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CALIFORNIA CONTRACTOR FINDS THAT THERE'S MORE TO RUNNING A PROFITABLE COMPANY THAN BEING A SKILLED TRADESMAN **PAGE 20**

> MONEY MACHINES SeeSnake helps contractor sell jobs

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> BETTER BUSINESS Five common pitfalls to avoid

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Everyone at Vac-Con, all of our friends, partners, associates and industry followers mourn the tragic death of our dear friend and dealer Dave Berube. He was killed, along with his friend Dana Parenteau, and his associate, Ben Bridges in an airplane accident on Long Island. Dave was the proprietor of New England Municipal Equipment Company, the very first Vac-Con dealer. For more than 30 years, Dave represented our products in the New England territory, and his engaging smile, friendly demeanor and can do attitude will be missed by everyone he touched. He loved life

and all it had to offer. He was involved in motor sports, including automobile racing, motorcycles and snowmobiles; if it had an engine, he liked it. He was an experienced and skilled pilot, having logged many thousands of hours in the air.

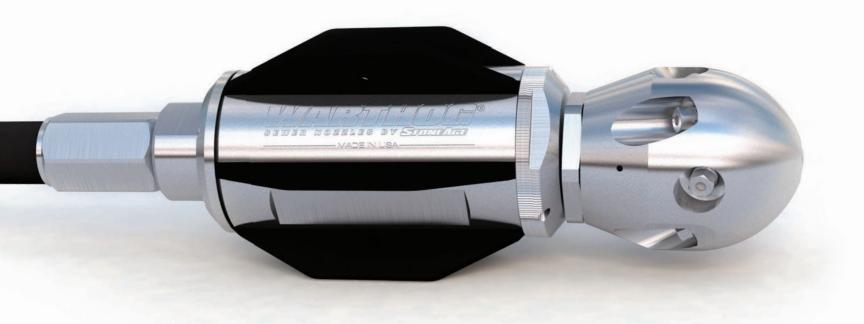
> But most importantly, he was our friend, our business associate and our partner. We did a lot of business together and had a lot of fun together; we laughed, we cried, we argued, we agreed, we fought, we made up. We miss all of those moments, Dave and wish you were still here. Wherever you have gone, we bid you Godspeed, and our thoughts are with you. Your memory will be cherished by us all.





Pictured: L-R Dave Berube and Darrell LeSage, President, Vac-Con, Inc.





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CONTENTS

JUNE 2016



features

By Ken Wysocky

20 Profile: A Businesslike Approach California contractor finds that there's more to running a profitable company than being a skilled tradesman.

30 Tech Perspective: Locating School – Frequency and Fields Understanding how high-tech utility locators work is the first step in making them work for you. By Ken Wysocky

- **36 Profile: Locate and Identify** North Carolina firm's focus on providing a complete underground picture helps build a solid reputation and customer base. By Cory Dellenbach
- **44 Tech Perspective: Locating School Equipment and Technique** An understanding of potential job site challenges can help operators differentiate between malfunctioning tools and job site issues. By Kyle Rogers



ON THE COVER:

Cary Hansen opened Hansen's Plumbing & Mechanical in Ventura, California, in 1987, but it wasn't until 2005 when he began focusing more on the business side of the operation that things really took off. (Photography by Collin Chappelle)





departments

12 From the Editor: Location, Location, Location

A clear picture of what lies beneath your job site is critical any time you're forced to excavate. By Luke Laggis

- 16 @cleaner.com Be sure to check out our exclusive online content.
- 48 Money Machines: Visible Results

Inspection cameras help California contractor's customers get the picture on drainline clogs and repairs. By Ken Wysocky

50 Safety First: Clamping Down on Accidents

Criminal prosecution for safety violations is more likely under new federal plan. By Doug Day

54 WWETT Spotlight: Upgrading a Favorite Modifications to Hot let II drainline jetter make the unit mo

Modifications to Hot Jet II drainline jetter make the unit more powerful and durable. By Craig Mandli

58 Better Business: Quit Being a Bad Manager

Avoid five common pitfalls and create an environment where employees work tirelessly to make your company succeed. By David Waits

62 Money Manager: Don't Tarnish Your Golden Years

Take advantage of easy online retirement calculators and other tools to prepare for life after work. By Erik Gunn

64 Product Focus:

Location and Leak Detection, Drainline TV Inspection Equipment By Craig Mandli

70 Product News

Product Spotlight: TT Technologies G Series Grundoburst splits iron and steel. By Luke LeNoble

74 Industry News

COMING IN JULY 2016

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SPECIAL ISSUE: Annual Buyer's Guide

- MONEY MACHINES: Lining system keeps work in-house
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ADVERTISER INDEX - June 2016

_
A D. North America Inc.
A.R. North America, Inc8 ALLAN J. COLEMAN
Allan J. Coleman Co 11, 81
MACHINERY
Amazing Machinery, Inc51
ARIES
Aries Industries, Inc43
C C
C Cable Center, The
A BAA
Cam Spray
Central Oklahoma Winnelson
CIPP Services, LLC
Cloverleaf*
Cloverleaf Tool Co
THE MORENOWS CHICK
Coast Manufacturing
CPI Products
CUES
D
Deep Trekker
Doug Meadows Co., LLC
direct
Draincables Direct
Manufacturing Company
Duracable Manufacturing Co17
E
Electric Eel
Electric Eel Mfg55
Epivirosight
Envirosight, LLC5
enz 🐠 usa inc.
Enz USA, Inc
F
Solutions

G	1
GapVax, Inc	Perma-L
General	Picote So
General Pipe Cleaners2	
Gorlitz ::::::::::::::::::::::::::::::::::::	Pipeline
GUZZUER Guzzler Manufacturing15	PIPELOGI
	PipeLogiz
н	
Hurco Technologies, Inc	PrimeLin
J	
Jetstream K	Pulsar 20
JETTERS NORTHWEST	
К	Quik-Lin
(s. N/1)	RS
Ken-Way Corporation46	THE SINGLE/SOL
L	R.S. Tech
Lansas.	IBA
Lansas Products	RapidVie
	Ratech E
MRP MRP	Root
Milwaukee Rubber Products, Inc	Root Rat.
	00000
Mongoose Jetters by Sewer Equipment13	Scooter V
MyTana	Sewer Ec
MyĪana Mfg. Company, Inc19	Southlan
Ν	SPARTAN
NLB Corp.	Spartan
NLB Corp57	Stone Age
NozzTeq, Inc	SubSurfa
0	
Ocean Quip LLC Ocean quip (ables LLC)	T&T Tools
Oceanquip Cables, LLC18	1 1001

Р	
USTRIES,	Trenchless Solutions, Inc46
erma-Liner Industries, LLC7	TRYTEK
PICOTE	TRY TEK Machine Works, Inc63
icote Solutions55	TST Sweden AB59
Pipeline Analytics	U
ipeline Analytics42	
IPELOGIX	Ultra Shore
ipeLogix, Inc8	V
, in the second	VAC-CON Vac-Con, Inc
MEX rimeLine Products, Inc41	
Pulsar 2000	
ulsar 2000, Inc	VARCo14
	Vivax-Metrotech Corp
Q	VSI Rentals
uik-Lining Systems, Inc18	
-	W
R	WATER
ESINGLE/XSOCIFION .S. Technical Services, Inc23	Water Cannon, Inc. – MWBE82
	Westech Vac Systems
BAK	Westmoor Ltd18
apidView IBAK North America71	Marketplace76-77
kalech	Classifieds
electronics atech Electronics, Ltd	
Root Rat.	
oot Rat	Have you seen the
	E-ZINE · E-ZINE · E-ZINE
S	Cleaner
	E.Zino2
cooter Video33 ewer Equipment Co. of Nevada42	E-Zine:
OUTHLAND OOL Mrs. Isc	Closenar
outhland Tool Mfg., Inc61	
PARTAN	
partan Tool, LLC84 STONEAGE	
toneAge, Inc4	Praying the
ubSurface Locators, Inc63	B-20
-	Any format and the second seco
170013	Go to cleaner.com
	to view the e-zine.
&T Tools, Inc	

Marketplace Classifieds	
Westmoor Ltd.	
Westech Vac Systems	9
Water Cannon, Inc MWBE	82



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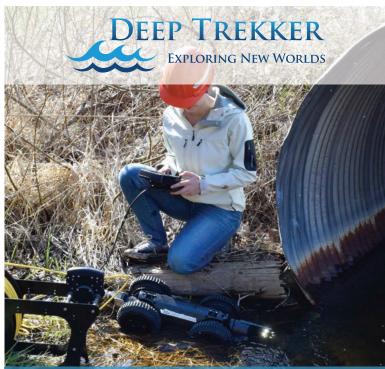
Location, Location, Location

A clear picture of what lies beneath your job site is critical any time you're forced to excavate

By Luke Laggis

'd like to hydroexcavate a whole city. I'd like to see the underground fully exposed, with all the infrastructure preserved and held in place by wires and stilts like dinosaur skeletons in a museum — a sort of living, life-size diorama of modern sanitation, exposed for a society that has little more understanding of its own life-supporting infrastructure than it does the bone structure of a Tyrannosaurus rex.

I'm sure you'd like to see your job sites exposed like that, too. When you have to replace or repair underground pipes, you don't have the luxury of being able to see everything that lies below the surface. That's why good locating equipment — and a thorough understanding of how to properly use it — is so important.



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Sweetwater Utility Exploration is one of the contractors featured in this issue. The company, based in Troutman, North Carolina, offers vacuum excavation along with electromagnetic and ground-penetrating radar locating services throughout the Northeast and as far south as Florida.

Thoroughness is critical when locating and mapping underground infrastructure, and it's one of the hallmarks of Sweetwater's work. Crews mark every utility on a job site and will also conduct records research on properties for clients. After surveying the job site, crews map the area and compare those maps to the records they received to confirm the location of all utilities and other underground obstacles. When clients determine the proper location for new utilities, Sweetwater uses its custom-built vacuum excavation equipment to pothole.

Nothing is left to chance. That's how you have to approach every utility locating scenario. It all starts with good equipment and a complete understanding of how to properly use it. The Tech Perspectives in this issue should provide a little insight in that regard.

The basics — equipment, technology, technique and the overall science of locating - are all detailed in this issue. These stories are no substitute for experience, but they're a nice complement and should reinforce the good practices you're already familiar with. And for the uninitiated, they also serve as a great introduction to the technology behind locating equipment, and an overview of the techniques you'll need to understand before tackling your own locating work.

You'll never be able to strip away every bit of dirt and completely expose your job site, but with good locating equipment and a thorough understanding of how to use it properly, you'll have a clear picture of everything that lies below the surface.

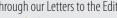
I hope you find these stories helpful, and I hope they help you keep safety top of mind at all times.

Enjoy this month's issue. **c**



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CALIFORNIA CONTRACTOR FINDS THAT THERE'S MORE TO RUNNING A PROFITABLE COMPANY THAN BEING A SKILLED TRADESMAN

BY KEN WYSOCKY PHOTOGRAPHY BY COLLIN CHAPPELLE



Plumber Anthony Steiger guides the jetter hose with assistance from apprentice Kole Hansen on a preventive maintenance cleaning job.



or years, Cary Hansen felt like he owned just a job while running his business, Hansen's Plumbing & Mechanical in Ventura, California. But fueled by

a relentless drive for self-education in the ways of business, Hansen now feels like he truly owns a company — and the distinction between the two has made all the difference in terms of profitability, not to mention job satisfaction.

"When you own a job, you don't make money unless you're working," says Hansen, who established his company in 1987. "But when you own a company, you make money even if you don't work because



you're delegating responsibilities. You can't do everything. ... You have to trust people; let go of the vine, as they say."

Hansen's experience is familiar to many drain cleaners and plumbers who strike out on their own, only to discover they're more skilled at plying their craft than running a profitable business. But Hansen's journey from tradesman to businessman shows that by making good use of available resources, it's possible to become skilled at both.

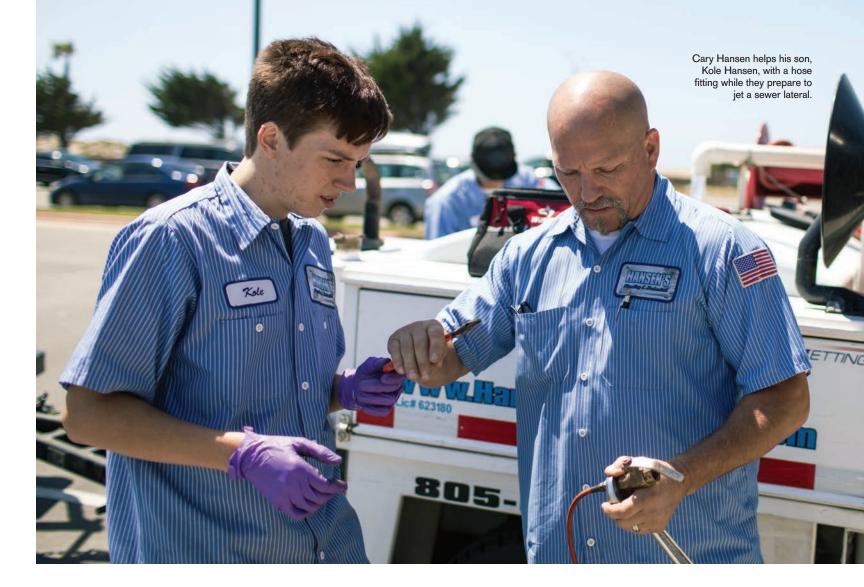
How skilled? Since Hansen took steps in 2005 to make his business more structured and, well, businesslike, he estimates that gross revenues increased between 800 and 1,000 percent.

Plumber apprentice Kole Hansen feeds a jetter hose into a clean-out to clear a lateral at a marina that often gets backed up with the waste from returning boats.

"Before, I wasn't even taking a salary," he says. "The money came in and I bought what I needed. The materials bills would go up and I'd try to pay them down. There was no structure at all, and work was taking a physical toll, too.

"Now that the company runs more by itself, I have more free time," he adds. "I got some balance back in my life that you don't have when you just own a job. Before, after so many years of doing everything myself, I got stressed out and burned out. But it reinvigorated me to learn how to really run a business — helped me put more passion back into the company. I still go out in the field to support the guys, but now it's about a 30/70 split between being in the field and in the office. It's a much better balance for me."





BUSINESS 101

Hansen started out his career as a backflow tester for a plumbing company in Ventura. Frustrated with the company's operations, he decided to start his own backflow testing company. "I figured I would do small plumbing jobs until I built up a large enough client base for backflow testing," he recalls. "But it worked out the other way around."

"Before, after so many years of doing everything myself, I got stressed out and burned out. But it reinvigorated me to learn how to really run a business – HELPED ME PUT MORE PASSION BACK INTO THE COMPANY."

Cary Hansen

By the early 2000s, Hansen employed four technicians and was focused on plumbing service work, drain cleaning and custom installations in new homes. "But there was never anyone in the office," he says. "I had too many hats on, so we dropped custom installations and focused just on service work."

In 2005, Hansen says sheer frustration and stress prompted him to "get serious about owning a solid company." He started by poring through trade magazines to figure out best business practices. He also attended seminars

run by business consultants such as Al Levi, the owner of Appleseed Business Inc., and Ellen Rohr, the owner of Bare Bones Biz Inc.

>> RIGHT: Plumber Anthony Steiger changes jetter nozzles before cleaning a commercial lateral line.

But the real turning point occurred when Hansen started participating in online sessions run by the Service Roundtable. That led him to an affiliated group called

Service Nation Alliance, a coalition of select contractors that teaches business planning, operation, finance and marketing skills. It also provides access to a network of contractors who can answer questions about business problems, as well as weekly training webinars, vast website resources and the ability to buy materials at a volume discount from select vendors, Hansen says.

Like anything, however, nothing good comes free; Hansen estimates he initially spent about \$15,000 for the Appleseed and Bare Bones seminars and a Service Nation membership, which requires a \$10,000 fee, plus \$100 a week. But he says the cash outlay, while painful, was a very worthwhile investment. "I was hesitant at first, but I've been very pleasantly surprised at the results," he says. "It's been

great. If you run two trucks and want to grow, it can get you over the hump."

As an example, he points to his company's website, which was underutilized for years and had become a financial black hole of sorts, consuming cash while providing lackluster results. But following a recommendation from a Service Nation mentor, Hansen contacted a consultant who redesigned and reconfigured the company's website. "It had a definite impact," Hansen says. "I'd say that once we got our website

WATCH THEM IN ACTION

To learn more about Hansen's Plumbing & Mechanical Inc., view the video at www.cleaner.com.





"I always buy the best equipment I can find BECAUSE IT SAVES MONEY IN THE LONG RUN."

Cary Hansen

cleaned up, our service inquiries went up about 20 to 30 percent a week.

"Before, we probably received about 30 calls a week (from people who found the company online)," he continues. "And now we get about 40 a week. Our average ticket is about \$400, so that comes out to several thousand dollars a week more than before. We even got

a reduced website hosting rate because of our Service Nation membership."

GOOD EQUIPMENT PROMOTES PROFITABILITY

Residential work generates about 60 percent of the company's business volume, with commercial work producing most of the rest.

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The Hansen's Plumbing team includes (front, from left) plumber Anthony Steiger, plumber Manuel Aranda, dispatcher Peggy Ledbetter, owner Cary Hansen, Patti Hansen, plumber Alexander Bryan, apprentice Jacob Slay, plumber Nathan Paul and apprentice Kole Hansen; (back) apprentice Daniel Paul and office manager Eileen Paul.

The company offers a variety of services, ranging from plumbing service to pipeline inspections and drain cleaning.

To provide this diverse array of services, Hansen's Plumbing relies on a fleet of equipment that includes five service trucks: Chevy 3/4-ton utility box trucks with 8-foot bodies from Harbor Truck Bodies. The company also owns cable machines built by Quadra-Plex capable of handling pipes up to 4 inches in diameter; hand-held RIDGID sink cable machines; a trailer jetter made by US Jetting (4,000 psi at 18 gpm); four wheeled mini water jetters manufactured by Gorlitz Sewer & Drain (3,000 at 7 gpm); and three RIDGID SeeSnake pipeline inspection cameras.

"I always buy the best equipment I can find because it saves money in the long run," he says. "For example, we used to buy less expensive camera systems and now we have a pile of old ones in our shop. Reliability is also an issue — if machines don't break down, they keep making money for you. I'm a true believer in spending that (proverbial) extra \$10 to make \$20.

"Knowing they have good equipment to work with also keeps up our $_{\rm CONTINUED}\!>\!\!>$

CORE VALUES ARE MORE THAN A CLICHÉ

Mention "core values" to employees and you're bound to see a lot of eye-rolling. But at Hansen's Plumbing & Mechanical in Ventura, California, owner Cary Hansen firmly believes that core values have, well, value.

"Establishing core values helps a company build a better team, because everyone shares the same values and feels like they're working for the greater good and each other," he explains. "I'm talking about things like having a can-do attitude, on-the-job integrity, respect, accountability and trust. When you share the same values and work together and support each other, it builds and strengthens the company."

Hansen says that developing core values generates another benefit: New employees quickly realize if they're a good fit or not — and if it's the latter, typically leave on their own accord. "If they feel like they're not part of the team, they don't stay — they weed themselves out," he says. "I never have to fire anyone."

Based on Hansen's own experience with business education, which he says radically transformed his business during the last 11 years, the company also emphasizes ongoing training and education as another core value. New apprentices cross-train with each of the company's five technicians to get maximum exposure to different ideas and techniques. In addition to hands-on training in the shop and on the road, Hansen is also establishing three half-hour, internet-based training sessions a week for technicians, focusing on job safety, plumbing code updates and traderelated topics, like how to operate a water jetter.

"I'm also looking at training companies that can teach our service technicians how to talk better with customers," Hansen adds. "Residential jobs are worlds away from working on commercial jobs."

To motivate technicians, Hansen Plumbing offers competitive salaries and benefits and also pays quarterly bonuses to employees who check off enough boxes on a scorecard Hansen uses to grade their performance. This, too, helps reinforce core values like accountability and can-do attitude. "Ninety days is a better motivational window than an annual review," Hansen explains. "It keeps them more focused and more driven.

"They earn the bonuses if they do really well on revenue, minimize service callbacks and generally support the team and aren't a headache to manage," Hansen says. "If they grade out really well, they can earn a bonus, a raise or even both." The cash bonuses range from \$150 to \$250 and raises vary from 25 cents to \$1 an hour.

"It works very well," he says. "They don't have to wait a full year for a raise, which minimizes continued requests for raises. We see a lot more positive attitudes and output."

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technicians' morale," he adds. "It gives them a more positive attitude toward work." Moreover, reliable, well-maintained equipment impresses customers, who perceive they're getting more value for their dollar.

"Knowing they have good equipment to work with also keeps up our technicians' morale. IT GIVES THEM A MORE POSITIVE ATTITUDE TOWARD WORK." Cary Hansen

In some instances, better equipment also helps customers make important decisions. For example, Hansen points out that the lights on his RIDGID SeeSnakes are more powerful than cheaper brands, so

Anthony Steiger pulls hose from a US Jetting trailer jetter to the clean-out where he'll access a sewer lateral.

they provide better images that make it easier to show customers a problem in their drainlines.

Investing in more equipment also helps Hansen's Plumbing generate



additional revenue as a subcontractor for companies that don't have the same resources. A good example is a smoke machine made by Hurco Technologies. "Hardly anyone around here has a smoke machine," Hansen says. "They're great because a camera can't always identify where a smaller break is located, plus you can't camera an entire drain and vent system."

MUNICIPAL MARKET BECKONS

Looking ahead, Hansen plans to buy a tractor-mounted camera system that's capable of inspecting larger mainline pipes because he sees municipal work as an opportunity for growth.

"I believe the market is there," he says. "The municipalities have their

own equipment, but sometimes it breaks down and they need support. And there aren't many other guys who do that kind of work.

"I'd like to get established with the camera and if that goes well, buy a vacuum truck," he adds. "I'm trying to keep the financial risk down by taking things one step at a time. I'm confident that a tractor camera will pay for itself right off the bat. ... If we do a good job, they'll keep calling us."

In the meantime, Hansen plans to keep learning and sticking with the business essentials that have transformed his business. "If something doesn't work, change it," he advises. "If it does work, keep doing it. Be relentless and keep going forward. It's like eating an elephant — you take one bite at a time." **C**

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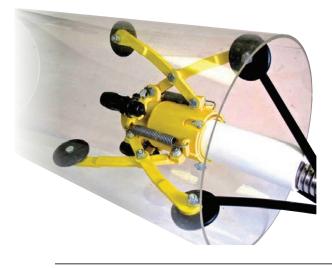
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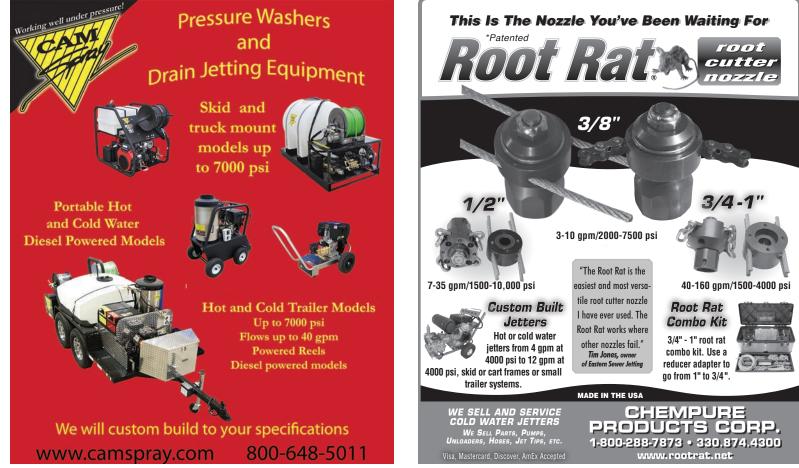
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SCHOOL

Frequency and Fields

Understanding how high-tech utility locators work is the first step in making them work for you

By Ken Wysocky

contractor using a utility locating system is a magician of sorts, slowly waving a wand through the air to determine the precise location and depth of a buried utility line — all while enhancing job site safety and productivity. Pretty neat trick, right?

Of course, these are technicians, not magicians, and they're wielding some impressive technology. But to the uninitiated, understanding and using these high-tech instruments can seem daunting. Transmitters, receivers, grounding stakes, milliamps, and hertz (Hz) and kilohertz (kHz) frequencies — how does it all work?

THE BASICS

As confusing as it may appear, it all boils down to one simple thing: magnetic fields. If you think back to middle school science, you'll no doubt remember that electricity produces magnetic fields, and that forms the basis for utility locating.

"It all works off magnetics," says Matt Lumbers, product manager for Subsite Electronics, a division of The Charles Machine Works Inc. "Anytime electric current flows, it produces a magnetic field."

To understand how locators work in concert with these magnetic fields, let's start from the beginning. The most commonly used locating systems utilize two basic components: a transmitter and a receiver (a hand-held wand). Both are battery powered. The transmitter sends current through a line, and the receiver detects the resulting electromagnetic waves, or frequencies, produced by that current. The receiver is capable of picking up a wide range of frequencies, typically ranging from a low end of 256 Hz to a high end of 83 kHz (or 83,000 Hz), Lumbers says.

There are two different kinds of locating methods, active and passive. In active detection, you create current by connecting a transmitter directly to a cable or pipe. With passive detection, you're tapping into pipelines (typically metallic power lines) that create their own magnetic fields/currents. Other types of pipes, such as plastic gas lines, are installed with jacketed lines called tracer wires that conduct electric current.

If tracer wires weren't installed, other options exist. For instance, a contractor could send a signal-generating device called a sonde through a pipeline via a cable. The wand detects the sonde's location. "If this is not possible, then you can use ground-penetrating radar (GPR), which can see nonmetallic objects underground," Lumbers says. "But this technology is very soil dependent and expensive, which is why it is not used very often."

GETTING CONNECTED

The most common form of utility locating — known as conductive mode — is done with direct-connect cables that resemble jumper cables, with a red

30 Cleaner • June 2016

LEFT: Jeff Kerr, owner of Marlin Wastewater Services, uses a Prototek analog receiver to locate a sonde and determine the location of a septic tank.

>> **RIGHT:** Technicians Joseph True (left) and Jamie Velasquez of Mid-Atlantic Utility Locating use Vivax-Metrotech equipment to transmit a signal along a utility line and trace its path.

lead and a black lead. To begin, plug the direct-connect cable into the transmitter, then connect the black lead to a ground stake and the red lead to the pipe you're trying to locate, or perhaps a meter to which it's attached. In other instances, you might connect the red lead to a pedestal in a utility right-of-way, he says.

Proper grounding is very important; the better the ground, the stronger the signal. As such, it's best to locate the ground stake as far as possible from the expected trace path. Placing the ground stake at a 90-degree angle from the trace path is your best option.

Next, turn on the transmitter and choose a low frequency for starters, then set the wand to the same frequency. Look at the wand's milliamp reading to verify good continuity;

the higher the milliamp reading, the better the connection. Why start at a low frequency? A lower frequency is not as prone to "bleeding off" onto other nearby lines, which is critical in an area congested with underground infrastructure. To locate gas pipes, for example, start around 815 or 870 Hz, Lumbers suggests.

After choosing a frequency, move about 25 feet away from the transmitter and walk in a circle. As you do so, look for a peak response on the wand, which is indicated both numerically and by a change in a tone emitted by the wand. The pitch goes higher when you're directly above the line you're seeking, he says. After you find a peak signal spot, follow the expected trace path. Every 5 feet or so, move the wand from side to side to ensure you're following the peak signal path. Do this for as long of a distance as needed. If the signal suddenly weakens, the pipeline probably changed direction. Arrows on the wand's

INTEGRATED LINE TRACING SIMPLIFIES LOCATING BY JOSH SOOY

Sonde locating is an effective and time-tested method for tracing the path of buried pipes.

The idea is to energize the camera head so that you can find a specific location using an electromagnetic locator. The transmitter embedded in the camera head emits a radio frequency providing precise location and depth. This technique is used when you need to pinpoint the location where a drainline is damaged to help reduce excavation needed to make the repair.

Modern camera monitors are making the job even easier by providing "integrated line tracing" functionality. When a transmitter is hooked up to the monitor, the entire push cable can be energized. A user can then use their locator to follow the entire pipe instead of just locating the camera head. No more running up and down stairs to mark the camera's location every few feet when mapping out a line.

Josh Sooy is senior product manager of underground technologies for RIDGID.



display panel will guide you back, Lumbers says.

If no pipe is located at the initial frequency setting, then work your way up the range of frequencies. "Think of the frequency range as a target where you're starting at the center ring, which is 256 Hz, and moving outward," Lumbers explains. "The next stage is midrange frequencies, which typically range from 8 kHz to 33 kHz. And if that doesn't work, try going up to 44 kHz."

Soil conditions can also affect utility detection. For example, drier soils make it more difficult to ground a detection system. The workaround: Pour a saline solution around the ground stake or moisten it with water, Lumbers advises. "Wetter soil is always better," he says.

COMMON ERRORS

Poor ground connections or bad ground placement are two of the most common rookie errors in utility locating. "If you're working in an area with multiple utility lines and place a ground stake over a telecom line, the wand may recognize both that line and the gas line you're looking for," Lumbers says. "That will result in bleeding off — you won't isolate the line you're trying to find."

Incorrect frequency selection — starting on the high end, for example — is another common mistake. "If I can successfully locate that utility using a lower frequency, then I don't have to change to a higher frequency that's more likely to bleed off," he says.

Contractors can expect to spend anywhere from around \$2,500 to \$8,000 for a utility locating system, depending on what features and accessories they order. To get a good return on investment, consider brands that offer features such as longer battery life, remote control operation for changing frequencies and dual-output units that allow you to locate two lines simultaneously. All these features improve productivity and profitability, Lumbers notes.

Given the complexity of the technology, are these locator systems difficult to operate? Not with proper training, he says. "It's not difficult for me, and I'm not an engineer. If I can do it, anyone can."

TRUST, BUT VERIFY

When contractors use utility locators, they're typically verifying the work already performed by contracted utility locating services. Isn't that just wasteful duplication of services? Not really, explains Lumbers.



"Just because someone puts paint on or flags in the ground doesn't mean they're accurate," he says, referring to the color-coded paint marks or flags used to mark utilities. (Red indicates electric power lines, green refers to sewer lines, yellow marks gas lines, blue indicates waterlines and orange points out communications lines.) "Plus, they have a margin of error that ranges from 18 to 24 inches on each side (of the markings/flags). Moreover, their markings don't tell you the exact depth of the lines.

"One issue we have in the field is that contract locators get paid by the ticket," he continues. "The more tickets they get done, the more they get paid, so it's all about speed. So if I'm a contractor and pull up on a job site, the first thing I want to do is verify the utility location and its depth."

Then it's up to the contractor to safely expose the utilities by hand or with hydroexcavators, for example, he says. ${\tt C}$





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MATT BELLMANN ALWAYS DREAMED OF OWNING HIS OWN COMPANY, AND AFTER YEARS OF WORKING IN THE HOTEL AND RESTAURANT BUSINESS, HE KNEW IT WAS TIME FOR A CHANGE.

In 2012, the dream became reality when he founded Sweetwater Utility Exploration. "It was just one of those things where I wanted to own a business," Bellmann says. "I just started pinching pennies and saved wherever I could and went for it."

The company, based in Troutman, North Carolina, offers vacuum excavation along with electromagnetic and ground-penetrating radar locating services throughout the Northeast and as far south as Florida. "A lot of our clients are developers and engineering companies and they have us come out and map the entire area before they'll even start working," Bellmann says.

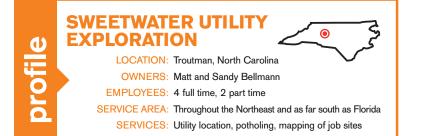
GETTING STARTED

It wasn't a fast road to starting Sweetwater. After leaving the hotel and restaurant business in the 1990s, Bellmann started as a field technician for a utility locating company — So-Deep U.S. P.C. After completing a project manager training program with the company he decided he wanted more time at home with his family and took a job as project manager for engineering and surveying firm Taylor, Wiseman & Taylor.

Bellmann began in TWT's office in Cary, North Carolina, and subsequently started the subsurface utility engineering department in







WEBSITE: www.sweetwaterutility.com



LEFT: Matt Bellmann, owner of Sweetwater Utility Exploration, uses a RIDGID electromagnetic locator to map utilities outside Bank of America Stadium in Charlotte, North Carolina.

ABOVE: Matt Bellmann (left) and project manager Michael Sheperd get ready to send a sonde into a sewer line to trace its path.

Charlotte. After eight years with the company, he knew it was time to follow his dream and, along with his wife Sandy, started Sweetwater. "Our goal from the start was to make sure we could do every job from start to finish, and we're doing that now," he says.

Sweetwater crews mark every utility on a job site and will also conduct records research on properties for clients. "I've got contacts with all the utility companies in the area, so we call them and get all those records," he says.

After surveying the job site, crews map the area and compare those maps to the records they received to confirm the location of all utilities and other underground obstacles.

When clients determine the proper location for new utilities, Sweetwater uses its custom-built vacuum excavation equipment to pothole.

"We'll tell them everything we find," Bellmann says. "If it's a water pipe, we'll tell them the type of pipe, size, depth and exact location, and we take a picture of it. We give them everything they would need to know, including soil condition and depth or if there is asphalt or concrete there."

USING EVERY OPTION

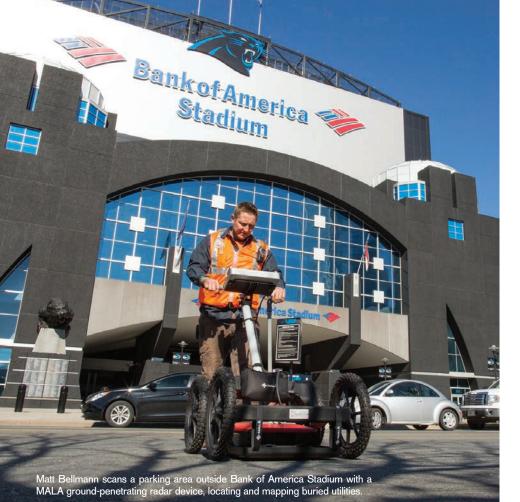
Sweetwater crews start each job with electromagnetic locating, where the tools can be directly connected to the utilities, and then proceed with other methods to make sure everything has been identified.

"We'll run the ground-penetrating radar over the site and then finish with a sweep of everything," Bellmann says. "That's why we use two guys to every job. One has the transmitter and one has the receiver. Once that signal attaches to something conductive, the receiver will start directing you over to the utility."

If there is no access to connect to the utility, and GPR equipment isn't an option, crews go to the vacuum excavation equipment.

"We'll do as much field recon as we can and then take out the vacuum excavation tools and verify the utility that way," Bellmann says. "Usually we can get a good feel for what things are. We then come in with the truck and positively identify."

Bellmann has his favorites when it comes to locating equipment. Most of his electromagnetic locators and sondes are from RIDGID, but he also has



"Our goal from the start was to MAKE SURE WE COULD DO EVERY JOB FROM START TO FINISH, and we're doing that now." Matt Bellmann

a Metrotech 810 (Vivax-Metrotech) that he'll go back to if the other locators fail.

"That's my security blanket," Bellmann says. "When something's not working out well, I just grab that old Metrotech and it puts me at ease. It's what I trained on."

The sondes often come in handy, too. "We'll tie fishing line to one and if it's a flowing current we'll drop it in there," Bellmann says. "I have my guys let the line out 5 or 10 feet at a time and we can track it with our receiver. We have environmental clients that have remediation systems, and a lot of that is put in with plastic pipes that run into manufacturing facilities. It's questionable where these pipes go sometimes, so we use the sondes all the time on those jobs."

When the situation calls for ground-penetrating radar, Sweetwater relies on MALA equipment. The company recently added a new MALA unit with a high dynamic range antenna to its quiver. "It's still pretty much the same frequency, but they've put a greater signal bandwidth on there, so it's like having multiple antennas in one," Bellmann says. "You get a lot better depth and the resolution on it is crazy."

On a job in 2015, Sweetwater found how useful having two



GPR units can be. Crews were called to Charlotte to help the city find a sanitary force main. "They weren't sure where it was," Bellmann says. "They had it on record but had no idea where it was. We got hired by the engineering company that was helping the city upgrade its sewer system."

Crews used two GPR units side by side, and both picked up the force main in thick red clay. Bellmann was impressed because GPR units typically have a tough time in clay; the signal reflects back at the unit because of the conductive materials in the clay.

"The locating equipment does pay for itself," Bellmann says. "It's a hard business if you don't have the right equipment. I want my guys and myself to have as many tools as possible."

LANDING THE BIG JOBS

Putting that equipment to work is something Bellmann doesn't have to worry about. Sweetwater's list of clients, many of them environmental and petroleum companies, continues to grow.

"A lot of that work is finding underground storage tanks," Bellmann says. The environmental companies are a big reason Sweetwater survived the recession. "We were getting a lot of Phase 2 jobs, which are when a business is getting foreclosed on or trying to finance, and an

FINDING THE RIGHT TOOL

When Matt Bellmann, owner of Sweetwater Utility Exploration, started his utility locating business, he decided to go with mainly RIDGID equipment.

"I wanted to be able to have the best possible equipment and offer the most services," Bellmann says. "We use the SR-60 locator when we do electromagnetic locates."

The SeekTech SR-60 locator from RIDGID is designed for locating under difficult conditions, such as poor conductors, poor soil conditions and poor grounding. It traces frequencies from 10 Hz to 490,000 Hz and can trace energized lines and sondes at the same time.

"You can pick up electric lines without putting your own signal on it because it can scan and find the frequency of that line," Bellmann says. "It's very beneficial when we do interior work."

When doing work for Duke Power in North Carolina, Sweetwater uses its SR-60 because much of the work is inside buildings.

"We can't hook up to the utilities and there are concrete floors with rebar that disrupts the GPR units," Bellmann says. "Our RIDGID, however, will pick up those utilities right away."

The unit has a readout display that shows the operator a proximity signal, a depth indicator and a frequency signal, all in real time. The readouts help the operator constantly verify the quality of the locate. The unit displays a line on the screen that's a picture of the utility line below, as opposed to a series of readouts that users have to synthesize in their head.

"You just look at the tracing line on the screen and start walking," says Bellmann. "You're actually finding the utility line, rather than guessing."

Crosshairs on the screen show the operator's position relative to the target signal. When the tracing line intersects with the crosshairs, the operator knows he's directly above the line. The tracing line stays on target even if the receiver's orientation changes, and it indicates when the utility line changes direction.



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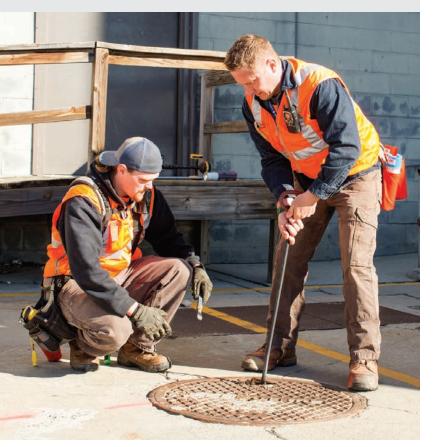
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ABOVE: The Sweetwater Utility Exploration crew includes (from left) field technician Tommy Wyatt, owners Matt and Sandy Bellmann, project manager Michael Sheperd and field technician Drannan Wyatt.

BELOW: Tommy Wyatt (left) and Matt Bellmann pry the lid off a manhole to launch a sonde and trace a sewer line.



"THE LOCATING EQUIPMENT DOES PAY FOR ITSELF.

It's a hard business if you don't have the right equipment. I want my guys and myself to have as many tools as possible." Matt Bellmann

assessment of the site is done to see if there is contamination. Before they go out and do any of their borings or monitoring, they would call us to find where the underground storage tanks would be."

Aside from the environmental work, Sweetwater performs a lot of work at Charlotte Douglas Airport. Bellmann says it's a tough environment to work in because of the noise and wind from planes.

"It's crazy loud and it's super intense out there," he says. "You're not only dealing with all these utility lines running everywhere, but you've also got directional lighting and the signs. Then the FFA has tons of fiber-optic lines that lead everywhere. It's one of the jobs where you have to calm yourself."

Sweetwater began working for the airport about 2 1/2 years ago after getting called in to work on a roadway improvement project. The airport wanted to put a bridge over the existing railroad, but two fiber-optic cables were buried parallel to the tracks.

"The owners of those cables wanted \$75,000 for each line to relocate them," Bellmann says. "We came in and mapped where the two cables were. Then we went in with vacuum excavation, positively identified the cables and gave them the coordinates."

The airport was able to design the bridge around the cables and saved \$150,000. "It saved them quite a bit of time, too," Bellmann says. "The company that owned the cables told them it would take at least a year to relocate the cables."



THE RIGHT WAY

Despite being busy, there is one area where Bellmann won't compromise: quality of work. He prides himself on running a company that pays attention to the details and follows a very detailed order of operations for every project.

"We charge by the hour, but we're not going to take advantage of people and stay on the job site forever," Bellmann says. "If we have a client that is rushing my guys, I would rather have my guys leave the job and tell the client to find somebody else or let us do the job that we need to."

Bellmann says there are contractors who will rush through jobs just to get them done, but his company won't. "If you rush through a job, somebody can get hurt working on that site and then it falls back on you."

Crews are required to show up on time, clean and uniformed with all equipment in full working order. "The clients really respect that and I think the guys enjoy that respect," Bellmann says. "When we pull up on a job site, people know we mean business. Our motto is, 'This isn't recess. We're not here to play games."

Bellmann is happy with where the company stands, with two field crews, but he would like to add one more full-time crew in the coming years to give him time to focus on marketing and

other aspects of the business.

"I'm pretty satisfied with where we are now," Bellmann says. "We didn't get into this to get rich. We just wanted a company that has a great reputation and a great client base, and I'm thankful for what we have now." C



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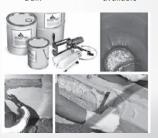
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TECH PERSPECTIVE

Ultra Engineering project manager Jeremy Marginson uses a GSSI groundpenetrating radar system to quickly scan an area for known and unknown utilities, providing a more accurate overall picture of what lies below the surface.

Equipment and Technique

An understanding of potential job site challenges can help operators differentiate between malfunctioning tools and job site issues

By Kyle Rogers

uccessful utility locating requires good equipment and better technique. When problems arise, fault most often lies with the person, not the equipment.

It's easy to mistake a job site problem for an equipment malfunction. Bad depth. Doesn't locate right. Those are the types of brief, vague descriptions that sometimes accompany McLaughlin locators that get sent in for repair, says Matt Manning, the company's products manager of electronics.

"We have a physical test we do where we check the equipment at three points. We check multiple frequencies and different modes of locating. If we can't find a problem, we can't fix it," Manning says. "An extremely high percentage of the units we send back out, we never hear about again, which indicates there must have been something wrong at the job site. That's not our goal. We don't like sending people equipment where we didn't define what was wrong. But a majority of the time it's the user not understanding the job site."

Effective locating begins with identifying potential issues and using the equipment properly.

"Sometimes a locator is only as accurate as its operator," Manning says. "There can be a lot of human error. A locator is designed to be held straight up and down, not swinging around. And you don't want to grip the instrument. You want to keep your thumbs relaxed so the locator is always hanging down."

That allows the locator to move along a consistent, horizontal plane

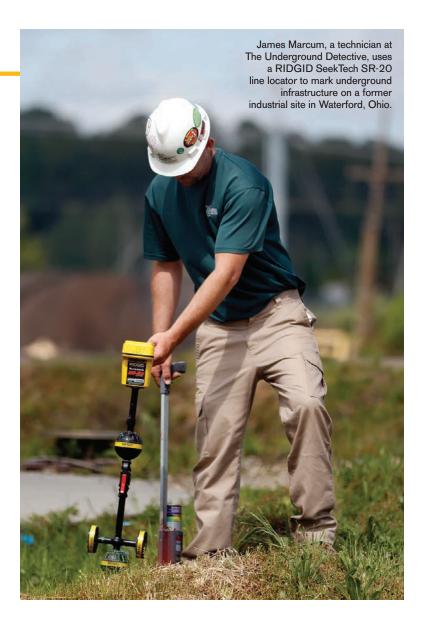
— not according to the contours of the ground.

"I've seen a lot of bad locates on the inclines and declines along the side of a road because the instrument was not being used on a consistent, horizontal plane," Manning says. "I saw a case where there was a mislocate on an embankment because the person was just trying to keep the locator at the same distance off the ground and was not moving on a consistent plane. The locate was right — if you were going off an angle."

From there, accurate locating is about adjusting to the conditions of the job site. For example, say you're trying to locate an underground line in an area congested with other utilities. Manning suggests locating the line to a known point.



Mid-Atlantic Utility Locating technician Jamie Velasquez uses a Vivax-Metrotech locator to identify utility lines along a residential street.



"You don't want to just walk away 50 feet from where you're connected, start to locate and say with certainty you have your line. You want to do an evaluation. Locate back to the source and, if possible, the next visible indicator. I've seen a lot of bad locates in which the operator walked to where they thought the utility should be and thought they had it, but they didn't understand that the signal they were sending out wasn't on just their utility."

A remedy for improving the likelihood of staying on your targeted utility in a congested environment is to start your locate in a less congested area.

"People tend to focus on the congested environment," Manning says. "Instead of setting up at, say, a telephone pole or utility box in that area, go to the next one that's not in the congested area. Locate from the uncongested area into the congested area. That can help a lot in that situation."

An understanding of soil conditions is also important. Dry soil is less conductive than wet soil and may produce a weak signal on the line being targeted, creating a more challenging locate. That comes into play especially with sandy soils.

"If it recently rained, sand might work alright, but sand drains very quickly so the top surface might not contain any moisture," Manning says. "You might have to use a different (grounding element). I've used a stop sign before to get a ground in sandy situations."

That can also be helpful in the wintertime when you may be dealing with frozen ground.

7 TIPS FOR BETTER LOCATING

It's important to be able to accurately identify the location of underground pipes and cables before getting started on a project, so you need your locator working properly. Here are seven tips aimed at keeping you on target:

Establish a test point. Regularly test your equipment on a known pipe or line, so that if a problem arises in the field you can immediately rule out equipment failure, says McLaughlin electronic products manager Matt Manning. Mark this location and you have a go-to point every time you need to test your equipment.

Check your frequency. To begin, be sure your transmitter and locator are set to the same frequency, says Eric Huber, a senior product manager for RIDGID. "You could be transmitting 8 kHz, but you're trying to find 33 kHz and you won't find it because you're not transmitting it."

Read the manual. "When people call me with problems, the best questions are from those who have read the manual," Manning says. "Their questions are usually more specific and I'm better able to help them."

Take a utility locating course. "Many people out there have been handed down information from the previous guy doing their job. But equipment has progressed and that person's experience may be related to older pieces of equipment, so some things could get missed," Manning says.

Keep 'em dry. "Some locators are better than others, but most manufacturers have built their equipment to withstand the elements – snow, rain, mist," Manning says. "If it's a downpour where you don't even want to be out there, it will probably affect the equipment too."

Don't be careless. A problem Manning sees far too often is equipment getting run over. "Too many people just lay the equipment down where they're working or they'll lean it up against a truck, or lay it on the tailgate. Then someone hops in the truck and leaves; next thing you know the locator falls off the truck or gets run over."

Remove the batteries. "Dead batteries leak acid. Good batteries don't," Manning says. "If you forget to turn off the equipment, you'll eventually run the batteries down. If you're using it every day, it may not be a big issue. But if you're using it, say once a week, that battery will start leaking acid and before you know it, your unit's damaged."

"Frozen ground is highly resistant. One time I used a sign that was below the frost line," Manning says. "That got me from a high resistance down to a wet, low resistance. The key is getting a good ground for the transmitter."

Develop an understanding of some of these finer points of locating and perhaps you won't find yourself sending the equipment back to the manufacturer, assuming that it's the source of your difficulties on a job site.

"People I have worked with who have at least a day of locator training and I don't mean on only the instrument — are much better than someone who just grabbed the equipment, read the manual and went out there," Manning says. "It's two parts. You have to know the equipment and how to utility locate."

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Visible Results

Inspection cameras help California contractor's customers get the picture on drainline clogs and repairs

By Ken Wysocky

onvincing skeptical customers that they need a drainline repair — or that a drain cleaning job was successful — is a difficult task for many contractors. Paul Kitchen isn't one of them, thanks to his RIDGID SeeSnake inspection cameras. "Our SeeSnakes help us sell jobs," says Kitchen, who co-owns Mr. Rooter of Sonoma County with his partner, Saunda Kitchen. "It allows us to get the customer out there so they can see what's going on — see that we've done a cleaning job properly. Or they can see what's happening inside the pipe and decide how to resolve a problem like a broken pipe."

Kitchen says he started buying RIDGID inspection cameras in 1998, the same year he and Saunda established their Mr. Rooter franchise. Based

"We've had the SeeSnakes from day one. We followed in the steps of other Mr. Rooter franchises that used them to get jobs and increase profits. We couldn't imagine not having them — they're an absolute must for our business." in Santa Rosa, the company serves the Sonoma County area with a wide range of services, including drain cleaning, pipe bursting and pipe lining. About 85 percent of the company's business focuses on residential work, with the balance coming from commercial clients, he says.

"We've had the SeeSnakes from day one," Kitchen notes. "We followed in the steps of other Mr. Rooter franchises that used them to get jobs and increase profits. We couldn't imagine not having them — they're an absolute must for our business."

The franchise provides a free pipeline inspection with every drain cleaning job to show customers that the problem at hand was resolved.

"We're already there," he notes. "We just want to know if we resolved the problem or if there's something bigger going on." The company does charge a fee, however, if they're hired as a subcontractor to inspect lines or perform services such as preliminary pipeline inspection for homebuyers or sellers.



Andy Soto (left) and Jonatan Villasenor of Mr. Rooter of Sonoma County with one of the company's RIDGID SeeSnake cameras, which are a big part of the company's ability to diagnose problems and sell jobs.

money machines	MACHINE:	Mr. Rooter of Sonoma County, Santa Rosa, California RIDGID SeeSnake inspection cameras Inspecting sewer laterals and other pipelines
	FEATURES:	Self-leveling camera; hardened stainless steel camera-head spring assembly; high-intensity lights; built-in transmitter for pipe locating; capable of inspecting 2- to 12-inch-diameter pipes up to 325 feet long
	COST:	About \$10,000
	WEBSITE:	www.mrrooter.com/santa-rosa

To clean lines, the company relies on large cable drain cleaning machines made by Gorlitz Sewer & Drain, as well as Gorlitz cart-mounted water jetters (1,500 psi at 2.1 gpm). The company also owns a 4018 trailer-mounted water jetter manufactured by US Jetting (4,000 psi at 18 gpm) and uses either US Jetting nozzles or Warthog nozzles made by StoneAge. The company has also invested in a TRIC Tools pipe bursting machine and a pipe lining system made by Perma-Liner Industries.

The cameras are critical lynchpins in the Kitchens' franchise because pipeline inspections often lead customers to use their other services, such as pipe bursting or lining. "The cameras pave the way," Kitchen explains. "They let us know if we need to dig up just one spot or replace an entire line. The fact is that you can't see underground unless you start digging everything up, which is disruptive and invasive." Key features of the standard SeeSnake include a self-leveling camera that ensures images are always upright, a hardened stainless steel camerahead spring assembly, high-intensity lights, and a built-in transmitter for pipe locating. The camera is capable of inspecting 2- to 12-inch-diameter pipes and can inspect lines up to 325 feet long.

Kitchen also cites the cameras' durability and ease of operation. He says technicians can be trained to use a SeeSnake in an hour or two. If a camera head gets broken, it's easy to change it out with a new one; the franchise typically keeps an extra camera head on hand, just for those instances. For larger issues, such as bent or kinked cables, the cameras get sent in to RIDGID for repairs. "But in the last six or seven years, we've only sent maybe two cameras back in to get fixed," Kitchen points out. "They're very durable.

"On average, our four SeeSnakes are out in the field on a daily basis, getting used at least four to five times a day," he continues. "They really get a workout and they do so in the wettest and nastiest conditions. They're watertight and very durable. Reliability is very important because it doesn't look real good if a camera breaks down while a customer is watching an inspection on the monitor."

Kitchen says it's difficult to calculate the return on investment for the SeeSnakes, which run about \$10,000 apiece. One thing he does know, however: Virtually all of the underground replacement and repair work the company does stems from camera inspections, so the return on investment is significant. "They help us sell jobs to customers, so they've paid for themselves time and time again," he says.

What would Kitchen say to plumbers who would like to invest in a pipeline inspection camera, but hesitate because of the expense? "I would say it's an investment worth making because the return on investment is huge," he notes. "First of all, with a camera, you know you're doing the job right, which reduces profit-killing service callbacks. And that \$10,000 camera you purchase could help you land a \$20,000 job. It's truly worth it to help you seal the deal." **C**

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Clamping Down on Accidents

Criminal prosecution for safety violations is more likely under new federal plan

By Doug Day

eterrence is one goal of a new effort to charge more safety and environmental violations as federal felonies. Under an agreement announced in December, federal officials are being encouraged to charge more safety and environmental violations as felonies rather than as misdemeanors.

According to a memorandum of understanding between federal agencies, more of the prosecutions would be handled by the Department of Justice's Environmental and Natural Resources Environmental Crimes Section and the U.S. Attorney's offices. Those two will be working more closely with the

"Given the troubling statistics on workplace deaths and injuries, the Department of Justice is redoubling its efforts to hold accountable those who unlawfully jeopardize workers' health and safety."

Sally Quillian Yates

Department of Labor's OSHA, Mine Safety and Health Administration, and Wage and Hour Division. Violations of the Seasonal Agricultural Worker Protection Act are also included in the agreement between the agencies. The Department of Labor has added a position to coordinate agency cooperation, and agency staffs are being trained to be more familiar with applicable federal statutes.



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"On an average day in America, 13 workers die on the job, thousands are injured and 150 succumb to diseases they obtained from exposure to carcinogens and other toxic and hazardous substances while they worked," says Deputy Attorney General Sally Quillian Yates. "Given the troubling statistics on workplace deaths and injuries, the Department of Justice is redoubling its efforts to hold accountable those who unlawfully jeopardize workers' health and safety."

In a memo to all 93 U.S. Attorneys, Yates provided examples of how the increased prosecution could impact penalties. Misdemeanors under the Occupational Safety and Health Act are punishable by fines up to \$10,000 and six months imprisonment for acts such as falsifying documents or willful safety violations that result in a worker's death. Those penalties have not increased since the law was passed in 1970.

On the other hand, charging the same violations as felonies for false statements, obstruction of justice, witness tampering, conspiracy, and environmental and endangerment crimes would increase penalties to five to 20 years in prison along with the potential for larger fines.

Besides filing criminal charges under Title 18 of the U.S. Criminal Code, the Environment and Natural Resources Division has increased civil prosecutions for worker safety violations under other laws such as the Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act and the Toxic Substances Control Act because such violations have a direct relationship with workers handling dangerous chemicals, cleaning up spills and responding to hazardous materials releases.

"While most employers try to do the right thing, we know that strong sanctions are the best tool to ensure that low-road employers comply with the law and protect workers' lives," says Assistant Secretary for Occupational Safety and Health Dr. David Michaels. "More frequent and effective prosecution of these crimes will send a strong message to those employers who fail to provide a safe workplace for their employees."

Companies that violate safety regulations often do the same with environmental laws, according to Assistant Attorney General John C. Cruden of the Environment and Natural Resources Division. "We will remove the profit from these crimes by vigorously prosecuting employers who break safety and environmental laws at the expense of American workers." **c**

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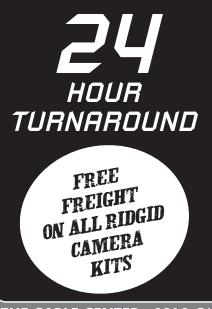
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Upgrading a Favorite

Modifications to Hot Jet II drainline jetter make the unit more powerful and durable

Anytime

Anywhere

By Craig Mandli

he Water & Wastewater Equipment, Treatment & Transport Show is a showcase for new innovations. It also gives companies the opportunity to introduce upgrades and improvements to proven products. One of those — the Hot Jet II drainline jetter from Hot Jet USA - garnered plenty of attention on the show floor this year.

"The Hot Jet II is the product that we make especially for this crowd," says Elle Eyre, a sales representative for Hot Jet USA. "It is our most popular model by far, but that hasn't stopped us from making improvements every year."

Among the upgrades are a full diamondplate premium powder-coat finish, diamondplate fenders, an increased maximum output of 10 gpm at 3,850 psi, a fully adjustable hitch with a 2 5/16-inch ball or D-ring, LED lighting package, and a powered 2 hp reel with 100 feet of 3/8-inch hose for sanitary cleaning. The hose reel was lifted 12 inches for easier operator access, while the size of the antifreeze and soap tanks were increased to help keep the operator on the job longer.

"The goal was to make it more userfriendly," says Eyre. "We increased tank capacity to r Any Drain

The Hot Jet II drainline jetter from Hot Jet USA garnered plenty of attention on the WWETT Show floor this year. Among the new upgrades to the unit are a full diamond-plate premium powder-coat finish, an increased maximum output of 10 gpm at 3,850 psi, and a fully adjustable front hitch with a 2 5/16-inch ball or D-ring. (Photo courtesy of Hot Jet USA)

and changed the configuration on the reel to make sure the operator can work longer and more comfortably."

The Hot Jet II includes many long-popular features as well, including a solid diamond-steel deck trailer available in multiple color options, two 3,500-pound tandem axles, a 35 hp Vanguard engine made by Toyota, 330-gallon water tank with fast-flow system, front and side lockable toolboxes, a custom-drilled nozzle kit, custom-drilled Warthog nozzle, strobe light, rear lighting, full solid-state remote control, premium jetter hose reel with variable speed and guide arm, 300 feet of Goodyear jetter hose, a lateral package to clean small drains up to 100 feet, rear throttle control, a full stainless steel enclosure, high-efficiency water heating system, and side and rear advertising signage options. It is also available with a satellite kit for jetting indoor drainlines.

"It's a fully loaded package," says Eyre. "For most in the drain cleaning or pumping industry, this is the ideal system for cleaning 3- to 12-inch lines."

The hot water jetting option available on the Hot Jet II is an added benefit, as hot water can be used to more effectively degrease or deice drainlines. The heat also allows the unit to double as a power washer and reduce jetting time versus exclusively cold water systems.

"We still get a ton of great feedback on the Hot Jet II," Eyre says. "It's the unit that put us on the map in this industry."

Eyre says the 2016 WWETT Show was a big success for the company as well, as they managed to sell every piece of equipment they brought right on the show floor. Eyre says the show also gives the company a great opportunity to get their name out in front of thousands of potential customers. Next year Hot Jet plans to continue to upgrade its current line of jetters, including a new engine option with electronic fuel injection. Eyre says the WWETT Show is a great opportunity to bounce ideas off customers and get feedback on what industry issues should be examined.

"This show is great because it gives people the chance to walk around and compare all the different jetters that are out there," she says. "It lets people talk to all the industry players in one setting, and compare apples to apples. That's great for the consumer." 800/624-8186; www.hotjetusa.com. C

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Quit Being a Bad Manager

Avoid five common pitfalls and create an environment where employees work tirelessly to make your company succeed

By David Waits

ince 2000, less than one-third of U.S. employees have been engaged in their work. This is according to numerous national surveys that measured employees' involvement, enthusiasm and commitment. Think about your most recent visit to a retail store or restaurant and your experience as a consumer will likely validate the reality of this startling statistic.

For many employees, the business' leadership has a lot to do with their engagement. A Gallup study of 7,272 adults revealed that one in two had left a job at some point in their career to get away from a manager and thus improve their overall quality of life.

Effective leadership requires not only doing the right things, but also understanding what not to do. Here are five critical mistakes business owners and managers should avoid at all costs.

Mistake No. 1: Failing to schedule time for learning conversations

You do what you schedule. When you listen, you learn. Leaders should only do what no one else can do, and no one can listen to your employees like you.

If you are always making business decisions as if you live in the emergency room, the health of your business is going to be in a constant state of trauma. A proper diagnosis of your company's "ailments" is required to make the decisions necessary for a healthy, prosperous business.

Schedule regular opportunities to ask them clear and concise questions and then discipline yourself to actively listen. This will give you vital information to implement two of a leader's main functions: removing obstacles and providing resources. How can you identify any obstacles that are impeding success and the resources your staff needs if you don't consistently schedule interactive learning conversations?

Mistake No. 2: Failing to consistently affirm

As a leader, are you encouraging or are you an encourager — or neither? One of *the* most powerful — if not the most powerful — tools to embolden, motivate and energize employees is the power of affirmation. Affirming is simply catching people doing things right and *telling* them about it. Don't just think it; express it. An effective leader is always on the lookout for opportunities to answer the soul-felt questions on the minds of their employees: "Do I matter?" and "Does what I do around here matter?" Answer those questions by being specific about the employee's positive actions. Always tie the positive action you observe to the beneficial business outcome.

Being encouraging is something you do, but being an encourager is something you are. If you are an encourager, affirmations will emanate from your lips regularly.

Mistake No. 3: Misdiagnosing

When you visit the doctor, he or she always asks a succession of questions and many times follows up with a battery of tests before prescribing any action to remedy an illness. Why? For the safety of the patient and for the critical business benefit of avoiding a malpractice lawsuit. The exception to this would be in an emergency situation where time is of the essence.

If you are always making business decisions as if you live in the emergency room, the health of your business is going to be in a constant state of trauma. A proper diagnosis of your company's "ailments" is required to make the decisions necessary for a healthy, prosperous business. This requires gathering accurate information (much of which can be ascertained by avoiding mistake No. 1) before randomly moving ahead with activity, which may or may not produce the desired results.

Sometimes small-business owners seek outside help to "treat" a problem that has been improperly, inadequately or incorrectly diagnosed. Before getting assistance, owners should answer this question: "What do I want to accomplish?" Only then can a decision be made on the fastest, most effective way to achieve the desired outcome.

Mistake No. 4: Wearing the wrong hat

Trainer. Monitor. Cheerleader. Fixer. Disciplinarian. Which hat do you wear?

This dilemma is further augmented by the maturity (or immaturity) of your staff. The challenge is not only knowing what hat you should wear, but also wearing the right hat at the right time.

If your staff is relatively new, it's important to be participatory in your leadership style, regardless of the hat you are wearing. As the employees develop, your style shifts to a hands-on leader. You can then transition to a benevolent dictator as you ensure that each employee is appropriately focused in his or her actions. When the team matures and is highly functioning, your style can shift to free-rein leadership as you equip them to be self-sustaining.

Your style shifts and your hats change. Your leadership flexibility is regularly challenged. Change hats as often as circumstances dictate and be



aware of the leadership style required based on the developmental maturity of your employees.

Mistake No. 5: Not taking responsibility

There are things you cannot control, so stop wasting time and precious emotional energy on these things.

There are things you can influence, so stop being passive and use your influence.

There are things you can control, so stop making excuses for those things. Get busy and act!

Take responsibility for your own actions, attitudes and words. Leverage your influence as a leader and lead by example.

Avoid these five common mistakes and leverage your powerful, positive influence as a leader. If you do, instead of people withdrawing, disengaging or leaving, they will passionately follow you. You are the most important element in the success of your staff. **c**

ABOUT THE AUTHOR

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Take advantage of easy online retirement calculators and other tools to prepare for life after work

By Erik Gunn

ometime in the future, you're thinking, you'll pass the business along to the next generation and go fishing. Sounds wonderful! How will you get there?

Planning for retirement can seem overwhelming, but it doesn't have to be. Start early, take it in small bites and keep at it. You'll be pricing bass boats before you know it.

COLLECT THE DATA

Start with information gathering. Pull all your ("your" means belonging to you and your spouse) financial information together: life insurance policies, bank accounts, retirement savings plans, your most recent Social Security income statement, mortgage information, pensions, and the last couple years of tax returns — personal and business.

Include any divorce decrees, marital settlement agreements or child support agreements you or your spouse are a party to, as well as basic information about your children (dates of birth, college plans, any insurance policies or savings accounts you have for them) and a short comment about circumstances particular to your spouse or children (special needs children, a spouse who is much older or younger than you are, children with a broad age span from oldest to youngest).

Last but not least, you need a copy of your will and power of attorney, the articles of incorporation or partnership agreement for your business, and your financial statements for the last couple years.

CONTEMPLATE YOUR FUTURE

Next, talk to your spouse about your mutual expectations. Do you want to buy an RV and see the United States, or move next door to the grandkids? Work at something different? Volunteer?

Don't take the answers for granted. Better to find out now that you have different ideas about retirement than after you've sold the business to your foreman and applied for Social Security benefits.

Other questions: How much longer do you want to work? Do you have significant personal debt? Are you expecting to pay for your children's college education? How healthy are you?

Of course these answers can change over time, but thinking about them as early as possible will help you keep track of where you want to be, where you are and how to adjust as your vision for the future changes.

MAKE SOME PROJECTIONS

Then look at projecting possible outcomes. Here's where the web can help. Choose a calculator, enter your specific financial information and some personal data, and you'll get a report.

As with any calculator, the old adage "garbage in, garbage out" applies. If the calculator only asks a few questions, you get basic information with limited applicability. Try several calculators and think carefully about the information provided.

Talk to your spouse about your mutual expectations. ... Don't take the answers for granted. Better to find out now that you have different ideas about retirement than after you've sold the business to your foreman and applied for Social Security benefits.

The Social Security Administration's website (www.ssa.gov) gives the complete picture of the government retirement benefit, including helping figure out how much you're projected to receive at full retirement age. (If you were born between 1943 and 1954 it's age 66; for those born between 1955 and 1960, the age rises by a few months each year until it's 67 for those born in 1960 and after.)

Create an account and you can get a personalized statement based on your record of Social Security earnings that will tell you exactly what you're projected to receive, or just take a quick look for a rough projection based on your last couple of years of earnings.

Social Security sends you a paper statement every five years, but you'll get current data if you create an account, and you can check it any time.

HELP IS ON THE WAY

You can find lots of information to help as you sort out your plans for retirement. Some are fairly simple, others more sophisticated. Each has advantages and drawbacks.

For basic projections:

No-load mutual fund company Vanguard, (www.vanguard.com) on its personal investors page, offers a variety of planning calculators, including a basic "When can I retire?" simulator and worksheets for retirement income and expenses. Discount broker Schwab (www.schwab.com) offers a simple calculator. AARP's (www.aarp.org) calculator winds up with a handy graph with green for your money and red for any expected shortfall. It also allows for changes in expected savings withdrawals and amounts of preretirement savings.



More details, but still free:

Discount broker Fidelity (www.fidelity.com) allows for detailed expenses, various scenarios including retirement work, Social Security estimates/ override and tax calculations. You can also save your data. Analyze Now (www.analyzenow.com) offers a pre- and post-retirement planner, which has good explanations, lets you save data and allows you to consider real estate purchases and various financial events.

A deeper dive at a cost:

J & L Financial Planner (www.jlplanner.com) is Windows-based and offers a 21-day free trial; cost ranges from \$109 to \$169 with more interesting and complicated features in the more expensive versions. Flexible Retirement Planner (www.flexibleretirementplanner.com) works on Java, the web, Windows, Mac and Linux. A personal edition is available for as small of a donation as \$20.

OnTrajectory (www.ontrajectory.com) is web-based and allows you to track progress and view your history; pay \$3 per month or \$30 per year.

OTHER HELPFUL RESOURCES

Laurence Kotlikoff's book *Get What's Yours* is a guide to maximizing your Social Security benefits — especially useful if you have complicated personal circumstances such as a disabled family member.

Jane Bryant Quinn's recent book, *How to Make Your Money Last*, is full of practical, straightforward explanations of the financial world, both pre- and post-retirement, and of financial products from the basic to the arcane. She also includes extensive information about Social Security — claiming it and maximizing it.

Also consider booking a session with a fee-only financial planner. These are people who do not sell financial products of any kind and thus have no built-in bias for a specific company's products.

Expect to pay around \$350 an hour for their time, which might sound steep, but consider: They have no hidden agenda. You give them information regarding your resources and objectives; they give you recommendations.

The National Association of Personal Financial Advisors (www.napfa.org) has an advisor search function and explains the qualifications necessary for a planner to make that list. **C**

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By Craig Mandli

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ELECTRONIC LEAK DETECTORS

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The **iQuarius** smartphone leak detection system from **Aquarius Spectrum** combines an Android app with an acoustic widget, a sensor that creates a powerful system that can perform pipe listening, acoustic survey and acoustic correlation. Pipe listening allows listening and recording very low-frequency sound vibrations. It also provides



a graphical presentation of these frequencies. Acoustic survey allows for GISbased acoustic logging that measures the vibration intensity in water pipes. The noise is recorded and automatically sent to the server for further analysis. Acoustic correlation occurs between two mobile sensors, allowing the user to pinpoint the exact location of a leak. It is ideal for leak detection service teams for both leaks surveys and pinpointing. Results can be analyzed on the

web application, and the app is available on Google Play. www.aquarius-spectrum.com

SUBSURFACE LOCATORS LD-18

The **LD-18** digital water leak detector from **SubSurface Locators** reduces ambient, intermittent noises from dogs barking, cars passing by, footsteps and people talking. Its digital electronics sample the sounds every few thousandths of a second, and if it detects an intermittent sound, it suppresses it instantly. Water leak sounds are almost always continuous noises, and the unit can identify continuous



leak sounds even in difficult conditions like busy streets. 775/298-2701; www.subsurfaceleak.com.

ELECTRONIC LINE LOCATORS

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The ULTRA-TRAC Acoustic Pipe Locator (APL) from SENSIT Technologies provides an alternative and supplemental method for locating buried pipes. It can locate pipes with broken or missing trace wire, providing the operator with an essential tool to locate metallic and nonmetallic pipes, cables and ducts, regardless of soil type. Its ease of operation, coupled with the ability to display and store data in 3-D, makes it ideal for anyone trying to find buried pipes, cables and ducts. 219/465-2700; www.gasleaksensors.com.



SUBSITE ELECTRONICS 830R/T Made to withstand the demands of rugged job sites, the Subsite Electronics 830R/T high-frequency electronic locator offers performance at a very high active frequency. This contractor-grade locating system can trace poor conductors, such as ungrounded tracer wire, and locate short lengths of utility infrastructure. Automatic



features such as gain control, auto depth, and visual and audio feedback make it easy for operators to confidently identify and trace metallic pipe or cable, water, and gas distribution lines. The system offers 150 hours of battery life on the transmitter, and 75 hours on the receiver. Adaptive filtering ensures that it is highly responsive in all modes of operation, quickly providing leftto-right guidance regardless of mode or operator style. In Peak Verify mode, the system gives operators an additional way to confidently verify the locate. **800/846-2713; www.subsite.com.**

SUBSURFACE INSTRUMENTS ALL MATERIAL LOCATOR

The All Material Locator from SubSurface Instruments can locate all subsurface materials, including plastic, metal, wood, cable and pipe. It will locate in hard clay, wet soil, snow or standing water, without the need for a separate transmitter, receiver,



wires and clamps. It was designed specifically to locate PVC pipes without a tracer wire for the utility, water, wastewater and gas industries. The PRO model can record coordinates with GPS tracking and store 300 waypoints in its memory, then export the GPS data via USB port. 855/422-6346; www.ssilocators.com.

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AMAZING MACHINERY VIZTRAC MAX

The Viztrac Max camera from Amazing Machinery has the same durability and super-slick push cable as previous Viztrac cameras, with a 22 percent larger 9-inch LCD color display and a rechargeable lithium-ion battery pack capable of up to eight hours of field use before recharge. The unit includes an AC/DC adapter for direct power supply, a 512 Hz sonde transmitter and a DVR



that records to a standard SD card. A 4GB card is included. 800/504-7435; www.amazingmachinery.com.

ARIES INDUSTRIES SEEKER

The Seeker video inspection system from Aries Industries is a compact, portable unit for drainline inspection. The easy-to-use, contractor-grade system works in 3-inch-diameter or larger pipe. Weighing only 40 pounds, the unit is self-contained with no external wiring. It can be used in conjunction with a CCTV truck. It comes with a builtin 512 Hz transmitting beacon and a bright 6.4-inch LCD screen. Users select from either a self-leveling mini-camera or a pan-and-tilt camera with self-cleaning wiper blade. Built-in AV outputs enable inspection data to be recorded



onto an SD card, DVR or a laptop using any software. Wireless controls, video transmission up to 300 feet and line tracing are available. 800/234-7205; www.ariesindustries.com.

CUES MPLUS+ XL

The MPlus+ XL push system from CUES includes a coiler configuration designed for larger pipeline applications up to 500 feet. It integrates swappable camera heads, a panand-tilt camera with 360-degree rotation and pan, video observation coding, observation coding interface and digital recording into an easy-to-use and intuitive package. This lightweight system includes large and durable wheels for easy portability and a balanced footprint for stability. It facilitates



CUES

quick removal of the control unit to be used separately for off-road or remote job sites or to accommodate compact storage. 800/327-7791; www.cuesinc.com.

CYCLOPS ELECTRONICS VALU-PAC IV

The Valu-Pac IV push camera system from Cyclops Electronics has a rotation-head color camera that can inspect 6- to 24-inch lines with its built-in lights. It can be mounted on a heavy-duty transporter with forward/ neutral/reverse capability, powered rewind and autolevel wind to the reel, plus keyboard data and on-screen footage to the controller. An auxiliary light controller increases its capabilities to 48-inch lines. The package includes 500 feet of TV cable, camera controller with



sound recording and light control, 15-inch LCD monitor and DVD recorder/ player, 5- to 18-inch adjustable skid, 500-foot TV tow cable and mechanical footage counter. Options include large line wheel kits, weights and lift kit, increased traction wheels, a 150-foot pushrod and system analyzer. 830/249-9756; www.cyclopstv.com.

DEEP TREKKER DT340 PIPE CRAWLER

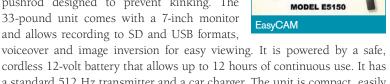
The DT340 Pipe Crawler from Deep Trekker is remotely and battery operated. Everything needed comes in two carrying cases, meaning no more dedicated trucks or complicated systems. The unit can deploy from anywhere in under five minutes. The unit comes with internal batteries,



a lightweight hand-held control console, a strong but thin tether, a pivoting tether connection, wheel and track options, and plug-and-play integrations. It is depth rated to 164 feet, and requires no topside power. It comes in two options — Light or Standard — that have a stagnant camera or rotating/zoom camera. 519/342-3177; www.deeptrekker.com.

EASYCAM MODEL E5150

The Model E5150 midsize color sewer camera from EasyCAM is offered with optional Wi-Fi compatibility for Apple or Android products. It comes with 150 feet of heavy-duty pushrod designed to prevent kinking. The 33-pound unit comes with a 7-inch monitor and allows recording to SD and USB formats,



cordless 12-volt battery that allows up to 12 hours of continuous use. It has a standard 512 Hz transmitter and a car charger. The unit is compact, easily fitting in a service van. 239/260-2056; www.easycamllc.com.

ELECTRIC EEL ECAM ACE WITH WI-FI

The Ecam ACE with Wi-Fi pipeline inspection camera system with Wi-Fi from Electric Eel enables users to record video with their mobile device. The Wi-Fi transmitter sends a wireless signal to almost any handheld device. Then by using the custom app, the user can see video, record video or take snapshots. Once a video is recorded, the user can email it directly from the device or download it to a computer. It allows users to quickly



inspect and locate a wide variety of pipeline problems while reducing cost

by knowing exactly where the problem is before digging. It is designed to inspect 3- to 10-inch lines, and has a 5.4-inch LCD monitor and stainless-steel-housed 1.68-inch color camera with sapphire lens. The flexible camera spring navigates 3-inch P-traps. It comes with 200 feet of braided 1/2-inch-diameter pushrod, industry standard 512 Hz sonde and a heavy-duty screen cover. **800/833-1212; www.electriceel.com**.

ENVIROSIGHT VERISIGHT PRO

The VeriSight Pro stainless steel self-leveling camera with shadowless, variable LED illumination from Envirosight captures crisp video footage regardless of pipe material. With supplied centering devices, it inspects lines 2 to 9 inches, and snakes through multiple bends for maximum range. An integral tri-band sonde (33 kHz, 512 Hz, 640 Hz) works with most locators. Its rugged welded-steel coiler comes with 130, 200 or 330 feet of pushrod.



The entire system runs continuously for six hours off internal rechargeable lithium-ion batteries, or off main or vehicle power. Its multi-language controller displays footage on an 8-foot TFT LCD, and captures up to 90 hours of MPEG-4 video on an SD/SDHC card (up to 32GB) or USB stick (up to 128GB). It zooms 3x, captures images in JPG format from both live and recorded video, and offers a 16-page text writer with full QWERTY keyboard. **866/936-8476; www.envirosight.com**.

FORBEST PRODUCTS FB-PIC3688A

The **FB-PIC3688A** 360/180-degree pantilt camera from **Forbest Products** allows users to generate panoramic pictures with remote directional control. It comes with a 2 1/4-inch waterproof high-resolution color camera head with zoom, and 400 feet of fiberglass cable and reel with meter counter. The 600TVL camera head has high LED lights, a wide angle of 130



degrees and focus of 10 to 60 mm, and can work up to 30 meters underwater. The heavy-duty waterproof control box includes a 10-inch LCD color screen with USB and built-in SD card to record photos and videos. Control buttons on the front panel are designed for controlling camera head rotation for more than 20,000 hours continuously. On-screen status indicators include footage of the cable pushed through the pipe. The built-in rechargeable battery lasts approximately three hours. **877/369-1199; www.forbestusa.net**.

GENERAL PIPE CLEANERS GEN-EYE PRISM

The **Gen-Eye Prism** video inspection system from **General Pipe Cleaners** lets the user use a tablet or smartphone to monitor and record inspection work. A Wi-Fi transmitter inside the unit sends video to a designated device — up to 500 feet away.



The command module weighs just 3 pounds and can be mounted securely on any GL or POD reel. An expandable cradle on top of the unit safely supports a standard-size tablet, and easily adjusts for optimal viewing. Optional brackets for mini-tablets and smartphones are available. It offers an on-screen distance counter to track how much pushrod remains in the line, a nine-page titler with full keyboard to add company and job information to videos, a power port to keep the tablet or smartphone charged during inspections, date and time stamps for records, an LED dimmer control, and 2-, 3- and 6-inch trap skids. Its self-leveling color camera automatically keeps the picture right side up. **800/245-6200; www.drainbrain.com**.

HAMMERHEAD TRENCHLESS EQUIPMENT PORTAVISION 3

The 200-foot pushrod capability of the **PortaVision 3** from **HammerHead Trenchless Equipment** can be increased from its standard system to a 300- or 400-foot capability simply by changing out its fiberglass spiral-wound pushrod reels, eliminating the cost of duplicate system components. The fiberglass spiral-wound material used to make the pushrod lasts up to four times longer than less durable pushrod materials. Wheeled camera skids are available for use with 8- to 12-inch pipe diameters. **800/331-6653; www.hydraliner.com**.



HATHORN CORPORATION

WI-FI CAMERA SYSTEM The Wi-Fi camera system from Hathorn Corporation delivers 200 feet of pushrod attached to a slim 1.4-inch self-leveling camera head. It includes a 512 Hz sonde transmitter and a rechargeable lithiumion battery pack, on-screen footage counter and adjustable lighting controls. The user can record video and take snapshots on any type of tablet or mobile



device up to 200 feet away with a custom mobile app. Recorded files can be emailed or downloaded straight to a computer. The system allows users to recharge their mobile devices directly from the control unit. **905/604-7040**; **www.hathorncorp.com**.

ID-TEC C70

The **C70** camera nozzle from **ID-TEC** is a combination of a video and cleaning nozzle for diagnosing and jetting 7- to 30-inch pipelines. It has seven replaceable jets for cleaning when moving forward, along with a camera and lighting for video recording on the pullback. The video is recorded in the nozzle and downloaded to special software on a tablet via Wi-Fi when the nozzle is lifted out



of the manhole. The software combines GPS coordinates with GIS mapping to determine the nozzle's location and nearby manholes and pipelines. The operator uses the software to review the video or to code the PACP report and to determine if further procedures are required for this line before he moves on to the next. It has internal memory and battery life for at least eight hours. Live view while jetting is optionally possible over Wi-Fi. **503/504-8474; www.sr-series.com**.

MEDIT TRITON DRAIN SCOPE

The Triton Drain Scope inspection camera from Medit can be used to inspect narrow-diameter pipes with tight bends. It has a 1.36-inch-diameter straight-view camera head, with a 200-foot-long push cable, a 10.4-inch color LCD monitor with image and video capture, an onscreen footage counter, full keyboard and a built-in 512 Hz sonde. The monitor has an optional Wi-Fi module to view/capture the live image on a tablet or smartphone for easy on-site documentation. The system is suited for quick



and easy inspections of 1.5-inch or larger drainlines, with the ability to easily navigate 90-degree bends, 2-inch P-traps, swimming pools and duct lines up to 6 inches. 800/239-9934; www.fiberscope.net.

MYTANA MFG. COMPANY MS11-NG

The MS11-NG midsized video inspection system from MyTana Mfg. Company can be used to inspect 3- to 4-inch lines with up to 150 feet of range. It has a 1 1/2-inch color self-leveling camera head, built-in 512 Hz transmitter allowing a technician to locate during the inspection, and a daylight-readable 6.4-inch monitor. Record or upload an inspection using the MyTana viewer app, available for iPhone, iPad and Android. Built-in



Wi-Fi allows multiple viewers on relining/rehabilitation projects. Inspection records can be uploaded to YouTube or still photos emailed to customers. Media connects through RCA jacks on the front of the unit. 800/328-8170; www.mytana.com.

PEARPOINT P340+ FLEXIPROBE

The P340+ flexiprobe pushrod sewer camera system from Pearpoint is lightweight, rainproof, rugged and has a built-in lithium-ion battery. Reliable and interchangeable cameras produce sharp digital pictures, which can be recorded externally or onto USB or compact flash memory. Advanced digital capabilities mean that users can zoom, pan and rotate images during recording to focus in on problem areas. Compact reel designs allow the systems to be fully transportable and protected in transit. A wide range



of compatible sondes, skids, brushes and accessories completes the package, allowing inspection of pipes up to 9 inches in diameter. 800/688-8094; www.pearpoint.com.

PIPELINE RENEWAL TECHNOLOGIES CLEANSTEER

The CleanSteer from Pipeline Renewal Technologies uses high-pressure water for propulsion, steering and cleaning as it captures live inspection video from inside lateral lines. It is able to traverse multiple bends in pipe, steer through branches and levitate above debris, allowing municipal contractors and commercial plumbers to locate failed pipes, cross bores and blockages, as well as clean the pipes. It is fully water-driven, as six propulsion nozzles



generate the power needed to pull its own flexible hose through multiple

bends, and a side nozzle on the camera can be aimed to steer through diverging pipes and hover past obstacles. An optional forward-facing nozzle can be pulsed to clear debris and other obstructions. The system works with any high-pressure water source, including pressure washers and combination trucks. Its 1/2-inch hose comes in lengths from 115 to 190 feet. 866/936-8476; www.pipelinert.com.

R.S. TECHNICAL SERVICES QUICK PEEK

The Quick Peek all-in-one, fully portable video inspection system from R.S. Technical Services is a compact, lightweight unit for drainline condition assessment in lines 2 to 10 inches in diameter up to 300 feet in length. The unit has a 7-inch bright LCD handle-mounted monitor equipped with a sun shield/screen protector that can be positioned for a comfortable viewing angle. Easily accessible monitor controls include power mode, aspect ratio (screen size) and menu, plus set buttons for color, brightness, contrast, tint and volume. The side-mounted AC/DC power source houses

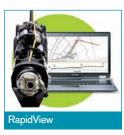


R.S. Technic

controls for all camera functions and provides a camera test terminal, AC/ DC input, video/audio output, keyboard input and a condenser microphone with on/off switch. Options include battery power, a self-leveling camera, 512 Hz receiver, roller skids, laptop interface, SD card reader and Wi-Fi interface. 800/767-1974; www.rstechserv.com.

RAPIDVIEW IBAK NORTH AMERICA 3D-GEOSENSE SYSTEM

The 3D-GeoSense System from RapidView IBAK North America uses a sensor in the camera to provide users with a three-dimensional map of the lateral. The XYZ coordinates can be determined when the camera is moving both forward and backward, immediately providing the operator a real-life site



plan with the width, length and elevation data of the lateral being inspected. The unit can be used in push or lateral launch applications. Additional thirdparty software is required. 800/656-4225; www.rapidview.com.

RATECH ELECTRONICS ELITE SD WI-FI

The Elite SD Wi-Fi pipeline inspection camera system from Ratech Electronics allows users to record pipe inspections wirelessly to an iOS or Android device, and take live video and digital still photos that can then immediately be uploaded to YouTube, eliminating USB thumb drives, SD cards and DVD discs. Users just



download an app to their iPhone or iPad and stream the video wirelessly. The Wi-Fi interface is available on any current Ratech product or existing systems in the field, and is available with a sun-readable 10-inch LCD monitor and either a self-leveling camera, small Ultra Micro camera or new pan-and-tilt push camera. Systems come in cable lengths from 100 to 400 feet. 800/461-9200: www.ratech-electronics.com.

RAUSCHUSA MINCAM360

The 2-inch minCam360 remote-controlled pan-and-tilt push camera from RauschUSA has four-step zoom and a tri-band sonde with selectable frequencies. The Bluetooth remote



includes a joystick for camera control. The cable reel comes with 200 feet of cable (with up to 300 feet available). The 8.4-inch sunlight readable monitor enables recording video, voice and photo directly to an SD card. This system is designed as a capable stand-alone inspection system, including a text generator for detailed reporting capabilities and an on-screen distance counter. It can be used in pipes 3 to 16 inches in diameter with all centering accessories. **717/709-1005**; www.rauschusa.com.

RIDGID MICRO CA-25

The **RIDGID micro CA-25** is a compact hand-held inspection camera with a fixed .67-inch aluminum imager head for basic and short-range inspection jobs. It has four ultra-bright adjustable LED lights, bringing superior image quality to its 2.4-inch color LCD screen. It includes video output



for transferring live images to external devices and 180-degree digital image rotation for capturing upright images. A hook, magnet, mirror and RCA cable are included with the unit in a hard-shell plastic case. The cable reaches to 4 feet and both the cable and imager head are waterproof. **800/769-7743;** www.ridgid.com.

RVI PRO MC360

The easy-to-use **mC360** CCTV pipe inspection system from **RVI Pro** incorporates a 2-inch-diameter pan-and-tilt camera head and 200 feet of pushrod. The high-resolution camera enables detailed visual analysis of pipe condition. Pan-and-tilt allows for easy inspection of tie-ins and joints. Image capture and video recording provide for quick documentation of the inspection. Its stainless steel frame is rugged and corrosion resistant. It can run on AC/DC or automobile power. Used with



its custom "Roll In Device," it can navigate tees, laterals and tie-ins, enabling easier inspections of what would usually require a crawler. **219/688-8271**; **www.rvipro.com**.

SPARTAN TOOL SPARVISION 200

At 25 pounds, the **Sparvision 200** pipe inspection camera from **Spartan Tool** is self-contained for easy on-the-job maneuverability. It comes with the choice of either an iPad Air or Samsung Galaxy S10 as the viewing screen, and is also compatible with personal devices. It comes with 200 feet of ultraslick pushrod and a color self-leveling camera. It offers instant snapshots, an on-



screen keyboard and telestration drawing ability, a 512 Hz locating beacon and distance counter. **800/435-3866; www.spartantool.com**.

VIVAX-METROTECH VCAMMX

The vCamMX portable all-in-one camera from Vivax-Metrotech can be used to inspect pipes between 1 and 4 inches. The control module's 8-inch daylight-viewable LCD screen shows the distance of pushrod deployed, as well as the current time and date. Recordings are made in AVI video and pictures in JPG format directly to a USB thumb drive, then instantly backed up to an SD card. The internal microphone allows audio commenting over recorded



video. The pushrod is traceable with the use of an external locator transmitter and available in 100 or 150 feet. The dual-frequency 512 Hz / 33 kHz sonde is standard equipment. Two camera heads are interchangeable in the field. The smaller D18-MX camera is fixed position and 0.7 inch in diameter, and the D26-MX is self-leveling and 1 inch in diameter. **800/446-3392**; www.vivax-metrotech.com.

VU-RITE VIDEO INSPECTION SYSTEMS MINI CAMERA

The professional-grade, durable 200-foot mini camera from **Vu-Rite Video Inspection Systems** is ideal for inspecting sewer lines as small as 2 inches or larger lines with the use of a mini lift adapter. The full-color mini camera has adjustable lighting and a heavy-duty stainless steel lens cover and body. It comes with a 512 Hz transmitter molded into the camera-head



pigtail. The rugged, lightweight, versatile frame has removable/extendable wheels, legs and handle for operating in confined spaces. It is available with an accurate footage counter and on-screen digital display, built in Wi-Fi and Android tablet. **423/256-3063; www.vu-rite.com**.

WOHLER USA VIS 350

The **VIS 350** visual inspection system from **Wohler USA** provides everything needed to inspect pipelines, precisely locate damage and accurately document the results of the inspection. It can be used to inspect waterlines 2 inches in diameter and larger with a pan-and-tilt camera head to ensure no damage is overlooked. The camera head has an integrated



transmitter that facilitates location detection by the Wohler L 200 Locator, which has an easy-to-read color display. Video footage and photos can be recorded and stored on a 2GB SD card for documentation and archiving purposes. **978/750-9876; www.wohlerusa.com.**

TRANSMITTERS

FLUID CONSERVATION SYSTEMS PERMANET+

The **PermaNet+** wireless network from **Fluid Conservation Systems** helps reduce water lost from leaks while saving time, money and labor. Responses are immediate when leaks are detected,



eliminating the need for site visits and drive-by patrols. The system is installed in the chamber, removing the need for disruptive above-ground installations. It works with FCS Permalog wireless leak noise loggers. Customers will receive leak reports generated by Permalogs on any internet-enabled device, and the status of each deployed logger is shown on map-based software. The system can send a leak alert whenever a logger detects a potential leak, enabling rapid response and minimizing water loss. 800/531-5465; www.fluidconservation.com.

SENSORAY MODEL 2253P CODEC

The Model 2253P Codec from Sensoray can collect and archive all video capture and corresponding data in tandem with other GIS mapping systems. It combines audio/video codec with a GPS receiver and multifunction port functionality. It can simultaneously encode, decode and preview A/V content and is housed in a rugged, compact exterior. All operating power is



supplied by a single USB port. Each of the two multifunction ports included can operate as an incremental quadrature encoder interface or as dual generalpurpose digital inputs (GPIO). Encoder counts, GPS data and GPIO states can be monitored and real-time encoder counts and GPS data can be overlaid onto any video stream. 503/684-8005; www.sensoray.com.

SMOKE LOCATORS

SUPERIOR SIGNAL SMOKE GENERATOR

Smoke Generators from Superior Signal offer a cost-effective method to find sources of surface inflow causing wet-weather sanitary sewer overflows. It is a fast and easy way to find leaks and faults in collections systems, laterals, plumbing, drains and vents. Classic Smoke Candles and Smoke Fluid Systems, plus Smoke



Blowers are available specifically for smoke testing. Classic Smoke Candles provide visible smoke to detect faults at a long distance. Smoke Generators are available in sizes to fit any need, from 30 to 500,000 cubic feet. Smoke Fluid Systems use an insulated heating chamber with stainless steel injector to maximize dry smoke output and produce quality liquid-based smoke. The smoke meets WEF, NASSCO and EPA standards. 800/945-8378; www.superiorsignal.com.

TURBO FOG M-45

The TURBO FOG M-45 is a versatile. lightweight, portable, self-contained smoke generator capable of producing dense, voluminous white smoke using leak-proof liquid smoke cartridges. Each cartridge can be replaced in seconds, allowing quick and easy replacement even while the unit is



operating, allowing for uninterrupted smoke production. There is no need to add additional smoke bombs or pump garden sprayers for additional test time. The Briggs & Stratton-powered turbine-type blower is a lightweight 45 pounds and creates a discharge velocity of over 75 mph and 2,000 cfm. It continues to work under pressure in up to 5.75 inches of water. It is available with a plumbing conversion kit. 800/394-0678; www.turbo-fog.com. c





PRODUCT NEWS

PRODUCT SPOTLIGHT

TT Technologies G Series Grundoburst splits iron and steel

By Luke LeNoble

The G Series Grundoburst static pipe bursting system from TT Technologies can burst anything from clay and concrete to ductile iron and steel, and can pull in a variety of replacement pipe including PVC, DIP, ABS, cast iron, fusion-welded HDPE and VCP jacking pipe.

The QuickLock bursting rods are linked together instead of threaded to prevent twisting. This saves time and extends the life of the cutter head while increasing safety.

"You just drop them in and they connect automatically," says TT Technologies President Chris Brahler. "There's no threading. It's a much more certain connection.

"You don't have to shut the machine down when you're pushing out the stem or pulling back during the bursting process," he says. "It's just a continuous feed or a continuous disconnect. Operators



don't have to worry about trying to break apart a threaded rod that's been twisted."

Pulled by a hydraulic bursting unit, the bladed cutting wheel splits the host pipe instead of ripping or tearing it like single-fin-type static systems. An attached expander spreads and displaces the split pipe into the surrounding soil while simultaneously pulling in the new pipe.

Eight models are available for bursting 2- through 54-inch pipe and larger. Pullback force ranges from 90,000 to 575,000 pounds.

"We have such an array of machines from small to medium to large, and the contractors can also do sewer pipe bursting with it," Brahler says. "Generally, a contractor can standardize in one machine, and with a wide range of accessories can retrofit the system without buying another machine." 800/533-2078; www.tttechnologies.com.



COXREELS BIODIESEL REELS

Biodiesel reels (SHF-N-525-BBN, TSHF-N-XXX-BBN and TSHL-N-635-BBN) from COXREELS are designed for biodiesel concentrations above B5. Model TSHF-N-620-BBN is designed for biodiesel concentrations above B20 when used with Viton seals and the Flexwing VersaFuel Hose. **800/269-7335**; www.coxreels.com.

▲ JOHN DEERE SMALL-FRAME SKID-STEER

The 312GR skid-steer loader from John Deere is designed for work in tight spaces or indoor operations. It features a 51 hp, Final Tier 4 engine with a 1,550-pound operating capacity. The radial-lift option offers a one-person boom lockout system that can be activated from within the cab. The lift system is designed for lower maintenance and optimal digging performance and is ideal when more reach is needed at midrange lift heights. All G-Series models are compatible with more than 100 available Worksite Pro attachments. 800/503-3373; www.johndeere.com.

EMPIRE LEVEL TRUE BLUE I-BEAM LEVELS

● The e55 Series of True Blue I-beam levels from Empire Level feature a top-read window for clear overhead viewing and built-in molded grip zones for enhanced portability. Magnetic models include a continuous magnetic edge that provides maximum holding power when measuring. High-contrast vial surrounds provide visibility in all light conditions. 800/558-0722; www.empirelevel.com.

LINK MANUFACTURING SWIVEL RAMP

The Swivel Ramp from Link Manufacturing is designed for cargo van and box truck applications and provides up to 1,500 pounds of loading capacity. Features include 180-degree swivel capability and two storage locations. It is available for bifold ramps in 30-, 36- and 47-inch widths and 99-, 108- and 117inch lengths. It mounts in the rear stored position like a traditional folding ramp, but can be stored inside, behind the wheel. When not in use, it rotates outside of the vehicle for unobstructed access. **800/248-3057; www.linkramps.com**.



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5 VACALL – GRADALL INDUSTRIES WATER RECYCLING SYSTEM

The AllClean water recycling system from Vacall – Gradall Industries is designed to conserve water and allow for AllJetVac operators to work all day without the need to refill the water tanks. It uses a series of filters, screens and centrifugal motions to remove matter of different sizes from water collected in the debris tank before returning it to the water tanks. A 240-gallon clean water washdown feature is included. **800/382-8302; www.vacall.com**.

6 DITCH WITCH DIGGING SYSTEM FOR WALK-BEHIND TRENCHERS

The OptiCut digging system from Ditch Witch, a Charles Machine Works Company, is made to enhance walk-behind trencher productivity in all soil conditions. Designed for depths up to 36 inches and 3.5 inches wide, the digging system uses a low-profile tooth design for a smoother cut with less chain wear. Configurations include a 4-pitch DuraTooth, a 2-pitch Shark and a 2-pitch DuraTooth/Shark combination. The digging system is compatible with Ditch Witch C12, C14, C16, C16X, C24X and C30X walk-behind trenchers and can be adapted to other makes and models with a special conversion sprocket. **800/654-6481; www.ditchwitch.com**.

7 GENERAL PIPE CLEANERS GEN-EYE PRISM VIDEO INSPECTION SYSTEM

The Gen-Eye Prism video inspection system from General Pipe Cleaners features a Wi-Fi transmitter that enables a tablet or smartphone to be used to view and record inspections from up to 500 feet via a free mobile app. The system offers all the features of full-size inspection systems in a compact, fan-cooled package. The command module weighs 3 pounds and can be mounted on any Gen-Eye GL or POD reel. Optional brackets for mini-tablets and smartphones are available. Complete systems include a self-leveling camera and a 512 Hz transmitter for camera tracking with the Hot Spot pipe locator. **800/245-6200; www.drainbrain.com**.

8 FRANKLIN ELECTRIC CENTRIFUGAL CLOSE-COUPLED PUMPS

The AG Series of centrifugal close-coupled pumps from Franklin Electric are designed for efficiency in challenging water transfer applications. Ten different models cover the most popular hydraulic performance ranges from 3 to 75 hp, flow ratings from 50 to 2,000 gpm, and heads up to 300 feet. Each pump is equipped with either a NEMA standard JM or JP motor for mechanical seal or packing gland configurations, both of which include a 416 stainless steel sleeve for extra durability and ease of service. **800/473-5422; www.pelican.com**.

REELCRAFT SPRING-RETRACTABLE REELS

Series L 70000 spring-retractable cord reels from Reelcraft Industries are designed to accommodate up to 100 feet of 12-gauge cord. Steel construction and baked-on powder-coat finish combine for a heavy-duty, corrosion-resistant finish. The containerized drive spring offers safer and easier handling during maintenance. Two sealed ball bearings produce a smoother spool rotation and easier operation. All cord reels are UL-listed. **800/444-3134; www.reelcraft.com**.

10 MILWAUKEE ELECTRIC TOOL CORP. CABLE-CUTTING PLIERS

Cable-cutting pliers from Milwaukee Electric Tool Corp. feature a hardened blade for clean cuts through 4/0 – 2/0 copper wire. The bevel jaw design minimizes deformation of the wire, allowing the user to quickly complete an installation. The forged metal body and black oxide rust protection prevents damage, and rubber mold grips provide added comfort. **800/729-3878;** www.milwaukeetool.com. **c**

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INDUSTRY NEWS

Federal Signal acquires Westech Vac Systems

Federal Signal Environmental Solutions Group, parent company of Vactor Manufacturing, acquired Westech Vac Sys-



tems, a leading provider of vacuum-truck-mounted solutions. As a Federal Signal subsidiary, Westech will continue to operate in Nisku, Alberta, as Westech Vac Systems.

Raven Lining Systems earns USDA certification

Raven Lining Systems earned the USDA Certified Biobased Product Label for its AquataFlex 505 and 506 products. The label verifies that the products' amount of renewable biobased ingredients meets or exceeds levels set by the USDA. Both products deliver strong adhesion properties to properly prepared concrete, steel, aluminum, wood, composites and many other substrates.

GapVax founders receive local honor

GapVax founder Gary Poborsky and his wife, Rose, were inducted into the Greater Johnstown Cambria County Business Hall of Fame in Johnstown, Pennsylvania. The GJCC Business Hall of Fame honors individuals who have made a lasting impression on the region through business contributions or efforts to improve the area. Poborsky founded GAP Pollution and Environmental Control in 1977.



Avanti International, US Grouts receive NSF certification

Ultrafine SD and Ultrafine ND cementitious grouts — manufactured by US Grouts and distributed by Avanti International — received NSF International certification as conforming to the requirements of NSF/ANSI Standard 61 for use in contact with potable water.

ServiceTitan reports record growth

ServiceTitan, a provider of cloud-based business management software, reported significant growth in 2015, adding a record number of employees and tripling its customer base. In 2015, the number of employees grew from 21 to 95.

Thompson Pipe Group – Flowtite names regional sales manager

Thompson Pipe Group – Flowtite named Dee Bryant regional sales manager. Bryant will be based in Houston and focus on growing the success of Flowtite FRP across the South Central market.

Draincables Direct names territory sales rep

Mark Lincoln has joined the sales team at Draincables Direct and will serve the Dallas territory. Lincoln has over 25 years of sales experience in the industry. **C**



Mark Lincoln

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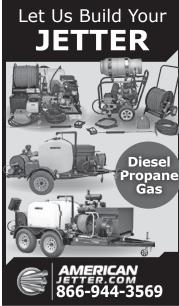
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COMPUTER SOFTWARE

FreeServiceReminderSoftware.com, FreeServiceDispatchSoftware.com, FreeRouteManagementSoftware.com. (C06)

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2000 John Bean Trailer Jet: 35gpm @ 2,000psi. 400-gallon tank, 400' new hose. \$11,000 OB0. 231-325-0052 or 734-365-4035. (CBM)

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JETTERS-TRUCK

740 Spartan water jet air-cooled. Approximately 50 hours. Unit is 18 months old. Skid mounted. Price - \$18,000. Tommy 914-760-0689 (C07)

Jack Doheny Supplies Inc. offers a full range of late model combo units and DOT industrial vacuum loaders. Call us @1-800-3DOHENY. (CBM)

JET VACS

2015 Camel Western Star 1200 combo truck, 824 blower, ejector plate, 12-yard debris tank, 80gpm @ 2,000psi water system, 1,500-gallon freshwater, 600' of 1" jet hose. Low hours and miles, some factory warranty left. For pic and more info call Jeff 317-258-4900 (C06)

2015 Freightliner Camel combo truck, 824 blower, ejector plate, 12-yd debris tank, 80gpm at 2,000psi, 1,500-gallon freshwater, 600' of 1" jet hose. Low hours and miles. For more info and pics contact Jeff 317-258-4900 (C07)

2009 Vactor 2103, International chassis, standard transmission, 88k miles, PD blower. \$68,000. Ready to work. Call Bill at 813-489-3108. (C07)

2002 Sterling LT7501 Vac-Con Model V390LHA combination sewer cleaning truck: Freshly painted white. CAT 3126 - 275hp engine, 3-stage fan, 1,000-gallon water tanks, pump off option available. 10' tele-scopic boom. FMC water pump - 65gpm @ 3,000psi. Articulating hose reel with 600 feet of new 1" hose. 84,316 miles. Located in Orange, CA. \$79,900. Contact Craig: 714-639-8352. Additional details at www.empireequip.com (CBM)

Vac-Con industrial machine mounted on a pre-owned 2006 Sterling cab and chassis. (Stock #8593C) www.VacuumSalesInc.com (888) VAC-UNIT (822-8648) (CBM)

Vactor 2100 body parts unit with blower on a 2005 Sterling (no engine & transmission) (Stock# 0311V) www.VacuumSalesInc.com (888) VAC-UNIT (822-8648) (CBM)

Vac-Con V390LHA combination unit with Roots 827 blower, 1999 International Model 2554 cab and chassis. (Stock #3918C) www.VacuumSalesInc.com, (888) VAC-UNIT (822-8648). (CBM)

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MISCELLANEOUS



CUES Grout/Seal System: Reel-control unit, extension cord reel. Also has Penta 4 hose on the reel. Approximately 700' on reel. Set for acrylamide. Never used. Asking \$6,000 USD

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2002 Ford E450 Cutaway Camera Van (valued \$34,500). Includes Pipe Analytics Software (valued \$11,840) and RST Main Line Trak Star (valued \$22,275). V10, low mileage, restroom, a/c. \$59,500. Call for more information/pics 985-969-3636, LA co6



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Aries Saturn case unit: Approximately 750 ft. cable, pan and tilt camera, setup for DVR, lots of extras. Also comes with Aries push cam. This system works good. \$15,000. dlamke@envspec.com 920-261-4000 (C09)

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WANTED

Wanted: Used US Jetting jetter parts, damaged trailer jet or a jet no longer in service. Specifically looking for 4018 pump or parts, but will consider whole units. Please email usedjetterparts@gmail.com with contact information and what you have available and we will get back to you. (C07)

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15J27 - Jetter Base Model



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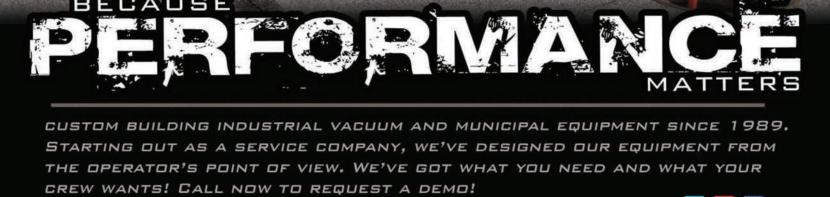
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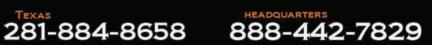
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