



ALLIED BIM AND PREFAB DELIVER SHOCKING RESULTS



PROJECT:

C&R Electric (Shepherd, MI)

PRODUCTS & SERVICES:

Fabrication Tools for Revit®
Fabrication Center®
Fabrication Desktop®

LOCATION/DATE:

Central Michigan
Summer 2020

ALLIED BIM ADVANTAGES:

- C&R is **saving 3-4 days of work** on jobs and has fewer errors since they now work from 3-D models (instead of 2-D).
- Improved accuracy on bills of material and increased buying power has delivered **nearly 30% savings**.
- A recent job resulted in **only six errors out of 360 assemblies** prefabbed, and they were design issues, not fab issues.
- Tracking job details and changing status in real-time with a QR code has provided **huge labor savings**.
- C&R has **improved labor efficiency and jobsite safety** by getting the right materials onsite in the right quantities.
- Digital models of entire electrical systems deliver a fantastic value-add that **better positions C&R as a future service provider**.

Electrical contractor realizes improved organization, accuracy, efficiency, and profit

Founded in 2005, C&R Electric LLC, has forged a reputation for outstanding commercial electrical contracting work in central Michigan and beyond. Based in Shepherd, a small town located “in the palm” of the Michigan “mitten,” the company specializes in residential, commercial, agricultural, institutional, hospitality, renewable energy, medical, and higher education projects.

With a staff of 88, C&R also has a suburban Chicago branch focusing on multi-family residential work, but central Michigan and Grand Rapids are its biggest markets, and the company has leaned into the forefront of technology. In 2019, C&R formed a design-build company, KTS Engineering Group, to handle all the company’s engineering.

An essential and recent component in the success of both companies is prefabricating as much as possible for any given project, and KTS’ staff of six engineers oversees the design and engineering. Kyle Sponseller, P.E., owner of KTS Engineering Group, and Vice President of C&R, explained that creating fabrication models using Revit and sending them to the build group for off-site fabrication in the shop has delivered amazing efficiencies – with expectations of even greater ones to come. They started with prefabbing in-wall, rough-in box assemblies and expanded from there.



Using Allied BIM, C&R now provides the entire design and installation team with a 3-D plan that can be updated on the fly.

CHARGING FORWARD

Sponseller explained that the company’s path to connecting design to fabrication was a circuitous one driven by limited time and resources (a refrain painfully familiar to most – all?! — construction contractors). Faced with senior staff retiring, burn out, and a lack of skilled incoming workers, he envisioned prefabrication as a way of helping his supervisors. “I got into the prefab world because I can give them a set of plans and then everybody has a set of drawings, and not just the foreman, and we can work better together,” he said.





KTS and C&R reinvest profits back into their employees and seek out innovative technologies like prefabrication, Revit, and Allied BIM. Connecting design to fabrication has increased profit margins while providing tangible benefits to staff.

Traditionally, he said, the supervisor would have the only set of prints for the job and would highlight circuits and drawings for the assemblies coming out of his conduits with colored pencils or highlighters, count them, and tell installers what to do. However, this process was neither scalable nor overly productive.

“I’ve always been extremely busy, and I was using AutoCAD in 2019, and hadn’t used Revit,” Sponseller said. In February of 2020, when COVID shut down a lot of in-person work, he was inspired to dive fully into Revit and bring a couple of his engineers along for the ride.

After investing \$20,000 for classes and training and four and a half weeks, he and a couple staff engineers were comfortable enough using Revit to design a 135,000-sq-ft hospital. “And as we dove in headfirst and started doing that, I was like, ‘Wow, we could totally prefab a bunch of this.’” Sponseller said that discovering “the remarkable power of Revit” was a breakthrough moment.

THAT FIRST JOB

In early 2021 KTS and C&R prefabricated all the in-wall rough-in box assemblies, metal-clad cable (MC), and the corresponding components, on a five-story assisted living facility. From there, prefabricating assemblies took off as Sponseller and staff started devising other ways of using Revit for

each job and expanding the fabrication capabilities in the C&R shop.

“Using Revit and Allied BIM now provides the entire field installation team – and everyone involved with the project – a 3-D plan where they can see them in their Procore Construction Management Software program.”

They used Revit and prefabrication to create in-wall assemblies on a variety of jobs, ranging from a major hospital project to a large residential project, to a 3,500-sq-ft bank branch, that “was pretty simple, and an extreme success.” “For that one, we actually re-drew that whole building in Revit and prefabricated it, and we were the only company who used the fabrication model. And that was a screaming success because it was just easy,” Sponseller recalled. Next up for the new design-fabrication system were a large manufacturing facility and a university job.

On that last job, they used another new tool, a Hilti layout tool, for point-marking and

construction layout. “So, on that job, we shot all of our points in the concrete showing where to hang conduit. And that’s where Allied BIM came into play,” he said.

ALLIED VISION: TRANSFORMING CONSTRUCTION

Sponseller was introduced to Allied BIM by his Revit training organization and the introduction turned out to be a game-changer. Allied BIM is a design-to-fabrication software program created in 2019 with the intent of improving the prefabrication process in the PHVAC, electrical, siding and framing, and modular building industries.

He studied alternatives to Allied BIM but didn’t find other products that matched up favorably. “Allied wants to automate the prefab process, the cutting of the saw and then the tube bender, and that really attracted me,” Sponseller recalled.

Based in Bozeman, MT, Allied evolved out of the realization that digital building design and automated prefabrication work were not connected, resulting in tremendous inefficiency. Co-founders Bob Harvey, (who had owned and operated a successful commercial plumbing business), and Brian Nickel (who was that company’s Virtual Design & Construction Manager) have a vision of transforming the construction industry. “The machine shop is disconnected from the designers, and the field is disconnected from the shop, and we saw a way to build it better,” Nickel said.

For his part, Sponseller was quickly impressed with Allied’s offerings and the flexibility the company brought to solving the design-to-fabrication challenges he and his team faced. As KTS and C&R worked on prefabricating in-walls, Allied provided several features to help collaborate on the process and improve it.

“The in-wall piece works really well with Allied. There are a lot fewer mistakes. When we used to send stuff out of here, I would say about 80% of it was correct if you’re lucky. You could even get that number probably down to 70. Using Allied, we just shipped 360 assemblies for a job, and there were six issues on it. And the six issues were actually design model issues, not prefab shop issues,” he said.

The primary reduction in errors coming from using Allied, according to Sponseller, is that staff members can see the model and understand what needs to be fabricated. “They’re not in the dark anymore, because before you’d have a 2-D sheet, and you wouldn’t be able to see the assembly or know anything about the assembly. They can now see the 3-D model.”



“The second thing is, I can basically give them all the information that you can dream of,” he added. As an example, previously when a KTS engineer sent information to a fabricator, extensive details about the assembly had to be abbreviated into what they called a part number. “Well, what happens is people just mess the part number up. It’s just not that easy to make sure that you’re correct the whole way through.” Using Revit and Allied BIM now provides the entire field installation team – and everyone involved with the project – a 3-D plan where they can see them in their Procore Construction Management Software program.

“The ability to track is huge. I didn’t have any way to know if an in-wall rough was completed or not. So, now I have that ability,” Sponseller said. “The guys can scan the [Allied BIM supplied] QR code and change the status of it themselves.” Allied provides an all-in-one solution, eliminating 2-D drawings. The designer just hits the “publish” button and all the information gets imported. “That alone on the BIM side, saves us three- or four-days’ worth of work, not having to sheet everything,” he added.

INCREASED BUYING POWER

This increased connectivity has also led KTS and C&R to immensely improve their accuracy when it comes to creating bills of material. “Now, I know exactly how many four-square boxes are going on every single job. And that allows me to use my buying power,” Sponseller said.

Previously, C&R would buy what was needed on a particular job over the counter. Now instead of buying four boxes of four squares that they used to pay a 35% markup on, they go directly to the factory and buy the same thing by the skid for a 7% markup instead of 35%.

This connectivity has also led to a significant on-site labor efficiency too. While field installers might need to walk across a jobsite multiple times for materials, they now have a detailed list of what’s needed, and it’s delivered to the installation space much more efficiently. “So, every time somebody didn’t have a four square, or ran out of four squares, they’d walk all the way across the jobsite, go to the container and get another box of four squares. But in the process, they’d stop and talk to the plumbers about last night’s baseball game, take a smoke break, go use the port-a-John, you name it,” Sponseller said.

Now with prefabrication and Allied, most of these inefficiencies are eliminated. “Now, all that stuff comes to my shop, which is paved. They’re not burying the skid steer because they went in

the wrong spot with a pallet and sunk it. And they’re not wasting a bunch of time. I have a fork truck here. I unload it, take it all, box it up into containers that are premade assemblies. And then they ship to site,” he said.

At the jobsite, C&R uses OSHA-regulated carts with safety chains, allowing for easy movement once they are lifted to the site by a boom lift. “Now nobody has to carry 17 boxes of four squares to the third floor. They just boom the entire cart up there. It’s just, the fewer people you have onsite, the less exposure you have,” he added.

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WHAT’S NEXT?

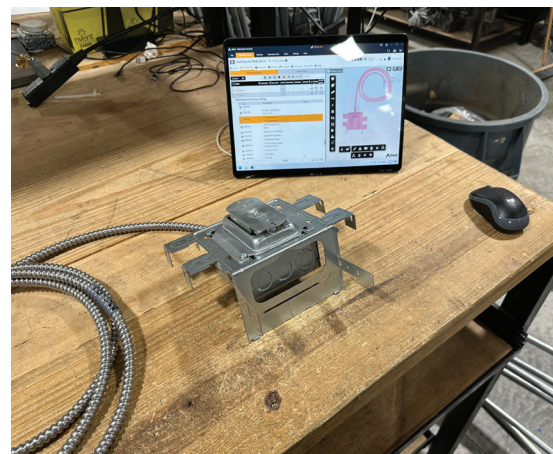
To this point, the company’s prefab system using Revit and Allied has performed so well that Sponseller wants to expand those capabilities to other types of assemblies, including conduit. “I think the Revit piece is kind of new, and I don’t think people prefab conduit very often. I think people prefab panel boards, transformers, services, light poles, things like that, but doing in-walls is pretty new, and so is conduit,” he said. He also envisions using Allied in conjunction with an inkjet printer to label every piece of material that is prefabricated.

“So, when I take a piece of Unistrut, I can run through and put on the Unistrut what conduit goes where, and then where the center line mark is, cut it, ship that to my guys at the site. And in theory, they’ll be able to build the entire rack without opening an iPad. They’ll just be able to take the bundle, cut it, and make it work,” he said.

MAKING THE COMPLICATED EASY

Finally, being able to provide clients or potential clients with a detailed digital model of the entire electrical system is a fantastic value-add. Besides being an excellent tool that allows C&R to uniquely position itself as a future service provider, it also allows them to differentiate itself in the bidding process.

“If I know the entire facility inside and out, I can now sell that as a service. And if my guy walks in



Prefabbing and using Allied BIM has resulted in C&R improving safety: More work is done in the controlled environment of the company shop, workers spend less time on ladders, and don’t have to carry materials up stairs or as far, because it’s cut and packaged and boomed with the truck.

there with my iPad and has access to my system, he brings it up and he can see what’s in the entire building. But if you hire somebody else, they don’t have any of this information,” Sponseller said.

At the end of the day, he believes that prefabricating as much as possible and using Revit and Allied has allowed his entire organization to make what used to be extremely complicated tasks easy. “I can tell you that overall, if we prefabricated the job back when we were terrible at it, we would see on average about 10% in labor cost savings.”

“I think that we can get our labor savings up to about 25%, which is going to be about 10% return on projects that we used to not be able to get, and we’re saving a lot of money on material.” ▲

