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SOFTWARE SUITE

Evolution of Fire Protection System Design and the Future with Revit:
A Developer's Perspective

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Computer aided design (CAD) has long been the design tool of choice for fire sprinkler designers and the introduction of Building Information Modeling (BIM) has helped bring together the disparate parts of a building to create a streamlined approach to managing a building through the various phases of its lifecycle. The use of Revit by Autodesk within BIM has presented the fire protection industry with new challenges for both developers and users of design software. The Johnson Controls SprinkCAD development team has lived the evolution of CAD, BIM and REVIT—despite the challenges of Revit, the team has found many users wanting to take the plunge and start working with Revit as their primary design tool. This article offers a perspective on addressing some of the roadblocks faced by developers and software users.

When fire protection system designers moved off the drawing boards and into CAD, perhaps the greatest advantage was the ease with which designs and working drawings could be revised. Erasers and erasing shields gave way to the ability to make changes with a few clicks of a mouse, whether sweeping changes in design or small adjustments. Even given the steep learning curve of CAD systems and computers, expensive hardware, and once-primitive software, the fire protection industry quickly adopted CAD-based design.

Expanding features and abilities soon followed the introduction of basic drafting tools with AutoCAD leading the pack. By providing a set of powerful application programming interfaces (API), Autodesk opened the floodgate to thousands of developers who quickly introduced new and intelligent applications for the entire AEC industry, including fire sprinkler system design. Specialized applications to perform hydraulic calculations and generate industry-specific fabrication reports turned these simple line-drafting programs into smart, multi-functional applications.

One big problem overshadowed the successes during this period of CAD maturity - INTEROPERABILITY. Software used by the various stakeholders in a construction project did not generate intelligent objects that could "talk" to each other and "understand" one another's needs, particularly in light of the life-cycle of a building. After design and construction comes the need for maintenance, servicing, even decommissioning of equipment and entire structures. Tackling these lifecycle issues was complex and almost unachievable - until the BIM concept was more fully realized.

Though the concepts have been around since 1970s (Wiki), today the most popular implementation of BIM in our AEC industry is Revit. With each new release Revit is providing more robust features, an expanded API, and is generally becoming easier to use. Over time the larger file sizes and need for intensive processing power for the vast volumes of information became acceptable thanks to high-speed computers, modern video cards, and inexpensive solid-state drives.

Nevertheless, CAD is not dead. The transition to Revit, or other object-oriented systems, will take time. AutoCAD and its lesscostly counterpart BricsCAD are still the tools of choice for the fire protection industry. There are literally eons of CAD experience accumulated by designers during last few decades. Yet change is on the way and seems inevitable. For the specialized fire protection software vendors the time to "jump on the Revit wagon" has come. Consider the roadblocks in front of the Revit developer with extensive CAD experience:

– Revit program operation is conceptually different from CAD (as is design in Revit)

– Many specific functions developed previously in CAD are a part of core Revit functionality

– New functionality required by Revit users in fire protection design is quite different from what was offered in traditional CAD software

– The new "Routing preferences" approach in Revit is a paradigm shift for software developers used to generating fitting connections outside of the CAD environment

– The management of Revit Families is a challenge to both developers AND users - to build, to use, and to maintain. Most companies in the business of family building are trying to make them unique rather than trying to meet an industry standard (because there is no standard for Fire Protection families yet)

– And we cannot forget about the millions of existing CAD drawings which may be needed for retrofit projects or design updates. This is why our BIMport utility (for converting SprinkCAD drawings into Revit models) has been so popular in recent years.

The list is endless.

As previously mentioned, the SprinkCAD team is finding many designers are ready to take on Revit despite the challenges. Their first hurdle is to find all the families needed for their projects. In some cases, the families they find do not 'play' well together or are missing important information like Construction Operations Building Information Exchange (COBie). Some families are unnecessarily large in file size due to excessive details such as embossed markings on frames and deflectors – completely invisible on a fire protection submittal document. Oversized families create project file sizes that explode into unmanageability.

Our Approach

SprinkCAD developers decided to save Revit operators from this headache by automatically building the families needed with a minimal level of detail. Designers choose only the parts they need. The Revit Family Builder tool, one of a suite of SprinkCAD for Revit tools, creates the family for them, 'on-the-fly'. Select the type of family you wish to add to your project, select the models and parts to include in that family, and the family is created and added to your project – including coarse, medium and fine presentations.
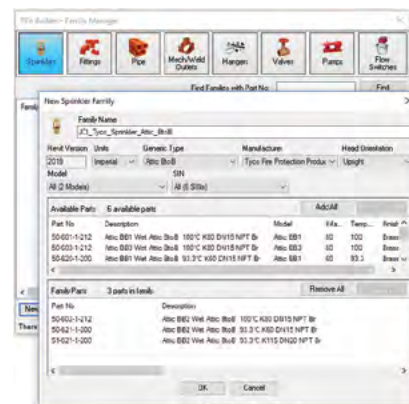
After initial generation these families can be re-used in future projects without re-building. If database updates affecting family content are delivered, you will be alerted that the family should be re-built.

Another important need that SprinkCAD addresses is the desire by fire protection engineers and system designers to easily calculate sprinkler systems built in Revit, even when the model is not "perfect". Problems like small gaps between model elements and incomplete hydraulic information in objects are overcome using specialized tools in our SprinkCAD for Revit toolset.

Both steady-state and non-steady state calculations may be performed on wet, dry, pre-action, and systems requiring Fluid Delivery Time analysis. Our approach is to remain flexible by allowing ANY Revit model to be mapped to our rich database of sprinkler system pipes, valves, pumps, heads and nozzles.
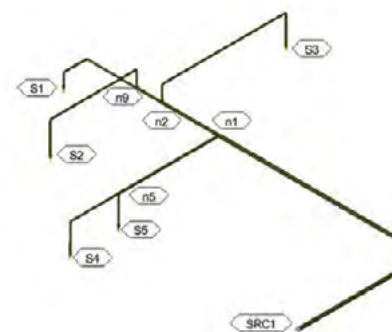
Any Revit sprinkler system may be traced and seamlessly delivered to the SprinkCALC / SprinkFDT software offering extensive calculation and reporting tools. Results are returned to your Revit project automatically, with tools to generate all code-required node labels, and to view and review most common hydraulic information right in the Revit model.

SprinkCAD for Revit tools are now offering layout functions to simplify the work of connecting heads to branch lines. Unlike native Revit commands, these tools allow you to set the schedule and size of multiple sections of a branch line or arm-over, individually.

As the adoption of Revit as a primary design tool continues, so will our development of tools and procedures. Tell us what tools you need to enhance your use of this exciting, new environment. Or, if you haven't yet, consider 'dipping your toes' into the Revit pool. Soon, the water may be over your head, so start learning to swim now! ·

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