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Vol. 22 Issue 3

PRESIDENT

Glen Hobson 205-441-5591 glen@handfmedia.net

ASSOCIATE PUBLISHER

Steven Goodwin 205-624-2181 steve@handfmedia.net

ADMINISTRATIVE DIRECTOR

Steven Hobson steven@handfmedia.net

EDITOR

Brandon Greenhill brandon@handfmedia.net

CREATIVE/ WEB DIRECTOR

Jacklyn Greenhill jacklyn@handfmedia.net

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Recon Wall Systems uses their expertise in precast concrete products to solve common problems associated with light pole base installation.

Light Pole Base (LPB) is a division of the established precast big block retaining wall innovator, Recon Wall Systems. Headquartered in Minnesota, Recon has provided over 20 million square feet of precast concrete block solutions to customers around the globe through its network of producers.

While Recon has been around for 22 years, the ethos of this company is anything but complacent. It has a culture which promotes idea generation. President Mike Klotthor is the current driving force behind this philosophy of improvement. He says this personal quality stems from his background as an engineer, a path he began to take in 2008 which included eight years as a consulting engineer. "As an engineer, I was always looking to provide solutions rather than simply utilize solutions that already existed but never really solved the biggest problems." This mentality is what led to the development of the Light Pole Base division, four years ago.

The problems Klotthor observed in the traditional light pole base installation process had to do with inventory lead times, inter-dependencies, and design and application complexities. Each year thousands of light poles are installed and the current process of creating a suitable base for each light pole on the project was slow and inconsistent. Some projects include hundreds of light pole bases and Klotthor knew there need-

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ed to be a better solution that could save time and money.

A typical scenario required 4-6 week lead time for concrete and other materials. Once the materials arrived, some of the biggest pain-points had to do with interdependencies associated with scheduling the right people with the right skills to be on-site at the right time. This timeline would often be further complicated by disruptive weather patterns. Additionally, the design of the layout and the application of materials often presented challenges due to the need for a variety of rebar configurations and customized anchor and conduit locations. In a tight labor market, finding enough skilled labor to install and tie rebar and place concrete is a major challenge. On top of that, once the forms and rebar are properly set contractors had to wait a minimum of 7 days for the concrete to cure before they could proceed.

The solution to these problems was well within the realm of the Recon's capabilities. Leveraging their experience as a provider of precast retaining wall blocks, the team designed a precast light pole base. The nature of precast meant that it was simple to make in advance and store as many as needed in inventory for upcoming projects, fully cured and ready to install. Contractors could have it readily available. And with an installation time of just 40-70 minutes, total lead time from order placement to project completion time was much shorter. This meant that in a time when labor supply is tight, the team could quickly install the bases and deploy their talent to other tasks to meet the needs of the project. Finally, customers have peace of mind knowing that these bases were

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made in a controlled environment and meet all necessary specifications and requirements.

Kurt Baecker, Project Manager for CSK Electric says, "the light pole bases that we have been using from LPB have been a game changer. They save a ton of time on the install and free up quite a bit of manpower. It used to take about four guys to go around to prep and pour the old style pole bases. We would usually spend about three to four days to prep the

pole base forms and tie up rebar cages. Also, we would spend at least another one to two days to pour and finish our pole bases. With these new style precast pole bases one guy can go around and drill all of the holes and usually set all of the bases the next day with the help of just one other person. One other benefit is that we can always come back and dig down to add a pipe into the base for future poles."

The inventive part of the product design starts with the anchoring system. The four slot adjustable anchoring system can accommodate light poles with a required bolt circle diameter ranging from 7.5 inches to 13.5 inches. This patented design, along with the four side openings for conduit installation, made for a universal product. At last, there was a precast product that could accommodate a wide range of pole types, heights, and bolt patterns.

One of the main concerns installers have when sourcing new products has to do with quality. Because LPB bases are made in a controlled environment, the variables such as concrete mix design, air entrainment and temperature which affect quality are reduced. These NPCA Certified production facilities adhere to strict quality control measures regarding compressive strength, air entrainment, and all other design specifications resulting in a product that is the same every time.

The response from the contractor community has been overwhelmingly positive. Tim Masiewicz, Project Manager and Electrical Contractor for Windemuller, Inc., says "I love using LPB bases for a variety of reasons. I appreciate the cleanliness and the ease of installation. It takes operator error out



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of the equation. The visual appeal is great; with this product there are no lines so you don't have to sand anything down to make it look nice. Another unique benefit is that you can actually re-use the bases if you need to relocate them. We did this recently, and the base was fully intact and the sliding adjuster was still functional. You could never do that with a poured-in-place base."

Tim adds, "the guys in the field were hesitant to try this new product at first. But now they appreciate the shorter install time and simple execution. With the traditional poured-in-place method, it would take two guys plus a contractor four to five hours to install a base with the use of a concrete truck. Now they can do it with just an excavator in less than an hour. The elimination of a concrete truck is a huge benefit, too, because that can be tough to maneuver into place. The excavator can easily get right in there, and sometimes you can get close enough to just set the base right into the hole."

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Best Practices for Testing with a Power Analyzer

We've seen countless instances where power monitoring sessions have gone wrong. As Murphy's Law states, "If anything can go wrong, it will." So regular users of power analyzers use "best practices", processes that eliminate sources of risk or failure. This list may seem excessive; indeed, almost none of the steps below are required for success. But if you are doing a test that requires a scheduled facility shutdown or you have to drive far to the site (first to setup and then to get the data), you will never want to have to do the test over. A little extra time and carefulness up front is a small price in order to greatly minimize any chance of failure.

Before the Job

1. Keep Core Tools Together

Keep your core system components together in a case so they are ready and you know where they are, in a pinch. If you are putting your system together in the first place, use the power analysis checklist to make sure you have obtained "the right stuff".

Acquire Equipment Early
 At least two weeks ahead of the job, make sure the job doesn't require any special accessories that you will need. If



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you have to buy some special measurement accessory, allow enough time to get it purchased and delivered before the testing is scheduled to begin.

- 3. Arrange for a Power Down (if practical) As far in advance as you can, determine if there will be a power down lockout for the circuits you will test and arrange for one if you can. It's faster and safer to install on a securely powered down circuit and it may need to be arranged well in advance with the facility manager. If it will be live, you have time to be sure your PPE will be available and up to the risks involved.
- 4. Charge the Analyzer Ahead of Time The day before your job, if you do not already keep your analyzer connected to a charger, attach it to have it fully charged for the job. If you have to set it up in a locked panel, you do not want any chance that it will run out of juice before power is available to it.
- 5. Have Your Memory Card in the Analyzer (if applicable) Some power analyzers allow for additional and/or backup logging storage with memory cards. In most cases, a memory card will provide virtually unlimited data storage for a power study. Other interfaces like Bluetooth, USB, and remote/mobile access can provide redundant communications to the analyzer but do not provide backup storage.

2. Current Probes Before Voltage Leads We recommend hooking up the current probes before hooking up the voltage leads because voltage clamps are easier to get knocked off during a tight installation. Since all probes are labeled at both ends, it is often easiest to hook up the probes and then attach them to the analyzer after getting the cables to lie the way you want.

• Note that for best accuracy, you want the place where the flexible current probes plug together to not be near the conductor it is monitoring. Ideally, it will be 90 degrees off from the point of contact with the conductor (that's the position where we calibrate them). If using a clamp-type current probe, be sure the clamp is fully shut and there is no rust or impediment at the point where the jaws come together.

• Also note that each current probe has an arrow on it pointing in the direction from the source to the load. Install this correctly and the waveforms and phasor diagrams will look correct. However, the default data setup in PowerSight will turn them around in software to get the correct power and power factor measurements, so you do not need to worry about measurement accuracy.

 Quickly Check Current Probe Pins When plugging the current probes into the analyzer, quickly verify that the pins are straight and none are

6. Keep Extras on Hand

Remember: "redundancy is the fail-safe key to success". Don't be afraid to carry a light case with spare analyzer charger, spare SD card, spare current probe, and a laptop (with USB cable if your analyzer has USB communications). None of these should be needed, but best practice is to be prepared with alternate means of communications and coping with missing/broken accessories.

Connecting the Analyzer

 Power Down (if practical)
 Best practice is to power down lockout before hooking up your analyzer.

 However, if you wear proper PPE for the arc flash danger and hook the probes up with care, you should be safe using a power analyzer and its accessories.





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recessed in the socket (should never happen, but best practice is to quickly check). Carefully line up the plugs in their sockets and firmly press them fully into the connector as far as they will go. Use some "feel" to recognize if the pins are entering into their sockets before you force it. When installed properly, all probe connector bodies will be inserted the same distance.

4. Use a Line-to-DC Converter (if necessary) For longer studies, your analyzer may need a power source to continue logging. If you do not have an accessible outlet nearby or if you need to lock the panel without wires going into it, you will need to power the analyzer from the circuit it is monitoring. For some power analyzers, this is a build-in capability. For others, there may be a line-to- DC converter offered by the manufacturer as a measurement accessory. It is best practice to reconsider purchasing/renting an analyzer that does not have either option available because shutting the panel tight has several advantages. Locked panels eliminate issues with safety, theft, and tampering. Closed panels (without cables exiting) eliminate a power cord tripping hazard and the chance that the panel's door will short the charger's cable. Be sure to check whether or not you will need a line-to- DC accessory, and then allow yourself time to procure one before the test.

Checking the Connections & Setup

- Ensure the Current Probes are in the Right Range Some wide-range current probes have multiple measurement ranges that can be switched between. After decades in the electrical testing industry, we have heard too many stories about tests having to be done over just because the current range was not set correctly. Try not to make this simple mistake; it could cost you lots of extra time, energy, inconvenience, and monetary expense.
- Go Through Connection Verification Procedures
 Once the analyzer is assumed to be properly connected to the circuit, check the basic measurements
 (if you can). For analyzers with build-in screens and
 keypads, this is done with a simple push of a button.
 For meters without screens, you may have to connect
 a laptop or other device to observe live readings.

Check the Voltage levels of each phase. Are they fairly balanced and close to what you expect them to be?

(There are situations where you do not expect the voltages be balanced, but you should see what you expect to see).

Check the Current levels of each phase. Are they fairly balanced and close to what you expect them to be? (There are situations where you do not expect them to be balanced and the load may be substantially off while you are checking, but do the levels seem right).

Check the Power Factors of each phase. Are they fairly balanced and reasonable for the load you are monitoring? If you have current probes (or voltage probes) switched, you will typically find one power factor is what you expect it to be (e.g., 0.70), another is very high (e.g., 0.95) and the last is very low (e.g., 0.35). In such a case, the very high and very low voltage or current leads are probably switched.

If you are using a laptop to communicate with the analyzer, you may be able to view live waveforms and phasor diagrams in addition to the basic checks mentioned, depending on the analyzer and software.

Some analyzers have more practical and efficient ways of verifying hookup connections, like red or green lights on each phase, warning messages, or a rules-based wizard. If these tools are at your disposal, use them to ensure the connection is verified.

- 3. Verify Analyzer is Charging (if applicable) If you are running a long test and you have access to the analyzer, verify that it is charging or getting power from the circuit being monitored. As mentioned before, some analyzers may use a line-to-DC adapter or have the ability to charge off the voltage being monitored as part of the analyzer's base wiring. Whichever is the case, or if you need to manually plug the analyzer into a wall charger, check that it is being powered by something so it stays on the duration of the test.
- Verify Correct Time & Date Checkout the time and date in the analyzer and adjust as necessary. You want your data to have the correct timestamps.
- 5. Verify Memory Card is Inserted Properly (if applicable) On occasion, a memory card may not be fully seated



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inside the analyzer. You may need to remove it and insert it again. Sometimes, new cards are a little tight the first few times they are inserted. In most cases, you should hear a click to confirm that the card is securely in place. A user-friendly analyzer will also inform you on its screen that a memory card is present.

6. Verify Correct Data Collection Settings If you have premade a custom data collection setup (logging intervals, input ratios, event trigger levels, P-P/P-N, etc.), then you should double check it before monitoring, either on your computer or analyzer. A well-optimized data collection setup can enhance a study and provide you with the most data points for the duration of the logging period, while a wrong setup can completely throw off the data for a test.

During Monitoring

1. Check on the Analyzer

If your monitoring session will last a week or more, come back after a day to download data and maybe capture a waveform, if possible (ideally, over wireless connection to the meter). If the study lasts for a month, it is often a good idea to come back after a week to pull out preliminary data. This not only give the customer something to look at, it verifies that the setups and triggers are working the way you intended and that the analyzer is getting the power it needs to keep operating. You never want to come back after a long study and find that you do not have the data you need.

- 2. Safe Communications with the Analyzer If the analyzer is accessible while the circuit is powered up, wear your PPE and gather the information you need from the analyzer or make any necessary hookup fixes. If the panel is locked (which is ideal), you should connect to the analyzer via wireless connection (Bluetooth, Wi-Fi, mobile, etc.) if possible. That way, you should be able to stay outside the arc flash zone and check on the analyzer without needing arc flash PPE.
- 3. Leave Memory card in While Logging (if applicable) Never remove a memory card while monitoring. If the analyzer is writing to it at the moment you do that, there is potential to corrupt the card and lose all the data. Instead, stop the monitoring session and then remove the memory card.

Conclusion

If this checklist feels a little like overkill, that is because it is. There are so many tiny errors that can be made when testing with a power analyzer, but any of them can lead to having to redo the entire test. Attention to detail is valuable in these processes and following these best practices can save you and your team from some big headaches.





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