# COSCO Fire Protection Implements Robotic Layout


## Fire Protection Contractor Simplifies Complex Connections with Robotic Layout Technology

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### Highlights

- Seamless integration with existing technology framework
- Precision installation of systems in all building types

# overview

Life safety and fire protection systems may seem like a straightforward network of sprinklers, alarms and detection sensors—unless that system must fit within a space with high peaks, twists, turns and seemingly disconnected lines such as a life-size castle at a theme park.

Location
California, USA

That's the challenge that COSCO Fire Protection faced on an expansion project for a global theme park operator. With a combination of building information modeling (BIM) and robotic total stations, the team was able to install all the necessary components in the complex structures and ensure the highest level of life safety system for visitors and employees at the site.

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## A 3D PERSPECTIVE

In business for more than 50 years, COSCO Fire Protection focuses on fire suppression systems and alarm and detection systems for commercial, education, healthcare, transportation, entertainment, retail and government structures primarily on the West Coast (California, Nevada, Oregon and Washington).

The firm's technical experts design, install and service fire protection and life safety systems in new construction, retrofit, and existing facilities. Every system is uniquely customized to meet a structure's objectives, insurance requirements and national, state and local fire codes and specifications.

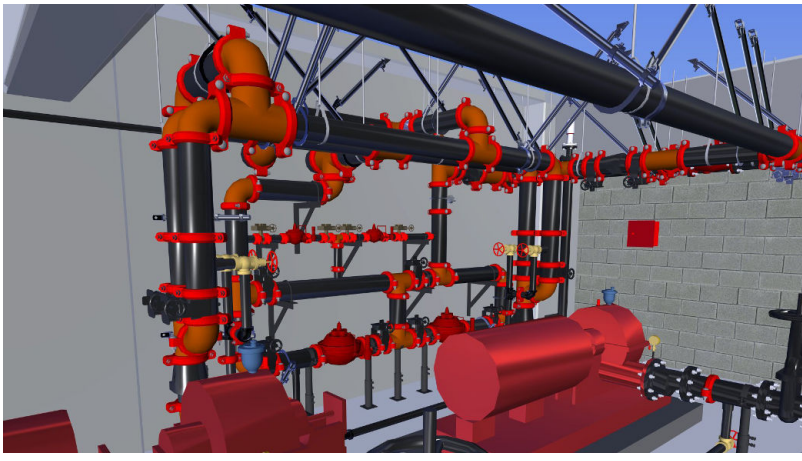
The company has been at the forefront of 3D design, and more recently, BIM and robotic total station systems to support design, fabrication and installation work with ever increasing efficiency and quality.

For design software, the company relies on Autodesk's AutoCAD® MEP, Navisworks® Manage, and Revit® MEP, as well as Hydratec's HydraCAD™ Fire Sprinkler Design Software.

Gray says, "As the 3D BIM process has evolved over recent years, coordinated designs have become highly accurate. We sought to translate that accuracy to the field. We were looking for ways to improve the efficiency and accuracy in locating pipes and anchors, particularly on today's increasingly common fast-track projects."

For years, the firm's field crews have used manual methods, such as tape measures to set pipe hanger and seismic anchors, as well as pipe sleeves. The advancement of robotic total stations provided a key opportunity to extend the firm's coordinated skills to the field.

"We were looking for a robotic layout system that would work seamlessly with our existing technology framework and was easy to use," explains Gray. "On the design side, we particularly




like the efficiency of the Trimble Field Points software. On the field side, we like that Trimble Field Link and the Trimble RTS Robotic Total Stations offer one-person operation. The built-in Wi-Fi on the Trimble Field Tablet makes it possible to receive Trimble files while onsite. We also considered that most of the MEP contractors that we collaborate with are already using Trimble Robotic Total Stations."

In May 2013, COSCO purchased its first Trimble RTS773 Robotic Total Station, Trimble Field Link solution and the Trimble Field Points software. They put it to work immediately, locating pipe hangers and seismic anchorage, as well as deck and wall sleeves.

## FROM DESIGN INTENT TO JOBSITE REALITY

The first step in the fire protection design process is to layout a preliminary 2D design with the HydraCAD Fire Sprinkler Design Software (integrated within AutoCAD). This design can then be easily converted from a 2D layout to a 3D AutoCAD or Revit model, and then switched back to 2D. Quick coordination adjustments are made to pipe elevations and routing in 2D mode. The computer then regenerates the 3D model, automatically updating all length annotations to piping and hangers.

The idea behind the 3D BIM coordination process is to work out the precise routing of the MEP/FP trades ahead of time, within a composite 3D model. Resolving conflicts and finalizing a clash-free model can often take months, depending on the size of the project and the complexity of the design—time well spent since the ultimate goal is to minimize installation conflicts in the field and the associated cost impacts.

Once the project has been coordinated, the team creates the layout point files using Trimble Field Points software. The software functions as a plug-in within AutoCAD and is used to place layout points over the locations of all concrete pipe and seismic anchors, as well as concrete deck sleeves. The Trimble Field Points software directly integrates with AutoCAD and the robotic total station and Trimble Field Link software. Once the layout points have been created within AutoCAD, the Trimble Field Points software exports a layout file and model to the tablet controller. Trimble Field Link supports a variety of 3D model types from simplified to complex, to accomodate the needs of the user. After the points have been staked in the field, the files can be sent back to the model and Trimble Field Points will identify any deviations from the design location with a revision cloud, providing true round-trip capabilities.

Gray describes their methodology with the technology, "We use a background file that is a simplified version of our piping plan, showing only the structural deck, column lines, and piping and dimensions. We also place each type of layout points group on their own respective layers, for easy use in the field using Trimble Field Link."

The points are categorized by Column Points, Control Points, 3/8" inserts, 1/2" inserts, seismic inserts, and deck sleeves. Since the Trimble Yuma tablets are always out in the field, engineers can email the layout files to field personnel. A PC version of Trimble Field Link Office allows the project team to double-check the layout files.

## INSIDE A NON-LINEAR SPACE

The combination of BIM and robotic total stations is especially valuable on projects where it's difficult to locate finished pendent sprinkler locations due to complex, non-linear and very large structures such as a popular theme park.

In one case, the fire system for a popular theme park's new attraction included over 3,700 sprinkler heads and 11 alarms systems spread throughout 215,000-square-feet.

Gray says, "Locating hangers and installing systems in a non-linear structure takes much longer with a conventional process of using tape measures and is much less accurate. With the robotic process, we can transfer our design directly from our digital files to the robot, which ensures that all of our work is installed precisely."

COSCO was able to rely on Point Cloud models created from the project to help model the fire protection system, while incorporating the necessary seismic provisions.

The field crews used Trimble Field Link and the Trimble Robotic Total Station system to precisely locate the finished sprinkler head locations on the floor, and then field personnel used a plumb bob to install the pendent sprinkler heads in the proper locations 30-50 feet above the ground. Gray says, "Even with the changes in our designs to accommodate seismic conditions, the Trimble robotic process helped ensure all final sprinkler head locations were installed in accordance with the owner's vision."

Firms like COSCO Fire Protection believe that the evolution of 3D BIM and robotic technologies allows MEP/FP trades to model virtually every component of their work and then easily and accurately install those design elements in the field. Gray concludes, "The initial design process takes a little longer to accomplish, but the end result yields highly precise installations."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