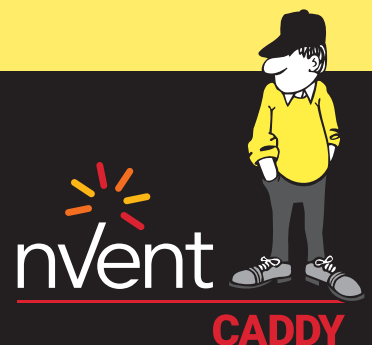




TECHNICAL HANDBOOK

Introduction to Prefabrication

For Electrical, Mechanical, and Datacom Applications



Introduction to Prefabrication

**THE CONTRACTING MARKET IS VERY COMPETITIVE.
BUSINESSES AND WORKERS NEED TO FIND NEW POINTS OF DIFFERENTIATION.**

CURRENT TRENDS

The construction market is incredibly competitive. Skilled installers and inexpensive materials are constantly raising customer expectations and lowering project bids. With so much pressure in the market, contractors need to find new ways to differentiate and win.

Additionally, as the market becomes more saturated, the prices for contracting services are also reduced. As contractors compete, they attempt to out-bid each other for projects by lowering prices. This cuts down on the contractor's profit margin and reduces the amount of money remaining at the end of the project, leaving companies vulnerable to unforeseen circumstances during the job. Contractors need to find new ways to grow profit margins while maintaining a high standard for safety and quality.

In order to survive and thrive in the current market, it is crucial that contractors learn and employ new technologies designed to maximize efficiency on the jobsite.

WHAT IS PREFABRICATION?

The term "prefabrication" can take on many meanings in construction. In general, it refers to parts arriving at a jobsite preassembled. Historically, complex assemblies were built at the location where they were installed. This demanded that installers had constant access to the jobsite in order to progress a project.

With prefabrication, assembly work is completed in a "prefab" shop completely devoted to the production and storage of components. Moving these tasks offsite allows contractors to mass produce assemblies that are used across similar projects and allows onsite installers to focus exclusively on mounting the finished product. In some cases, the primary assembly can be completed on site, either on the floor of the jobsite or an alternative location. The use of a prefabrication shop typically yields the most advantages, but each situation has unique benefits to the installer.

The process yields countless benefits, but requires a completely new approach to the entire process of purchasing, creating, and installing assemblies. Similarly, the hardware used during the mounting of the finished piece can be very different from the hardware that contractors are accustomed to. Unlike the traditional hardware that is mostly standard across brands, companies are now emerging with new and unique ways to allow contractors to prefabricate.

Despite a few perceived drawbacks, contractors are starting to recognize that prefabricating pieces allows for better time management, safer installation, and cost savings throughout a project, regardless of its size.

Perceived Drawbacks of Prefabrication

ALTHOUGH TREMENDOUSLY BENEFICIAL IN THE LONG-TERM, THE SWITCH TO PREFABRICATION CAN BE INITIALLY DIFFICULT. IT MAY DEMAND:

OFFSITE SPACE

Most of the work of prefabrication is done off of the construction site. Prefab may require shop space from contractors for assembly and storage of completed components. Many prefabrication projects need an entire facility devoted to completing and inspecting pieces that will be used on the final jobsite. For many contractors, shop space is a very limited resource.

PRODUCT KNOWLEDGE

Although the function of parts needed for prefabrication are the same, the way they are installed can differ and demand additional training. Installers spend their entire career with familiar installation methods, so they may lack the time or motivation to learn new ones. Different processes can dissuade an installer from trying a new method.

EXPENSIVE PARTS

To effectively complete a prefab project, special parts are needed for quick and easy installation. These parts are designed to be easier to install and often have different features than products for traditional installation methods. Compared to commodity products in a price conscious market, prefabricated parts are usually more expensive. Although the labor saving more than compensates for the increase in product price, purchasing agents may not directly feel the financial benefits of purchasing premium products that reduce the cost of the whole project.



These potential problems can be easy to remedy. However, they often demand upfront investment that can deter installers from prefabricating.

Time-related Benefits of Prefabrication

THE MOST WELL-KNOWN BENEFITS OF PREFABRICATION ARE TIME-RELATED. MOVING A MAJORITY OF ASSEMBLY OFFSITE GIVES CONTRACTORS:

MORE LEAD TIME

Contractors are able to prepare for projects sooner and spend less time on the jobsite. Installers also do not need to wait for access to the site to begin working because they can prepare the necessary pieces in advance at the prefab shop. Once the site opens, they are able to quickly install the assemblies produced months earlier.

LESS DOWNTIME

Workers can be employed more effectively because they can work in the prefabrication shop when they are not out on service calls. In an industry traditionally involving an inconsistent schedule, workers are able to fill the gaps in their schedules by working on projects in the shop.

SCHEDULE FLEXIBILITY

Jobsites usually have a very strict schedule during which specific trades can work. When one installation crew is working, it may be difficult or dangerous for a different installation crew to work at the same time. Similarly, there may be outside circumstances that limit when workers can access the site. For example, some cities have ordinances that limit noise during night hours. Some buildings remain partially open during construction and cannot have heavy traffic during work hours. Whatever the specific situation, it is much easier if the majority of the work can be done offsite. Prefabrication shops can run at any time of the day or around the clock if necessary, allowing quick turnaround and giving the contractor more control over the schedule of his or her project.

CASE STUDIES

Denver, Colorado

St. Joseph Hospital completed 2.5 months earlier than expected, an 18% reduction in total project length.^[1]

Changsha, China

Mini Sky City, a 57-story sky scraper, completed in just 19 days.^[2]

Oviedo, Spain

226m² school prefabricated and assembled in 90 days.^[3]

Aside from simply completing a job faster and saving labor cost, there are specific time-related benefits that can make scheduling much easier for installation crews.

Prefabrication makes schedule compression possible by as much as **18%.^[1]**

Other Benefits of Prefabrication

WORKING IN A CONTROLLED SETTING REDUCES MANY OF THE RISKS THAT CAN HAVE A NEGATIVE IMPACT ON THE SAFETY OR EFFECTIVENESS OF A CONTRACTOR'S WORK. PREFABRICATION CAN IMPROVE:

PROFIT MARGIN

Prefabrication reduces time spent on the jobsite during installation, allowing contractors higher profit on jobs and more jobs per year. In most projects, labor is the largest part of a project's final cost. Materials, in comparison, are much smaller. Thus, reducing labor costs is the easiest way to increase profit margin.

SCRAP

On the jobsite, pieces are often discarded if they are not immediately useful. When prefabricated components are assembled in a shop, they produce significantly less waste. When prefabricating, unusable cuts and spare parts can easily be stored and held for future projects. Reduction of waste results in a reduction of cost and offers another way for contractors to save money.

SAFETY

Traditional methods often require installers to spend extended amounts of time on lifts, which can compromise quality of work and greatly increase the possibility of worksite injury. With prefabrication, contractors do not need to work among other crews, spend long amounts of time on lifts or ladders, or worry about the impact of adverse weather. All of the equipment necessary for proper assembly can be kept in the shop and used when needed. Components can be assembled in places that are comfortable and convenient to contractors, as opposed to less than ideal spaces available at the construction site.

QUALITY

Once the component is completed, it can be easily inspected and installed in one piece. One piece installation eliminates the need to rework projects and reduces possibility of installation error.

41% of projects
experienced a decrease
in project budget by
6% or more due to
the use of prefab.^[4]



Prefabricating has tangible positive benefits on a project that extend much farther than just shortening installation time.

Selecting the Correct Hardware

PREFABRICATION CAN BE EASILY APPLIED TO ANY PROJECT WHERE REPEATED COMPONENTS ARE MADE UP OF SEVERAL PARTS. FOR EXAMPLE, SERVICES LIKE CABLE TRAY, DUCT, SPRINKLER PIPE, AND HORIZONTAL RUNS OF COPPER AND CONDUIT ARE VERY EASY FOR A CONTRACTOR OF ANY SIZE TO ASSEMBLY OFFSITE, TRANSPORT, AND INSTALL.

However, without the proper hardware, it is nearly impossible to implement the necessary changes to the way pieces are assembled and installed. Contractors need to use specialty hardware that has different features than the parts they would traditionally purchase. In general, it is ideal to choose hardware that ship partially or completely preassembled, have limited loose hardware, and can quickly attach at structure or at load.



Manufacturers like nVent CADDY offer several products specifically intended for prefabrication. For example, the nVent CADDY Rod Lock and nVent CADDY Speed Link systems are designed to provide special features that make them best suited for use when prefabricating.

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