



WIRELESS POWER TRANSMISSION

The end of powerlines?

When Nicola Tesla created all his inventions from power generators to AC current he was hailed as a genius. Then things changed when he began to talk about pulling power from the earth, harmonics and frequencies. He almost completed his wireless power transmission station on Long Island but, the money was pulled out from under him and that was that. If he had access to microwave technology who knows where would we be today.

For years various attempts were made to pick up where he left off by what might be called the fringes of the scientific community. Today those concepts are now being pursued by entrepreneurs with a serious eye to the commercial aspects of wireless power transmission. Electric cars now using plug in charging are ready to be charged by wireless pods in the pavement. On the drawing boards are microwave transmitters up on road side poles that will beam power to electric cars as they travel on the roads under them. The end result would be minimal battery capacity, lighter cars, etc. Compare this with MIT that can light a bulb at 100 meters without wires. So attention is becoming a reality and the pace is picking up.

There are projections that the growth in this area will be exponential between 2014 and 2020. A lot of this is already in the personal products area that are already using this technology such as charging stations, etc. for phones, toothbrushes, etc. The intriguing question is what will happen once "industrial strength" transmission becomes possible. Many of the prototype and experimental items being developed also use microwaves in their transmission schemes. Solar panels on satellites in outer space beaming energy back to earth could be implemented fairly soon...however one of the points of resistance to this is the idea that we would all be constantly bombarded by these microwaves since the concentration of the beam disperses with distance. Many years ago an electrical engineer was commenting on how much of the electronic/electrical/microwaves is basically invisible pollution. He wondered if one day, in an instant, it all became visible what would it look like

and how scary would it be? In this case "out of sight...out of mind" seems to be a good idea.

One of the "down the road" plans is to use this technology to eliminate the grid and all of its shortcomings from power disruptions to physically locating the equipment. So let's follow this yellow brick road to where power is beamed or transmitted wherever it is needed without any of the current impediments. What will become of the grid and all its components? No downed wires and the outages in snow and ice storms. You will be able to live "off the grid" but still have the luxury of electricity.

With all this development is an undercurrent of concern about the effect of microwaves becoming even more pervasive and excessive in the future. Safety procedures in all these applications abound. The towers transmitting power to cars passing along the road have in the system a cut off should a bird or branch block the transmission, even for a second. The transmitter would have to reread the receivers code before they could resume transmitting. All these designs focus on one car or one house or the most simplistic example. How would this play out on the turnpike in rush hour with literally thousands of microwave power beams? Cars losing power as tractor trailers block their receivers? Is this a case where technology is way ahead of real world applications?

How this will work with existing power distribution remains to be seen. Imagine several square blocks of New York City. Does each business and each apartment have their own receivers? The concentration of thousands and thousands of microwave power transmissions could be pretty intense. Backing up the power chain a little further, how will this all impact our present utility companies. Throughout all the various articles, etc. on this subject, billing never will be an issue!



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We have been updating our website, so stop on by and see what is new and interesting!

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SPORTS QUIZ

- How many years was Muhammad Ali exiled from boxing for refusing to enter military service during the war in Vietnam?
a. 3-1/2, b. 5 c. 8 1/2 d. 2
- How many record-setting times was Don Baylor hit by a pitch during his 9 years as a major league baseball player?
a. 79, b. 134, c. 188, d. 267.
- Name four baseball players whose faces have been displayed on U.S. postage stamps.
- What are the two oldest stadiums in major league baseball?
a. Camden Yards, b. Detroit Tiger stadium, c. Yankee Stadium d. Boston Fenway Park
- Who was the first American Leaguer to hit four consecutive home runs in one game?
a. Lou Gehrig, b. Babe Ruth c. Roger Maris d. Roberto Clemente
- How many pentagonal patches are there on a soccer ball?

1. a. 3-1/2 years, from April 1967 to October 1970 2. d. 267 3. Babe Ruth, usually black. The white patches are hexagons.
Boston Fenway Park 5. a. Lou Gehrig, on June 3, 1932. 6. d. 12. They're

The Largest Independent Electrical-Mechanical Sales and Service Company in the Northeast

THE LONGO LETTER

VOLUME 5 ISSUE 5

70 YEARS

WINTER 2014



Joseph M. Longo
President

It is the season to make resolutions; whether serious or light hearted, few of them make it very long. Thankfully in business we refrain from resolutions for the coming year and concentrate on planning, objectives and results. In 2014 we did a lot of upgrading across the board from administrative to field service and, of course, our shops. As a result, we are looking forward to being more efficient and effective in everything from customer communication to work flow and onsite work. From what I can see, so far we are heading in the right direction and I anticipate you, our customers, will reap the benefits in 2015.

At the end of 2014 we had some more impressive anniversaries. A shop mechanic in Wharton at 40 years and a field service technician at 35 years. As I was thanking them at their celebrations, I realized both of these men had mentored me in the mysteries of the electric motor when I was still in my teens! These anniversaries are not unusual for Longo where we have had, and will have, quite a few associates with 20, 30 and more years. I think that the younger associates appreciate this and see that there is more to this company than meets the eye.

2015 will also be a milestone for Longo, our 70th anniversary In 1945 my grandfather, John R. Longo, started J.R. Longo & Sons Electrical Equipment. They quickly

outgrew their small shop in Morristown, especially when the neighbors complained about the fluctuations in the electric power. Over the years the company grew and prospered until it now has four locations in NJ, PA and NY.

Our active business territory has grown. We now are servicing accounts in Delaware, Maryland and Virginia. Part of this new business is due to our Philadelphia area shop and a persistent sales force. Our reputation, when it comes to huge motor and pump combinations, has preceded us, and the fact that we have our own trucks to handle the transportation makes the distance almost irrelevant.

For quite a while our business has been fairly stable when it comes to innovations and abrupt changes. 2015 may be a little different with global weather, changes in fuel and political influences. It has always been a part of our business plan to keep an eye on market forces and adapt as our customers may require and this year will be no different in that regard.

I hope that you and yours have a wonderful holiday experience and all have a safe, healthy and prosperous 2015.



There are various quality assurance, testing, evaluating groups in our industry and even extend across the board to most other industries as well. As an off shoot there are also screening companies that are third party evaluators for companies that have neither time nor expertise to make selections. One of the largest is ISO, International Organization for Standardization which formed right after WWII which, as its name states, creates international standards for a multitude of industries around the world.

Unlike ISO, NETA (InterNational Electrical Testing Association) is focused on one area, electrical testing. Originally, NETA was founded as the National Electrical Testing Association in 1972 on April 14 at the first recorded meeting. Wasting no time at getting down to business, NETA published its first Acceptance Testing Specifications document in 1973, followed by the first Maintenance Testing Specifications in 1975. NETA's founders worked hard at forging a path on which today's members continue to travel. They recognized that being small in numbers meant that they would have to work even harder to get the word out about the importance of electrical testing.

One way that the association kept up with tech-

nology was to begin offering electrical testing and maintenance schools. These programs, started in 1983, have evolved into what is now known as PowerTest, a NETA hosted event. PowerTest has always served to unite individuals seeking to expand their knowledge of that for which they are passionate.

NETA certification and accreditation are two things that really set this organization apart from many other professional associations in existence today. An emphasis on quality, whether that is the quality of a testing technician, the quality of the company backing that individual, or the quality of the test results and services provided, is a philosophy shared across generations and geography alike. These items, coupled with safety and breadth of service, are what have made the services of NETA Accredited Companies and NETA Certified Technicians highly sought after.

For Longo, being NETA certified as a company, along with our technicians, provides third party recognition of our capabilities. Unlike some third party companies, where a donation gets you a plaque and a window decal, NETA requires hard work and studying to achieve the various levels of expertise.

FIELD SERVICE

Who are these guys and what do they do?

Our field service crews don't rewind motors, rebuild pumps or program controllers. Simplistically they remove the bad and install the good, whether it is 500GPM pump, 100 HP motor or run a couple hundred feet of conduit. We are the only field service group that has the in house expertise to be proficient in both electrical and mechanical equipment, as well as a complete line to load responsibility.

As we all know nothing is as simple as it seems, That is why we are fortunate to have these pros because there is no substitute for their seasoned understanding of the nuances of all the various products, procedures and applications we deal with.

There are a multitude of potential hiccups between removal and reinstallation that can create delays



and even safety problems. Long term Longo technicians provide not just 60 years of experience, but team work that produces safer, smarter and more efficient results. They can see and resolve any of these hiccups so they do not add time and cost to the job.

Not every job is a crisis waiting to happen, but being prepared for whatever may pop up is part of that. A major factor is their vans, which could put an industrial hardware store to shame, that have all the equipment to do the various jobs right, and again, do them safely.

Now if anyone asks, you can tell them exactly who those guys are.

A few years ago we rewound a hydrogenerator that was from the early twenties. In fact, the complex had a collection of these old but stout generators. Recently we received another one of these, only this one was substantially bigger than the previous job-a 1500 KVA, 120 RPM, 2400 volts unit.

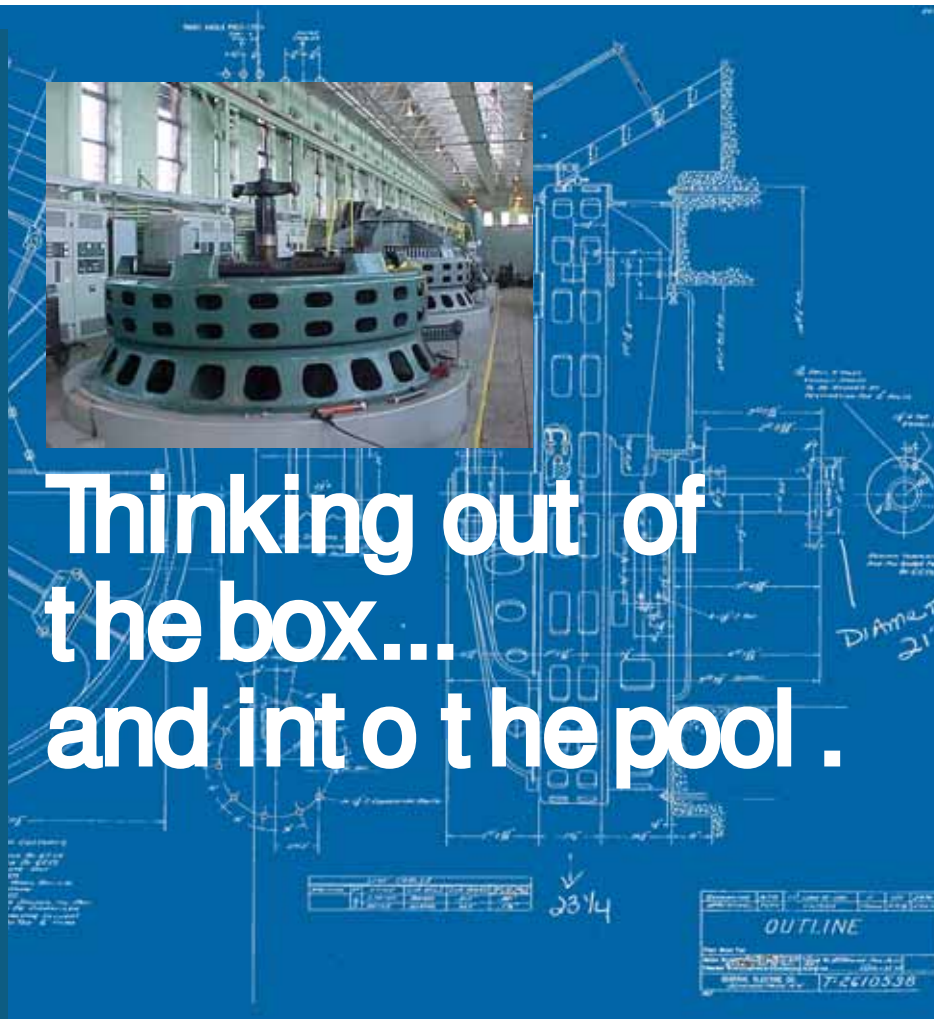
The rotor was just shy of fourteen feet in diameter and the stator a few feet larger. Now we have some large spray booths and ovens but this one was not going to fit into either of them. The rotor was removed and the windings were disassembled. It was bit of a surprise to find they used wood and cardboard for insulation back in the 20's!

To power wash the stator we hit our local big box store and bought a pool. Not some high tech industrial equipment cleaning bath, just a swimming pool. Once up and sealed the stator was craned over and placed into the pool. One of our new technicians donned a combination of shing and safety garb and began power washing the unit. Once the unit was clean the pool had to be pumped out taking all the water and refuse out to be properly disposed of.

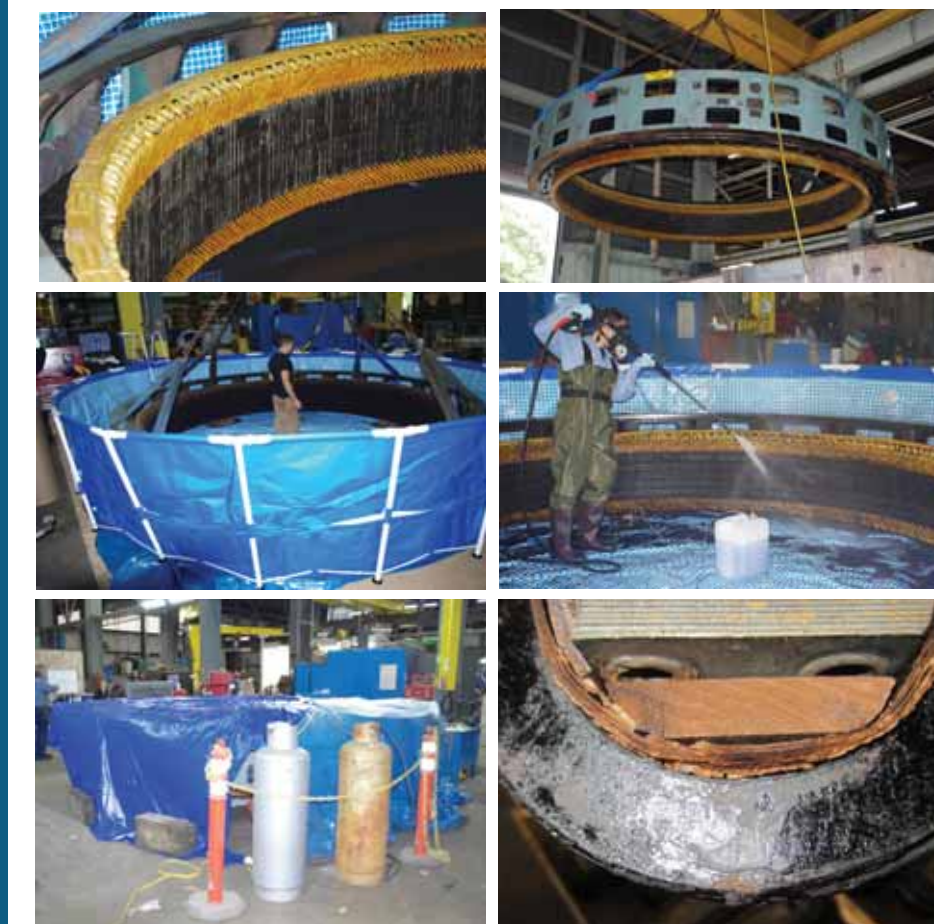
The pool was dismantled and the stator left to air dry. However, it would require more heat to ensure it had dried out completely before it could be tested. The stator was covered in insulation and topped under the cover and left to run until the megger reading were satisfactory. While the pool was a new technique, the heating is not and the shop took all safety precautions to ensure the heaters were properly placed and that it was vented correctly as well.

Not everything is cutting edge, just coming up with solutions that work.

Top left; Winding as it arrived. Top right; Stator lifted into position. Middle left; Pool erected and the stator in it. Middle right; Power washing, Bottom left; Drying out the stator. Bottom right; Wood and cardboard insulation in the rotor windings.



Thinking out of the box... and into the pool.



Three days on a Texas wind farm.

The Wye procedure up tower is surprisingly straight forward, but takes some planning to ensure it is expedited efficiently. Here is an example of a recent repair we did at a Texas wind farm in late October.

A trained two man crew was dispatched from our Wharton Servicenter. As part of their gear was a specific Wye ring repair kit developed by our winding department. This kit contains all the materials and components needed up tower further streamlining the operation. No need to locally search for or source anything.

Day one involves the crew getting onsite and setting up in the nacelle. The first operation in the procedure is removing the hub. Once that is off the technician examines the Wye ring to find the break or breaks. In this case there were two breaks. The initial break and then the secondary break. The secondary break was more severe with easily identifiable evidence of arcing having taken place. All Wye ring connections are upgraded during the repair process.

Day two the actual repairs begin on the Wye ring. The kit components are laid out and the technicians begin the step by step procedure. Once the repair is completed any areas of insulation that were removed during the repair have to be replaced. After the insulation is in place it is covered with a light coat of epoxy and left to cure.

Day three begins with a check on the epoxy to be sure it has cured. Chilly Texas nights can affect the timetable on the epoxy setup. Heaters can be used to speed up the curing time depending on the temperature inside the nacelle. A final check on the repair and the hub can be reinstalled.

With an efficient, trained and properly equipped team a three day up tower repair is definitely a major time and money saver. The money saving is obvious once you remove the crane, crews and transportation. In addition, only three days down time, is something really significant on a farm like this.



You are looking at a repair that can save up to \$100,000!

THE HOW AND THE WYE



The procedure begins with the dismantling of the hub. Once the area is open, and available, the Wye ring can be examined by eye to find any faults. A specific infrared procedure is available to ensure "invisible" breaks are also caught and repaired.

Longo has been involved in the wind industry even before we were a part of NAWSA (North American Wind Service Alliance). In the early years most of our repair work centered around bearing replacement. In many cases ground based generators were placed up tower. Although it is basically a horizontal installation, there is a pitch to it placing extra pressure on the bearings. After a while our crews adapted to this repair up tower, even creating special tools to make changeover safer and much easier, working smarter.

More recently wind generators coming through our shop for repair have had another reoccurring problem. We have found the Wye rings have been splitting and breaking. If they are detected early enough they can be repaired, otherwise there will be arcing and the resulting arc can create significant damage. Detecting and repairing this fault has been difficult since one break will not be noticed or detected. Until now, this repair was an extremely expensive proposition involving removing the generator from the tower, transporting it to a repair

facility and then, once repairs were completed, it was reinstalled up tower. Thousands upon thousands of dollars spent on crews, cranes, transportation etc.

This type of failure is just becoming more prominent as these generators begin to age. Some are in the sixth to seventh year when this type of failure begins to occur. Currently there are approximately 1500 of these generators that are in or approaching this age. While that is a significant number of potential problems, it pales when you consider that there are over 10,000 such generators in service. You can see that as these units roll into the critical time period this expensive problem can multiply 10 fold in the next 5 years and beyond.

Our lead winding technician decided to see if there was a way to repair this problem up tower and eliminate the huge expense of having it removed from the tower. With his experience and knowledge he developed a way to not only detect the fault, but repair the broken Wye

ring while the generator remained inside the nacelle. The repair requires patience and attention to detail. In order to be successful, the balance of the rotor has to be carefully maintained.

Again, the details are extremely important from removal of the fan hub to the repairing of the insulation and the reassembly. While the procedure is surprisingly old school it has been done to more than a dozen generators so far without any problems.

Originally the idea was greeted with some skepticism and then the light went on.



Close up showing the actual split in the Wye rings