

Mobile Training Simulator For Waterjetting, Industrial Vacuuming And Confined Space Operations



Gary Toothe, training manager for FS Solutions, describing Federal Signal's intermodal training simulator during live demonstrations at the 2010 WJTA-IMCA Expo in Houston Texas. See Expo article on page 2.

High-Pressure Waterjetting In Sewers (With No Commercial Axe To Grind)

By: **Prof. Charles Fairfield, Ph.D.**, Professor of Civil Engineering, School of Engineering and the Built Environment, Edinburgh Napier University, Edinburgh, Scotland

High-pressure waterjetting (correctly applied) is an excellent way of cleaning blocked drains or fouled sewers. Apply it incorrectly and damage results. This is typified by the low jetting resistance of the most common pipe materials (HDPE, PVCu and PP). Indeed, one UK house builder banned all thermoplastic pipes on its sites after post-jetting closed-circuit television (CCTV) inspection showed damage which caused water infiltration from the pipe surround.

This problem is not impossible to solve; drain cleaning contractors can dislodge blockages with lower pressures than they commonly use, which results in less, or no, damage to the pipe-wall. Drain cleaning contractors often use pressures in excess of 4000 psi (27.6 MPa) to clear fat, oil and grease blockages from typically 4-inch (100 mm) diameter pipe. When this practice is compared to the findings of Wakely *et al.* (Loughborough University, 1996), which showed that pressures as low as 1600 psi (11.0 MPa) could clear hardened concrete, questions have to be raised about the “blast it and hope” approach taken by some drain-cleaning contractors and the resulting continued damage to drain and sewer networks.

The economics of such operations are always going to be the driving force behind the way they are done; naturally, companies want to maximise the number of drains cleaned *per* day to maximise profit. This is understandable, especially in today's economic climate, but there has to be some compromise to at least begin to alleviate the problem. Given the

meltdown of the economy and the delay in starting major infrastructure projects, can we not lobby hard for pipe, drain and sewer inspection, maintenance and repair work (a £1 billion (c. \$1.5 billion) market awaits in the UK alone)? Such jobs need no planning permission, enabling legislation *etc.* £1 billion spent looking

after our sewers saves a lot of small businesses/contractors to say nothing of the broader societal benefits – Government(s), please take note.

Waterjetting trials were carried out by Edinburgh Napier University. A

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2010 WJTA-IMCA Expo

The WaterJet Technology Association and the Industrial & Municipal Cleaning Association (WJTA-IMCA) welcomed participants from the U.S. and abroad to the inaugural WJTA-IMCA Expo held August 17-19, 2010, at the George R. Brown Convention Center in Houston, Texas.

“We had a great turnout at this first Expo in the new larger facility,” said WJTA-IMCA Association Manager Ken Carroll. “It is much more convenient for everyone to have all of the exhibits and boot camp sessions in one location. On the economic side, we were very happy to hear many companies reporting that business is improving. We appreciate the turnout and everyone's participation in the 2010 Expo.”

Fifty-seven exhibiting companies displayed waterjet supplies, equipment, systems, safety gear, and services; industrial cleaning equipment; and vacuum and tank trucks and hydro-excavators.

During boot camp presentations on August 18-19, participants learned useful tips and information for



their day-to-day business activities. Topics included new regulations for commercial vehicles, waterjetting safety, high pressure waterblasting tips and techniques, hose maintenance and safety, fire and explosion risks when cold-cutting, precision waterjet cutting benefits and capabilities, video inspection of pipelines, hydro-excavation applications and techniques, nozzle selection for sewer cleaning, avoiding the dangers of static electricity, and plant safety.

A special extended boot camp session was presented by Kathy Krupp, managed services leader of Dow Chemical Company, and Sam Harkins, environmental, health, safety and training director of Veolia ES Industrial Services. Krupp and Harkins described the

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StoneAge, Inc. Files Complaint For Patent Infringement

On August 4, 2010, StoneAge Inc., a leader in the design, manufacture, and sales of high pressure waterblast tools filed a lawsuit against NLB Corporation for patent infringement.

As stated in the complaint, which is available at www.stoneagetools.com, StoneAge alleges that NLB's Typhoon 10 product infringes StoneAge's US Patent Numbers 7,635,096 and

D617,870, which cover StoneAge's Banshee heat exchanger tube cleaning products.

StoneAge seeks damages for NLB's infringing sales as well as injunctive relief. StoneAge is a 100% employee owned company based in Durango, Colorado. StoneAge is represented by Buether, Joe & Carpenter, LLC, a law firm based in Dallas, Texas.

NLB Confident In The Face Of StoneAge Patent Infringement Claim

NLB Corp. President Forrest Shook said today that patent infringement allegations by StoneAge, Inc. of Durango, Colorado, are warrantless, and that NLB would seek damages.

"Our Typhoon™ series nozzles do not infringe on any StoneAge patent," he said. "They follow the same rotating waterjet technology path that NLB has used for nearly 40 years, with enhancements that improve upon all competing systems. We have patents pending on these nozzles and we expect they will be approved."

Shook said NLB would ask for damages against StoneAge for violation of U.S. antitrust laws.

"We are confident the Typhoon™ series nozzles will become the industry leaders," Shook continued,

"and that they will be working hard for our customers long after these litigations have been forgotten."

NLB Corp., headquartered in Wixom, Michigan, is a global leader in high-pressure and ultra-high pressure waterjet technology and began manufacturing quality waterjetting pumps and accessories in 1971. It pioneered the use of rotating waterjets with its original line of patented SPIN JET® floor and grate cleaners in the 1970s, and with its patented SPIN-NOZZLE® rotating heads in the 1980's.

Since then, hundreds of specialized rotating tools developed by NLB have become industry standards, for applications as diverse as surface preparation, tube and pipe cleaning, tank cleaning, tube bundle cleaning, and concrete hydrodemolition.

NLB today has nearly 200 employees and is a wholly-owned subsidiary of Interpump Group S.p.A. of Sant'Ilario d'Enza, Italy. NLB continues to develop innovative solutions for the high-pressure water jetting industry, including convertible pumps and accessories. For more information, go to www.nlbcorp.com.

Congratulations To Dr. David A. Summers



Dr. Summers received a plaque honoring his service at the university from B. Samuel Frimpong, Ph.D., PEng, professor and chair of the Department of Mining and Nuclear Engineering (seated at right).

David A. Summers, Ph.D., was honored with a retirement celebration on September 30, 2010, to recognize his over 40 years of service at the Missouri University of Science & Technology (formerly the University of Missouri-Rolla). Family members and friends, including colleagues and former students, gathered together to honor Dr. Summers and share stories of his accomplishments over the years.

Dr. David Summers has made extraordinary contributions to the advancement of waterjet technology during his long and illustrious career at the Missouri University of Science and Technology.

He is a Pioneer in the application of waterjet technology to the solution of practical industrial problems. He has given the world new solutions to old problems by the innovative application of waterjets.

He has shared his new knowledge of waterjetting through numerous technical articles, a book "Waterjetting Technology," and through the many students that he mentored in his High Pressure Waterjet Laboratory and sent out to industry.

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The *Jet News* is published by the WaterJet Technology Association (WJTA)-Industrial & Municipal Cleaning Association (IMCA) and is a benefit of membership in the Association.

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wide range of engineering thermo-plastics, as well as commercially available concrete and clay, were jetted using the UK Water Research Centre's standard jetting rig, to Water Industry Specification 4-35-01 standards (Water UK, 2000). This was used as a benchmarking exercise: any materials that did not resist full wall penetration after being jetted in a static position for 2 minutes at 2610 psi (18.0 MPa), with a 30° angle of attack and a 5 mm ± 0.5 mm stand-off height, failed the test, thus negating the need for any further pressure/time characterisation to evaluate their performance.

In some ways the test is unrealistic: the jet rarely stays static for more than a few seconds when used *in situ*, let alone a full two minutes. Also, the test does not take account of the pipe wall thickness, so it is conceivable that a poor, yet thick pipe material may pass WIS 4-35-01, whereas a good, but thinner pipe material may fail. There is also the argument that different types of materials exhibit different failure mechanisms: ductile materials tend to suffer a narrower, deep rut, with dislodged material displaced around the jet contact area, brittle materials tend to suffer a shallower rut spread over a larger area, having been caused by the random intersection of rapidly propagating cracks. The ductile material may fail more rapidly than its brittle counterpart due to its rut depth, but the damage in terms of volume lost may be less than in the brittle material. This is why it is essential to characterise failures not only in terms of volume lost but also in terms of wall thickness lost. Ultimately, it's penetration of pipe walls that causes sewage exfiltration and groundwater infiltration.

Where a material did pass to WIS 4-35-01, further pressure/

time characterisation to evaluate its performance was undertaken to investigate the potential for damage when jetted at higher pressures than are required to shift blockages. Time for a heartfelt plea; CCTV surveys may well show you don't need jetting – the “blockage” may be the family's pet rabbit.

Ductile and brittle damage were the two main failure types encountered, but contained therein were a combination of complex local shear, tensile and compressive failures. The effect of waterjetting on typical pipe-grade HDPE can be seen in Figure 1.

Figure 1 shows how the jet has tunnelled into the material, causing a volume loss of 12.2 mm³ with 7.80 mm loss of wall thickness - enough to achieve complete penetration on many sizes of HDPE sewer. The same material lost only 1.34 mm wall thickness at 4000 psi (27.6 MPa) after 10 s jetting and 2.04 mm at 4000 psi (27.6 MPa) after 20 s – ample time to shift most blockages. If the pressure were dropped to 1600 psi (11.0 MPa), then the loss of wall thickness fell to 0.27 mm – enough to ensure the sewer isn't burst (at least this time around).

Of course, because plastics' durability as sewer and drain materials had been called into question by

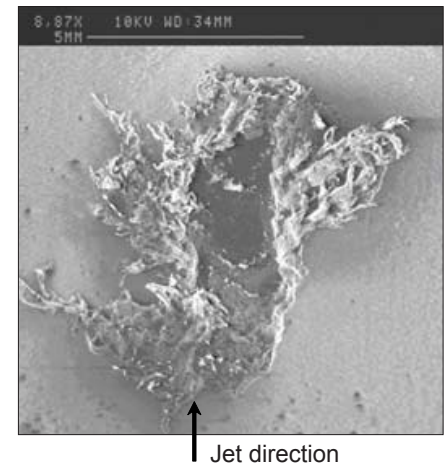


Figure 1. Scanning electron micrograph of pipe-grade HDPE sample after jetting at 4000 psi (27.6 MPa) for 2 minutes.

the concrete and clay industry, it was important to assess the jetting resistance of these materials; perhaps surprisingly, concrete and clay were not always the best performers. Figure 2 shows the damage caused to clay pipe.

In Figure 2, the pipe exhibited a “slip circle” type rut, with a “tunnel” underlying a “bridge” structure as a result of the burrowing action of the jet after 5 minutes' jetting at 7500 psi (51.7 MPa). This sample lost a volume of 33 mm³ and 1.8 mm of wall thickness; this did not burst it.

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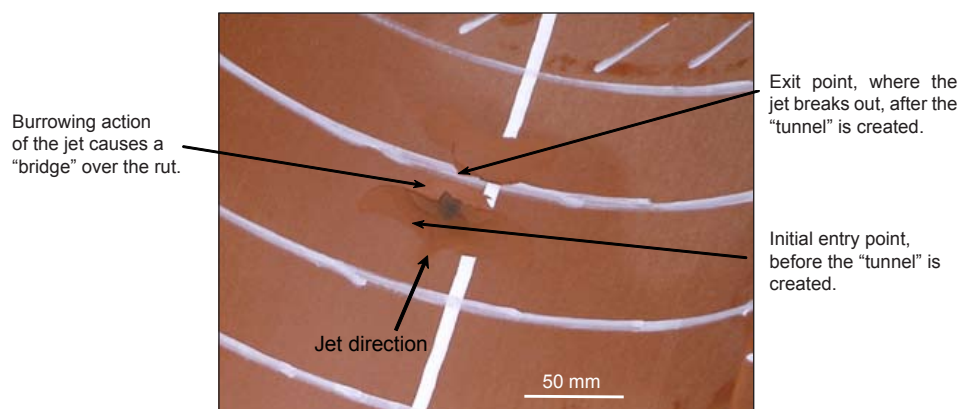


Figure 2. The effect of high-pressure waterjetting on clay.

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CanMar Contracting's Largest Hydrodemolition Contract

Ontario, Canada has, for many years, traditionally relied on jackhammers for restoration of deteriorated concrete, especially in basement parking garages across Toronto.

Toronto-based CanMar Contracting Ltd., formed in 1999 to specialize in basement parking garages, ramp and slab concrete restoration work using traditional jackhammer techniques, recognized the need to seek more efficient and less labor-intensive methods. CanMar has started the changeover to introduce hydrodemolition techniques with the delivery of three Aquacutter Evolution robots from Aquajet Systems.



Generally the Aquajet robot is removing the top four inches to expose the rebar, but in places is undertaking thru-removal of the full eight inches, under propping the adjacent slab for support.

And the decision is paying off. Over the past 24 months CanMar has completed more than 600,000 ft² (55,741 m²) of garage slab restoration in Toronto using the Aquacutter robots – achieving approximately 150,000 ft²/robot/year (13,935 m²/robot/year).

“Working a typical ten-hour day, we are able to achieve an average of 1,000 ft²/day (93 m²/day) using the Aquajet robot” says David Porciello, CanMar’s hydrodemolition manager. “A single jackhammer can at best achieve 50 ft²/day (5 m²/day) so it would require at least 20 jackhammers to match the robot’s production, meaning a significant cost in labour costs.”

Largest contract

Currently working on a three-phase contract in downtown Toronto’s Charles Street, an Aquacutter HVD robot is key to completing an underground three-level basement car park ahead of schedule. On completion, it will be CanMar’s largest hydrodemolition contract to date totalling more than 84,000 ft² (7,804 m²).

Constructed some 30 years ago, the eight-inch thick garage slabs had deteriorated badly as a result of excess de-icing chemicals to control ice on the roads throughout Canada’s harsh winters and carried on the wheels and under-bodies of vehicles. The salt, snow, and water then penetrate the concrete causing the rebars to rust and expand, creating stress within the concrete and eventually causing to the concrete to spall and break up.

To ensure that the garage remains operational throughout the removal and new concrete placement by CanMar, each floor was divided in half to allow working over an area of approximately 28,000 ft² (2601 m²).

The Aquacutter robot is used to remove the first four inches of the slab to expose the rebar and, with selective removal across the slab, undertake ‘thru-removal’ for the full eight inches.

Referred to as a two-way slab, it features double high density rebars particularly around the columns. In the centre of each parking lot between the columns the rebar overlaps requiring propping on the floor below to support the slab.



Working a typical ten-hour day, the Aquajet robot is able to achieve an average of 1,000 ft²/day (93 m²/day). This compares with a single jackhammer achieving 50 ft²/day (5 m²/day).

Basic principles

This technique is becoming an increasingly used method for removing deteriorated concrete. The qualitative advantages of hydrodemolition over alternative removal methods are briefly described together with a number of applications around the world.

Concrete rehabilitation using hydrodemolition or waterjetting techniques is becoming an increasingly important aspect of civil engineering and building renovation projects. Applications can involve cleaning, roughening, removal of deteriorated concrete, and even cutting.

It causes no damage or vibration to existing rebars and prevents damage or loosening of adjacent concrete and parts. Suitable for a wide range of applications, it ensures

(continued on page 11)



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2010 WJTA-IMCA Expo, from page 2

Dow and Veolia partnership that has resulted in a reduction of hydroblasting risks and incidents through technological improvements, implementing automated procedures, and safety innovations. Krupp and Harkins shared success stories in hydroblasting technology applications, as well as safety controls and work processes.

Live demonstrations were held on August 18 on a lot adjacent to the Convention Center. **Aqua-Sales/Armadillo Tube Cleaning** removed solid concrete from a tube with the Armadillo Tube Cleaning System, and participants were able to view the interior surface of the cleaned tube via a long reach video camera. **FS Solutions** demonstrated its mobile training simulator designed to help customers increase job safety, operational efficiency, and regulatory compliance in a variety of applications. **GapVax** demonstrated the vacuuming and offloading capabilities of its HV-57 High Dump. **Gardner Denver Water Jetting Systems** demonstrated its 325-20HC-DT unit powering hand held tight shut off guns and converting the system from 20,000 to 10,000 psi operation for rotary line cleaning. **Hammelmann Corporation** performed a tank cleaning demonstration using its XXL tank cleaner designed for cutting very hard scale, refractory, polymers, and other materials from tanks and vessels.

Jet Edge demonstrated precision waterjet cutting of intricate designs in metal on its Mid Rail Gantry waterjet cutting system in the exhibit hall. **NLB Corp.** demonstrated its Saflex-2000 semi-automated tube lancing system. **Peinemann Equipment USA** demonstrated high pressure cleaning machines for heat exchangers, including the triple lance TLE-B utilizing flex lances. **StoneAge, Inc.** demonstrated waterblasting with the "Shrouded Banshee" tube cleaning tools by drilling holes through concrete and rock and sewer line cleaning with the Warthog. **Terydon, Inc.** demonstrated abrasive waterjet cutting using the JACKTRACK Vacuum and tube cleaning with the HELM (heat exchanger lancing machine). **TurtleSkin WaterArmor** demonstrated the durability of the new MFA Water Armor PPE system, which is certified to meet the proposed new EN standard of a 40,000 psi 0 degree waterjet at the standoff of three inches and a swipe speed of 1.6 feet per second at a flow of 5.5 gallons per minute.

Live Demonstrations At The 2010 WJTA-IMCA Expo

August 17-19, 2010 • Houston, Texas



See more pictures on page 9

The 2010 Expo was a great success. Visit www.wjta.org to view the 2010 WJTA-IMCA Expo photo album.

2011 WJTA-IMCA Conference and Expo

The WJTA-IMCA 2011 Conference and Expo will be held September 19-21, 2011, at the George R. Brown Convention Center in Houston, Texas. The Conference and Expo will focus on precision waterjet cutting, industrial waterjet cleaning, waterblasting, hydrodemolition, surface preparation, and industrial vacuum equipment and trucks. The program will include:

- Paper Presentations Featuring Emerging Technology and New Applications (Tuesday and Wednesday)
- Exhibits (Monday evening, Tuesday, and Wednesday)
- Live Demonstrations (Tuesday and Wednesday)
- Boot Camp Sessions (Tuesday and Wednesday)
- Pre-Conference Workshops (Monday)

Contact Ken Carroll to reserve exhibit space or live demonstration space. Call (314)241-1445 or email: wjta-imca@wjta.org. Watch your mail and email for details, and visit www.wjta.org for updates. ■

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August 17-19, 2010 • Houston, Texas



Exhibitors At The 2010 WJTA-IMCA Expo

August 17-19, 2010 • George R. Brown Convention Center • Houston, Texas



See more pictures on page 18

CanMar Contracting's Largest Hydrodemolition Contract, from page 6

high performance rates with a good finished surface.

The key element of hydrodemolition is to pressurize and widen existing pores and micro cracks in the weakened concrete structure using high pressure water penetration.

Material is easily removed as the built up pressure exceeds the tensile strength of the damaged or weakened concrete.

In addition to the water pressure, the volume of water is also a contributing factor to the system's efficiency. The rate of removal, for example, is dependent on the amount of water directed towards the concrete surface in order to rapidly and continuously pressurize the areas being treated.

Canada's first female operator



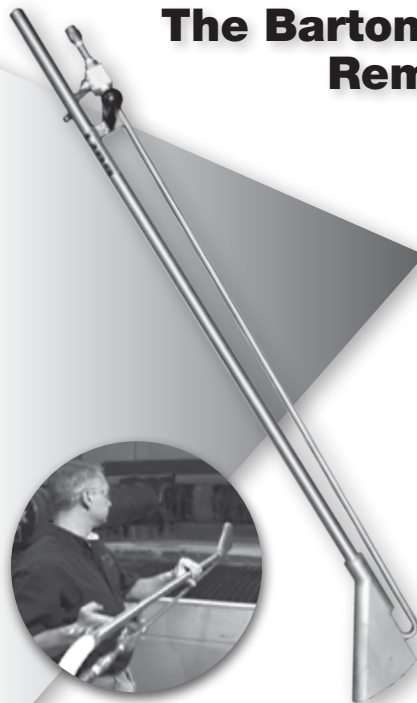
David Porciello, CanMar's hydrodemolition manager (r.), and his daughter Justina.

The Aquacutter hydrodemolition robot's operator, Justina Porciello – thought to be Canada's first female hydrodemolition operator and certainly one of the youngest at just 22 – is highly positive about the performance of the robot.

"Within three months of starting I felt very comfortable operating the robot – it's so easy and maneuverable. It is also an extremely compact machine," she says.

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"With just six months of experience she is one of the best operators I've ever trained," confided proud father, David Porciello.

In addition to operating the Aquacutter robot, Justina is also responsible for handling all daily maintenance and simple breakdowns.

CanMar's contract includes the removal of the deteriorated concrete and replacement with a similar grade 35-MPA concrete. The complete slab is then treated with a thin mastic protective coating.

For more information, visit www.aquajet.se or email aquajet@aquajet.se. ■

San Diego Ship Repair Contractor and Fabrication Shop Receives National Recovery Act Grant to Add Jet Edge Waterjet System

Pacific Ship Repair & Fabrication (PACSHIP) is now offering precision waterjet cutting services at its San Diego shipyard and fabrication shop.



The ship repair and fabrication contractor is capable of processing complex parts from virtually any material with its new 60,000 psi Jet Edge Mid Rail Gantry waterjet cutting system, which features an 8 feet x 13 feet work envelope and is capable of maintaining +/- 0.001 inch linear positional accuracy (over 12 inches) and +/- 0.001 inch repeatability (bi-directional).

PACSHIP added its new waterjet cutting machine after receiving a Small Shipyard grant through the U.S. Maritime Administration, says Bill Carroll, PACSHIP director of business engagement. The grant was offered to small shipyards to help them modernize and become more competitive.

Since installing its Jet Edge waterjet machine, PACSHIP already has experienced improvements in quality, efficiency and capabilities, Carroll notes. His statement was echoed by PACSHIP's Sheetmetal Department

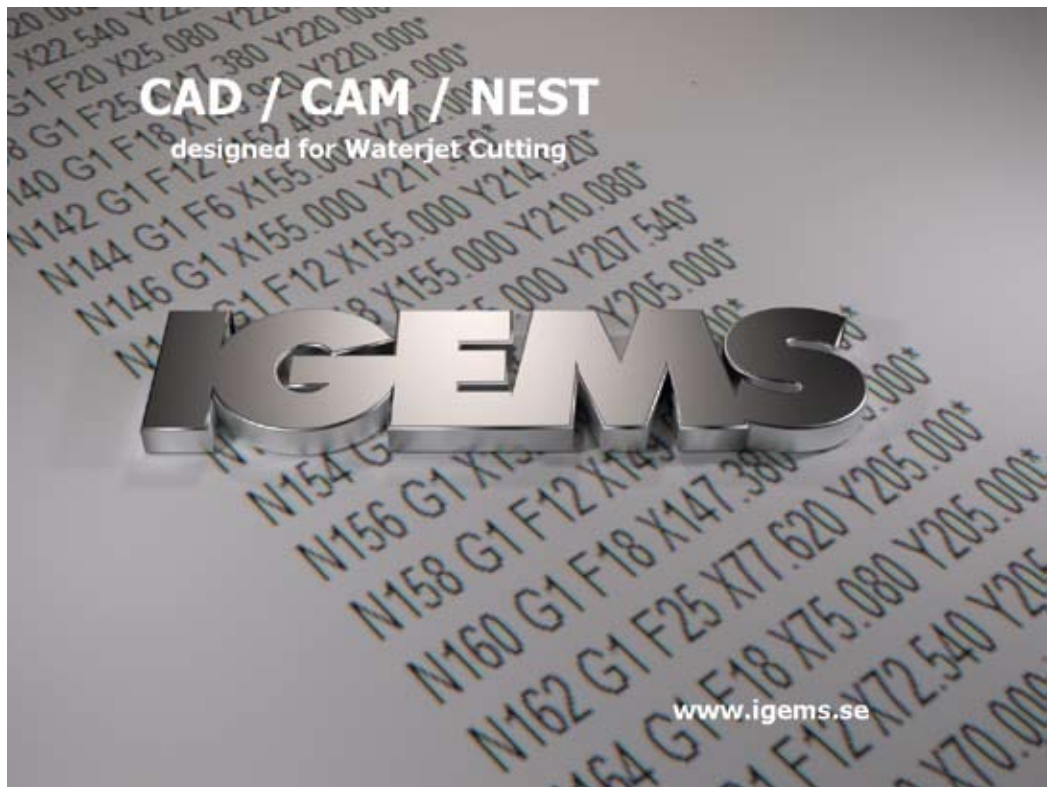
Manager, Mr. Dave Whitacre. "We have greatly increased our capabilities in all types of material cutting, thus reducing the need to outsource precision cutting by keeping the work in house," Whitacre says. "We recently accomplished the precision cutting of approximately 1000 square feet of ½ inch thick Kevlar armor plating to assist in our ballistic door manufacturing. As far as productivity gains, we can tell you that, for the Sheet Metal Department, the waterjet has significantly reduced the time on task jobs by a factor of five."

PACSHIP, which serves both the marine industry and general fabrication customers, uses its water jet to cut many military-use materials such as Kevlar and high-strength armor plating, as well as plastics, carbon fiber, rubber, copper, and stainless steels.



"We determined that water jet cutting would be the best method

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Jet Edge Introduces 5-Axis Waterjet Cutting System And New Energy-Efficient Servo-Driven Intelligent Waterjet Pump

Jet Edge, Inc., introduced its latest waterjet cutting innovations November 2-3 at FABTECH 2010, including the new energy-efficient, servo-driven ECUBE 6200 intelligent waterjet pump and the Idro line 5-axis waterjet cutting system.

Developed through the Jet Edge and Tecnocut S.p.A. research and development partnership, the new energy-efficient 90,000 psi (6200 bar) ECUBE 6200 waterjet pump utilizes an electrically controlled servo-driven intelligent pump. The completely electro-mechanical system is more efficient and has 80% fewer components than a hydraulic intensifier. The ECUBE 6200's electric drive control solution ensures a constant pressure level, resulting in improved cut quality.

The Idro line 5-axis waterjet system, also available through the Jet Edge and Tecnocut research and development partnership, is capable of cutting virtually any material.

The Idro line is available in three sizes, 5.5 feet x 6.5 feet nominal (1700 mm x

2000 mm), 5.5 feet x 13 feet nominal (1700 mm x 4000 mm) and 6.5 feet x 13 feet nominal (2000 mm x 4000 mm). It features the innovative IKC 5 Axis waterjet cutting head, which is capable of making inclined cuts and controlling kerf to ensure optimal part quality. The IKC's capabilities include 600° rotation, a maximum angle of

+/- 60°, and dynamic precision from +/-0.2 to +/-0.5 mm/m, depending on the tilt of head.

The Idro line's high-precision ground rack and pinion X and Y axes

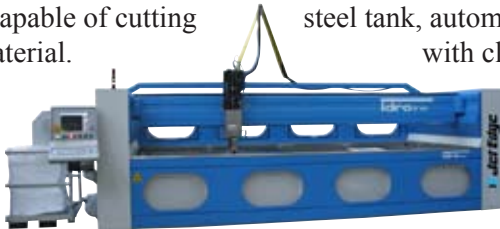


and ball-screw-driven 5.9-inch (150 mm) Z axis make it one of the most accurate waterjet systems available. It maintains a cutting tolerance +/- 0.004 inch (0.1 mm/m), and repeatability

accuracy tolerance of +/- 0.001 inch (0.025 mm) and supports a contouring and rapid feed rate of 0-1575 ipm (0-40,000 mm/min).

Motion components are protected by steel covers with labyrinth lip seals to ensure lasting performance.

The Idro line is equipped with programmable contact height sensing and comes standard with one 5 axis cutting head. A second 5 axis or 3 axis cutting head can be added. Other standard features include a stainless steel tank, automatic safety guards with clear windows on front



and back, and a dredge conveyor for abrasive removal. Its many options include a rotating axis for

pipe cutting, fire jet etching system, a drill and twin shuttles. Free software updates are included for the life of the machine. The Idro line's monolithic design expedites installation and makes it easy to relocate if necessary. Its rigid fixed upright bridge structure can be moved out of the way for forklift or crane loading.

Jet Edge also demonstrated its 90,000 psi (6,200 bar) X-Stream waterjet intensifier pump technology and Mid Rail Gantry precision waterjet cutting machine.

For more information, visit www.jetedge.com, e-mail: sales@jetedge.com or call 1-800-JET-EDGE (538-3343).

StoneAge® Introduces The 40k psi Badger®



The StoneAge Badger is now available at 40k psi. The Badger® BA-H6™ compact design delivers powerful cleaning due to rotation speed control and quality jets. The BA-H6 removes hard scale, plastics, and polymers fast and efficiently. With a viscous fluid governor and high pressure seal design, this compact 2D nozzle travels through pipe elbows as small as four inches in diameter. It uses StoneAge OS6 Sapphire Tips with jeweled orifices.

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Fast Digitizing System Available For Flow Waterjets

Flow International Corporation has launched FlowTeach™, a system designed to quickly digitize patterns, templates or parts into FlowMaster® software. The software and hardware are available for all Flow Mach series waterjets and can be retrofitted onto most legacy Flow systems.



Contract cutting shops, also known as job shops, often receive a template or a physical part that must be re-created instead of a dimensioned drawing. In these instances, it can be time consuming to turn that template or physical part into a cutting program. FlowTeach solves this problem by allowing the operator to jog the Flow machine tool around the periphery of the part or template, selecting points and thereby recreating the geometry within the FlowMaster control. FlowTeach will also be of particular interest to anyone in the stone industry for digitizing countertop and flooring patterns.

Simple to learn and easy to use, the operator guides Flow's standard laser edge finder to capture points along a part's geometry. The system has an intuitive interface featuring easy to read icons and various functions that support the creation of circles, ellipses, polylines, and arcs to both simplify and speed up the process. A wireless remote pendant allows the user to be close to the work piece and accurately position the cutting head along the contours.

For more information, visit www.flowwaterjet.com.

Angel Machinery Now Distributing Jet Edge Waterjets In Wisconsin

Jet Edge, Inc., has announced that Angel Machinery is now distributing Jet Edge waterjets in Wisconsin.

Located in Menomonee Falls, Angel Machinery carries a wide variety of metal fabricating machinery, machine tools, tooling and accessories. Angel's metalworking industry roots extend back to the 1950s, giving the machinery distributor the expertise and experience to help customers select the right manufacturing equipment to meet their needs.

For more information about Angel Machinery, visit www.angelmachinery.com or call 262-252-4550. For more information about Jet Edge, visit www.jetedge.com or call 1-800-JET-EDGE (538-3343).

Jet Edge's 80HP, 60,000 PSI Diesel-Powered Waterjet Intensifier Pump Ideal For Mobile Cold Cutting Applications

Waterjet manufacturer Jet Edge, Inc., introduces the 80hp, 60,000 psi iP60-80DS diesel-powered waterjet intensifier pump.

The iP60-80DS water jet pump is capable of producing up to 1.35 gpm (5.1 L/m) of ultra-high pressure water for mobile water jet cutting applications, and is especially suited for cold cutting in environments where heat and flames are restricted. Built with the contractor in mind, the iP60-80DS is powered by a reliable four-cylinder Cummins turbocharged diesel engine and is designed for portability and ease of maintenance. Intensifier components can be accessed without having to get into the hydraulic center section and hydraulic rod seal. No special tools are required. The Jet Edge iP60-80DS waterjet intensifier pump is made in the U.S.A.



For more information, visit www.jetedge.com or call 1-800-JET-EDGE (538-3343).

Congratulations to prize winners at the 2010 WJTA-IMCA Expo!

\$250 Attendance Prizes

Lauren Box, Code Red Safety and Rental, Deer Park, Texas

Dale Carter, Plant Maintenance Services, Odessa, Texas

Robert Larsson, TST Sweden, Kinna, Sweden

Theophilus Richards, Theo Richards General Contractors, Ltd., Trinidad and Tobago

\$50 Exhibit Passport Prizes

Francisco T. Parga, Martin Hydroblasting Services, Inc., Brawley, California

George A. Savanick, Ph.D., Apple Valley, Minnesota

George W. Swauger, Smith Industrial Service, Mobile, Alabama

\$50 Survey Prizes

Andrew Kuron, Powertrack International, Inc., Pittsburgh, Pennsylvania

Gary L. Manack Jr., Terydon, Inc., Navarre, Ohio

\$100 Exhibitor Prize

Wilson Company, Houston, Texas

Exhibitor **Stutes Enterprise Systems, Inc.**, held a drawing for a gas barbecue grill. Congratulations to lucky winner **Billy Flagel** of U.S. Industrial Services, LaPorte, Texas.

Congratulations To

Dr. David A. Summers, from page 3

Dr. Summers was the prime mover in the founding of the WJTA in 1983 and served as the Association's first President. He has been and continues to be very active in promoting the safe use of waterjets. He led the WJTA effort that produced a safety manual that has been accepted as the authoritative statement of standard waterjetting safety practices in the United States. He was the Chairman of the committee that produced the latest revision of this document in 2010.

Dr. Summers was a member of the WJTA Board of Directors for 26 years and has served as President and Chairman of the Board. He was the recipient of many awards including the Safety Award and the Pioneer Award.

The Pioneer Award is WJTA's most prestigious award. It was given to Dr. Summers because he used his vision of the future to determine the course of advancement of waterjet technology.

George Savanick
President, WJTA-IMCA

(photographs continued on page 31)

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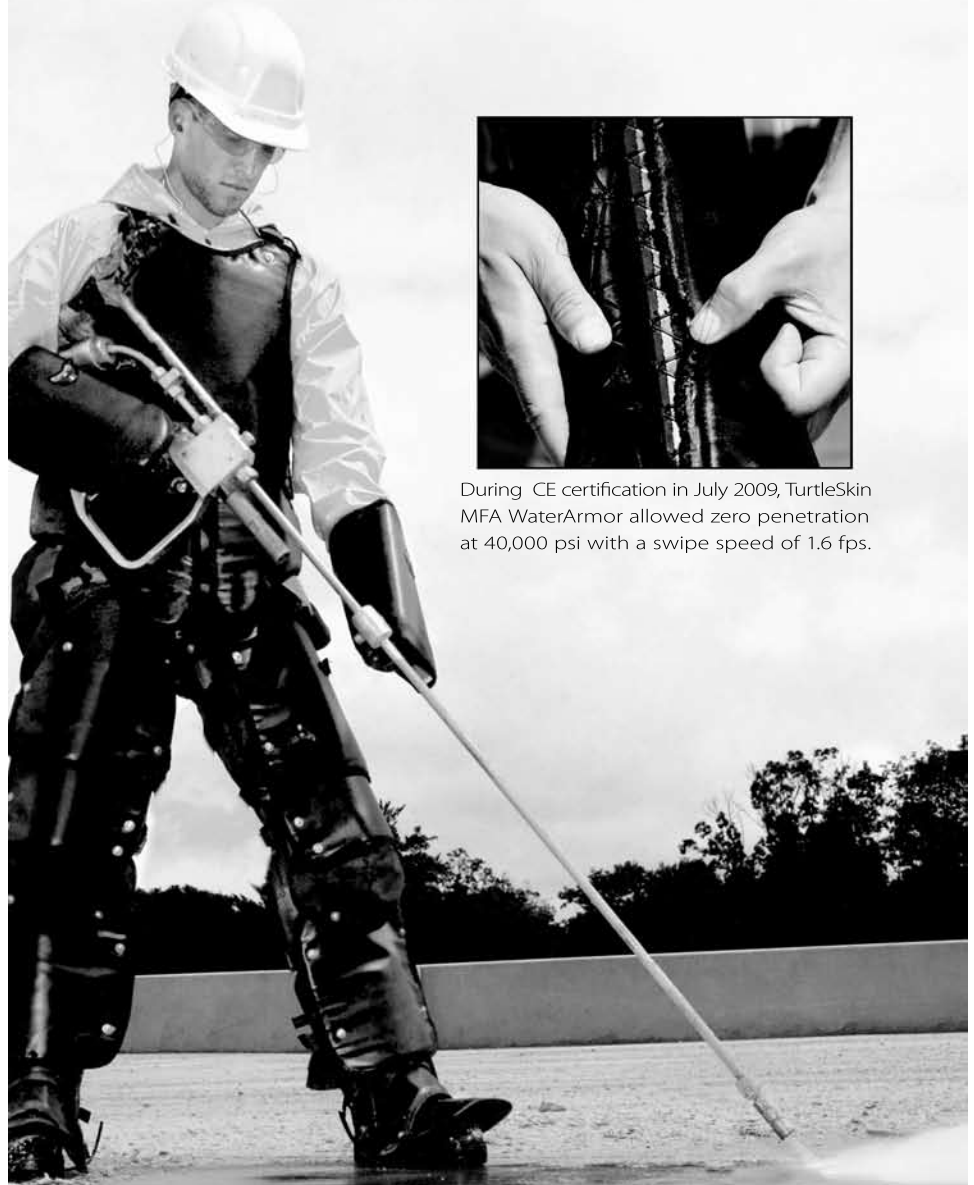
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NEW TurtleSkin MFA WaterArmor UHP WaterJet Protection



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Exhibitors At The 2010 WJTA-IMCA Expo, from page 10

August 17-19, 2010 • Houston, Texas



High-Pressure Waterjetting In Sewers (With No Commercial Axe To Grind), from page 4

4000 psi (27.6 MPa) for the same time barely damaged the clay (7.9 mm³ volume and 0.31 mm wall thickness losses).

Figure 3 shows the damage caused to a concrete pipe sample after 2 minutes' jetting at 5000 psi (34.5 MPa). Surprisingly the rut was worse than that in clay pipe samples under similar circumstances.

In Figure 3, the pipe has lost a volume of 2200 mm³ and 2.4 mm of wall thickness. Thus concrete, intuitively the best performing material, was the worst in terms of volume lost, however, as with the clay pipe – it did not burst.

Figures 1 to 3 show waterjet damage across the whole range of sewer



Figure 3. The effect of high-pressure waterjetting on concrete.

materials. These images show, first hand, the severe damaging effect that can be caused by the apparent neglect shown to existing sewers and drains; an issue that needs addressing.

Although much more jet-resistant than common pipe-grade plastics, clays and concretes still suffer damage. Basically, pressures are too high and often don't need to be.

It is not *just* the pipe material itself that should be considered for jetting resistance when designing a sewer or drain. Other components such as joints, collars, sleeves and bends should also be considered. It is just as likely that any blockage could occur in these areas, and given the fact that these components are predominantly manufactured from different (sometimes cheaper) grades of material than the pipe itself, it is even more important to get a holistic view of the sewer system's jetting

(continued on page 20)

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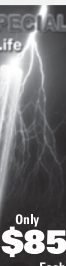
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High-Pressure Waterjetting In Sewers (With No Commercial Axe To Grind), from page 19

resistance. This is even more significant when considering clay or concrete sewers, which also use thermoplastics in seals, joints *etc.*, especially given that clay and concrete pipe manufacturers have in the past questioned the durability of thermoplastics used in sewers, with specific reference to their inability to resist cleaning by high-pressure waterjetting!

In today's increasingly crowded underground network, the use of slip-lining systems is becoming more prevalent as a fix to damaged pipes or those nearing the end of their design lives. These materials (usually thermosets rather than thermoplastics), if used to line live sewers and drains, will also have to be assessed for their resistance to waterjetting. Nowhere in an extensive literature review (Campbell, 2008) did the Edinburgh Napier University research uncover pipe-rehabilitation materials' jetting resistance data. Seeing jetting resistance holistically leads to the question; has the jetting resistance of new fibre-optic cable in sewer systems been tested? Before this causes serious network damage let's agree to jet-test some cable sheathing – just in case?

In conclusion: don't always reach for a jetting rig without first surveying the drain or sewer, control the pressures used and ensure that they are sufficient to shift the blockage but not high enough to damage the pipe, accept the variations in drain and sewer materials – there is a place for plastics, ceramics and metals in this market – but jet accordingly and finally, view underground utilities holistically – they contain more than just a host pipe.

This article was submitted by Prof. Charles Fairfield, Ph.D., Professor of Civil Engineering, School of Engineering and the Built Environment, Edinburgh Napier University, 10 Colinton Road, Edinburgh EH10 5DT, Scotland, Tel: +44 (0)131 455 2232, e-mail: c.fairfield@napier.ac.uk.

References

Campbell S.A. (2008) An experimental analysis of the behaviour of polymeric and

ceramic pipe-wall materials subjected to the action of a cavitating waterjet. PhD thesis, Edinburgh Napier University, Edinburgh, Scotland.

Wakely B.J., Shingleton J.A. & Rogers C.D.F. (1996) The performance of pipes when subjected to high-pressure waterjetting. Loughborough University Research Report, Loughborough, England.

Water U.K. (2000) Water Industry Specification 4-35-01. Water U.K. 7: 13-16. ■



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Ultrahigh Pressure Electric Servo Pump

TECHNI *Waterjet*™ has introduced a new range of waterjet cutting high pressure pumps known as the Quantum Electric Servo Pump™. TECHNI *Waterjet* is the first waterjet manufacturer to utilize “direct servo” technology in an ultrahigh pressure waterjet pump and has developed patented designs to integrate the core technology into an efficient, reliable and controllable ultrahigh pressure (UHP) waterjet cutting pump.



The Quantum Electric Servo Pump incorporates a servo motor directly enveloping a high load, precision ball screw. The ball screw directly houses the ceramic plungers, which reciprocate back and forth to create the pumping action, in much the same way as a hydraulic cylinder works on an intensifier pump.

The infinite control of the servo motor and precision of the ball screw, enable extremely accurate control over the output pressure and volume of the water displaced, and eliminates pressure spikes when deadheading. This infinite control gives an operator the ability to program virtually any pressure and flow rate from zero to full capacity, while only using the power displaced at the cutting head.

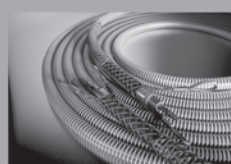
The Quantum Electric Servo Pump is available in three different models. The ESP55 has a maximum output pressure of 55,000 psi (3722 bar) and a maximum output volume of 1 gpm (3.8 lpm). The ESP66 offers 66,000 psi (4550 bar) and 0.8 gpm (3 lpm) and the ESP77 offers 77,000 psi (5308 bar) and 0.7 gpm (2.8 lpm).

For more information, visit www.techniwaterjet.com or call 1-888-TECHNI-3.

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Participation is limited to WJTA-IMCA members in good standing. You must sign up in order to participate. To sign up for the **WJTA-IMCAlistServ**, contact Pete at the WJTA-IMCA office by email: wjta-imca@wjta.org, phone: 314-241-1445, or fax: 314-241-1449.



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Jet Edge Spyder Abrasivejet Radius And Circle Cutting System Designed For Use In Potentially Hazardous Environments

Jet Edge has introduced the Spyder Abrasivejet Radius and Circle Cutting System, a portable abrasive waterjet cutting system designed for use in potentially hazardous environments.

The Spyder Abrasivejet Radius and Circle Cutting System can be set up on the side of tanks, small vessels and large diameter piping. It is held in place by vacuum cups and features a self-aligning centering pin for fast and reliable setup. Motion components are made from non-ferrous materials, and



cutting head manipulators are powered by pneumatic motors, making the Spyder suitable for use in all environments. A master control panel allows operators to control the cutting head manipulators, direction, speed of travel, abrasive delivery and vacuum components from one location.

The Jet Edge Spyder Radius and Circle Cutting System is available in two sizes: 1 inch to 6.5 inches inside diameter/16 inches to 48 inches outside diameter and 3 inches to 12.5 inches inside diameter/27.5 inches to 56 inches outside diameter.



The Spyder waterjet cutting system is powered by Jet Edge's 60,000 psi (4,100 bar) waterjet intensifier pumps, which are available in electric or diesel models up to 280HP.

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2011 WJTA-IMCA Conference and Expo

New Date
September 19-21, 2011

Monday-Wednesday, September 19-21, 2011

George R. Brown Convention Center, Houston, Texas

Network with professionals from around the world at the WaterJet Technology Association (WJTA) and the Industrial & Municipal Cleaning Association (IMCA) 2011 Conference and Expo.

The 2011 WJTA-IMCA Conference and Expo is dedicated to high pressure waterjet technology and related industries, including precision waterjet cutting, industrial and municipal cleaning and maintenance services, surface preparation, waterblasting, chemical cleaning, wet and dry vacuum services, tank cleaning, waste handling, spill response, hydro-excavation, environmental solutions, catalyst recycling, and the cleaning, inspection and repair of storm, sanitary, fresh water and process sewer systems.

Exhibit Space

Don't miss this opportunity to showcase your products and services at the event that focuses on high pressure waterjet technology and related industries.

To reserve exhibit space, call Ken Carroll at (314) 241-1445.

Comments from past attendees

"The live demos are great! I saw first-hand how well the tube bundle cleaning systems operate, and I got to compare different systems before making a buying decision." – Mark Blanchard, Waterworks

"This is the only meeting I know of that focuses on the things I need to serve my plant customers better – safety information, industry contacts, and new products and equipment." – Denny Barton, Heintzmann Corporation

"Safety is so important to my business, and these guys know safety. I learn new safety practices at every meeting." – Sean Benoit, PSC

"I really like the fact that the meeting centers around jetting and industrial cleaning. I don't have to spend hours trying to pick out vendors who actually know something about my business." – Jerry Biehl, IVS Hydro, Inc.

"I listened in on some of the R & D paper presentations out of curiosity and ended up coming away with a solution to a hydroblasting problem. The paper presentations are a real bonus." – Dave Whitlock, CEDA-Reactor Ltd.

"I enjoy the new topics and research we learn and meeting other people in our business." – Victor Zenon, Pelichem Industrial Cleaning Services

The Preliminary Program Includes:

- **LIVE DEMONSTRATIONS**
of abrasive waterjet cutting, equipment/system conversions, industrial vacuuming and of loading, rotary line cleaning, sewer line cleaning, tank/vessel cleaning, tube and bundle lancing, waterblasting, waterjet gun operations, and waterjet pumps. These live demonstrations give you an opportunity to see the results and ask questions about equipment and applications.
- **NEW HIGH-TECH PRODUCT AND EQUIPMENT** displays by exhibitors representing leading industry manufacturers and suppliers from around the world.
- **BOOT CAMP FOR CONTRACTORS AND END USERS** – Learn new business ideas, safety recommendations, and tips and techniques to improve workforce productivity and stay competitive in today's marketplace.
- **PRE-CONFERENCE WORKSHOPS** on waterjet technology and industrial cleaning.
- **EMERGING TECHNOLOGY, NEW APPLICATIONS** – Hear some of the world's leading engineers and researchers share new developments in applications, mechanics, equipment, and procedures.

The WJTA-IMCA Conference and Expo is presented by the WaterJet Technology Association and the Industrial and Municipal Cleaning Association. For more information, an abstract submission form, or application for exhibit space, visit www.wjta.org or contact the WJTA-IMCA, telephone: (314)241-1445, fax: (314)241-1449, email: wjta-imca@wjta.org, mailing address: 906 Olive Street, Suite 1200, St. Louis, MO 63101-1448.

2011 WJTA-IMCA Conference and Expo

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Call for Papers

The WJTA-IMCA invites you to submit an abstract to the WJTA-IMCA 2011 Conference and Expo. This program offers an excellent opportunity to highlight your work and research. Submit an abstract, network with the world's top waterjet professionals, and see and learn about new and innovative tools and equipment.

The 2011 WJTA-IMCA Conference and Expo will focus, from a practical and scientific viewpoint, on the most up-to-date advances in waterjetting and industrial cleaning equipment, techniques, and applications. Abstracts accepted for the 2011 Conference and Expo will be published in the official proceedings.



Hotel Reservations

The Hilton Americas, 1600 Lamar, Houston, TX 77010, is directly connected to the George R. Brown Convention Center via two indoor skybridges. The room rates are \$142 single/\$152 double occupancy. Make your reservations online at www.wjta.org or call toll-free (800)236-2905 or contact the Hilton directly at (713)739-8000. When calling, be sure to identify yourself as a participant in the 2011 WJTA-IMCA Conference and Expo.



For more information, an abstract submission form, or application for exhibit space, visit www.wjta.org or contact the WJTA-IMCA, telephone: (314)241-1445, fax: (314)241-1449, email: wjta-imca@wjta.org, mailing address: 906 Olive Street, Suite 1200, St. Louis, MO 63101-1448.

Preliminary Schedule of Events

Monday, September 19, 2011

- 8:00 a.m.-5:00 p.m.
Waterjet Technology – Basics and Beyond Pre-Conference Workshop
- 8:00 a.m.-5:00 p.m.
Pre-Conference Seminar
- 6:30-8:30 p.m.
Industry Appreciation Reception – Exhibits Open

Tuesday, September 20, 2011

- 8:00-10:00 a.m.
Live Demonstrations
- 10:30 a.m.-5:00 p.m.
Exhibit Hall Open
- 10:30 a.m.-5:00 p.m.
Boot Camp Sessions
- 1:00 p.m.-5:00 p.m.
Paper Presentations
- 5:30 p.m.
WJTA-IMCA General Membership Meeting

Wednesday, September 21, 2011

- 8:00-10:00 a.m.
Live Demonstrations
- 10:30 a.m.-3:00 p.m.
Exhibit Hall Open
- 10:30 a.m.-3:00 p.m.
Boot Camp Sessions
- 1:00 p.m.-3:00 p.m.
Paper Presentations



QualJet Sells Safety Products By TST Sweden

QualJet, the publisher of *Quality Waterjet Newsletter* and an international sales subsidiary of OH Precision (Taiwan), has announced that it will start reselling waterjet safety products from TST Sweden for US, Canada, and Southeast Asia. TST Sweden is a market leader of waterjet safety products in Europe, and offers broad product coverage from safety garment to high-pressure hose protection. All TST safety products are certified with CE standard and can provide protection up to 3000 bar (43.5K psi).



"We are very excited to have QualJet/OHP as our distributor and expand our product offer to North America and Southeast Asia," says Robert Larsson, international sales manager of TST Sweden. He says, "Waterjet blasting professionals in these regions would recognize immediately our design effort in making waterjet safety products not only safe but also comfortable when wearing them. We take pride in our products and its quality."

Matthew Maa, GM of QualJet, says, "By combining TST's broad safety product offers and our UHP blasting waterjets, we can now service our customers' needs end-to-end. We like especially TST's design concept of "safe with style." Customers in North America and Southeast Asia can now enjoy the top-notch waterjet safety products like never before. This should benefit the operators of waterjet the most and subsequently their employers. We are looking forward to servicing customers' safety needs immediately."

For more information, email: info@qualjet.com or call toll-free: 1-866-782-5538 in the US/Canada.

2011 WJTA-IMCA Conference and Expo
September 19-21, 2011

Announcement and Call for Papers

For more information, see page 29.





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FS Solutions Appoints New Regional Sales Representatives

FS Solutions has appointed **Bill Pharis** and **Brad Ketchum** as regional sales representatives for parts and service sales. Supporting the Long Beach, California, and Pasadena, Texas, locations respectively, Pharis and Ketchum will be responsible for developing and maintaining customer relationships and expanding the presence of the Guzzler, Jetstream and Vactor brands in these markets to ensure continued growth.

Pharis joins FS Solutions with 12 years of sales and product management experience with such companies as United Rentals and Masonite International.

Ketchum has more than 12 years of sales management experience in the automotive aftermarket industry. Prior to joining FS Solutions, he held positions at Transamerican Auto Parts, RELCO, Wheel Technologies, and Keystone Automotive Industries.

"The addition of highly qualified people is vital to our organization, so we are proud to add Bill and Brad to our sales team," said Tony Fuller, director of industrial sales for Federal Signal Environmental Solutions Group. "Their sales knowledge and experience will help expand our sales opportunities and will also have a positive impact on our relationships with FS Solutions' customers in their regions."

Additional FS Solutions centers are located in Birmingham, Ala.; Gonzales, La.; Toledo, Ohio; and Streator, Ill. All FS Solutions locations provide access to factory-trained, certified technicians and genuine OEM parts.

"FS Solutions customers look to our sales staff for recommendations and solutions to the unique challenges of their particular applications," Fuller said. "Whether it's a contractor looking for faster, more cost-effective ways to perform cleaning operations or a business that can benefit from

application expertise, equipment evaluations or training, we're providing solutions."

For more information, call 800/822-8765, or visit www.fssolutionsgroup.com.



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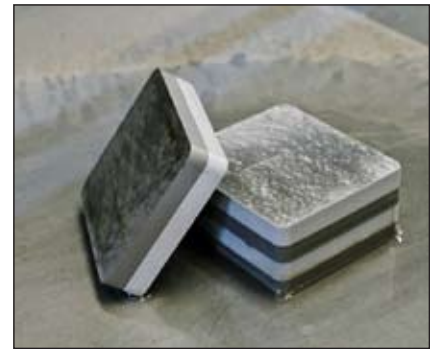
San Diego Ship Repair Contractor and Fabrication Shop Receives National Recovery Act Grant to Add Jet Edge Waterjet System, from page 12

for cutting these materials due to its precision and lack of heat affected zones,” Whitacre says. “Our method of cutting these materials prior to the procurement of our water jet machine was to plasma cut, torch cut, or saw cut.”

In business since 1969, PACSHIP specializes in aircraft carrier, combatant and auxiliary ship modernization and repair. Its customers include the U.S. Navy, U.S. Coast Guard, Military Sealift Command, BAE Systems, General Dynamics and Northrop Grumman, as well as other shipyards. The ISO 9001:2008-certified and NAVSEA Master Ship Repair contractor performs a full range of shipyard installation, maintenance and repair services including program management, structural fabrication, pipefitting, welding, electrical and electronics, rigging, painting, blasting, sheet metal work and carpentry. It also manufactures watertight doors, hatches and other marine closures. In addition to its Jet Edge waterjet cutting machine, PACSHIP features a full-service sheet metal department that includes CNC brakes, shears, plasma cutting machines, rollers, and finishing equipment.

PACSHIP chose a Jet Edge waterjet system for many reasons, Carroll explains, noting that the company specifically liked Jet Edge’s ease of operation, table size, and its robust construction.

“The Jet Edge Mid Rail Gantry System has a perfect combination of features to suit our needs,” he says. “The specific reasons why we purchased the Jet



Material shown is three-quarter-inch thick bi-metallic ballistic armor plate. The bi-metallic plate consists of one each .375 inch thick aluminum plate and one each .375 inch thick stainless steel plate. Photographs are courtesy of Pacific Ship Repair & Fabrication.

Edge waterjet cutting machine are numerous including: cost, simplicity in operation, the ability to maintain the equipment ourselves, outstanding customer service and the warranty.

“We are highly satisfied with Jet Edge’s sales process, installation, training, service and parts. There is no doubt the greatest strength is the customer service. Jet Edge Regional Sales Manager Bradley Schwartz is without a doubt one of the most

conscientious sales representatives we have ever dealt with. He has a superior knowledge of the product he is selling and the willingness to help out whenever the time arises.”

For more information about PACSHIP, visit www.pacship.com or call Bill Carroll at 619-232-3200x149. For more information about Jet Edge, visit www.jetedge.com, or call 1-800-JET-EDGE (538-3343). ■

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Barton Appoints Joe Morris Northeast Regional Sales Manager

Barton Mines Company has announced the appointment of Joe Morris as Northeast Regional Sales Manager.

Morris replaces Chris Waters, who has been promoted to Manager of Customer Services.



Joe Morris

Morris has been with Barton since 2006 working in Inside Sales. His four years experience in this capacity make him uniquely qualified to assume the outside sales role. Morris possesses comprehensive knowledge of Barton's line of garnet abrasives and a deep understanding of the market. Morris has undergone OEM training on various aspects of waterjet technology enabling him to assist customers with fault diagnosis of machines.

Prior to joining Barton, Morris worked in fabrication and manufacturing including experience with technical paint and coating application methods and abrasive media blasting.

As Regional Sales Manager, Morris will educate the waterjet and blast media markets in the value of Barton garnet abrasives and will work to maximize customer satisfaction.

For more information, visit www.barton.com, e-mail info@barton.com or phone 800-741-7756.



Attendees listening to one of the many Boot Camp sessions that were held during the 2010 WJTA-IMCA Expo.

Advanced Pressure Systems Expands Operations To La Porte, Texas

Advanced Pressure Systems (APS) has opened their first branch office in La Porte, Texas, to deliver improved access and customer service to contractors working in the industrial complex along the Houston Ship Channel and over to Beaumont and Port Arthur.



Johnny Matsoukas has been appointed the Branch Manager for APS La Porte, and he will handle all aspects of technical sales.

Johnny Matsoukas has more than 15 years of experience in the high pressure water blasting industry. He can be contacted at (281)



Johnny Matsoukas

290-9951 or (281) 220-7270 (cell), or via e-mail at jmatsoukas@waterblast.pro.

The APS La Porte Branch will stock an extensive range of water blasting tools and products for pressures from 15K to 40K. These will include control guns, control valves, nozzles (sapphire, carbide and custom drilled steel), hoses and flex lances (Parker Hannifin) and a selection of pre-threaded rigid lances. StoneAge rotary tools will also be available. For more information, visit www.waterblast.pro.

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Email addresses and other member contact information published in the WJTA-IMCA Membership Directory is meant to encourage helpful, informative communication between members. The information is not provided to circulate spam or junk mail.

The WJTA-IMCA leadership requests that members respect the contact information of fellow members and not use that information for the dissemination of spam or junk email. Membership information is not meant to be circulated beyond the WJTA-IMCA membership.

2011 WJTA-IMCA Conference And Expo

September 19-21, 2011 • George R. Brown Convention Center • 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, oil and gas, power plants, process, and medical industries — continues to expand at a rapid pace.

The **2011 WJTA-IMCA 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
- 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 Technology and Equipment
- Hydrodemolition
- Hydroexcavation
- Jet Mechanics and Visualization
- 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
- Vacuum Equipment

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 page 30, attach a copy of your abstract(s), and forward to the attention of the Conference Coordinator at WJTA-IMCA. **The deadline date for submission of abstracts is December 31, 2010.**

An Abstract Review Committee consisting of four referees will review the abstracts. Authors will be advised beginning **February 28, 2011**, regarding the decision of the Abstract Review Committee.

The 2011 WJTA-IMCA Conference And Expo is organized by the **WaterJet Technology Association (WJTA) and Industrial and Municipal Cleaning Association (IMCA)**. WJTA-IMCA 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 of \$399 (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-IMCA Conference and Expo.** (Authors must pay the applicable member or nonmember price.) Also, one registration is good for 2 (two) papers. Your paper will **NOT** be included in the *Proceedings* if the publication fee or registration fee is not paid.
- 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 WJTA-IMCA office.
- Papers should be free of commercialism.
- Papers should be submitted as a Word file and a PDF file.

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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, fax or email to WJTA-IMCA by **December 31, 2010**. Authors will be advised beginning **February 28, 2011**, regarding the decision of the Abstract Review Committee.

Paper Information

Paper Title _____

Authors _____

Contact Person

(Please print or type)

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(First Name) (Surname/Family Name)

Position/Title _____

Company/Organization _____

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Please check the category that best describes the general nature of your paper. ☐ Applications ☐ Research

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

Type of Study

- ☐ Modeling
- ☐ Experimental study
- ☐ Hardware development
- ☐ Contractor case study
- ☐ Manufacturing case study
- ☐ Software development
- ☐ Economic analysis
- ☐ Legal and Safety
- ☐ Other _____

Process

- ☐ Cutting
- ☐ 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 _____

*September 19 is reserved for pre-conference workshop.

Mail completed form and abstract, **NO LATER THAN DECEMBER 31, 2010**, to: Conference Coordinator, 2011 WJTA-IMCA Conference and Expo, WJTA-IMCA, 906 Olive Street, Suite 1200, St. Louis, MO 63101-1448, USA, telephone: (314)241-1445, fax: (314)241-1449, email: wjta-imca@wjta.org, website: www.wjta.org

WJTA-IMCA Welcomes New Members

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Comments Solicited On Improvements To Recommended Practices

Comments are solicited regarding improvements to the WJTA-IMCA publications, *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment* and *Recommended Practices for the Use of Industrial Vacuum Equipment*. While both publications are reviewed periodically at the WJTA-IMCA conferences and throughout the year, your comments and suggestions for improving the publications are invited and welcome anytime.

The *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment* is being revised and is scheduled for release later this year.

Please address your comments and suggestions to: WJTA-IMCA, 906 Olive Street, Suite 1200, St. Louis, MO 63101-1448, phone: (314)241-1445, fax: (314) 241-1449, email: wjta-imca@wjta.org. Please specify which publication you are commenting on.

Congratulations to Dr. David A. Summers, from page 17



Dr. David Summers, his wife, Barbara, and son Dr. Joe Summers. David and Barbara's oldest son, Dr. Daniel Summers, and his family were unable to attend the event. Daniel sent his best wishes via a letter read aloud by Joe.



Dr. Summers visits with colleagues.



Artist Edwina Sandys congratulates Dr. Summers. Sandys designed the Millennium Arch, which stands on the grounds of the university. The components of the Millennium Arch were cut with a waterjet.

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