Fire Protection Engineers: Using Science and Technology to Make the College Campus Safe from Fire

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As colleges and universities are trying to compete for the best students, there is an increasing demand to improve and modernize college campus facilities. To keep up with this demand, colleges and universities are building larger stadiums, more modern laboratories and more comfortable housing units. These newer facilities are larger, taller and their designs are more complex. Consequently, the fire protection systems that are needed to protect students and faculty from fire are also more complex.

Furthermore, recent tragic fires in dormitories and fraternity houses have placed a new interest in upgrading the fire protection features in existing residential facilities. As financial resources are limited for such upgrades, it is essential that the most efficient fire protection be provided.

To help make their campuses safe from fire, many colleges and universities are employing the services of fire protection engineers. This article will explain how fire protection engineers make college campuses safe from fire and will answer some of the questions that a campus administrator may have when deciding to employ a fire protection engineer on his or her campus.

What is a Fire Protection Engineer?

Fire protection engineers design ways to protect people, property, structures and the environment from destructive fires. They use science and technology to analyze how buildings are used, how fires start, how fires grow, and how fire and smoke affects people, buildings and property. On the college campus, fire protection engineers have the knowledge, skills and abilities to:

- Design systems that control fires, alert people to danger and provide means for escape;
- Review building design documents for new and existing campus buildings to assure compliance with the applicable building and fire regulations;
- Evaluate campus buildings to pinpoint the risks of fires and the means to prevent them;
- Investigate fires to discover how fire spreads, why protective measures failed, and how those measures could have been designed more effectively.

They can also assist campus administrators by working with architects and other engineers, state and local building officials and local fire departments to build and maintain fire safe campuses. In addition, they make recommendations for cost effective fire protection solutions to ensure that the structure, and the property and occupants contained within are adequately protected.

What are the Educational and Licensure Requirements for Fire Protection Engineers?

Like engineers in other disciplines, fire protection engineers are required to earn college degrees from accredited engineering programs. Many fire protection engineers begin by earning a bachelor's of science (BS) degree in fire protection engineering. Others start off by first earning a BS degree in civil, electrical, chemical, or mechanical engineering and then completing a MS degree in fire protection engineering.

After a fire protection engineer graduates from college, he or she usually starts on the path towards becoming a licensed engineer. To legally practice engineering in the United States, an individual is required to be licensed. To become licensed as a fire protection engineer, an individual is required to:

- Obtain a bachelor's of science degree in engineering from an accredited engineering program at a college or university.
- Pass an eight hour, 180 question exam on the fundamental principals of engineering.
- Obtain a certain amount of work experience (most states require 4 years).
- Pass an eight hour, 80 question exam on the principles and practice of fire protection engineering.
- Once this process is completed, he or she is designated as a Professional Engineer (P.E.).

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What is a Fire Protection Engineers Role in the Design and Construction of Structures?

When employed by a college or university, most fire protection engineers work to make structures and the people and property who occupy these structures safe from fire.

A significant portion of the cost of campus construction is devoted to fire protection features. These features may include structural fire resistance, detection and suppression systems, egress systems, alerting systems, and smoke management systems. These features must all work together as one complete system to protect life and property, and to preserve continuity of operation. Furthermore, these features are required to conform to multiple codes, and installation, use and maintenance requirements, which are enforced by various regulatory officials before, during and after construction. By having a fire protection engineers on staff, the campus administrator can assure that these requirements are met in a timely, cost-effective manner.

The roles of the traditional construction team in designing the fire protection system have typically involved the architect for furnishings, finishes, and egress methods; the structural engineer and/or architect for fire resistance; the mechanical engineer for suppression and smoke control systems; and the electrical engineer for fire alarms, secondary power supplies and fire detection systems. The coordination of these efforts has sometimes been assigned to one of these team members, or has been abdicated to others. This approach may work for a typical building where strict application of the code to resolve minor issues is all that is necessary. However, it can lead to problems, either during construction or during the life of the building, if the coordination and design have not been properly considered and documented. When designed by fire protection engineers, these systems are coordinated into a comprehensive, fire and life safety strategy.

Moreover, as buildings are becoming taller, larger and more complex, performance-based fire protection design is being used more frequently. Fire protection engineers can play an important role in judging the adequacy of a performance-based fire protection design or a design that is prepared as an equivalency to prescriptive code requirements. With performance-based design, the fire protection engineer can help find solutions that embrace the university's vision while meeting the project's fire safety goals.

How Can Fire Protection Engineers Assist in Making a College Campus Safe from Fire?

Typically, when employed at a college or university, fire protection engineers work in a fire marshal's office, safety office or a unit that is responsible for design and construction of new and existing campus buildings. In this capacity the fire protection engineer is responsible for reviewing construction and fire protection system design documents for compliance with the required fire safety standards. They can also coordinate design issues early in the planning stages of a project. For the campus administrator who is concerned about campus safety and a successful construction project, properly prepared and reviewed plans save time and reduce the financial burden on the campus.

Fire protection engineer also work with other design professionals such as architects, and engineers to determine the best solution to a fire safety problem. In this capacity, fire protection engineers can be an invaluable asset by facilitating successful communication between the design professionals, the fire department and campus administrators, thereby reducing confusion and frustration over project objectives and requirements.

Given that most campus fire deaths occur in residential units, fire protection engineers are also designing ways to make existing campus housing units safer. Since the tragic dormitory fire that occurred on the Seton Hall University Campus in 2000, there has been an increased awareness on the benefits of having sufficient fire protection features installed in all campus residential facilities. Because of the limited amount of time that is available – usually during summer break -- for installing fire protection systems in residential units, it is imperative that these retrofit projects be planned efficiently. In this case the fire protection engineer can assist in the planning process. This includes resolving water supply issues, coordinating new equipment with existing fire protection systems, and planning for hazardous materials abatement.

In addition, to making buildings safe from fire, fire protection engineers can assist in performing fire investigations to discover how fires start and spread, why protective measures failed, and how those measures could have been designed more effectively.

They can also be a resource for information on innovative fire safety such as residential fire sprinklers, voice evacuation systems and water mist, and on other technical fire safety issues like microbial induced corrosion (MIC) in sprinkler piping.

Chris Jelenewicz, PE has a wide range of experience in the field of fire protection drawing on his experience in the fire service and as a code official. He has over 20 years of fire service experience. For seven years he served as fire chief for Maryland's Chillum-Adelphi Volunteer Fire Department, in addition to being a licensed fire protection engineer. He currently serves as engineering program manager at Bethesda, MD-based Society of Fire Protection Engineers, where his is responsible for advancing the organization's recognition, recruitment and professional practice activities.

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