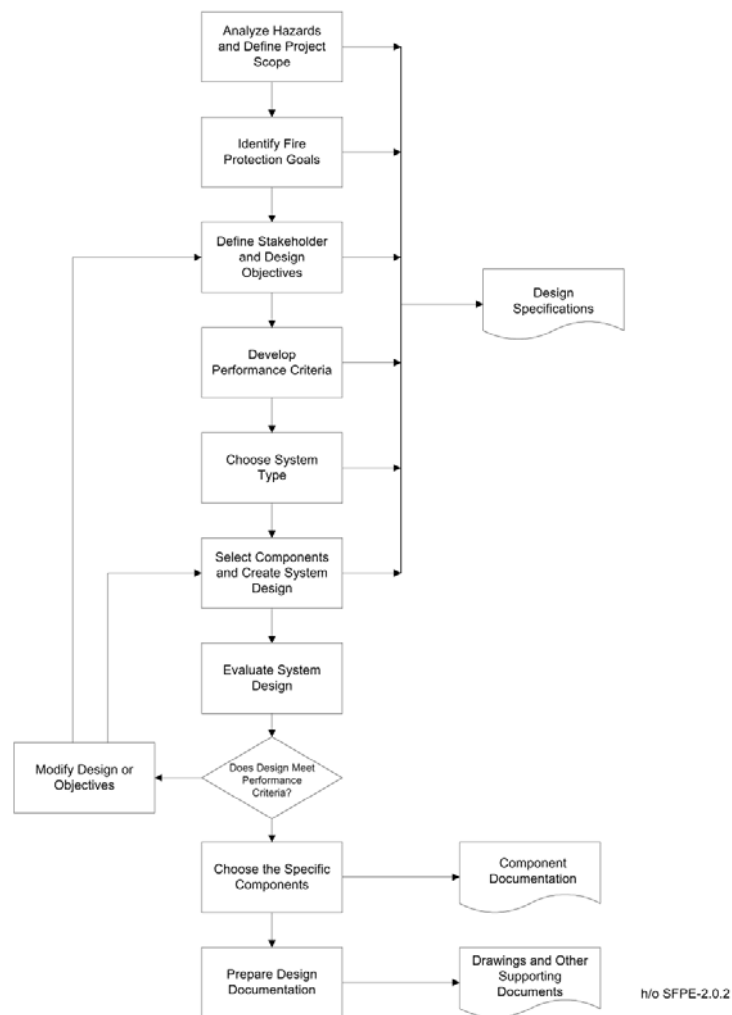


Applying Performance-based Fire Alarm System Design – Part 4

by Dean K. Wilson, P.E.

Over the course of the last four issues I have continued to discuss a very hot topic in the arena of fire protection today, namely, performance-based building design. The graphic attached to this article offers a graphical representation of how this performance-based design process or procedure would apply to the design of a fire alarm system.



As I have stated several times, the key to understanding the whole performance-based building design arena rests with realizing that a process makes it work. So when a designer applies the concept of performance-based design to a fire alarm system, that designer will use a very methodical procedure. Such a procedure will help ensure that the fire alarm system design will meet the specific needs of the project, and also provide a comprehensive solution to whatever fire protection problems the procedure has, itself, identified.

As we explained in the previous issues, the designer begins by analyzing the hazards and defining the project scope. The designer next identifies the specific fire protection goals that will apply to this project. By gathering information from the stakeholders in the project, the designer proceeds to define the stakeholder objectives. The designer applies negotiating techniques to resolve any conflicts between various stakeholder objectives and then combines the results into design objectives for the project. Next, the designer defines the performance criteria that will quantify the design objectives. With these first four steps complete and documented in the design specifications, the designer then moves on to choose the fire alarm system type that will best meet the design objectives.

Choosing the type of fire alarm system presents no more of a challenge to the performance-based design process than it does to the typical prescriptive design process. The designer must decide to which type, if any, of an off-premises system the protected premises system will transmit signals.

The protected building will, first of all, have a protected premises fire alarm system. Such a system, as its main purpose, will activate local audible and visible alarm notification appliances to notify the occupants that they must evacuate the protected building. A protected premises system could also interface with a supervising station fire alarm system to help make the building even

safer in the case of fire. And, a protected premises fire alarm system could provide additional features. These features might include the operation of a fire extinguishing or suppression system; the recall of elevators; the unlocking of doors; the closing of smoke barrier doors; the control of heating, ventilating, and air conditioning equipment; or the operation of smoke control systems, to name a few.

Sometimes the protected premises fire alarm system provides Emergency Voice/Alarm Communications Service. This system, used in occupancies such as high rise buildings, notifies occupants to relocate to areas of refuge, rather than evacuate. It may also selectively and partially notify occupants to evacuate, while simply informing other occupants of the nature of the emergency when the fire does not immediately threaten their safety.

The emergency voice/alarm system consists of a series of high reliability speakers located throughout the building. They connect to, and receive control from, the fire alarm system communication console located in an area designated as a building fire command station. From the building fire command station, individual speaker zones or the entire building can be selected to receive an alert tone followed by a voice message that gives specific instructions to the occupants.

Some systems also have fire warden telephone stations on each floor, or within each fire zone, to which a fire warden would report to assume local command and pass on specific evacuation instructions. Such telephones may also allow emergency responders to communicate when the structure of the building inhibits the operation of their hand portable two-way radios.

A trained building employee usually operates the fire command station until the fire department arrives, at which time the officer in charge takes over.

Protected premises fire alarm systems may transmit signals to off-premises locations by means of a central station fire alarm system, a proprietary supervising station fire alarm system, a

remote supervising station fire alarm system, or by means of an auxiliary connection to a public fire alarm reporting system.

A central station fire alarm system receives signals from a protected premises at a constantly attended location operated by a company that provides central station service. This operating company must be listed by either Underwriters Laboratories Inc. (UL) or Factory Mutual Research Corporation (FMRC). Central station installations must have either the UL Certificate or FMRC Placard, whichever means of verifying the character of the installation the Authority Having Jurisdiction requires.

When they receive fire alarm, supervisory, or trouble signals, operators at the central station take action prescribed by NFPA 72-1999, *National Fire Alarm Code*.

The proprietary supervising station fire alarm system provides service at large commercial or industrial occupancies. Signals transmitted over a proprietary system are received and automatically and permanently recorded at a constantly attended proprietary supervising station located either at the protected premises or at another location of the property owner.

Upon receipt of fire alarm signals, supervisory signals, or trouble signals, operators at the proprietary supervising station will dispatch a runner to investigate. The operators will also retransmit fire alarm signals retransmitted to the public fire service communication center.

A remote supervising station fire alarm system connects the outputs from a protected premises fire alarm system and transmits them to a remote location. NFPA 72-1999, *National Fire Alarm Code*, specifies that fire alarm signals must be received at the public fire service communication center, at a fire station, or at the location of the public agency that has the responsibility to receive fire alarms from the public.

If the public agency is unwilling to receive the remote station fire alarm signals, or if that agency is willing to allow another organization to receive those signals, then the signals may be received at a location acceptable to the authority having jurisdiction. Such a location must have trained personnel on duty 24 hours a day. Upon receipt of fire alarm signals, the personnel retransmit the signals to the public fire service communication center.

In some cases, the public agency receiving fire alarm signals may also be willing to receive supervisory signals and trouble signals. In most cases, the system transmits supervisory signals and trouble signals to a constantly-attended location acceptable to the authority having jurisdiction.

An auxiliary fire alarm system provides the interface between a protected premises fire alarm system and a public fire reporting system. If a community does not have a public fire reporting system, then a protected premises within that community cannot have an auxiliary fire alarm system.

Once the fire alarm system designer has chosen the appropriate type of fire alarm system--as with each of the previous four steps in the performance-based design process--the designer must clearly and carefully document the choice of system in the Design Specifications. This written record will allow anyone reviewing the design to develop a thorough understanding of the decision making that the designer employed throughout the design process.

The designer must next select components and create a system design. And, we will focus on that important step in the next issue.

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