evacuation During High-Rise Fires
Shanghai, China
Info: www.isee-sh.org

BRAINTEASER > Problem/Solution

Problem

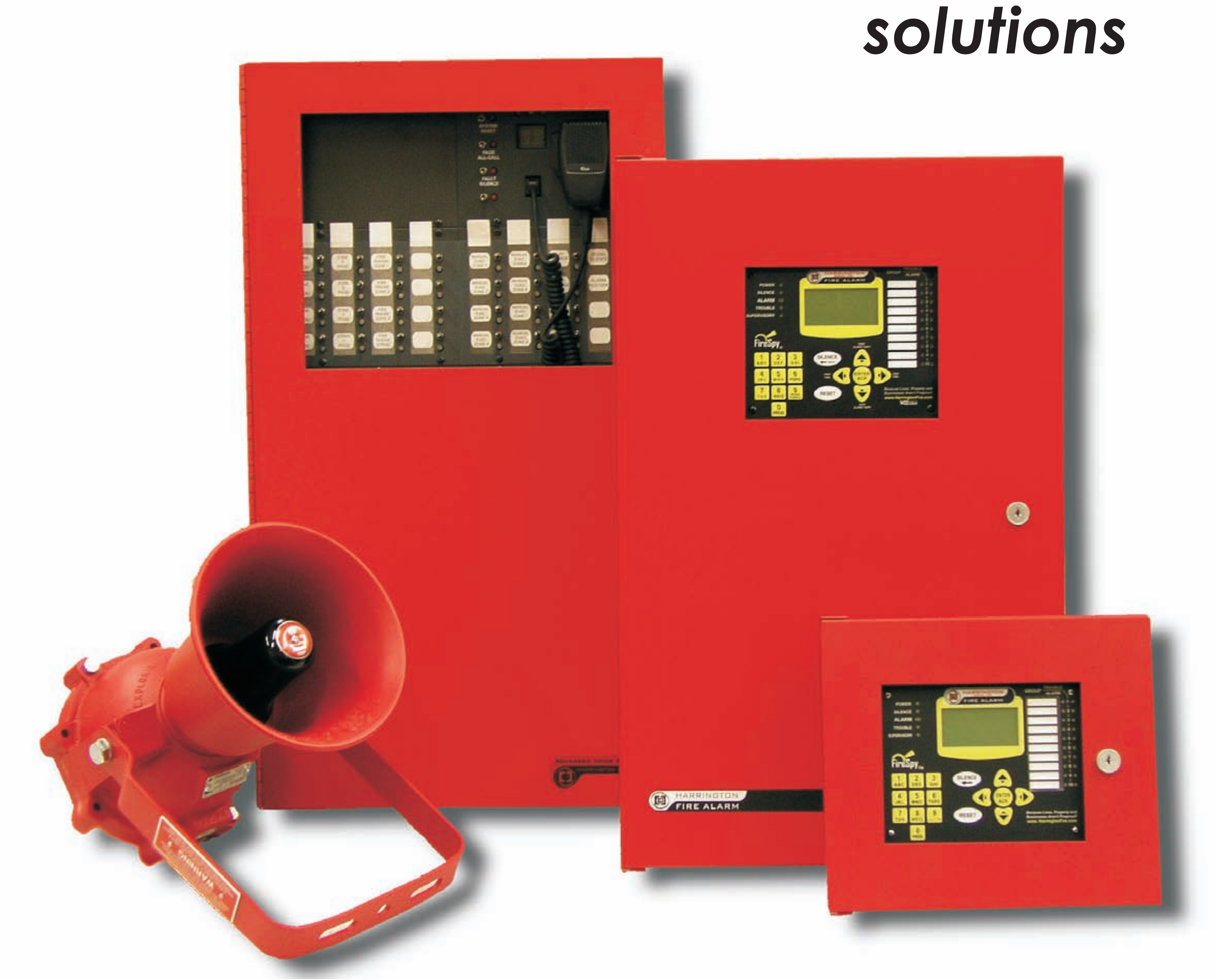
[**What numeral will be in the ones place of 2^{200}?**]

Solution to Last Issue's Brainteaser

Christine operates a lemonade stand on a hot summer day. She has developed a unique sales plan for her lemonade: instead of charging a fixed fee, customers must pay the amount that is in the cash drawer and then remove 40 cents. When the fourth customer shows up, he exclaims that there is not any money in the drawer. How much money was in the drawer when Christine opened for business? What is the minimum amount that Christine must have at the beginning so that she will not eventually go broke?

She started the day with 35 cents. After the first customer, she had 30 cents in the drawer. Following the second customer, she had 20 cents. The third customer doubled the 20 cents, and then took the entire 40 cents from the drawer.

Christine must start with at least 40 cents in the drawer to avoid eventually going broke.

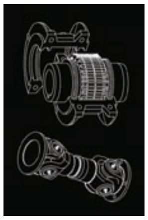


HARRINGTON
FIRE ALARM

CASE STUDY

CLARKE FIRE PROTECTION

Insist on Certified UL-Listed Couplings & Driveshafts from Clarke



In the fire protection industry, there's no margin for error. So whether you're retrofitting an existing fire protection system or specifying equipment for a new fire pump set, making the right choices on everything from fire pump diesel drivers to driveshafts and couplings can have a major impact on the safety and performance of your system.

Clarke Fire Protection Products, Inc.
3133 East Kemper Road
Cincinnati, OH 45241, USA
800.513.9591
www.clarkefire.com

In a reliable fire pump package, each system component is vital in meeting the needs of critical fire protection applications.

Although major components such as fire pump drivers, pumps and controllers typically exceed standards and have been UL-listed for many years, electric motor couplings and diesel driveshafts had never been certified for fire pump service despite the 1993 NFPA 20 regulation requiring listed driver components.

Today, many in-service couplings rely exclusively on elastomeric material for power transmission. However, a large number of documented failures indicate that elastomeric couplings may be unreliable for high-performance fire protection applications. Better solutions for fire protection systems include flexible metal couplings for electric motors and flexible connecting shafts (universal joint drives) for diesel engines.

As an industry leader in fire protection, Clarke Fire Protection Products, Inc., has invested the engineering resources necessary to develop and test couplings and driveshafts to make them certifiable for fire pump service. Clarke takes great pride in completing that mission with outstanding results: (1) Clarke flexible metal couplings for electric motors are now UL-Listed and will begin shipping in January 2008 and (2) Clarke universal joint driveshafts for diesel engines will be UL-Listed in early 2008 and available for shipment shortly thereafter. When credibility counts…Clarke delivers.

For more information about Clarke Fire Protection Products, Inc., or to place an order for UL-Listed couplings or driveshafts for your next installation, call at 800.513.9591, or visit online at *www.clarkefire.com*.

SMOKE AND FIRE PREVENTION

Fabri-Lock Fabric Draft Curtain System

Specializing in smoke containment, draft curtains, curtain boards, and smoke curtains, Smoke and Fire Prevention is a very unique firm. Providing and installing the Fabri-Lock Draft Curtain System for over 17 years has provided valuable experience and the ability to be able to offer a true turn-key system. Providing design assistance, turn-key pricing, detailed submittals and shop drawings, installation, and a warranty, there is no better choice when in need of draft curtains.

Smoke and Fire Prevention
Phone 800.991.1352
Fax 434.374.8217
www.smokeandfireprevention.com

Unlike traditional metal panels or dry wall, the Fabri-Lock System is installed after all utilities and piping has been run. This not only keeps projects on schedule, but prevents the continuous problem of getting to the end of a project and realizing that there are 400 holes in the draft curtain that need to be sealed. Unlike traditional draft curtains, Fabri-Lock is a fiberglass material. Weighing just a fraction of traditional materials, Fabri-Lock is perfect for existing buildings or pre-engineered metal buildings. The technology of the system allows for any size or shape penetration to be easily re-sealed. Repair to the system is also, by far, the easiest and quickest available.

See what professionals in the industry have to say about the Fabri-Lock Draft Curtain System…

"The installation was three times faster than any alternative, and the damage from other trades could be fixed without a mess – even over the owner's equipment."

Matt Oberlies – The McClier Company

"After using metal and dry wall in the past, the first time we used the Fabri-Lock system, our company and the building owner were pleasantly surprised at how much the fabric enhanced the lighting and appearance of the building's interior."

Tom DeLong – Northeast Construction Company

"I've been on projects that used metal smoke curtains, but after using the Fabri-Lock system, I found that the job looked better and installation was quicker and hassle free."

Keith Raab – J.M. Thompson Company

CASE STUDY

EAST COAST LIGHTNING EQUIPMENT, INC.

Court Ruling Requires Lightning Rod Firms to Tell the Truth

Two manufacturers of non-standard lightning rods may find it difficult to hawk their wares, thanks to a recent federal appeals court ruling. Heary Brothers Lightning Protection/Lightning Preventor of America based in Springville, N.Y. and National Lightning Protection Corporation of Denver, Colorado, have been permanently forbidden from making any more false claims regarding the capabilities of their so-called Early Streamer Emission (ESE) lightning protection products.

East Coast Lightning Equipment, Inc.
24 Lanson Drive
Winsted, CT 06098
888.680.9462
www.elce.biz

In early January, the U.S. Court of Appeals for the Ninth Circuit upheld a lower court's finding that the ESE vendors used false advertising claims to sell their ESE lightning rods. What exactly is an ESE? It's a flyer saucer like contraption measuring about a foot in diameter. The ESE vendors mounted the device on a flagpole on or near a structure and claimed it offered a broad range of protection from lightning strikes, many times greater than a system that complies with national safety standards.

ESE systems have been installed on homes, commercial and public buildings, airports, golf courses, schools and even major league ballparks. Unfortunately, no competent scientific research supports the exaggerated areas of protection that the ESE vendors claimed their products provide. In fact, lightning experts have long been skeptical, saying the vendors' claims were based on scanty, inconclusive and just plain inaccurate data.

The federal injunction deals a blow to the sellers of the ESE's and leaves purchasers of ESE systems with a serious problem. They bought the ESE systems to protect their structures from lightning, not realizing that the claims of protection they were being promised had no scientific or technical grounding. This might be a bitter pill to swallow, according to Mark Morgan, president of East Coast Lightning Equipment in Winsted, Conn.

"Unfortunately, retrofitting these facilities with real lightning protection systems can be difficult," Morgan said. "Owners who were sold an ESE system have essentially been deprived the opportunity of having cost-effective lightning protection that complies with US standards installed on their buildings."

For more information on lightning protection systems that meet UL and NFPA standards visit *www.ecle.biz.*

SIMPLEXGRINNELL

InfoAlarm™ Command Center Strengthens Response Capability of Simplex® 4100U Fire Alarm System

SimplexGrinnell has advanced the capabilities of its flagship Simplex 4100U fire alarm system with the introduction of the InfoAlarm™ Command Center – an expanded large-screen panel display and intuitive user interface that can help speed the response to emergencies.

Designed to facilitate quick, easy operation in emergency situations, the Simplex 4100U InfoAlarm Command Center enhances fire and life-safety protection by expanding the amount of information that can be displayed on the panel. The multi-line display and the intuitive soft control keys enable system users, maintenance personnel, and first responders to access clear, easy-to-understand information that can identify the location, nature, and severity of an emergency or fire alarm system condition.

Fire protection and command operations can be further supported by placing remote, compact-sized InfoAlarm command centers in building entrances, lobbies, and other key locations.

SimplexGrinnell LP
50 Technology Dr.
Westminster, MA 01441-0001
800.746.7539
www.simplexgrinnell.com

"Today more than ever, access to information via the fire alarm system is critical in an emergency, whether it's a fire or other threatening situation," says John Haynes, director of Product Line Marketing at SimplexGrinnell. "That's why the Simplex 4100U InfoAlarm Command Center is such an important advancement. In simplest terms, it gives system operators and emergency responders more 'at-a-glance' information about an event, without having to scroll or push buttons. As a result, the response can be more rapid and accurate."

In addition to the extended information display, the InfoAlarm Command Center, one of the first products listed to meet the new UL 864 fire alarm equipment testing standard, gives the Simplex 4100U system added flexibility to meet application-specific customer requirements. Key features and benefits include:

- Easy, cost-effective upgrades
- Remote panel option
- "On the fly" instant-switch language selection
- Site map
- Watermark background
- Custom activity display choices

For more information, visit *www.simplexgrinnell.com.*

1

Ceiling Strobes

System Sensor's SpectrAlert® Advance, a series of audible/visible notification appliances, includes indoor and outdoor selectable-output ceiling strobes. These strobes have plug-in designs with universal mounting plates. CSFM-listed, they are electrically compatible with the extensive SpectrAlert product line and meet all standard agency listings including UL, FM, MEA and ADA. SpectrAlert ceiling strobes can be selected in standard or high candela, in combinations of red and white exteriors, and with a selection of exterior markings in various languages.

www.systemsensor.com
–System Sensor

2

Photoluminescent Exit Signs

Low-cost, Ever-Brite II Series photoluminescent exit signs require no electricity, are easy to install and provide a solution for recent code requirements. The signs are nontoxic and nonradioactive, and have no internal components to burn out. Ever-Brite exit signs carry the ENERGY STAR® logo, are ETL-listed to UL-924 standards at 50 feet, and meet NFPA Life Safety Code 101 and OSHA requirements, as well as numerous state and city building codes in both the U.S. and Canada.

www.mulelighting.com
–Mule Lighting, Inc.

3

Fire System Manager

Silent Knight announces the completion of the Underwriters Laboratories® listing process for the IFP-NetUL Fire System Manager. The IFP-NetUL is a PC-based system that works with Silent Knight's intelligent analog/addressable fire control panels: the IFP-1000, IFP-100 and the IFP-50. The IFP-NetUL also features upgraded control capabilities that allow it to provide reset and silence functions for all three fire control panels when installed in a UL-compliant installation.

www.honeywell.com
–Silent Knight, Honeywell Life Safety Group

4

Remote Waterflow Alarm Device Testing

Model 1200 RemoteTEST offers a self-contained method to "remotely" fulfill the primary function of the wet pipe system inspector's test. Using the required TESTanDRAIN valve for testing the waterflow alarm devices for system viability and water supply integrity, the RemoteTEST checks the entire system's readiness to deal with a fire. It can be integrated into an existing panel or wired to an independent one. Remote operation saves time and manpower, and allows for system tests to be performed easily during off-peak hours. Available with an optional bypass loop.

www.testandrain.com
–AGF Manufacturing Inc.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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.

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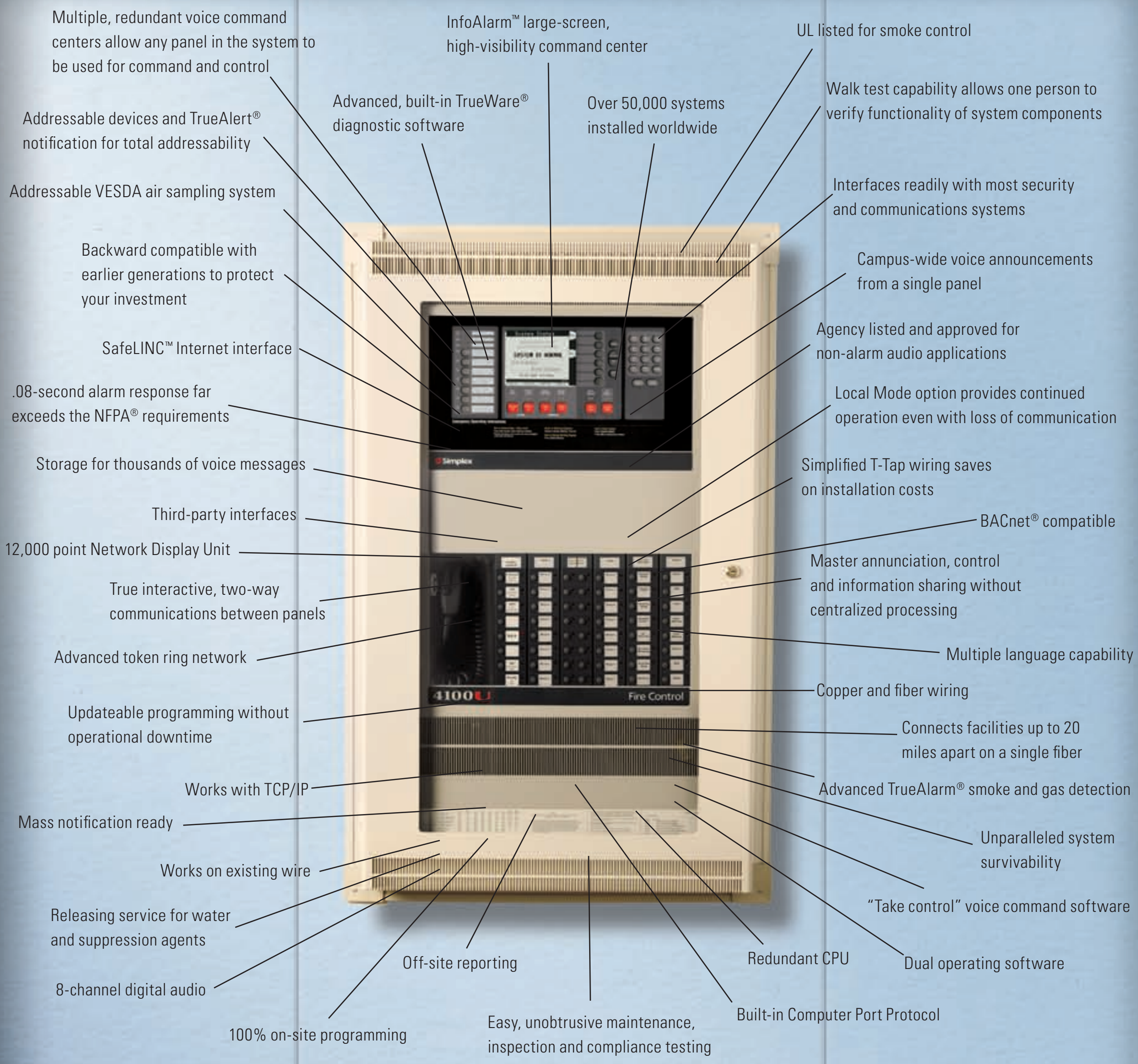
READY FOR TWO THINGS: 1) ANYTHING. 2) EVERYTHING.



A fire alarm system should do more than detect fires. It should be the focal point of a complete life-safety solution that integrates security, communications and other critical applications. The Simplex® 4100U fire alarm system does. It's flexible, expandable, easy to use, and prepared for everything. So you're ready for anything. Learn more at www.simplexgrinnell.com/besafe or 1-800-746-7539.

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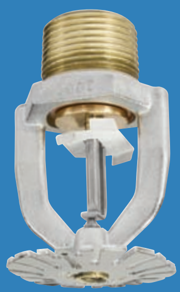

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