

# Maximizing the Benefits of Prefabrication in Electrical Contracting

Focusing on the strategic integration of prefabrication, learn practical approaches for tracking performance and quantifying the value added through prefabrication efforts.

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**What happens when** you get a dozen specialty subcontractors together to review what they have learned and turned into practice on prefabrication? You get confirmation of the purposes and a plan for a measurement system for it.

## Benefits of prefabrication

There are three main categories of prefabrication work:

1. Common among all items but unique to the type of job, like boxes, wall mounts, whips, fixture kits, etc.
2. Job/type of work specific items that are related, such as hospital headwalls, high-bay light assemblies, and racks.
3. Build to order/project specific items that are one of a kind or high-risk elements of a project.

The panel of electrical contractors recalled/remembered that they worked with their teams to set the foundation with a strong understanding of the why behind prefab. Clarifying its purpose will help establish a consistent mindset and set expectations, making it easier to drive adoption and expand its use across projects.

Prefabrication provides far more benefits than just faster installation, as shown in **Fig. 1** on page 20. Because work happens in a removed environment away from the job site, it is safer, more reliable, and more predictable. The controlled environment of a prefab shop allows



the work to happen with far fewer disruptions than those experienced day to day on the jobsite.

Without the impact of weather, other trades, working around material and equipment, the space of the prefab shop itself can offer a distraction free space to produce efficiently. With prefab, work can happen in parallel and sooner, reducing the various peaks and dips of a typical project schedule.

Lastly, despite concerns that prefabrication might take work away from the field, it has the opposite effect. When implemented effectively,

it helps contractors stay competitive and win more projects, employing more electricians.

## Measuring prefabrication outcomes

In the early days of introducing prefabrication to your team, buy-in from the field can be a challenge. Having a clear message and understanding of the benefits lays the groundwork to bridge this gap.

A common misconception to overcome is that prefabrication simply means faster installation. While that can often be true, it also becomes a

point of resistance when it isn't. This causes other important benefits to be overlooked.

As your team buys into the concepts, sees the various ways to measure success, and is using it in the daily work, how do you measure/ know it's working? The electrical subcontractors got together and reviewed methods of measurement

“ The controlled environment of a prefab shop allows the work to happen with far fewer disruptions than those experienced day to day on the jobsite. ”

to confirm meeting their goals. The measurements that were discussed used can be categorized into three areas:

- **Utilization:** the act of making use of something (how much)
- **Effectiveness:** how well the desired result was produced (how successful)
- **Savings:** if there is a financial benefit

## Utilization

There were several ways that the companies looked at how much prefabrication that is being done. While they acknowledged that not every method may consistently apply, these approaches can still provide

useful data to support and encourage teams to increase prefabrication efforts. Ideas shared were:

- **Prefab percent usage (hours spent in prefab out of the total) per job, scope of work, or division.** This is preferably done by reviewing the work breakdown structure and percent of projects using prefab at all/in any capacity. The focus of the discussion was on if it's at the job site or in the workshop/another location.
- **Reviewing if equipment utilization is tied to prefab.** The thought with this is if subassemblies are made and brought to the site, the equipment can be on the job site for a shorter amount of time by working quickly to assemble/install the prefab versus waiting for the team to make multiple items/using the equipment sporadically.
- **Headcount expected on site versus actual.** Some companies do use a more 'production' measurement approach. One prefabrication manager for a large electrical contractor explained their team has established a rough estimated time for different assemblies. In the shop, they will track and monitor how long that assembly takes, if it took longer than expected, and why. This data is compiled monthly and used for production and quality goals. The top producers receive incentives to continue improving.

## Effectiveness

This entails measuring how well the prefabrication is working. This is different than how fast or how much. Looking at the benefits to your entire system is important.

## What Does Prefab Provide?

- Safer
- More reliable
- More predictable
- Controlled environment
- Manpower allocation/buffer
- Reduce project duration
- Get more work

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Fig. 1. Why use prefabrication?

- A prefabrication foreman from a participating contractor explained that tracking productivity in an application that complies with the ASTM E2691 Job Productivity Measurement Standard, like JPAC® (Job Productivity Measurement and Control) allows them to see if the prefab assembled and sent to the job site was able to be installed productively. In reviewing the trends, the weeks following the prefabs arrival to the jobsite, his team is able to see how the prefab impacted the productivity for the overall job.
- Making common among all types of prefabrication in the workshop in an uninterrupted setting is a very good way to increase productivity on the jobsite by having quality checked items available for faster installation.
- Building consistent items needed for your job that can be manufactured altogether, quality checked (like those patient headwalls or light fixtures or electrical panels), and sent as needed for installation will help for consistent flow and work.

## Savings

While considering cost savings may seem self-explanatory, it is imperative to consider time, cost, and the increased quality.

If you have established common and consistent prefab assemblies that you use (by default) across your jobs, are using BIM to build the job more productively, but not yet practicing full simulation of building, work and information modeling – you are most

## Want to Know More?

Check out the NECA-5 NEIS Standard for Prefabrication. Prefabrication collectively refers to any kind of completion of electrical components, sub-assemblies, or modules of a construction project in a different, off-site location and performed in a controlled environment.

Take the Prefabrication Litmus Test, introduced in our 2023 EC&M feature article, The Evolution of Prefabrication, to assess where your organization falls along this maturity model and look for next steps (Fig. 2).

| Prefabrication Litmus Test                                                                                                           |                                                                                                 |       |        |              |       |        |
|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|-------|--------|--------------|-------|--------|
| Complete the table by placing a checkmark to indicate the frequency of usage/application of the following items within your company. |                                                                                                 |       |        |              |       |        |
|                                                                                                                                      |                                                                                                 | Never | Rarely | Occasionally | Often | Always |
| Traditional                                                                                                                          | Basic prefab assemblies                                                                         |       |        |              |       |        |
|                                                                                                                                      | Manual prefab production                                                                        |       |        |              |       |        |
|                                                                                                                                      | BIM on jobs were required                                                                       |       |        |              |       |        |
|                                                                                                                                      | BIM in combination with surveying equipment to aid layout                                       |       |        |              |       |        |
|                                                                                                                                      | Technology/tools to model work, effort, and time                                                |       |        |              |       |        |
|                                                                                                                                      | Supply-chain resources to reduce non-installation effort                                        |       |        |              |       |        |
| Transitional                                                                                                                         | Common/consistent prefab assemblies                                                             |       |        |              |       |        |
|                                                                                                                                      | Some automation in prefab production process                                                    |       |        |              |       |        |
|                                                                                                                                      | Results of BIM models to learn and improve productivity                                         |       |        |              |       |        |
|                                                                                                                                      | Work modeling for optimization                                                                  |       |        |              |       |        |
|                                                                                                                                      | Information modeling for DFMEA                                                                  |       |        |              |       |        |
|                                                                                                                                      | BIM model outside job site to learn about how to do the physical build better                   |       |        |              |       |        |
| Industrial/<br>Technological                                                                                                         | CAD or BIM libraries include data on ideal work packaging                                       |       |        |              |       |        |
|                                                                                                                                      | Fully automated production of common parts                                                      |       |        |              |       |        |
|                                                                                                                                      | Digitalization of model components for FEA and boundary testing                                 |       |        |              |       |        |
|                                                                                                                                      | Full simulation of building, work, and information modeling for optimal time, cost, and quality |       |        |              |       |        |
|                                                                                                                                      | Continuous and ongoing waste reduction                                                          |       |        |              |       |        |
|                                                                                                                                      | Practices to reduce information entropy                                                         |       |        |              |       |        |
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**Fig. 2.** Prefabrication litmus test.

likely aligned with the transitional contractor (see the Sidebar below).

Our 2023 feature article, *Measuring the Cost Benefits of Prefab*, discussed a simple and straightforward way to quickly recognize and measure cost savings from prefab. This approach consists of measuring the total labor cost savings that result from 1) improved productivity and 2) reduced composite rate. These can easily be measured at the job level using the Job Productivity Measurement (ASTM Standard E2691) and Job Productivity Assurance & Control (JPAC®).

While cost savings is only one of the several benefits provided through prefab (and intentionally placed last in the discussion), this approach will allow your team to get immediate feedback on:

- Is prefab improving the overall productivity of building the job?
- Are we harnessing resources effectively with prefab to reduce the overall labor cost?

Electrical contractors in MCA's Agile User Group forum have taken the Prefabrication Litmus Test (shown in **Fig. 2**) and when they review the stage they're in, have been in, and are moving to, they discussed and shared the benefits they're realizing — and the challenges they're encountering to push from traditional to transitional to industrialized.

While several participating contractors have measurements and prefab tracking in place, few have achieved a wholistic view of the benefits and risk reduction opportunities at a larger scale. It's worth noting that other shared approaches noted amongst this group for tracking prefab was:

- Using a prefab tracker to monitor the orders as they come in.
- Tracking hours against the job (using a prefab cost code or multiple cost codes for prefab).
- Tracking work completion, hours,

productivity, and composite rate savings.

## Conclusion

Whether you are just starting out or further along the prefabrication continuum, maintaining a clear understanding of its core value is essential to not losing sight of the overall goal: building in a way that optimizes time, cost, and quality. Working in a controlled environment also reduces risk and improves safety outcomes. The impacts on workers, projects, and the organization can be measured through one or more of the approaches outlined above — the key is ensuring the intent behind the process remains intact. **EC&M**

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