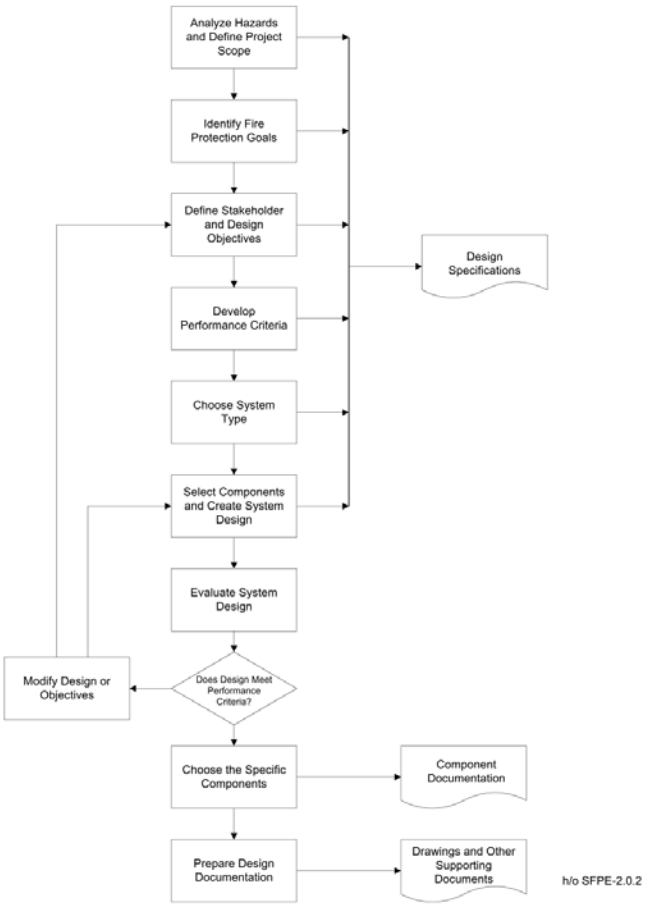
Applying Performance-based Fire Alarm System Design – Part 7

by Dean K. Wilson, P.E.

Once again, at the recent Fall Educational Conference of the National Fire Protection Association, held in Dallas, TX, performance-based building design continued to remain a prominent topic at this national meeting. In the last seven issues of *IMSA Journal*, I have followed the graphical representation of a process that intends to help assure the overall quality and reliability of a fire alarm system design. The fact remains that performance-based design succeeds most effectively when a careful process guides the designer.



As I have suggested previously, a fire alarm system designer who intends to work in the performance-based building design arena will do well to understand that "a process makes it work." The methodical procedure makes certain that a designer will include every detail necessary to create *and* thoroughly document a design.

The procedure defines the scope of the project by leading the designer through a thorough hazard analysis. The designer will then explore and document the specific goals for life safety, property protection, mission continuity, and environmental protection. The designer then creates and documents a set of performance objectives for the fire alarm system design by skillfully amalgamating the stakeholder objectives for the project. Using this methodical procedure, the designer will make certain that each performance objective has one or more performance criterion to both quantify and validate the particular objective. He or she will then document the selected criteria.

The designer will next choose and document the type of fire alarm system that will best meet the performance objectives. He or she will then select and document the general type of components, create and document a specific system design, and evaluate that design by comparing the performance it will provide with the performance criteria that stand behind each performance objective. The designer will make necessary adjustments, either to the design or to the objectives, until a successful design emerges.

The designer will then complete the final two steps in the process: choose the specific components for the system and prepare the final design documentation. In these last two segments of the performance-based design process, the designer will make specific choices of manufacturers of components, particular model numbers, and assemble the chosen components into a complete fire alarm system.

Here an understanding of what each manufacturer offers in the way of component features and arrangements will allow the designer to choose exactly which component will best serve this particular design. Fortunately today, most manufacturers offer a great deal of product information by means of the worldwide web and also by such means as CD-ROMs. This allows a designer to keep a tremendous amount of reference material available in a relatively small space. It also allows a designer to compare product offerings from manufacturer to manufacturer.

NFPA 72-1999, *National Fire Alarm Code*, sets the baseline level of quality by requiring that every fire alarm system component must satisfy Section 1-5.1.2:

> 1-5.1.2 Equipment. Equipment constructed and installed in conformity with this code shall be listed for the purpose for which it is used.

The examination, testing, and listing of fire alarm system components by a nationally recognized testing laboratory acceptable to the Authority Having Jurisdiction helps assure that fire alarm system equipment will have at least a minimum acceptable level of quality and reliability. Once a piece of equipment has received the appropriate listing mark (label), then the relative differences between components from different manufacturers becomes largely a matter of uniqueness of features and, even, personal preferences.

Life cycle costs presents one aspect of design that becomes important during the selection of specific components. What will it cost to maintain the fire alarm system during the entire period of its useful life? A wise designer will focus a good deal of attention on this matter, as he or she selects specific components.

Once the designer selects the specific components, he or she must now create the final documentation package for the design. The documentation will actually consist of three parts. The

designer has already created the first part, the Design Specifications, by thoroughly documenting the decisions made during the first six steps of the design process. The designer will also include in the Design Specifications a work plan that details the manner in which he or she will manage the installation of the system. And, the designer will include both a Testing Plan that details how the installing contractor will perform the system initial acceptance test, and a Training Plan that details how the contractor and manufacturers' representatives will train the personnel at the facility to properly operate the fire alarm system.

The designer will then create the second part of the documentation package, the Component Documentation, by assembling the manufacturers' literature concerning the selected components. He or she will carefully mark each sheet so that anyone reviewing the documentation will know exactly which model number applies to this particular fire alarm system design. In addition to the so called "cut sheets," the designer will assemble all of the manufacturers' component installation and operations manuals. To these, he or she will add a "Sequence of Events," either as a narrative, or in the form of a matrix that depicts system inputs and outputs and their relationship to each other.

The designer will then create the third and final part of the documentation package by providing detailed design drawings. These drawings will give sufficient details of the fire alarm system design to allow a fire alarm system installing contractor to create the working drawings for the system.

Throughout the creation of a performance-based design, the designer will employ a very methodical process to help ensure that every detail receives the necessary emphasis. As a result of applying this process, the designer will create a fire alarm system design that will meet the needs of all of the stakeholders in the project. This fire alarm system will provide the appropriate level of

fire safety for the building, and will work in concert with the other aspects of the engineered fire protection for the building. This holistic approach to fire protection will satisfy the goals for life safety, property protection, mission continuity, and environmental protection.

And, the designer will have proven that "a process makes it work."

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