



Electrical component prefabrication is increasingly valued

BY DARLENE BREMER

PREBUNDLING SAVES

UNTIL RECENTLY, labor contracts prohibited electrical contractors from doing much preassembly of electrical parts away from the job site. "Negotiations during the past couple of years, however, have given management more flexibility in choosing to prefab electrical components," observed Rob Colgan, director of marketing for the National Electrical Contractors Association (NECA).

What kinds of products or components are electrical contractors most frequently prefabricating? "We prefab wire and cable assemblies, or any mass quantities of materials or parts that require cutting, bending, threading, wiring, or assembly of any kind," said Roger Oertli, president, construction group at Guarantee Electrical Co., St. Louis, Mo. Prefabbing cable assemblies is very cost-effective for repetitive layouts such as hotel rooms, condominiums, laboratories, and some office environments. The company has a 10,000-square-foot fabrication shop, which is usually manned by three to four technicians, and a 20,000-square-foot storage facility for electrical components. "For large fast-track jobs, we may have as many as 12 or 14 technicians working in the shop," Oertli said.



MONEY AND TIME

At Dynalectric Co., San Diego, Calif., products such as light fixtures, rough-ins for outlets and receptacles, and switchboxes and panelboards are routinely preassembled by four or five electricians in the fabrication shop. "Assemblies are shipped out as one unit, sometimes even before the walls that house the units are built," said Dave Raspolich, vice president and general manager. "Prebundling materials is particularly advantageous on fast-track jobs, which is quickly becoming the norm. Such off-site assembly of materials allows the contractor to have more control over the project schedule.

"We began prefabricating two years ago for a specific hotel job," said Steve Chilton, executive vice president of Cache Valley Electric, Salt Lake City, Utah. For that 12-story hotel project, the company prefabricated in-house all of the telecommunication conduit for each room. Recognizing that prebundling saved money, management has since preassembled outlet boxes, light fixtures, metal-clad cable, trapeze hangers, and seismic supports, and staffed the fabrication shop with dedicated licensed electricians.

Sargent Electric Company, Pittsburgh, Pa., frequently prefabricates temporary lighting panels for job sites. "It's so easy to take preassembled panels to the site and just plug them in," said Gary Hartman, manager of the commercial group. For lighting in sport-

ing arenas, such as for its Pittsburgh Steelers' Heinz Field stadium project, the company preassembled and wired the entire lighting fixture on the ground before lifting the steel assembly 100 feet high to install. "The obvious advantage is that the electricians are mostly working safely on the ground," said Hartman. The process also saves time by avoiding the erection of scaffolding and the use of major lift equipment to make numerous trips.

The company's fabrication shop is staffed on a per-project basis, with the number of electricians varying from two or three to 12, depending on the scope of the project. "We approach prefabricating on a per-project basis and rarely fabricate components in a single shop," said Chuck Peckham, executive vice president. For the Heinz Field project, preassembly of electrical parts was performed in a dedicated warehouse. And the company's Midwest division prefabricates its own raceway components for delivery to the job.

The best jobs

Jobs such as wiring hotel rooms ideally lend themselves to prefabricating electrical components. "The repetitive nature of such jobs makes it possible to have to build only one prototype," said Oertli. Each crate with the preassembled wiring can be labeled for the individual room and should include all the necessary tools

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and materials for installation. It is then shrink-wrapped and shipped on a pallet to the job site and delivered directly to the room in which it is to be installed. "Every necessary component to install the electrical system for such an application is delivered to the site in one piece, and the electricians can then easily install it," he added.

Industrial applications are somewhat more complicated than hotel rooms, according to Oertli, but the benefit of increased productivity from the use of prefabricated assemblies still applies.

"Prefabricating components is an option for any job you can think of," said Raspolich, "although repetitive jobs are best." The company continually searches for items in projects that have a lot of duplication, thereby increasing prefabrication productivity. "Other examples are warehouse lighting systems, fixture whips and fixture assemblies, and large tenant-improvement projects," he added.

Since Cache Valley has been prefabricating for a relatively short time, the company is still examining the various options available for expanding the operation. "Of course, hotel rooms, apartments, and the like, lend themselves ideally," agreed Chilton. However, applications such as industrial processes, automation controls, security and fire alarm systems, and other low-voltage systems can also enjoy the benefits of prefabrication practices.

"Any job is a candidate for prefabrication," said Sargent Electric's Peckham. For the company's work on the lighting at Heinz Field, the lighting fixtures and supports were preassembled in the warehouse, allowing the project team to ensure that all the parts used were the correct ones. The assemblies were then staged at the stadium exactly where the fixtures were to be installed. "This sort of procedure provides control over both schedules and assembly placement, and also allows a contractor to industrialize the installation process," Peckham said.

How the process works

"At Guarantee, the first step after being awarded a contract is to have a turnover meeting with the operations department," said Oertli. Attendees include the project manager, foreman, and the manpower coordinator, all of whom examine the job requirements to decide which products most lend themselves to being preassembled. Subsequent decisions include which of those assemblies should be built in the shop, which should be built on the job site, and which should be purchased from the manufacturer. "The team then discusses scheduling priorities, the manpower levels needed to perform the work, and how to deliver the preassembled components and stage them on the job site." "The goal is to prefabricate the assem-



blies so that all components will be ready and available for field personnel when they need it," Oertli said. To increase productivity and efficiency during the prebundling process, the company sets up assembly lines in the fabrication shop.

Dynalectric also holds a turnover meeting after the contract is awarded. "We discuss the entire project, of course, and decide which items can be prefabricated, always keeping the schedule in mind," said Raspolich. From there, the foreman develops detailed drawings, including material types and elevations of how the installation needs to be done in relation to the customer's needs. Once the drawings are developed, the project and prefab foremen meet to discuss material needs and scheduling. The company does have standard drawings on-hand, which can be used as a base for developing the project's detailed drawings, and a stock of parts is always kept on-hand so that the new project can begin immediately. Based on the project's needs, the prefab foreman begins ordering parts that are not in stock. He or she then schedules the work, and assemblies are shipped to the job site as they are completed.

If a project is special with unique assemblies, it will be pre-packaged per the foreman's requirements. For example, said Raspolich, if it is a hotel job, each packaged preassembly will be delivered directly to the specific room in which it is to be installed. The cardboard crate used for shipping the assembly is then used as a trash receptacle. "This has become a real selling point with owners when they see how clean our electricians leave the site."

At Cache Valley, the project manager designs each component of the job and engineers what needs to be done to prefabricate those components. The designs are discussed with the people in the fabrication shop and plans and schedules that will meet the requirements of the project are finalized. Parts are then ordered and the fabrication crew builds the assemblies accordingly.

When the company decided to continue prefabrication operations after the original job for which they were put in place, it decided to perform all prebundling work at the headquarters site rather than at individual job sites. "We made the decision to keep prefab operations separate from the job site to both control the environment in which the work was done and to avoid any potential inefficiencies," explained Chilton. Prebundling assemblies at headquarters has also offered Cache Valley more control over scheduling and quality assurance, and it has proven to be more cost-effective to have electrical parts delivered to a central location, rather than to different job sites.

"The field supervisors are starting to see the value of prefabrication," said Chilton. The company anticipates learning that there are even more opportunities to use prebundling as a way of saving both time and money.

After Sargent Electric was awarded the Heinz Field project, the company's project management team met with counterparts from its partnering company, ERMCO, Indianapolis, Ind., to brainstorm which parts of the project should be prefabricated. "We also met with the project journeymen and superintendents to get their input and to implement the best ideas," said Peckham. Materials for the project were ordered and components preassembled for delivery to the job site per the project schedule and staged in the areas

in which they would be installed.

Goals and benefits

Guarantee Electrical recognized the advantages of prefabricating electrical components more than 30 years ago. Its goals are to keep field crews to a minimum, maximize efficiency and productivity, improve construction schedules, and increase profitability. "We continued the practice over time because we learned not only about the financial advantages, but that working in the controlled environment of the fabrication shop increased productivity," said Oertli. In addition, working in a centralized location means tools such as binders, cutters, and threaders do not have to be delivered to the job site. "In the prefabrication shop, these important and often expensive tools are kept out of the weather and are safer."

According to Oertli, another major benefit of prefabricating is better safety records. Components are assembled away from the job site, and away from the other trades, until installation. "For applications involving height, prefabricating reduces fall incidents because the electricians are going up in the bucket fewer times," he added.

Dynalectric began preassembling electrical parts in 1991 to increase productivity and exert more control over project schedules. "Other goals of prefabrication are higher efficiency and reduced crew rates," added Raspolich. All of which saves the company money and makes it more competitive in its market. Over the years, the company has investigated other options, but plans to continue to use its own prefabrication facilities. "When ordering prefabricated assemblies from vendors or from companies that offer prefabrication services, you end up actually losing the best benefit of preassembling, which is control," Raspolich observed. And if the company hired to complete the assemblies misses the deadline, it throws off the project schedule, increases labor costs, and diminishes the electrical contractor's reputation.

At Sargent Electric, the goals for prefabrication are the same, including to cut costs, save time, and to increase safety. "When you prebundle components, you reduce the overall time needed to complete the project," said Peckham. In addition, there is a direct relationship between prefabrication operations and the time needed to complete each individual activity, particularly those for repetitive hotel, condo, or apartment jobs. "You can have half of the work for the electrical systems for those rooms done before they are even built."

According to Peckham, prefabrication takes a lot of pre-planning and requires input from a variety of sources, from vendors to journeymen and apprentices, to make it work and be the efficient time saver it's meant to be.

"Prefabrication allows the company to improve operations, customer service, control, and quality while maintaining or improving profitability," said Chilton. He concluded by encouraging everyone to examine the potential benefits of instituting prefabrication operations not only to each individual company, but also to the industry as a whole.

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