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Cooper Electrical Drives Productivity Using Cloud-Based Technologies

By adopting leading edge smart construction technology, including advanced off-site fabrication techniques, Cooper Electrical demonstrates the value of applying Lean Construction principles in every phase of workflow.

In the ever-increasingly competitive landscape of the global construction market, North Carolina-based Cooper Electrical Construction Company's dedication to technological innovation has driven its evolution into an industry leader. By prioritizing productivity, accuracy, safety, and efficiency--and by adopting cutting edge cloud-based technologies—this Electrical and Instrumentation & Controls contractor is accomplishing its mission to apply Lean Construction principles to create and maintain the highest levels of performance.

Constantly striving to create and adopt solutions that streamline communication and collaboration throughout the workflow, Cooper Electrical employs cloud-based tools at each stage that contribute to increased accuracy and safety, reduced waste, and greater efficiency. Trimble SysQue models, for instance, are an essential aspect of the company's strategy to maximize the benefits of off-site fabrication. By fully utilizing the functionality of SysQue, a Revit add-in with a library of over one million electrical components, Cooper consistently meets its targets for trade coordination, safety , material management, quality, and labor productivity.

"Cooper uses SysQue to its full potential, which allows us to produce a more accurate model, and that enables us to more accurately fabricate these assemblies for field installation," says David Faircloth, BIM Manager at Cooper Electrical. "As most of our projects are some form of a collaborative execution, having a shared model that is available to the entire team in real time is critical."

Because the basic content that comes standard with Revit may not be geometrically accurate to the specifications of a particular job, using SysQue's vast content library means that the BIM team's modeling can represent the actual catalog of fittings available, thus preventing the costly rework and schedule impacts that can result from using inaccurate content. By utilizing SysQue, Faircloth and his team can use components in their models that are true-to-life in their dimensions, which helps to eliminate the potential for the costly errors that can occur if a model relies on conduits, bend radiuses, or cable trays that aren't dimensionally accurate.

"The benefit of using SysQue is that it runs directly inside of Revit, so we can fabricate directly from the working Revit model, and because all of the parts and pieces are so accurate, we can fabricate off-site. SysQue and off-site fabrication go hand-in-hand," says Faircloth.

Working smarter and faster

Faircloth cites increased accuracy, reduced material waste, safer working environments (by assembling fabrication in a controlled environment at safe working heights), and time-savings, as the key benefits of Cooper's commitment to employing the highest standards for off-site fabrication. The time savings, in particular, can dramatically increase productivity on any given electrical construction project.

"As we develop the design and do our coordination efforts, we often release a certain section of the building, but the building is not in a phase where the installation could begin," explains David Chase, EVP at Cooper. "We could have an area of the building that we sign off on, and through traditional installation, it may be three or four months before you can actually perform that work. With off-site fabrication, when that area of the building gets released, we're able to send that to the fab shop and start the building process immediately. When that area of the building becomes open, we are able to instantly put it up. We're not waiting for that area to become available. This allows us to get in and out of these areas much more quickly, which helps lower craft density and frees up space for other trades."

In this way, Cooper's workforce can get a jumpstart on building the electrical rough-in before the building is ready for installation, increasing efficiency and decreasing the necessity to wait. Every project can move ahead and maximize the potential for time savings within the timeline.

Spooling, 3D rendering, and cloud integration

In addition to the benefits of using SysQue for its massive library, its spooling capacity also increases production by splitting the building installation into smaller assemblies, which increases accuracy and allows for more detailed—and more manageable—drawings, as well as providing other advantages in the BIM department, during fabrication, with deliveries, and during install. By spooling with SysQue, Cody Everett, BIM Coordinator at Cooper says, every aspect of fabrication is improved. "With spooling, we are able to take a big picture—a hundred-foot run of cable tray, for instance--and break it down into smaller sections, so it's easier to comprehend, easier for the guys to build, and it also makes it a lot quicker for us to produce those drawings."

SysQue's Connect2Fab feature, which Cooper helped to beta test, streamlines the process even further. "It's an absolutely amazing tool," says Faircloth. "Here's yet another process where we're able to eliminate paper, save time, and potentially also create cost and material savings, as well."

Connect2Fab uses cloud integration to share the spooled drawings, eliminating the need for prints. "We are able to save a tremendous amount of time by taking these spooled elements, pushing them via the cloud to the guys in the fab shop. In our older method, we would produce the spool inside of Revit, but then we would have to go through and tag, dimension, make sure the views were good, and ensure that all of the schedules were accurate. Now, we can push that up to the cloud and Connect2Fab does all of that for us," continues Everett.

Cooper considers the 3D active view, which allows users to easily rotate images to provide views from every necessary angle, to be a game-changer. "Traditionally on a flat piece of paper, we would have to create three or four views, to give them a top view, a side view, a front view, an isometric view. Now, we are able to give them one view that has all the information. They can rotate it with their fingers and it's instant. We can instantly upload it to Connect2Fab and within a matter of minutes, it's in the fab guys' hands," says Everett.

Cloud-based communication

As a company that prioritizes a Lean Construction approach, Cooper Electrical understands the value of optimization efforts that focus on making workflow reliable. Todd Girth, Project Superintendent at Cooper describes one example: "Because the spooling process is an automated process, SysQue automatically tags everything, dimensions everything, and produces schedules for everything that's going to be a part of that one assembly." Another example is Connect2Fab's automated color-coding system, which clearly indicates the progress of each assembly as it moves through the process. "It basically builds a timeline for us, so we can see progress as they are building each of these assemblies," explains Girth. "As each assembly goes through their stages, they change colors in the master view. When one is released for fabrication, it changes color in the master 3D view, so you can easily see what's been released and what hasn't. We can do that with each different phase through different colors in this master view."

In order to get the most out of off-site fabrication, communication is essential. AutoDesk's BIM 360 Glue, a cloud-based BIM management and collaboration package, enables Cooper's BIM department to upload drawings, submittals, schedules, and other essential files to the cloud , which makes them immediately available to the personnel who need them. By leveraging the power of cloud-based communication, the whole team can get anywhere-anytime access to streamline project workflows, whether they are in the fab shop—or thousands of miles away at a job site.

The positive impact of BIM 360's collaboration tools across the board is substantial. "We can send everything straight to tablets via the cloud, so it's in the fieldcraft's hands instantly,

versus with a more traditional method, we would be printing it all out and would then need to get it delivered to the site," says Wes Stover, Project Superintendent at Cooper. "We are saving all of the time that it would take for someone to print, package, and deliver those drawings to the field and distribute them. Now, they are uploaded and it's instantly in their hands."

And everyone is literally on the same (paperless) page, including the contractors and engineering firms that Cooper works with. "BIM 360 is a really great collaboration program that we can use internally with all of our people," says Faircloth. "We can also use it externally with the different MEP trades, as well as with the engineering firms that we work with." BIM 360 makes it possible for Faircloth and the BIM department to share their most current drawings in Revit and to collaborate using those files in the cloud. That basically makes it instant for the people that we are working with. They instantly get those updates, as soon as we sync the models and they sync theirs, they have those updates live,".

Keeping it Lean

Live coordination means that the fieldcraft isn't referencing outdated models or wasting the time and paper required by traditional methods. Lean Construction is a priority at Cooper, and BIM 360 Glue is just one of the tools the company is using to minimize material waste, as well as loss of time due to miscommunication, delayed communication, or human error. The company also employs Trimble RTS and its cloud-based portion, Trimble Connect, to ensure efficiency and reliability when surveying and measuring in the field.

"Trimble allows us to lay out specific points in the field much faster and more accurately than the traditional method of pulling tape measures. With Trimble, we are able to set up the robot in an area in the field, and using the control points we've entered, it gets us within an eighth-of- -an-inch of where that point is located. We are able to locate points of interest faster than a traditional pulling of a tape measure, and it also eliminates the human error of misreading a tape measure," explains John Stiltner, Project Manager at Cooper.

By using Trimble to lay out points faster and more accurately, Cooper makes big gains in layout production. Because of the nature of Cooper's assemblies, precision is essential. "The accuracy of the layout of the fabricated assemblies is very important, because when our assemblies come out, they have to be suspended from the deck above, and the rods that we use to support our systems aren't very flexible, so the location of the anchor in the deck has to be precise in order for our fabricated assemblies to line up appropriately in the field," says Stiltner.

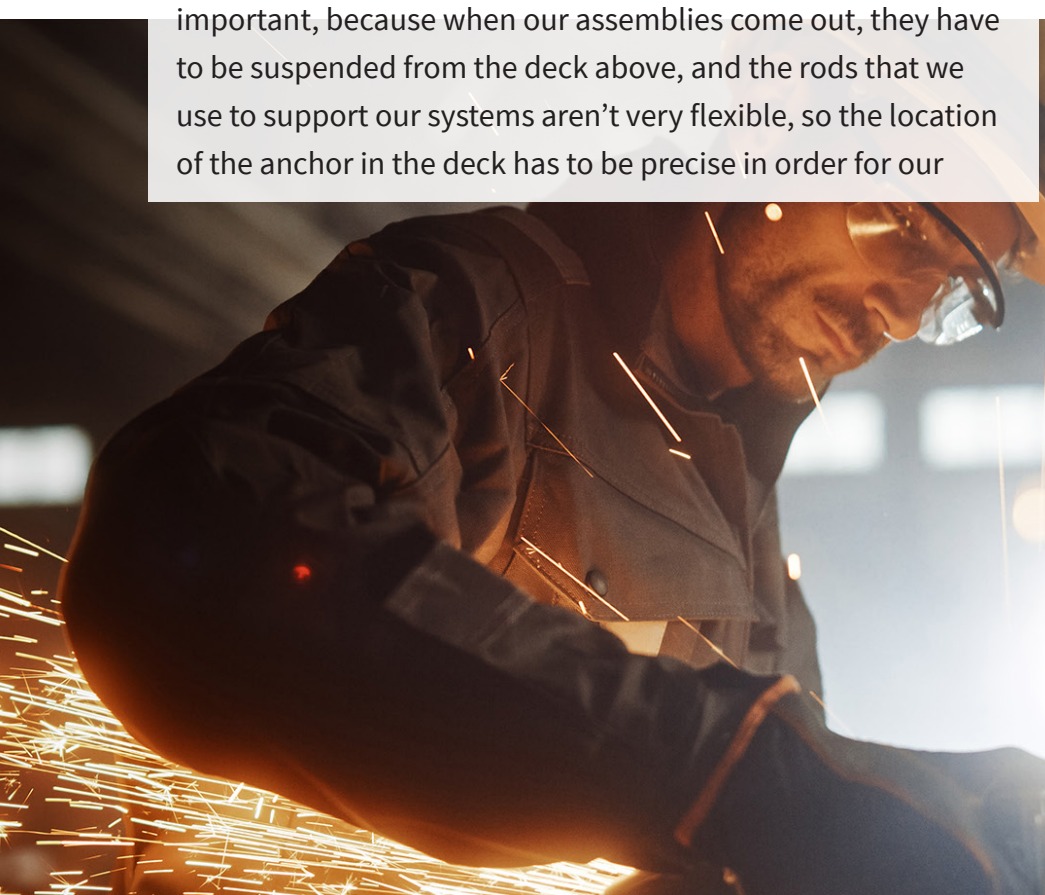
The Trimble RTS system is both reliable and indispensable on several levels. Not only does Trimble allow for faster, more accurate surveying, it also collects data in the field, which Faircloth and his team can then use to improve model accuracy. This can be especially important when field conditions do not match the model.

"On a recent project, the steel beams and columns were off by an inch to an inch-and-a-half. If we had pulled dimensions with a tape measure, then everything on the job would also have been off by up to an inch-and-a-half, whereas using Trimble, we were able to stay where we needed to be, because we were not relying on the variances in the building steel. That also allows us to collect that point in the field and send that information back, so we can see how far off it is in the field versus in the model. By collecting data in the field that, in turn, allows us to have a more accurate model," says Larry Stine, Project Director at Cooper.

Two-way communication

In keeping with Cooper's emphasis on Lean Construction principles, consistent, reliable information flow is vital, which is why Trimble Connect's cloud-based element is also a tremendous asset in the company's toolkit. Trimble Connect enables efficient communication between the workers operating the Trimble RTS and everyone else, which greatly enhances productivity in the field. Before implementing this cloud solution, a typical means of transferring data points would be to put the information on a flash drive and transport it to the site, or to email a file to someone in the office trailer, who would download it to a flash drive and physically hand it to the Trimble operator. Trimble Connect makes all of that obsolete and creates an immediate data exchange back and forth in real-time.

"With Trimble Connect, the transfer of information between the BIM department and the Trimble is instantaneous now, whereas before it could have taken a couple of hours," says Faircloth.



Throughout all stages of every project, Cooper Electrical is constantly applying the best and most cutting-edge technologies available to increase productivity and drive greater efficiency in the workflow. By actively seeking out applications and practices that decrease downtime and diminish waste, Cooper's investments in off-site fabrication , cloud collaboration, and the latest tools from Trimble and AutoDesk keep them on the leading edge of their industry.

"Overall, the cloud-based platform we use allows us to better control and manage costs. For the majority of our clients, low costs aren't their highest priority, achieving schedule is, although costs, and especially cost forecasting, still matter. The accuracy of information in the model helps us purchase correct items and quantities as well as simplifying cost tracking and forecasting, including our fieldcraft hours. It makes everything from overall project forecasting to monthly billing easier and more accurate." says Jen Carter, CFO at Cooper.