

# Fire Sprinkler Design

## — *Then, Now, and the Future*

By Russell Leavitt

I began my fire protection career over 30 years ago when I was hired by Sentry Automatic Sprinkler as a fire sprinkler design trainee. Sentry had a formal training program that included several months of classroom work followed by closely supervised project work. The curriculum included all facets of sprinkler design including hydraulics, performing flow tests, conducting field surveys, and coordination with other trades. It was a wonderful introduction into the profession.

As I look at the profession of fire sprinkler design, it has changed significantly since I first started my career. In fact, it is not officially referred to as design by organizations such as the National Institute for Certification in Engineering Technologies (NICET), but is rather designated as layout for technicians certified by the organization. Regardless of what we call the technician or designer, the preparation of drawings used for the installation of sprinkler systems has changed significantly during my career.

The most sweeping change has been the explosion of design technology. The days of hand-prepared working plans and hydraulic calculations are pretty much gone. The use of computers for the design and layout process is virtually universal and we are seeing the rapid implementation of building information modeling (BIM) processes into the design of systems, with many general contractors and architects requiring that all trades use BIM systems in the preparation of working drawings. Along with this, many jurisdictions are requiring that the submission of plans for approval be done electronically, which will effectively force any stragglers to move into the electronic age.

There are many obvious benefits that have come with the use of computers in the design process. Computers certainly allow hydraulic calculations to be performed much quicker than those done manually and, as we know, the effective use of gridded piping layouts was not practical before computer programs became available. Computers make the layout of sprinklers and piping much faster and simpler and the ability to create, store, and use details for system equipment, hangers, earthquake braces, and other components has made the preparation of drawings faster and the finished product more accurate and usable — or at least that is the objective.

The interesting part of having and using these wonderful tools is that it has not necessarily resulted in a better finished product. The ultimate purpose of a fire sprinkler working plan is to facilitate the installation of the system, but it seems that we hear the same old “complaints” about the designs such as the piping does not fit, hangers are not cut properly, drops are too short, along with new ones including incorrect notes, “cluttered” drawings, and just dumb mistakes indicating a general lack of attention to detail.

This begs the question, “why?” There is no single answer, but a couple of the more common “pitfalls” include:

- The designer or layout technician does not know what the computer and the software are doing. This is most evident in

hydraulic calculations where many designers have very limited knowledge regarding fire sprinkler hydraulics and are almost totally dependent on the computer. This is also true, although perhaps to a lesser degree, when it comes to the actual layout of the system. Many designers lack knowledge of some of the most basic requirements of NFPA 13 and are much too dependent on the computer laying out the sprinklers and piping. Design software is not nearly as intuitive as we think and excellent design still requires a working knowledge of those things that impact the placement of sprinklers, the routing of piping, and proper use and placement of other system components.

- The ease of “cutting or copying and pasting” leads to just plain dumb mistakes. Not having to recreate over and over again many of the rote or typical items that are a part of every system is one of the best benefits of computer-based design. However, because of the ease of copying and pasting, small changes that may need to be made to make an item applicable for the place in which it is copied are missed or ignored. A few of the more common mistakes include incorrect or incomplete general notes, incorrect hanger details, wrong pipe sizes, or incorrect sprinkler types in the legend. The mistakes lead to delayed approvals or, even worse, costly corrections during the installation phase.

The use of design technology is here to stay. If used properly, the benefits can result in faster and more efficient design. However, computer-based design does not currently and, in my opinion, will never be a substitute for a well-trained, knowledgeable designer or layout technician. A designer who cannot manually calculate a system, lay out sprinklers, or route piping without a computer will never deliver as fine a product, no matter how sophisticated the design software, as the designer who knows and has the ability to apply design principles.

This, of course, raises another question for us — how do we ensure that this knowledge and skill is passed to the next generation of design and layout technicians? How we answer this may very well foretell how well our industry performs in the future, and the future is nigh upon us. Think about it.

### **About the Author:**

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