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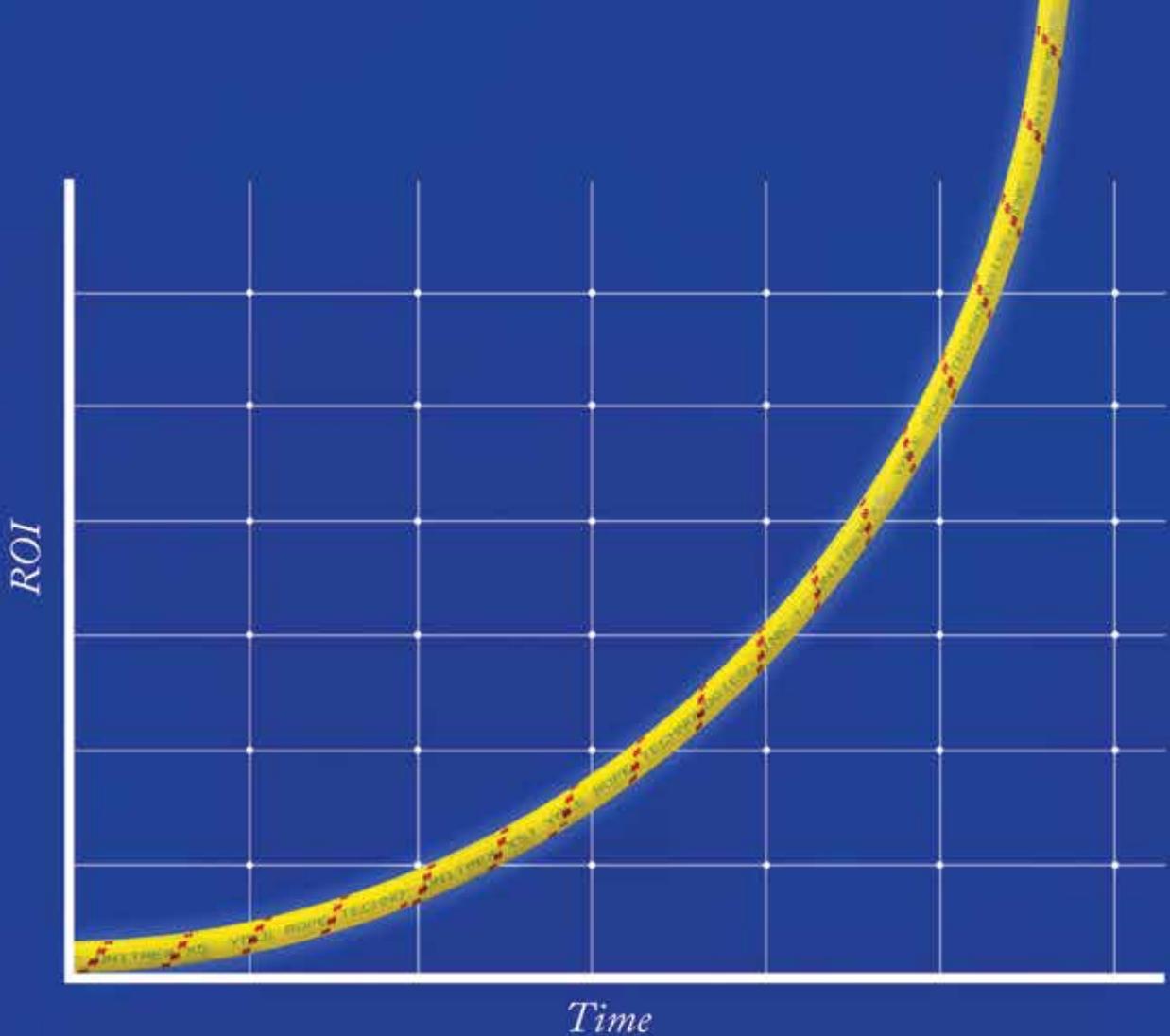
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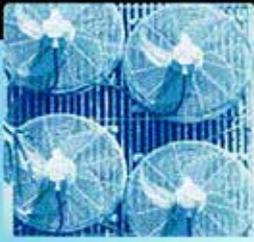
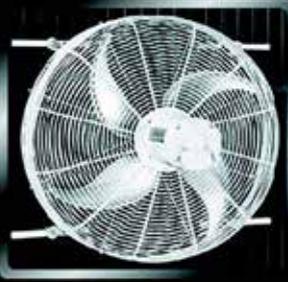
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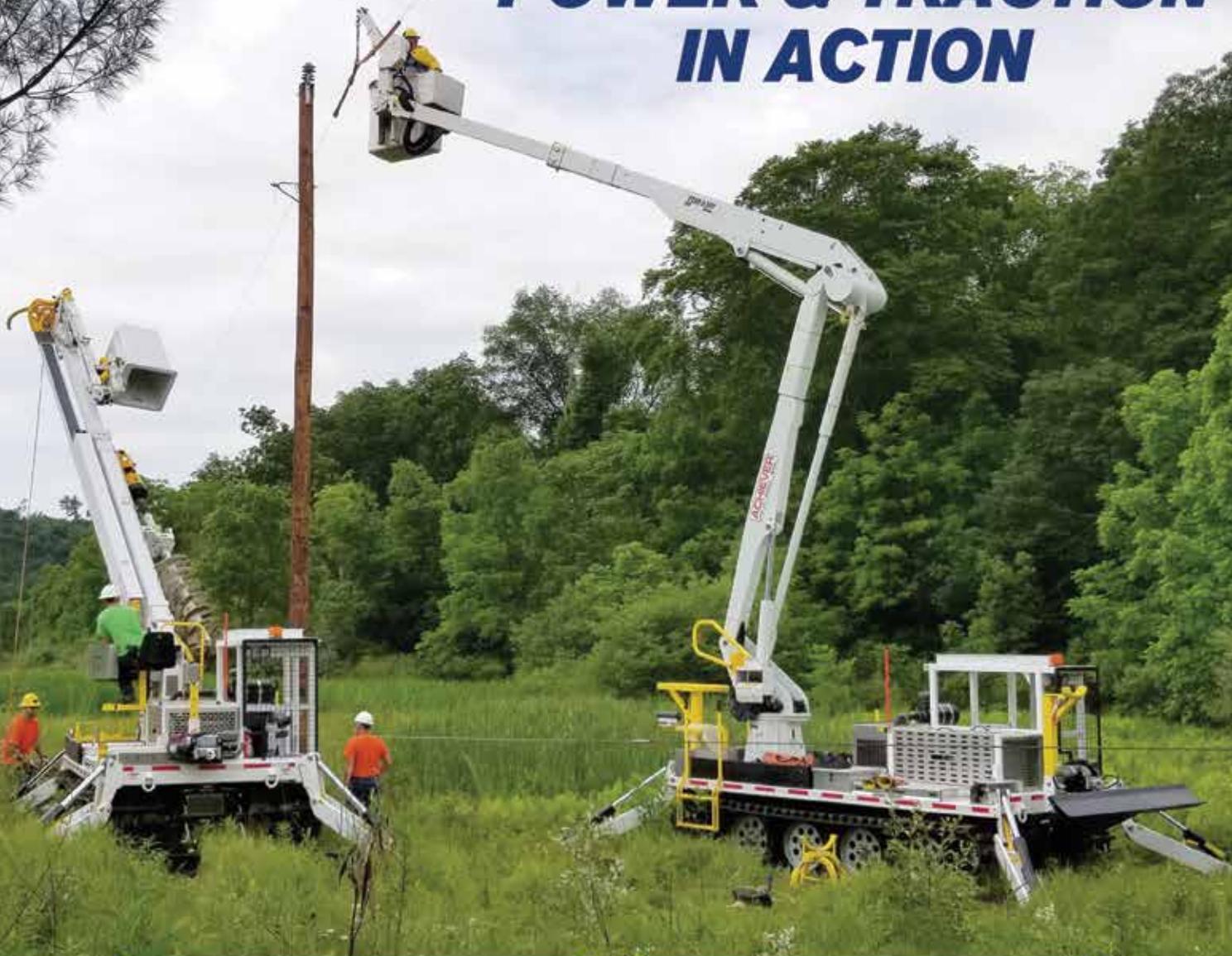


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## **Terex introduces New TL Series Aerials for Transmission Work at EUFMC 2019; Built for Cost-Effective Ownership**

Terex Utilities has expanded its TL Series of aerial devices with three new telescopic and material handling models designed for transmission work. “Cost-effective mounting options, commonality of parts, and reduced maintenance features are ways TL Transmission Aerials Devices deliver economical cost of ownership over the life of the equipment,” said Dan Brenden, Director of Engineering. Terex introduced the new series at the 2019 Electric Utility Fleet Managers Conference (EUFMC) on June 3.

The series includes the TL80, TL100, and TL80/112, which provide 80 ft., 100 ft., and 112 ft. working heights, respectively. The new TL Transmission aerial devices were developed to have strong working ranges when compared to similar transmission aerials. “With variable capacity through the working envelope, the TL Series delivers optimum capacity in the work zone areas where you need it the most,” said Brenden. For example, the TL100 has more than 61 ft. of horizontal reach. It has a maximum material handling capacity of 1,000 lbs.

All three models feature end-mounted two-person platforms with capacities up to 700 pounds. Self-leveling platforms rotate 180 degrees. The TL80 and TL80/112 are also available with an option of a side mounted platform having a jib capacity up to 2,000 lbs.

Designed to provide ground access, the platform on all TL units can be lowered to within inches of the ground. “This makes it easier for line workers to hand off tools and clean out debris in the platform. It also aids personnel



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rescue,” said Balaji Dhondiba, Engineering Manager for Aerial Products.

“Typically able to be mounted on lower GVW chassis than traditional transmission units, it affords fleet owners greater flexibility to aid in managing their budget,” said Dhondiba. For example, the TL80 can be mounted on a 33,000 lbs. GVW, tandem axle chassis. “Not only is this less expensive to purchase than a tri-axle chassis, it also costs less to maintain over the life of the vehicle,” he said.

In addition, the boom design increases bed space and bed access to the bucket.

Use of high grade, high yield strength steel in the upper and lower boom sections, provides rigid operation while reducing weight in the boom. In addition, the lower boom comes with a fiberglass lower boom insert and an upper boom that allows the TL80 and TL80/112 Category B Dielectric to be rated for 138kV work. The TL100 can be rated up to 69kV.

Commonality of parts is another way Terex Utilities is working to streamline fleet management for owners. The TL80 uses the same cylinder for its lower and upper booms, as does the TL100. All three models feature the same leveling cylinders. In addition, the same part is used for the upper boom rest for the TL80 and TL100. For ease of maintenance, hydraulic fittings above the rotation bearing utilize o-ring seals, and adjustable wear pads are easily accessible from outside the boom when adjustment is necessary.

“The new TL aerial devices are a cost-effective addition to transmission fleets when lower GVW chassis are preferred and specific work zone capacity meets the needs of the type of work being done,” said Brendan.

“EUFMC provides electric utility fleet managers a time and place to discuss issues affecting them. We will continue to attend, listen and deliver solutions – as we have been through the years,” said Joe Caywood, Director of Marketing.

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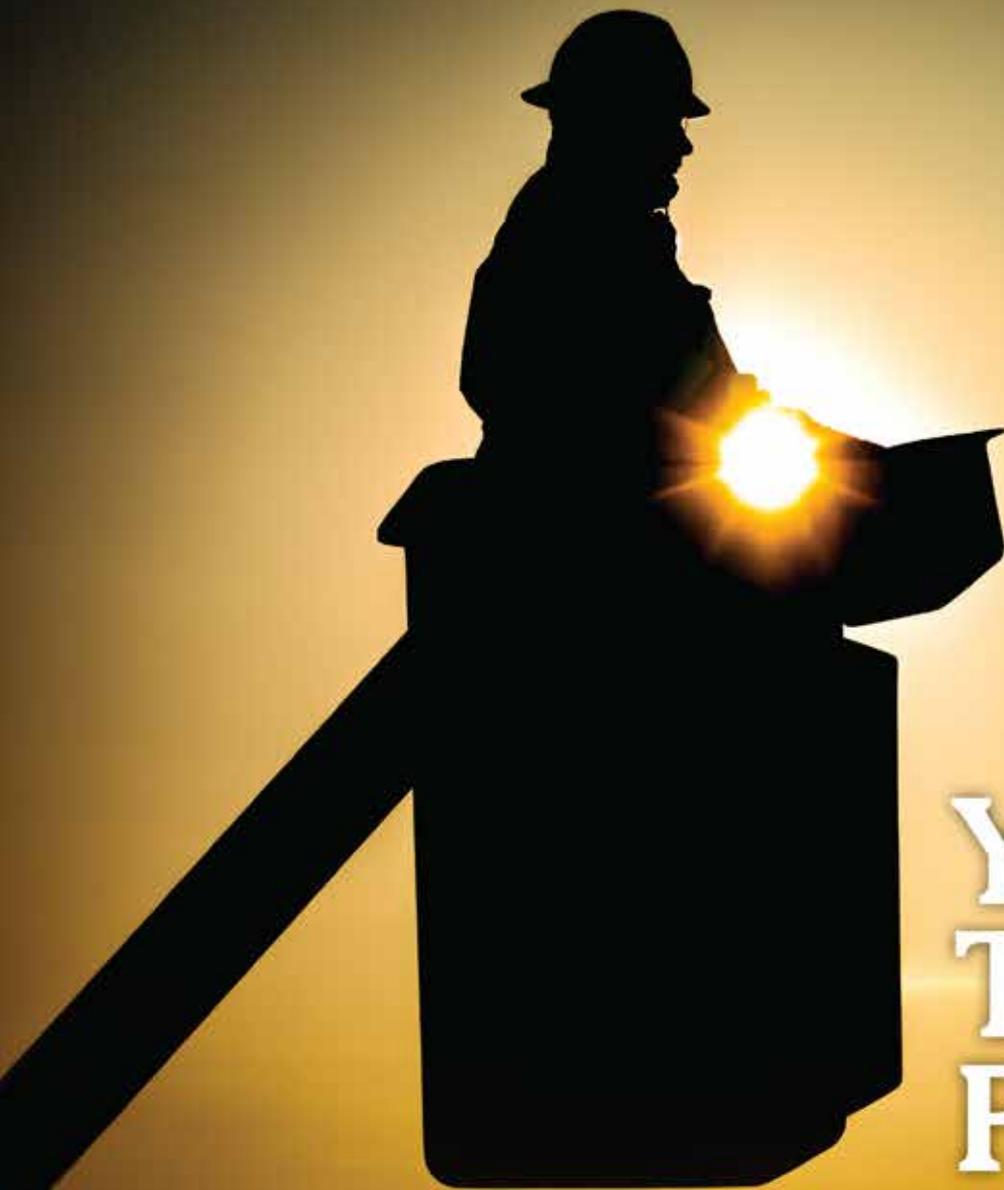


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# Probing Infrastructure Readiness for 5G and Beyond



*Three-dimensional, gyroscope-based mapping of telecom ductwork will verify whether it is ready for high-density fiber optic cable and allow assets to be properly charted*

As the era of 5G arrives, the field of telecommunications is about to become even more dazzling, dramatically impacting every aspect of people's lives – autonomous cars, smart communities, far-reaching IoT. However, with the rollout currently underway, many contractors and telecom operators are discovering a significant challenge with the existing underground infrastructure, as well as potential obstacles for installing new fiber optic cable - the backbone of 5G and beyond.

As a result, gyroscope-based 3D mapping tools are beginning to play a critical role in telecom infrastructure, enabling operators to digitally track assets as well as ensure that installations are not inadvertently compromised.

## Navigating underground maze

The challenge is twofold. First, due to a much greater fiber count, the physical makeup of fiber optic cabling for 5G is not only considerably heftier – having a much larger outside diameter than 4G – but in many cases, it is also less flexible. Second, the duct through which the fiber must run is often installed in highly congested underground areas competing for space in a tangled web of utility infrastructure. This is where telecom, electricity, gas, water, and cable TV grids all compete for space with drainage, mass transit, and other networks.

As a result of these and other natural obstructions, contractors are often forced to maneuver the ductwork to avoid existing barriers. Such maneuvers sometimes result in unexpected turns or bends that compromise min-

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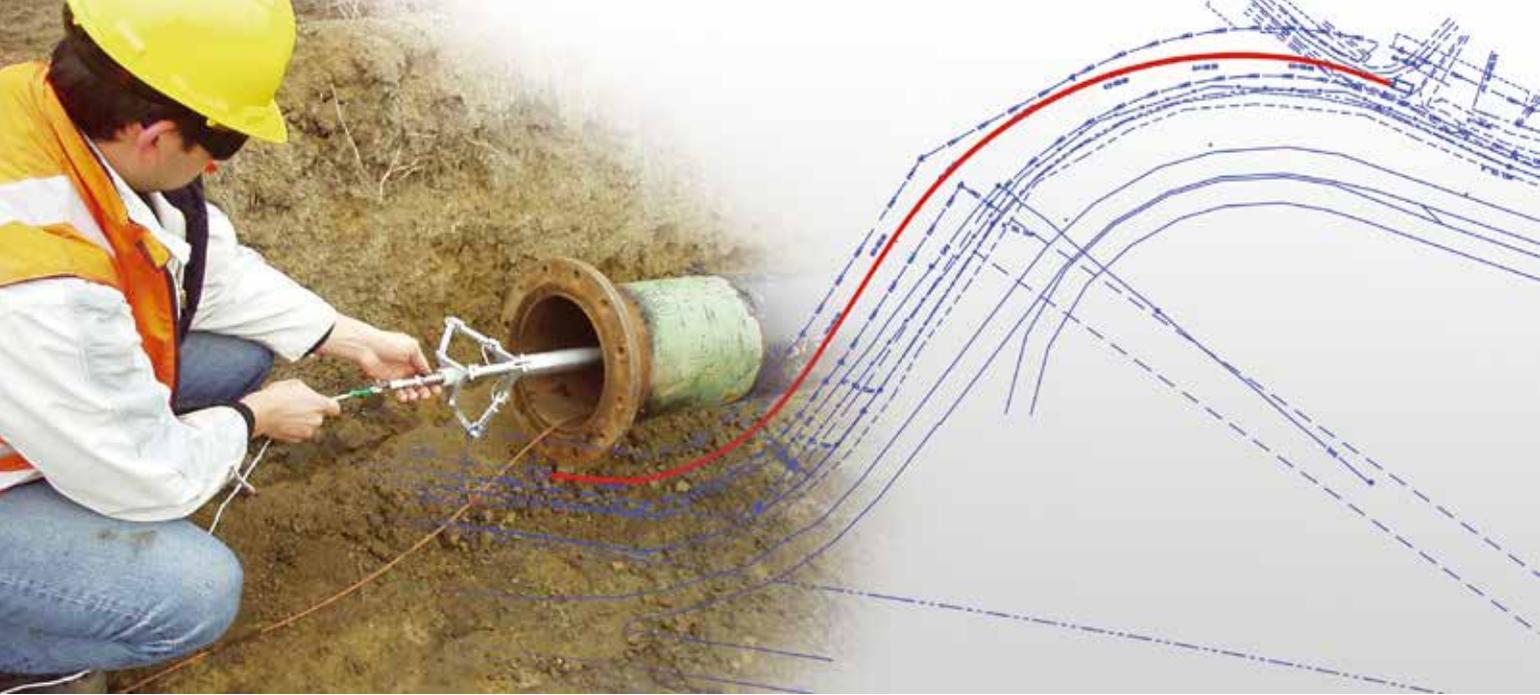


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imum “bend radius” specifications mandated by the cable manufacturer which can cause breakage and ultimate failure of large quantities of fiber during installation. Additionally, these manipulations with the path of cable ductwork can leave assets which are not properly mapped, more vulnerable to accidental damage.

It is not only new construction that is at issue. Many plans for installing 5G cable include utilizing what is known as empty or “dark” HDPE ducts that were previously installed with earlier cable installations to allow for future growth. Yet, not many telecom experts were able to foresee the potential shortcomings of these pre-installed ducts. With the smaller 4G and earlier cable generations, the fibers within were able to withstand the tighter bends. Installing 5G cable in many of these same areas has become an unknown risk.

“Looking back on the emergence of 4G, who could have envisioned five years ago that the increase of fiber count for 5G would double or triple – with a range of 1,700 to nearly 7000 fiber strands in a single cable resulting in a fill ratio in excess of eighty percent,” says Santosh Saride, Market Analyst, with Condux International (Mankato, MN).

Condux is a major supplier of equipment used to install fiber optic cables, and has found that utilizing advanced duct mapping technology is saving telecoms significant time and money during the ramp-up to 5G.

“Proper mapping of the duct in both new and previously installed ductwork promises to expedite the installation of fiber optic cable for 5G and beyond, as well as reduce future downtime due to improperly mapped ducts,” Saride adds.

#### Evaluating possible solutions

The fact is, many, if not most, telecom operators do not have precise maps of their underground assets. Even for those that have invested in geographic information systems (GIS) to store network-related data, the quality of their three-dimensional (XYZ) data provided from most standard GIS platforms is often inaccurate or inadequate. This is largely due to factors such as: unknown depth; references to aging or no longer existing above ground landmarks; analog data references; and the inability to map infrastructure installed by means of trenchless methods, such as river crossings, underneath buildings, etc.

Alternative techniques such as ground-penetrating radar and beacon-based systems are unreliable or impractical because these systems are difficult to use and don’t get the exact measurement of the pipe’s centerline. Moreover, beacon-based systems can measure to a limited depth and are highly susceptible to electromagnetic interference, rendering them virtually useless in densely piped areas or near railways and power lines.

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Gyroscopic-based 3D mapping systems, however, are solving the underground duct mapping problem, delivering reliable XYZ data as well as the centerline of the duct or pipe. The technology, which has been proven through years of mapping underground water infrastructure and pipelines, is now being applied to both existing and new ductwork within the telecom market.

## Automated gyro-based mapping

Condux International, a U.S. based company that has spent decades providing tooling for blowing and pulling fiber through ductwork, has started providing gyroscopic-based 3D mapping technology that allows customers to ensure successful installations of pipelines and ducts – including those for fiber optic cable.

“The gyro-based tools can precisely map the duct or pipeline through miles of dense infrastructure, accurately locating irregularities in ductwork and providing data on bend radius and other deviations that can interfere with the transmission of fiber optic signals, often robbing a 5G cable of up to 40% or more of its transmission capabilities,” says Saride.

Precise mapping of underground cable ducting is now possible through the use of inertial guidance technology that incorporates the exacting 3D instrumentation – gyroscopes, accelerometers, and magnetometers. Incorporated into an innovative tool that travels through the cable ducts, it can precisely map the path from end to end, including bends, undulations and other deviations that may have been required to route the duct through the congested maze of existing underground infrastructure.

Knowing the extent of those deviations, particularly bends, can be critical to understanding the true capacity of the ducts to successfully accommodate the bulkier super-high-bandwidth fiber cable. This is because the radius of every bend in an underground duct can adversely affect the ability of the 5G-or-higher cable to perform according to cable manufacturers’ specifications.

Constructed with military grade hardware, the unit features centralizing rings that support a body containing mapping instruments. The 3D gyro-tool is articulated,



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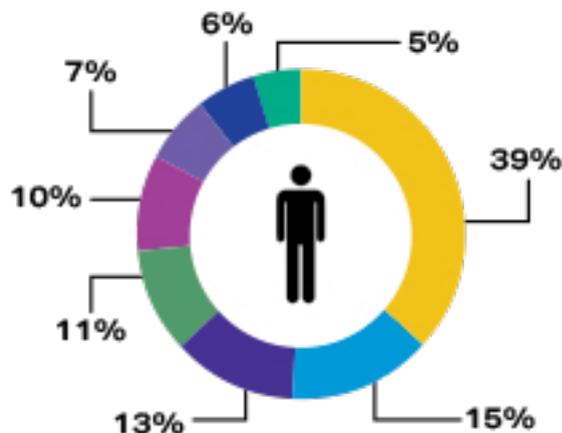
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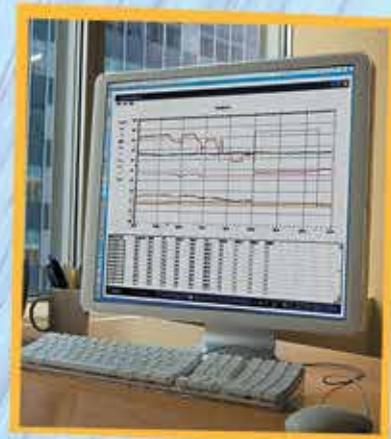
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Power transformers can last anywhere from 15-30 years, but when they enter the end of their life cycle and suddenly self-destruct, plant managers are left scrambling to find a replacement. Under the gun, they often believe the best move is to source a duplicate from the exact same manufacturer. Otherwise, the fear is that the installation will slow to a crawl while contractors in the field try to make a square peg fit in a round hole, almost literally. For good reason, too, as the process of trying to match the transformer bus work and fitting it into the enclosure can drastically delay installation and keep a plant offline for far too long.

However, the availability of transformer manufacturers that specialize in customizing the bus work and footprint to match an end-user's setup saves time and money, while greatly reducing downtime and the associated headaches. Plant engineers can benefit from a few tips before choosing based on the lowest quote.

#### Case in point

The fear of switching to a different transformer manufacturer is well founded, as many engineers have been burned by the false promises from some vendors who proclaim, "Trust us, we can do it and it will fit," with their fingers crossed. Quite often, it doesn't. Feet that don't match runners and bus bars that don't line up properly often delay installations for days or weeks until everything can be cobbled together. In the meantime, production suffers.

Last summer, the CertainTeed plant in L'Anse, Michigan, encountered this exact issue. They had a turn-to-turn short in the 1000 KVA transformer running their manufacturing floor. "It ended up being a total failure, so production went down immediately," recalls Logan Edwards, an electrical engineer for the building products producer.



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"We could not afford to halt production, so I rented a 1000 KVA generator until we could get an exact replacement for the transformer," continues Edwards. "But the monthly rental fee for the generator was extremely expensive - approaching five figures. Plus, the fuel required to run it was costing thousands of dollars. The hard part was none of this was considered capital. It was all an operating expense. So, we needed a transformer, fast to help offset the mounting operating costs."

"In a high-production manufacturing plant, getting the power back is the highest priority," says Alan Ober, an engineering manager at ELSCO ([www.elscotransformers.com](http://www.elscotransformers.com)) a Cincinnati, Ohio-based transformer manufacturer providing new, repaired and rebuilt transformers ranging from 500 through 3750 KVA in 2.5, 5 and 15KV primary voltages.

With 42 years of experience as a lead design and integration engineer, Ober has lived the war stories (both losses and victories) and has the wisdom to explain why engineers need not fear the prospect of sourcing a transformer from a manufacturer other than that on the nameplate.

Finding like for like, in a hurry

In search of not only a fast and perfect fit – along with original quality of construction – plant engineers often assume that they can still get the same exact replacement from the same exact manufacturer.

"The reality is that many of the original manufacturers went out of business long ago or were bought out," observes Ober. "For instance, GE Industrial, Square D, Schneider and a lot of others are either no longer in business or are part of other companies now."

Even if a plant manager insisted on a power transformer being built to original specifications, that can take an extended amount of time, and there still is no guaran-



tee that the unit would match exactly.

Yet, through much due diligence some plant engineers have discovered a way around the "exact replacement vs. quick replacement" dilemma in the form of vendors who specialize in repairing original transformers, or building new transformers with quality materials, in advance.

Once completed, both remanufactured and new transformers are stocked in a warehouse. When an engineer calls up for an emergency replacement, the transformer is pulled out of storage, custom bus work is machined to the exact specifications of the enclosure, and the transformer is loaded onto a truck. Some manufacturers can do all this in a matter of 24-36 hours.

Much of the credit for such a solution goes to the careful gathering of the dimensions of the transformer, and then duplicating it as precisely as possible. As a result, both the high side and low side line up as in the original installation. The same attention to dimensional detail extends to ensuring the transformer feet fit on the front-to-back runners of the existing enclosure. As a result, the transformer gets energized quickly and the plant resumes full operation with minimal downtime.

Failed Delivery

"I started looking to see who could get me a dry type transformer to replace the blown one," continues Edwards. "The rating would be the same, but we knew it would be hard to find a custom retrofit transformer."

Edwards gathered multiple quotes from different

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vendors and decided upon one who promised form-fitting bus work at a bargain price. Part of the low price stemmed from the fact that their transformer was wound with aluminum, which costs less than copper but is also less durable.

“They said, ‘Don’t worry. We’ll have it done by such-and-such time,’ adds Edwards. “So, we scheduled a specific downtime to get it installed.”

However, as is often the case, the manufacturer over promised and under delivered.

“The weekend before we were set for installation, they called to tell me that there had been some issues and it wasn’t going to happen by the scheduled date,” explains Edwards. “What a letdown.”

Not only was it a hassle for the plant to reschedule the downtime, but they were still piling up operational costs with the generator.

“That’s when I reached out to ELSCO who I used before and asked if they could rush a transformer with custom bus work before the ‘down’ which was scheduled in three to four days.”

#### Measuring up

Few manufacturers offer the customization of a transformer before shipping, and of those only a handful can turn it around within a day or two and guarantee it fits right the first time. So, it is critical to ensure the vendor selected is actually capable of the carrying out the task. The trick for any transformer manufacturer to create custom bus work that match exactly is to obtain the exact tolerances. This may seem simple, but it’s more than just H x W x L.

“If the bus is right there where it’s supposed to be, then all the installers have to do is measure the cable coming from high-side switch, cut it, terminate it, and they are done,” says Ober. “Then, you can energize it in as little as two hours after the transformer is setting on its base.”

“It’s funny how it all worked out. The transformer we



got from ELSCO had the higher quality copper windings, which increased cost, but we ended up with a much more robust transformer,” adds Edwards. “The added cost for the copper was actually a ‘wash’ considering that we would have had to rent the generator another week while waiting for the cheaper transformer.”

Edwards then worked with a contractor to have it installed. “We didn’t have to shim it up, nor did we have to slot any additional holes. Everything fit perfectly.”

For more information, contact: Electric Service Company (ELSCO); 5331 Hetzell Street, Cincinnati; OH 45227; 800-232-9002 or 513-271-1752; FAX: 513-271-0543; info@electric-service.com or www.electricservice.com.

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Pressure-driven membrane systems utilize thin, porous sheets of material to separate contaminants from water. The technology, in the form of microfiltration, ultrafiltration, reverse osmosis filtration, and nanofiltration membranes, provides superior water quality with less waste than technologies like sand filtration. Because of this, it is commonly used for potable water production and advanced wastewater treatment, including "purple pipe" reclaimed and recycled wastewater applications.

However, without adequate pre-filtering of the water entering the membranes, such systems can be susceptible to irreparable damage from large particles. In addition, water that is not adequately pre-filtered can cause excessive membrane fouling, leading to sub-par water production as well as costly, premature replacement and unscheduled production downtime.

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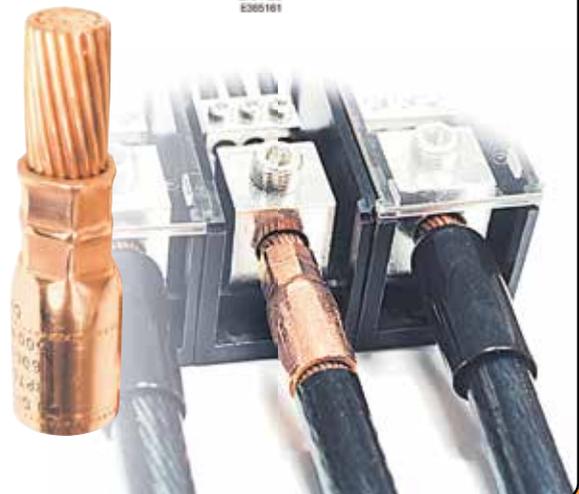
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Fortunately, a growing number of municipalities are ensuring superior water quality, as well as membrane longevity and reliable production, utilizing low maintenance, multi-element, self-cleaning, pre-treatment filters.

#### Optimizing Membrane Longevity and Production

When a municipal water utilities plant in the Southeast United States needed to protect its membranes filters, a superior pre-filtering system was required.

According to an instrumentation technician who installs, programs, configures, and troubleshoots monitoring devices in the drinking water facility, as soon as the water is pulled from the wells, it goes through a strainer. From there, it goes to other parts of the plant for further treatment and cleaning, with membrane filtration utilized at the end of the process.

“The well water has to be strained,” says the technician. “If the sand got through, it would destroy the membrane. The membrane is sensitive to large particles and expensive [to replace].”

While the facility has utilized a sand strainer, instrumentation technician felt this was too small for the plant’s volume, which produces millions of gallons of drinking water per day.

In response, the plant turned to a multi-element, self-cleaning pre-treatment filter from R. P. Adams,

which first introduced and patented the technology in the 1960s and has over 10,000 installations worldwide today.

This design provides an alternative to sand filters, centrifugal separators, and basket type strainers. Unlike those designs, which have limitations in particle size filtration and also require frequent maintenance, the multi-element, self-cleaning pre-treatment filter can provide continuous removal of suspended solids. When utilized as the “first line of defense” for pre-membrane water filtration, it typically filters out sand, silt, and other suspended solids from 500 to 75 microns.

Another significant feature of the multi-element design is in the engineering of the backwash mechanism. With traditional strainers, the backwash mechanism comes into direct contact with the straining media. This can be problematic, as large, suspended solids often encountered with raw water can become lodged between the straining media and the backwash arm. The result is straining media damage and/or rupture that can compromise membranes and other downstream equipment, hindering plant operation.

Instead, the multi-element design utilizes a tube sheet to separate the straining media from the backwash mechanism. This prevents the backwash mechanism from coming into contact with the media and damaging the elements, caused by large solids becoming lodged between the media and the backwash arm.

According to the instrumentation technician, the pre-filter has helped to prolong the usable life of the drinking water facility’s main membrane.

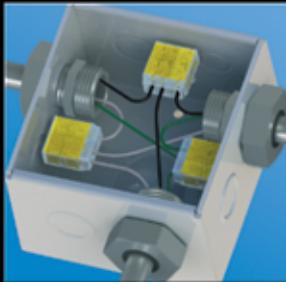
“With pre-filtering, our main membrane functions well for about seven years before it needs to be replaced,” he says. “Without pre-filtering, it would need to be replaced much sooner.”

Municipal water plants also need to consider how to best reduce membrane fouling and required maintenance. Traditional strainers, however, due to limitations in straining area can become clogged quickly. When that occurs, cleaning, media replacement or backwashing is necessary, which adversely affects pro-

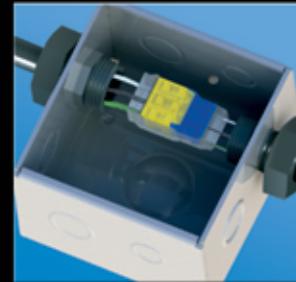
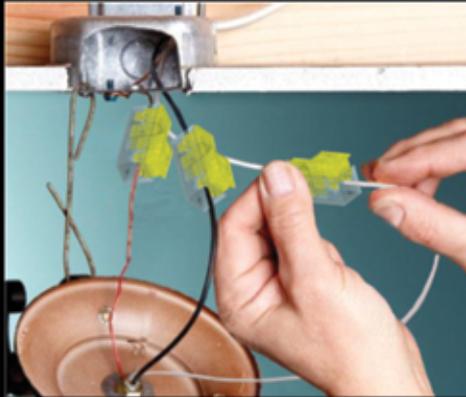
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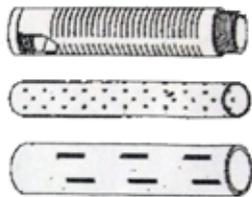
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ductivity as well as maintenance costs.

In this regard, the multi-element design provides three to four times the surface area of traditional strainers and pre-filters. This translates directly into less frequent backwashing so less water goes to waste, less power is consumed, and less maintenance is required.

"We have had no real issues since we bought the pre-filter," says the technician.

When considering pre-filter technology for municipal potable water or wastewater systems, automatic multi-element, self-cleaning, pre-treatment filters are an increasingly popular choice and a reliable, cost effective solution.

For more information contact R.P. Adams, Inc., P.O. Box 963, Buffalo, NY 14240-0963; Phone: (716) 877-2608, toll-free: (800) 896-8869; Fax: (716) 877-9385; E-mail: [info@rpadams.com](mailto:info@rpadams.com); Visit the web site:

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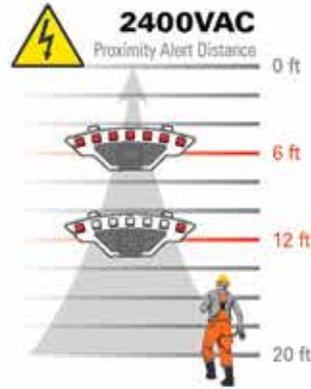
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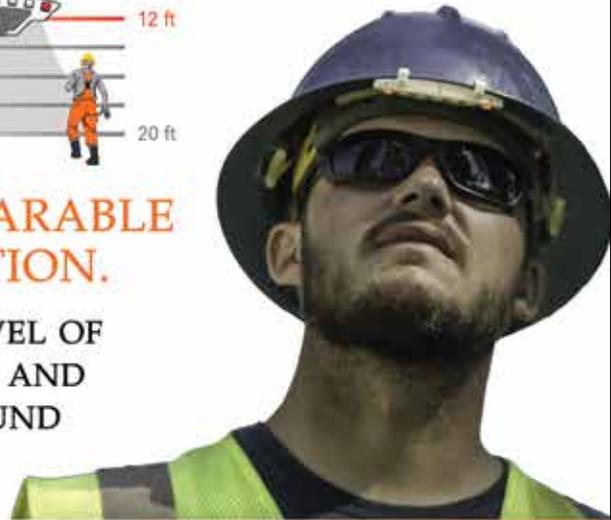
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