WJTA Jet News

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Hydro-Excavation Applications

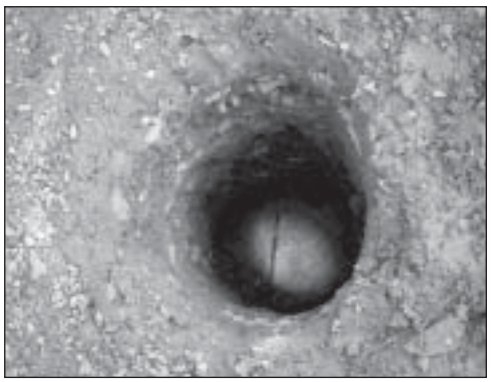
Water Shutoff Repair

Drilling Mud Removal

Long Reach Applications

Minimal Disruption To Landscape

Utility Construction



Heavy Clay Soil

Repairing Steam Line Under Foundation

See article, "Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction and Municipal Use," page 2.

Photographs provided courtesy of Vactor Manufacturing, Inc., a Division of Federal Signal Corporation.

On the inside

AWJ Cutting Of Thick Materials .. pg. 5
Twin Aqua Cutters Solve Corrosion Problems On German Bridge ..... pg. 8
PaR Systems Purchases Unidynamics ..... pg. 9
New Multi-Gun Valve Designed For Higher Flow ..... pg. 10
New Products, Services ..... pg. 12
KMT Receives Substantial Order For High Pressure Injection Pumps ..... pg. 16
Call For Papers ..... pg. 18

Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction And Municipal Use

Introduction

Every day, contractors, municipalities and utilities excavate for installation of underground facilities, or must locate existing pipes, cables and lines for maintenance and repairs. In the past, this usually involved digging by hand (often a slow and tedious process) or with a mechanical excavator, backhoe or similar machine.

Every year, there are numerous reports of injuries, deaths, explosions and fires from unsafe or poorly planned excavations that strike underground facilities or result from collapsed trenches. Many of these incidents can be avoided and the risks minimized by utilizing techniques such as vacuum excavation.

Definitions

Vacuum excavation is a general term that may include processes using either water (hydro-excavation) or high-pressure air to loosen soil. In either case, an air vacuum is used to move the loose soil and rocks, often into a debris tank for later disposal or back-filling the hole that's been made.

Hydro-excavation is a process that utilizes pressurized water to break up and remove the soil via air conveyance (vacuum) into a debris tank, providing a non-destructive means to safely locate utilities and precisely excavate an area.

This article will focus specifically on hydro-excavation and its origins, benefits, safety factors, applications and economic value.

Historical Perspective

Hydro-excavation as we know it today can trace its growing popularity to the Canadian oil and gas industry, which realized years ago the efficiency of using a hydro-excavation machine to "daylight" buried gas pipes and other utility lines. With cold weather and permafrost, petrochemical plants and facilities in Canada found that using heated water made hydro-excavation the only viable option to excavate year-round.

In the early 1960s, catch basin cleaners were adapted for hydro-excavation use, but the technology was crude. Vactor® built its first hydro-excavation machine, the ExcaVactor," in 1969. However, the market then was immature and it was the only unit built.

In the 1970s and '80s, customers modified vacuum trucks and sewer cleaners for hydro-excavation use. Some took vacuum components off the trucks and mounted them on all-terrain vehicles to get into remote locations. In the 1990s, a number of companies saw a growing demand for hydro-excavation machines and began manufacturing truck- and trailer-mounted units in varying configurations.

By 2000, hydro-excavation was widely used across Canada and was moving into the United States. In recent years, the practice has rapidly gained acceptance in the U.S.

Safety and Damage Prevention

Improved safety and damage prevention top the list of key benefits of hydro-excavation. An underground utility strike can be catastrophic, affecting thousands of people and costing millions of dollars. A single incident may cause personal injury or death, property damage, lost work opportunity, community disruption, ecological damage and insurance liability.

More than 40 percent of pipeline system leaks and ruptures are caused by damage from outside force, and more than half of all cable service outages are caused by excavation damage.

While disruption of a telecommunications network is not as inherently dangerous, it can be expensive and inconvenient, impacting traffic control systems, health services and emergency response activities. The importance of minimizing underground utility strikes and their consequences cannot be denied.

Using hydro-excavation in such situations can avoid:

- "Hits" or "strikes" on underground utility lines, cables and pipes
- High costs to repair damaged infrastructure
- Costs and inconvenience of interrupted utility services
- Serious injury or death to workers and the public
- Liability and increased insurance costs
- Loss of a company's reputation, revenues and employee morale

In addition, hydro-excavation can improve overall productivity and efficiency for contractors, municipalities and utilities.

(continued on page 4)

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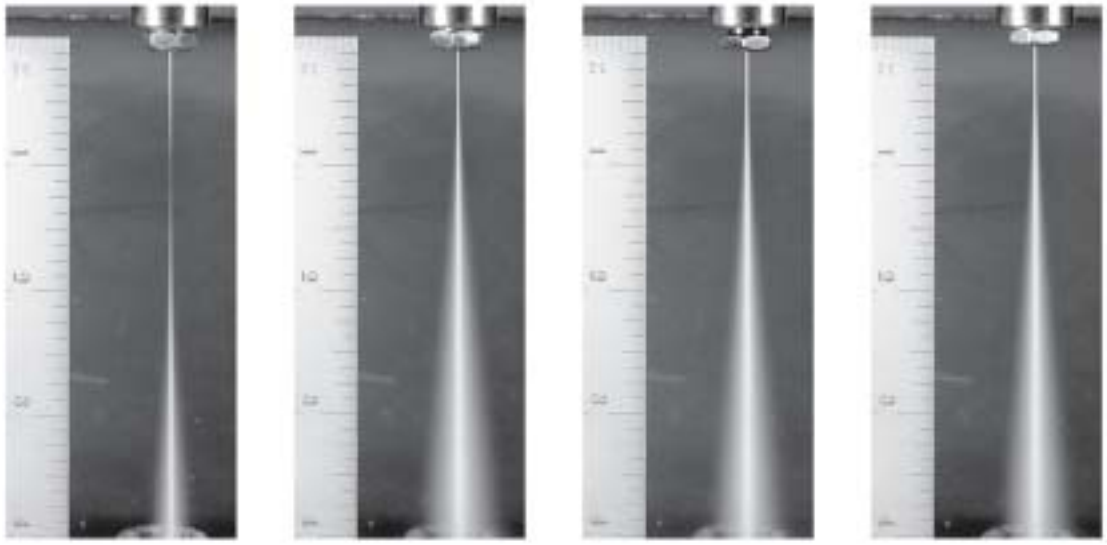

GATTI High-Cohesive | Competitor "A" | Competitor "B" | Competitor "C"

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Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction And Municipal Use, from page 2

Government regulation

The U.S. presently has more than 14 million miles of buried utilities and pipes. Current laws prohibit the use of mechanical means to dig within 18 inches of buried cable and pipe in the U.S., and 45 cm in Canada. Buried utilities are often miss-marked or maps are inaccurate, requiring underground facilities to be located by sight, either by hand-digging or another means, to maximize safety. This is often called "daylighting." Unfortunately, digging by hand is often time-consuming, and mechanical excavation is inherently risky.

The U.S. Department of Transportation's Damage Prevention Quality Action Team views the situation this way:

> *The United States has a vast underground infrastructure of pipelines, conduits, wires, and cables that affect every individual. This underground infrastructure is critical to our way of life, constantly providing oil and natural gas, telecommunications, electricity, water, sewage, cable TV, and other vital products and services. Disruption of any of these underground facilities could affect the safety of the public, the environment, and continued service reliability that could impact our entire economy.*
>
> *One of the leading causes of disruption to our country's underground facilities is external force damage (sometimes called 'third-party damage') that occurs during excavation activities. Both industry and government have recognized this. Although such damage occurs far too frequently, it is usually preventable. Responsibility for preventing excavation damage is shared by all stakeholders. Advanced planning, effective use of one-call systems, accurate locating and marking underground facilities, and the use of safe-digging practices can all be very effective in reducing underground facility damage. In most states, increased and mandatory use of the state's one-call system has significantly reduced the incidence of excavation damage. However, damage still occurs.*

Risky business

Strikes on natural gas lines are particularly hazardous and occur all too often, resulting in significant property damage, injuries and even deaths. The tables below illustrate incidents for natural gas distribution pipelines during the years 2000-2004.

Natural Gas Pipeline Operators
Incident Summary Statistics By Year
2000 – 2004

Distribution Operators

Year	No. of Incidents	Fatalities	Injuries	Property Damage
2000	154	22	59	$23,398,834
2001	124	5	46	$14,071,486
2002	102	10	44	$23,804,202
2003	146	11	58	$22,293,833
2004	171	17	41	$54,079,550
Totals *	**2,580**	**318**	**1,404**	**$356,679,645**

* Totals include accidents from 1986 – 2004. Source: Office of Pipeline Safety Statistics.

As these statistics show, property damage from gas distribution pipeline incidents more than doubled from 2003 to 2004, from over $22 million to $54 million. Of the 171 incidents reported in 2004, 48 were caused by third-party excavation, resulting in more than $10.6 million in property damages.

Distribution Pipeline
Incident Summary By Cause
1/1/2004 – 12/31/2004

Cause	No. of Incidents	% of Total Incidents	Property Damages	% of Total Damages	Fatalities	Inuries
Car, truck or other vehicle not related to excavation activity	12	7	$18,010,380	33.3	1	2
Fire/explosion as primary cause	26	15.2	$5,874,315	10.9	0	4
Operator excavation damage	1	0.6	$0	0	0	0
Third-party excavation damage	48	28.1	$10,636,424	19.7	0	4
Totals	**171**	**100.0**	**$54,079,550**	**100.0**	**17**	**41**
Average			**$316,255**			

Totals and averages include all accidents from 2004. Source: Office of Pipeline Safety Statistics. Data for 2005 not available at time of publication.

Applications

Virtually every construction contractor, municipality and utility does underground construction and/or has subsurface facilities. At times, a subcontractor with expertise or

(continued on page 6)

AWJ Cutting Of Thick Materials

An article written by Hashish* presented interesting results on precision cutting of thick glass, titanium, and steel with abrasive waterjets (AWJ). Here are the highlights.

Pictures of some examples of really thick materials cut with AWJs were shown, including 450 mm (18") thick aluminum (cut in single passes), 300 mm (12") thick glass (cut in two passes from top and bottom), and 1 meter (39.4") thick concrete (cut with penetrating tool).

Jet trail-back, taper, and surface finish were identified as the three main characteristics of AWJ cuts. Results of 14 cutting tests on a 300 mm thick sample of titanium with different abrasive flow rates and cutting speeds were presented. The trail-back curves match the prediction of a universal AWJ kerf equation. The kerf width profiles show some similarity to kerf width profiles predicted with a kerf shape model of pure waterjets. This pure waterjet model with some modifications was applied to AWJs. Tilting the nozzle forward or sideways can minimize the trail-back and taper.

Mesh No.	$r = m_a/m_w$	0.1	0.12	0.15	0.2	0.25
	d_p (mm)	Mixing tube length, 1_m (mm)				
16	1.65	439	423	401	369	340
36	0.76	202	195	185	170	157
60	0.38	101	98	93	85	78
80	0.25	67	65	62	57	52
100	0.13	34	33	31	28	26

An equation to predict proper mixing tube length for achieving a certain mixing efficiency was also presented. The table above shows predicted mixing tube lengths for a mixing efficiency of 90% (i.e. particle velocity at 90% of its maximum possible velocity). According to this table, longer mixing tubes are required with larger particles and shorter mixing tubes can be used with higher abrasive flow rates.

Examples of AWJ nozzles used for thick material cutting were shown. Mixing tubes for these nozzles were 300 mm (12") and 450 mm (18") long. Two abrasive inlets were used to feed abrasive into each nozzle. As an example of work done with these nozzles, a hexagonal honeycomb shape with 2-mm thick struts was cut out of a 300 mm thick glass block. A tilting cutting head was used to correct for trail-back and taper.

* Hashish, M. (2004) Precision cutting of thick materials with AWJ, *Proceedings of the 17th International Conference on Water Jetting,* Colin Gee (Ed.), *Proceedings of the 17th International Conference on Water Jetting — Advances and Future Needs,* Mainz, Germany, 7th - 9th September. p. 33-45.

Article reprinted with permission from the *Quality Waterjet Newsletter*, July 4, 2006, published by QualJet LLC, www.qualjet.com.

Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction And Municipal Use, from page 4

specialized equipment is needed to handle certain excavation jobs. There are many potential applications in which hydro-excavation is a viable option. These include:

- Line location, installation and repair for utilities and pipelines
- Sewer and pipe rehabilitation
- Telecommunications maintenance and repair
- Slot trenching
- Waterline maintenance and repair
- Directional drilling
- Sign and pole installation
- Landscaping (i.e., digging holes for new trees and shrubs)
- Repair work or excavation in tight spaces and congested areas
- Potholing

With hydro-excavation, buried natural gas and petroleum pipelines can be uncovered without risk of puncture. Fiber optic cables, telephone lines, water mains and other utilities can be efficiently located without damage. This method also causes less surface damage, traffic disruption and other potential digging drawbacks.

Operators can use hydro-excavators to dig with precision, offering a less invasive method for slot trenching, potholing or pipe location. In grassy areas, sod can be replaced and, within a week, a casual observer would never know a hole had been dug there.

Cost/Benefit Analysis

To effectively evaluate the costs versus benefits of hydro-excavation compared to mechanical excavation methods, worksheets such as the ones in the following column and on page 11 can be used. The first worksheet in each of the two sets includes typical figures for the example shown. Use the second, blank worksheets to plug in your own numbers and compare conventional digging and hydro-excavation.

In most cases, a yard-for-yard comparison between a hydro-excavator and a bucket machine favors the bucket machine. However, the actual removing of the dirt is only a small part of the overall job.

Let's look at the following job as an example: Acme Utility Co. has contracted you to uncover a 2 ft. x 2 ft. area they believe to be six feet underground, then backfill with clean material and restore to its original condition.

Option 1: Conventional Method

Open hole with sloped sides to allow for legal hand digging for exposure of utility.

Operation	Time	Cubic Yards	No. in Crew	Amount
Unchain, unload & stage equipment	0.5 hr.			
Uncover utility	3 hrs.	13.3	4	
Backhoe, Dump truck				
Backfill (compacted)	2 hrs.	12.1		
Restoration (196 sq. ft.)	1.5 hrs.			
Reload equipment	0.5 hr.			
Totals	**7.5 hrs.**	25.4		

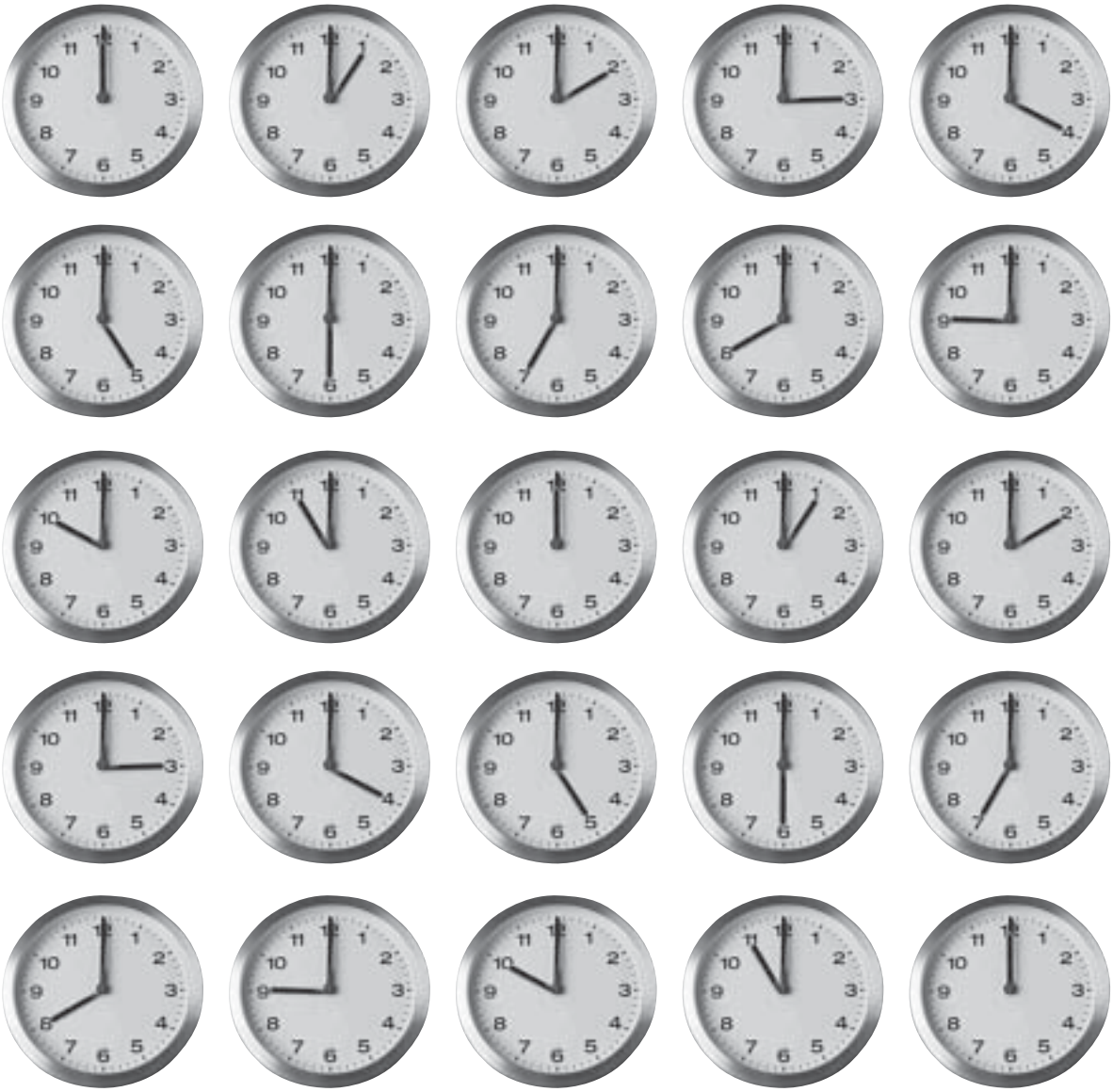
Operation	Time	Cubic Yards	No. in Crew	Amount
Unchain, unload & stage equipment				
Uncover utility				
Backhoe, Dump truck				
Backfill (compacted)				
Restoration (196 sq. ft.)				
Reload equipment				
Totals				

Live Gas Lines Exposed

Limited Access Areas

Multiple Utility Lines Safely Exposed

(continued on page 11)



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Twin Aquajet Robots Solve Corrosion Problems On German Bridge

The 286 m long Loithal Bridge on Germany's A8 autobahn was experiencing corrosion problems with rebar along the parapet caused by salt laid over the winter months to combat the heavy snowfall.

Two hydrodemolition robots from Sweden's Aquajet Systems are being used on a German bridge project close to the Austrian border removing more than 140 m^3 of badly corroded concrete from the parapet beams and hard-shoulders under a very "tight" contract.

Built in 1957, the Loithal Bridge on the busy Salzburg - Munich A8 autobahn, is experiencing severe corrosion problems on the parapet beams and hard-shoulders, caused by salt laid over the winter months to combat the heavy snowfalls. The salt has also caused considerable corrosion to the parapet's rebar.

In a two-month contract – scheduled to have started in April 2006 but set back more than a month due to heavy snowfalls – main contractor, Kassecker, awarded the hydrodemolition contract to Hochdruck Industrie Service GmbH. Based in Frankfurt, Hochdruck entered the hydrodemolition sector in 2004. According to Project Manager Dirk Simon, approximately 40% of increased turnover is from new hydrodemolition business.

Beset with problems, including the initial bad weather at the start of the

Two hydrodemlition robots from Aquajet enclosed within a gantry above the parapet on both sides of the bridge are removing more than 140m^3 of badly corroded concrete.

contract, Hochdruck had initially proposed using its single Aqua Cutter HVE Evolution and electronically controlled robot.

"We soon recognized the need for a second unit so as to be able to tackle both sides of the autobahn at the same time, in an already very short contract period," said Dirk Simon.

Making use of the Aqua Cutter HVE Evolution, water is blasted at extremely high pressure into the concrete. The high pressure water is delivered to the tracked robot through flexible high pressure hoses. Inside the robot there is a gimbal-mounted lance with a nozzle attached. The operators can select the nozzle operating width to meet the requirements of the job they are working on.

The nozzle compresses the jet of water and delivers over 200 litres a minute under 1000 bars of pressure. The lance is mounted to a roller assembly, which traverses on a beam delivering a consistent high pressure jet to the concrete beneath a protective skirt. The robot is operated through either a wireless or a lightweight hard-wired remote system, which also features a shoulder harness for operator comfort.

The operator can program the robot to vary the angle of penetration, the lance speed and the degree of oscillation. This allows the contractor to determine the number of passes needed to meet the specification for removal – usually this means removing the unsound concrete while leaving the sound concrete with a superior bonding surface.

"This is the beauty of this robot," says Jan-Åke Petersson, "It cleans the concrete and base underneath and leaves a craggy surface, which gives a much greater bonding area than a surface prepared with jackhammers or sandblasting machines."

He adds, "There is no risk that the area treated will have any impact or vibration damage – if you strike rebar with a jackhammer it is most likely that the vibrations will travel deeper into the sound concrete leading to micro-fractures and loosening of the rebar. This does not happen using the Aqua Cutter."

Both Aqua Cutters are supported in a tailor-made gantry and steel surface preparation deck covering the complete width of the autobahn. The gantry and deck is 20 m wide and is hydraulically moved forward 20 m at a time. In addition to providing a

(continued on page 13)

PaR Systems Purchases Unidynamics

PaR Systems, Inc. has announced the acquisition of the assets of Unidynamics, Inc., a leading U.S. material handling and specialty equipment company, based in Conroe, Texas. The purchase was funded with capital from PaR Systems financial partner, American Capital Strategies (NASDAQ: ACAS).

Unidynamics joins Jered LLC, a wholly owned subsidiary of PaR Systems, to provide specialty material handling design, manufacturing, and service to the marine and military markets. Recently, Unidynamics made specialized handling equipment installed in military applications including the Littoral Combat Ship, the first of the U.S. Navy's planned next-generation surface combatants.

"The acquisition of Unidynamics enhances PaR Systems' existing automation and material handling solutions and strengthens our support for military and commercial marine customers," said Rick Edger, Jered president and head of PaR Systems' military division.

PaR Systems purchased Unidynamics' assets from their section 363 bankruptcy sale process. PaR Systems plans to act quickly to complete Unidynamics' immediate projects before relocating the facility to Jered's Brunswick, Ga., location.

For 45 years, PaR Systems has provided automation and material handling solutions and remains focused on specialized robotics, material handling, and crane equipment applications to improve customer quality, safety and productivity. Headquartered in Shoreview, Minn., PaR Systems serves highly specialized industries including aerospace, marine, semiconductor, food and beverage, military, government, research, semiconductor, medical, laboratory and manufacturing. In August 2005, PaR Systems acquired the assets of Jered Industries, Inc. and expanded its automation and material handling expertise into the military and commercial marine industries. For more information, visit www.par.com.

Unidynamics, Inc. has designed and built innovative solutions and world-class equipment for material handling applications. These include applications for such markets as marine, offshore energy, hazardous materials, aerospace, pleasure cruise ships, and others requiring customized solutions.

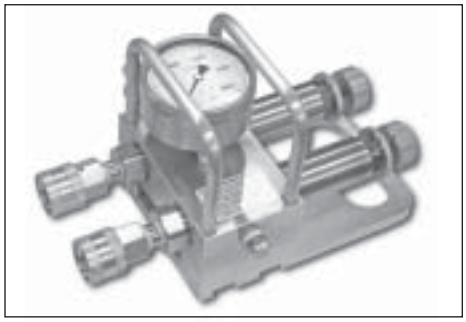
New Multi-Gun Valve Designed For Higher Flow

A new high-flow multi-gun valve from NLB Corp., the MGV12-3000, lets users operate two or more waterjet lances from a single high-pressure pump unit at flows as high as 60 gpm (227 lpm). The new valve is designed for operating pressures from 4,000 to 12,000 psi (276 to 830 bar), and can be repaired in the field in less than five minutes.

The MGV12-3000 can be used with any dump-style waterjet lance, and the nozzles in the lances can be different sizes. Each operator independently controls the loading and dumping of his own lance. The assembly comes complete with mounting plate, guard, pressure gauge, and NPT couplers for inlet/outlet connections, and weighs just 27 lbs. (12kg).

The new multi-gun valve features a disposable, screw-in cartridge that can be replaced at a job site in under five minutes. It is the same, proven quick-change cartridge used in the latest NLB lances and foot control valves, minimizing inventory needs.

NLB Corp., a leader in high-pressure and ultra-high pressure waterjet technology, manufactures a full line of quality waterjetting systems and accessories for contractor and industrial uses. These include surface preparation, paint removal, tank and tube cleaning, concrete hydrodemolition, concrete and pipe cutting, and more. For more information, visit www.nlbusa.com or contact Jim Van Dam by phone: (248) 624-5555 or e-mail: vandamja@nlbusa.com.



Mark Your Calendar

2007 American WJTA Conference and Expo

August 18-22, 2007

Marriott Houston Westchase Hotel
Houston, Texas

Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction And Municipal Use, from page 6

Option 2: Hydro-excavation Method

Open hole with sloped sides to allow for legal hand digging for exposure of utility.

Operation	Time	Cubic Yards	No. in Crew	Amount
Park truck, turn on vacuum & water	5 min.			
Uncover utility	0.5 hr.	0.9	2	
Hydro-excavator				
Backfill (compacted)	25 min.	0.9		
Restoration (sod was cut & peeled back at start of excavating)	1.5 hrs.	1.2		
Totals	**2.5 hrs.**	3		

Operation	Time	Cubic Yards	No. in Crew	Amount
Park truck, turn on vacuum & water				
Uncover utility				
Hydro-excavator				
Backfill (compacted)				
Restoration (sod was cut & peeled back at start of excavating)				
Totals				

These tables illustrate the time, labor and cost savings between the different methods. The Option 1 crew will likely be occupied onsite almost all day, while Option 2's crew has time for multiple jobs in one day. This may or may not be a typical example in your area.

Cost/benefit analysis worksheets used with permission of www.safeshovel.com.

Today's Technology

The most effective hydro-excavators today are dedicated units designed and built specifically for hydroexcavation. They combine high-pressure water systems that cut through and break up sod and soil with a highflow air vacuum that lifts soil and small rocks out of the excavation area.

In the late 1990s, Vactor® Manufacturing saw that customers needed a dedicated machine, resulting in the Vactor HXX Hydro-Excavator introduced in 1999.

Fan System or Positive Displacement (PD) System

On most dedicated hydro-excavators available today, customers may choose either a fan system or a positive displacement (PD) blower as the vacuum source. Each has distinct advantages:

- A fan system moves an incredible amount of air, excavating more rapidly than other systems. It's also easier to operate and maintain, and the unit's overall weight is usually less. Also, fan units are generally less expensive than the PD versions.

- A PD blower moves air over long distances, allowing for excavation at greater depths, but at slower speeds, than fan units.

Typical hydro-excavation jobs do not require digging to great depths or at long distances, so the fan type is more productive for the majority of hydro-excavation applications.

In either the fan or PD configuration, a simplified airflow path design will maximize pickup and filtration effectiveness. Additional features that improve the unit's overall productivity include extendable or telescopic booms offering a wide range of rotation and mounted on the curb side, large-capacity water tanks and debris bodies, heavy-duty solid construction, heated pump and hose reel cabinets, convenient operator controls and tool storage.

(continued on page 14)

New Products, Services

Richel, Inc. has introduced the **DARDI waterjet systems**, available in three standard table sizes. The DARDI waterjets are complete abrasive systems. They come with the full support of the RICHEL team including software and technical support, spare parts, installation, and training. For more information, contact Julie Kaiser or Ben Gerhardt, RICHEL, Inc., phone: 330-677-9100, fax: 330-677-9121, website: www.richel.com, email: richel@richel.com.

Lindsay Gorrill, former president and CEO of WGI Heavy Minerals, and **Melanie Delfakis**, former direct sales for WGI Heavy Minerals and Universal Minerals, have partnered together to create **Precision Industrial Supply, LLC.** Precision Industrial Supply delivers quality garnet products and service to the abrasive waterjet industry. Precision's Durajet Garnet is a premium washed garnet produced specifically for the waterjet cutting market, and it is strategically located across the U.S. and also available through a network of distributors. For more information, call 208-762-3536 or visit www.precisionindustrialsupply.com.

Safety Committee Solicits Comments On Improvements To *Recommended Practices*

The WJTA Safety Committee hereby solicits comments regarding improvements to the publication, *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment*. While *Recommended Practices* is reviewed periodically at the biennial conferences of the WaterJet Technology Association, your comments and suggestions for improving the publication are invited and welcome anytime.

Please address your comments and suggestions to: Safety Committee, c/o WJTA, 906 Olive Street, Suite 1200, St. Louis, MO 63101-1434, phone: (314)241-1445, fax: (314)241-1449, email: wjta@wjta.org, web site: www.wjta.org.

Twin Aquajet Robots Solve Corrosion Problems On German Bridge, from page 8

working surface for the Aqua Cutter Hydrodemolition units, the deck and gantry allow easy access to the deteriorated concrete and rebar along the bridge. It also provides protection from the traffic – in a 'live' application having minimal effect on the traffic flow – and a base for the treated concrete to fall safely.

The Loithal Bridge is 286 m long and features six sets of columns, the highest with a bridge height of 33 m. With the balustrade safety barrier removed, Hochdruck is clearing up to 9 cm depth along the top of the 1.10 m parapet beam, between 17-20 cm from the bottom of the 70 cm deep beam and up to 8 cm on its facing edge.

Due to the extremely short contract, Hochdruck is working two 12-hour shifts for 10 days, breaking for a long weekend break before starting the next 10-day session. Working a three-day cycle, the robots are used to remove the deteriorated concrete from 20 m of the facing edge of the beam over the first 12-hour shift. The Aqua Cutters are then returned to the start of the 20 m section to work the top edge of the beam in the second shift. This, according to Dirk Simon, is a major feature of the tracked robots from Aquajet Systems, compared with competitive wheel-mounted units.

"Being a tracked unit means the Aqua Cutters can move backward and forward along the beam plus the robot is able to turn 360º on the same spot," he said, adding, "Within the confined working width of the enclosed hard-shoulder area means turning with a wheeled-unit would be impossible," said Mr. Simon.

On the second day, the Aqua Cutters are used to remove the 17-20 cm of concrete on the underneath of the beam along the same 20 m section. For the third day, the base area of the surface preparation deck is cleared of fallen concrete debris and the gantry moved over the next shift;

With over 200 litres a minute delivered at 1000 bar of pressure, the robot removes the corroded concrete to expose the rebar without any damage, leaving a 'craggy' surface for a superior bonding with the new concrete.

in readiness for the next 20 m, three-day cycle.

According to Site Supervisor Bernd Klyne, each of the Aqua Cutters is removing up to 4 m^3/day. He is, he says, "Very pleased with this performance, which is totally removing the concrete below the rebar without causing any damage or misplacement of the rebar."

Providing water power for the two robots, Hochdruck is using two high pressure pumps each powered by Caterpillar C15 diesel engines rated at 440 kW, to provide up to 250 l/min at 1000 bar for each unit.

With the rebar exposed, the main contractor is able to identify and replace large quantities of the corroded rebar.

"The robots from Aquajet are by far the best machine for this job," says Dirk Simon, adding, "It can operate on the underbeam operations as easily as the top face cleaning and with the 6 m standard tower it can perform vertically and overhead with the same efficiency."

For its next job, one of the Aqua Cutters will be moving closer to Hochdruck's base in Frankfurt for a bridge project on the A66.

Although removing a similar amount of concrete as the Loithal Bridge project, "It will," he says, "be easier with not such a critical 'tight' schedule."

For further information, contact: Stefan Hilmersson, Aquajet Systems AB, Brunnsvägen 15, SE-570 15 Holsbybrunn, Sweden,Tel: int +46 (0)383 508 01, Fax: int +46 (0)383 507 30, email: aquajet@aquajet.se.

Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction And Municipal Use, from page 11

Water flow and pressure

There are several benefits to using water (vs. air) as a nondestructive excavation tool.

Water flow and pressure

- Acts as its own lubricant
- Controls static electricity
- Avoids the sandblasting effect of air
- Works in almost all soil conditions
- Can be heated to excavate frozen ground

Vactor recommends in most cases using three to nine gallons per minute (gpm) of water volume for hydro-excavation. Contractors are paid to excavate the soil, not to dump debris, recover water or get more water.

(continued on page 17)

Frozen-Ground Excavation

Low Water Usage

WJTA Welcomes New Members

Corporate

Aquachem Corporation
Bill France
Mike Qusen
Unit 14, 201 Spinnaker Way
Concord, ON L4K 4C6
Canada
Telephone: (905)761-7255
Fax: (905)761-7256

Individual

Piotr Kotlowski
NAM PREMATOR W.L.L.
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Hidd
Manama 2862 Bahrain
Phone: [97](31)767-4218
Fax: [97](31)767-2392

Nancy Lauseng
Jet Edge
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St. Michael, MN 55376
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Fax: (763)497-8701

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Hoong Yeu Precision Technology, Inc.
No. 162 Sect. 4
Chung Hwa Rd.
Hsinchu 300
Taiwan, Republic of China
Telephone: [88](63)538-5161
Fax: [88](63)538-9996

Jared Potter
Potter Drilling LLC
1665 Industrial Road
San Carlos, CA 94070
Telephone: (650)620-9232
Fax: (650)620-9237

Mike Scraylian
Blick Industries
2465 Laguna Canyon Road
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Telephone: (949)499-5026
Fax: (949)499-1398

Ed Smith
Hartman Walsh Corporation
7144 N. Market Street
St. Louis, MO 63133
Telephone: (314)863-1800
Fax: (314)863-6964

Wayne Wisk
MK Hydroblasting
PO Box 1573
White Court, AB T7S 1P4
Canada
Telephone: (780)778-6985

James Zohar
5 Bruce Street
Dartmouth, NS B2W 1L3
Canada
Telephone: (902)434-4117
Fax: (902)462-1834

The ***Jet News*** is published by the WaterJet Technology Association (WJTA) and is a benefit of membership in the Association.

KMT Receives Substantial Order For High Pressure Injection Pumps

KMT Waterjet Systems has received a significant order for high pressure pumps for the new Huntsman Polyethylene plant in England.

KMT Waterjet Systems has signed a contract with SembCorp Simon-Carves to deliver KMT McCartney injection pumps to a new plant for production of plastics in Teesside, England. The plant, which is being built by Huntsman, one of the leading global chemical producers, is set to start production in the fourth quarter of 2007. The unit will be the world's largest single line Low Density Polyethylene (LDPE) plant.

KMT's high pressure injection pumps provide the process stability and high reliability required for the new plant. The unit will produce 400,000 tons of low density polyethylene annually through a single line tubular reactor under the license of ExxonMobil.

"Injecting initiator solvent at reactor pressure is process critical and KMT is pleased to provide the pump equipment and knowledge that has been gathered during more than 50 years of high pressure engineering expertise. KMT McCartney is the origin to KMT Waterjet Systems and is today a separate profit center within KMT Waterjet Systems," says Lars Bergström, CEO of KMT.

The new plant is being constructed by SembCorp Simon-Carves, one of the world's most experienced process engineering contractors for the design and supply of LDPE plants.

Hydro-Excavation: A Safe, Cost-Effective Alternative For Underground Construction And Municipal Use, from page 14

Therefore, using the proper water volume is cost-effective and saves time. In addition, the resulting debris has minimal water content, not a slurry as with systems using high water volumes, which often allows debris to be put back into the excavation.

Vactor recommends using water pressures between 1,500 and 2,000 psi. Pressure higher than 2,500 psi is unsafe. Operating a hydro-excavator at the proper water pressure virtually eliminates the chance of damaging line covers or casings.

Industry outlook

Many facilities and areas in Canada have experienced intolerance to utility strikes and, as a result, they now rely heavily on hydro-excavation. The U.S. still has somewhat of a tolerance for hits as a "cost of doing business," although that's changing.

Enhanced enforcement from a government level may drive contractors increasingly toward vacuum and hydroexcavation in coming years. While legislation has been enacted in a few cities and states across the U.S., those examples are limited. However, many people in the industry say it's just a matter of time.

The vacuum excavation market will have to deal with plenty of unknowns in the near future – a recovery of directional drilling, the possibility of a fiber resurgence, and further legislation to prevent "hits" and enforce existing one-call regulations.

Conclusion

At the time of this publication, it looks like hydro-excavation will continue to grow in acceptance and popularity for the foreseeable future. Contractors are increasingly finding value in hydro-excavation for themselves and their customers. More municipalities are gaining confidence in the practice as new projects are completed.

Hydro-excavation can virtually eliminate the unknown or unintended consequences from any project involving drilling, trenching or excavation. Whatever the future holds, hydro-excavation is here to stay and gaining ground.

Photographs courtesy of Vactor Manufacturing,Inc.

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2007 American WJTA Conference And Expo

August 18-22, 2007

Marriott Houston Westchase Hotel ● Houston, Texas, USA

Announcement and Call for Papers

Impressive progress and a fast-growing understanding of the diversified applications of waterjet technology are generating a growing excitement in the industry. New techniques and applications are being developed and current ones are being improved. Waterjet technology, now being used in nearly all types of industry — manufacturing, mining, construction, concrete, stone, aerospace, engineering, process, and medical industries — continues to expand at a rapid pace.

The 2007 American WJTA Conference And Expo will focus, from a practical and scientific viewpoint, on the most up-to-date advances in waterjetting equipment, techniques, and applications. The areas to be addressed include, but are not limited to:

- **Abrasives, Water, and the Environment**
- **Advanced Industrial Applications**
- **Advances In High Pressure Technology**
- **Automotive and Aerospace Applications**
- **Cleaning and Coating Removal**
- **Components and Systems**
- **Construction and Non-Manufacturing Applications**
- **Contractor Applications and Processes**
- **Demilitarization, including Removal of Land Mines (Demining)**
- **Drilling Applications**
- **Excavation, Tunneling, and Mining Applications**
- **High Pressure Equipment and Systems**
- **Hydrodemolition**
- **Jet Mechanics**
- **Jet-Material Interaction**
- **Manufacturing Processes**
- **Market and Future Needs**
- **Novel Jets and Applications**
- **Process Modeling and Control Studies**
- **Rock Cutting**
- **Safety, Training, and Environmental Protection**

Commercial and academic authors are encouraged to submit titles and abstracts for consideration. To submit an abstract(s), please complete the abstract submission form on the back of this sheet, attach a copy of your abstract(s), and forward to the attention of the Conference Coordinator at the WaterJet Technology Association. The deadline date for submission of abstracts is December 29, 2006.

An Abstract Review Committee consisting of five referees will review the abstracts. Authors will be advised by February 28, 2007, regarding the decision of the Abstract Review Committee.

The 2007 American WJTA Conference And Expo is organized by the WaterJet Technology Association. The WaterJet Technology Association looks forward to providing this forum and to your involvement and participation.

Authors - Please Note

- Papers must be original. Papers must not have been published elsewhere or be pending publication.
- Publication Fee. A nonrefundable publication fee (equal to the price of a member Full Conference registration) is required. This publication fee will be waived if at least one author registers (Full or Combo) for the WJTA Conference. (Authors must pay the applicable member or nonmember price.) Also, one registration is good for multiple papers. The deadline date for receipt of your final paper will be April 20, 2007. The publication fee or payment for a Full or Combo registration is due no later than June 1, 2007. Your paper will NOT be included in the *Proceedings* if the publication fee or registration fee is not paid by this date.
- Papers and presentations must be in English. Papers should be no longer than 15 printed pages. A "Paper Guide" containing directions for submitting papers will be forwarded to you after your abstract is accepted. Papers that do not follow the "Guide" will be returned to the author(s) for correction(s) or charged a fee for revisions made by the WaterJet Technology Association office.
- Papers should be free of commercialism.
- Papers should be submitted as a Word file and a PDF file. If an author cannot produce a PDF file, a fee may be charged to convert a Word file to a PDF file if the Word file requires significant reworking (e.g., page breaks, pictures moving).

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Abstract Submission Form

For each paper to be submitted for consideration, please complete this form, attach a copy of the abstract, and mail or fax to WJTA by December 29, 2006. Authors will be advised by February 28, 2007, regarding the decision of the Abstract Review Committee. Please mail or fax this form even if you email your abstract.

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Please check the category that best describes the topic of your paper. ❑ Applications ❑ Research ❑ Contractor

Key words (Check the boxes under the different categories that apply to your paper):

Type of Study
- ❑ Modeling (theoretical)
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- ❑ Hardware development
- ❑ Contractor case study
- ❑ Manufacturing case study
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- ❑ Other _____

Process
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- ❑ Drilling
- ❑ Surface preparation
- ❑ Cleaning
- ❑ Stripping
- ❑ Safety
- ❑ Milling
- ❑ Jet-assisted
- ❑ Other _____

Related Industry
- ❑ Generic
- ❑ Shipyard
- ❑ Mining
- ❑ Construction
- ❑ Aerospace/Aircraft
- ❑ Automotive
- ❑ Oil/Gas/Refinery
- ❑ Quarrying
- ❑ Other _____

Jets
- ❑ Waterjet
- ❑ Abrasive-waterjet
- ❑ Abrasive suspension jet
- ❑ Pulsed
- ❑ Cavitation
- ❑ Polymer Jets
- ❑ Other _____

Material
- ❑ Metal
- ❑ Rock
- ❑ Glass
- ❑ Ceramic
- ❑ Composite
- ❑ Concrete
- ❑ Other _____

Environment
- ❑ Field work
- ❑ Factory work
- ❑ Submerged
- ❑ Nuclear
- ❑ Demilitarization
- ❑ Offshore
- ❑ Other _____

*August 18 is reserved for the short course(s).

Mail completed form and abstract, NO LATER THAN DECEMBER 29, 2006, to: Conference Coordinator, 2007 WJTA American Waterjet Conference, WaterJet Technology Association, 906 Olive Street, Suite 1200, St. Louis, MO 63101-1434, USA, telephone: (314)241-1445, fax: (314)241-1449, email: wjta@wjta.org, web site: www.wjta.org

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