



Oat Jet



This photograph shows oats being loaded at the Guiney Organic Farm in Mower County, Minnesota. The oats are being loaded from a farm wagon into a trailer for transport to market. The oats are forced through the loading tube by an auger powered by a John Deere 530 Tractor.

The Guiney Family has operated this farm in Mower County, Minnesota since 1856.

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Industrial Vacuum Contractors, Manufacturers Form Committee To Develop Recommended Safety Practices

The WaterJet Technology Association (WJTA) organized a meeting of industrial vacuum contractors and representatives of equipment manufacturers in Chicago, Illinois, on August 22, 2006, to discuss the possibility of creating a document of recommended safety practices for industrial vacuum training and operations and to address other issues involving industrial vacuum contractors.

This meeting was very successful. The participants offered suggestions and exchanged ideas on how to develop a recommended safety practices document and the key issues that should be addressed in the document. A committee of contractors and manufacturer's representatives was formed to begin work on the project. Subsequent to the August 22nd meeting, two conference call meetings have been held, and a draft table of contents has been created (see list reprinted at right). Committee members are currently developing text to cover issues in the table of contents.

The committee invites your comments and suggestions regarding topics and issues that could be included in the recommended safety practices document. Please address your comments and suggestions to:

Recommended Safety Practices
for Vacuum Operations
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.

Recommended Practices for Industrial Vacuum Services

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15.0 References

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Abrasive Waterjet For Cathode Ray Tube Disassembly

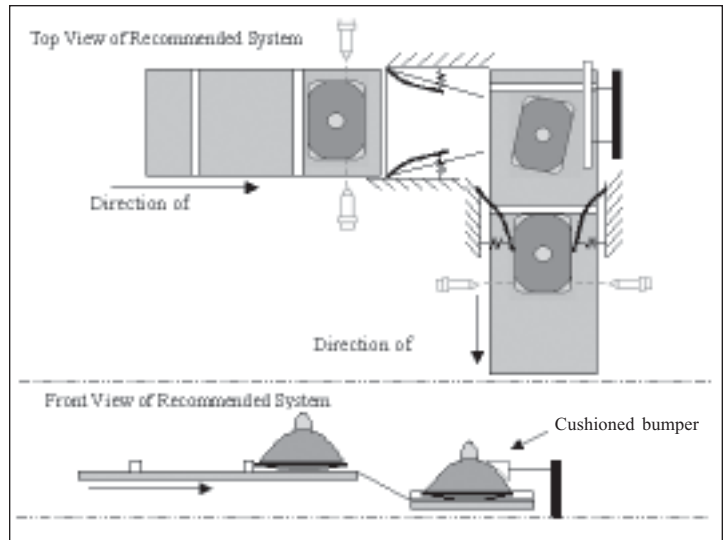
Glass cutting with abrasive waterjets is a very common application. However, cutting cathode ray tubes (CRT) with abrasive waterjets requires a special investigation. Geskin et al. * presented such an investigation in their 2002 paper. Here are the highlights.

A CRT consists of a faceplate, made of unleaded or low-leaded glass, and a funnel, made of high-leaded glass. For retired CRTs, there is a need to separate these two parts so that the unleaded or low-lead glass can be used in some other applications (e.g. in architecture and construction). Two currently commercial technologies for CRT disassembly are water-cooled diamond saw and a "hot-wire", which employs thermal shock to break the glass tube. These two commercial technologies have their limitations in productivity and separation reliability as well as automation.

In evaluation of abrasive waterjets for CRT disassembly, the basic requirement is complete separation of a CRT within a time frame of significantly less than 2 minutes. The authors started with an abrasive waterjet cutting experiment in the lab. Using 45 kpsi water pressure, a 0.010" orifice, and a 0.060" focusing tube, a separation speed of 60 ipm was achieved. Then further tests were done with these four approaches: (a) multiple nozzles; (b) using glass abrasive; (c) use water-only jets; (d) use low-pressure suspension jets. Multiple nozzles can definitely cut down the cycle time. Using glass abrasive can achieve a reasonable cutting speed at 30 ipm. But nozzle clogging did occur, probably due to inconsistent glass particle sizes and nozzle design. Further processing refining is needed if glass abrasive is to be used. Water-only jets tend to break the glass and did not show promising results. Tests with suspension jets were conducted in a different location and the results did

show effectiveness of suspension jets in this job.

Based on these tests, a waterjet-based CRT disassembly prototype system at a laboratory scale was built and tested. This system used two sets of dual nozzle setup, mounted on two cutting stations oriented 90 degrees to each other and linked with conveyor belts. The first set of dual jets cut off two sides, simultaneously, of the rectangular faceplate. The CRT was then transferred to the 2nd cutting station, where the other two sides were cut. The weight of the CRT was enough to secure it for the cutting and transfer. A cushioned bumper may be added to support the CRT to enhance stability (was not used in the prototype system). The conveyor belt speed was set at 32 ipm. The system throughput



Conceptual schematic of the four-nozzle waterjet system.

was 2 CRTs per minute, much higher than the required 1 CRT per two minutes. Therefore the authors concluded that the experiment was successful.

* Geskin, E.S., Goldenberg, B., & Caudill, R. (2002) Development of advanced CRT disassembly technology, In Paul Lake (Ed.), Proceedings of the 16th International Conference on Water Jetting, Aix-en-Provence, France, October 16-18, p583-593.

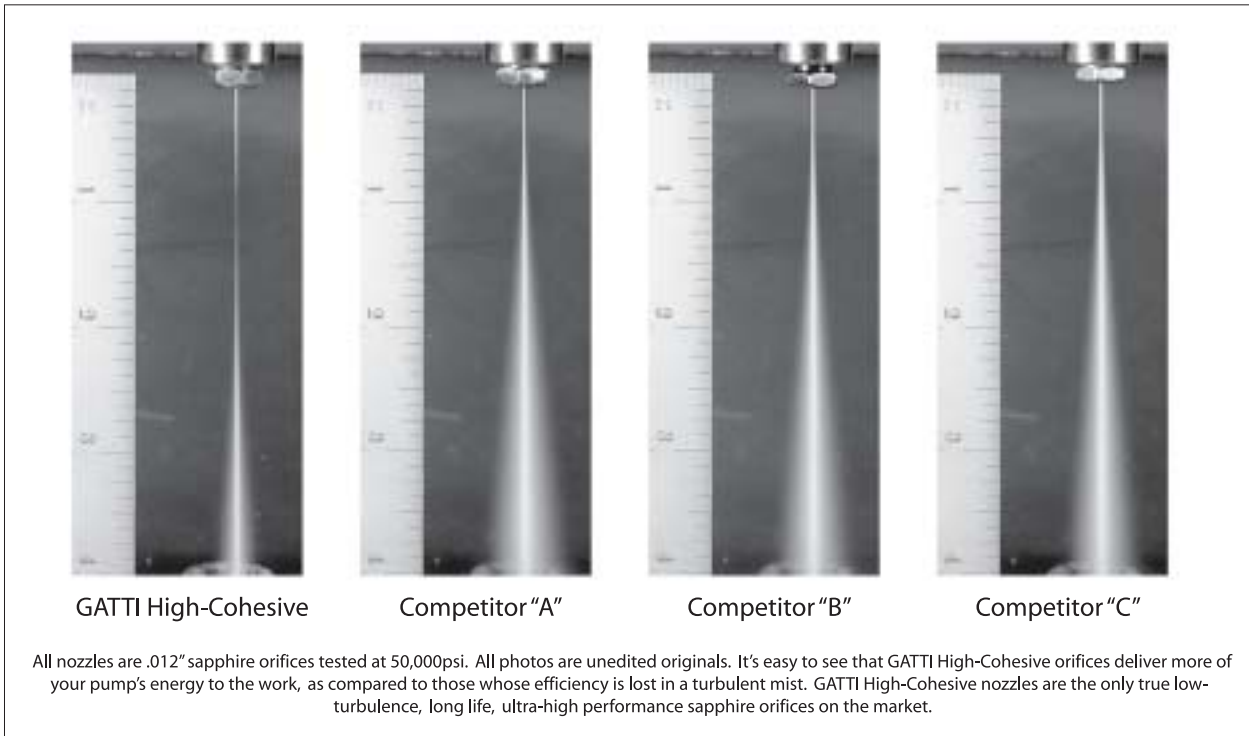
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Waterjetting Effects On Concrete Moisture Level

Waterjetting effects on the moisture level in concrete has been a subject of controversy in the cleaning and surface preparation industry. Last year Todd A. Shawver conducted a series of tests and published a paper* to provide a scientific answer that clears up the previous speculation. Here are the main points of his paper.

The effectiveness of water jetting for surface preparation has been proven. Its percentage of surface interference failure is only 7%, compared to 38% for abrasive blasting, and 31% for jack-hammering. Waterjetting is capable of

removing invisible contaminants, one of the main causes of coatings failures. It also eliminates dust and does not disrupt other nearby work. Among current practices for concrete coating removal, one of the most common methods is shot blasting with recyclable steel shots. Some of these steel shots can escape the vacuum system and become a potential source of coating failures. Failure to completely remove invisible contaminants and creating dust are also the disadvantages of shot blasting.

However, with waterjetting, there has been a concern that it may

(continued on page 11)



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Jet Edge Appoints New International Sales Engineer



Antoine Deproost

Jet Edge, Inc. has appointed Antoine Deproost as its new International Sales Engineer.

Antoine is responsible for sales of Jet Edge systems in Europe, South America and the Middle East, and for developing international distribution partners in Africa, Asia, Australia, the Caribbean and Central America.

Antoine brings to Jet Edge more than 20 years of experience in international sales and global product management. Previously, he held sales and product management positions with Omega Engineering, a manufacturer of measurement control instruments; Thermo-Electron, a manufacturer of measurement and control instrumentation; and Endress-Hausser, a global supplier of measurement controls. Antoine has an Electro-Mechanics engineering degree from T.I.K.B of Belgium and a specialization diploma in electronics from PBNA, a Dutch engineering academy. He also has received training in marketing and sales. Antoine is a native of Brussels, Belgium.

2007 American WJTA Conference and Expo

August 18-22, 2007

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- **Live, Onsite Demonstrations** of a variety of waterjet applications, including cleaning, paint/coating removal, concrete preparation, and testing the durability of safety equipment.
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- **Waterjet Technology: Basics and Beyond Pre-Conference Workshop** — Start with the basics and follow up with an in depth look at waterjet applications: Surface Preparation, Cleaning Applications, and Cutting Applications.
- **Emerging Technology, New Applications** — Hear some of the world's foremost engineers and researchers share new developments in applications, mechanics, equipment, and procedures.

The **WJTA Conference and Expo** is unique in that the program is dedicated to high pressure waterjet technology and related industries. If you are involved in high pressure waterjetting for cleaning, surface preparation, industrial vacuuming/air moving for industrial cleanup/recovery, waterblasting or cutting, or if you are interested in finding out more about the industry, the **WJTA Conference and Expo** is an ideal resource for information and an excellent meeting for networking with other professionals in the field.

Hotel Reservations at the Marriott Houston Westchase

The Marriott Houston Westchase is the central location for the WJTA Conference and Expo activities. To make reservations, call toll-free **1-800-452-5110** or contact the Marriott directly at **1-713-978-7400**. Be sure to identify yourself as attending the WaterJet Technology Association Conference to receive the special group rates of **\$109 single/\$119 double occupancy**. **August 10, 2007**, is the deadline for guaranteed room availability. Reservations received after August 10, 2007, will be confirmed on a space available basis. Rooms may still be available after August 10, but not necessarily at the rates listed above.



Visit WJTA's website, www.wjta.org, for regularly updated Conference information

**Acquisition Launches New Life
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**PaR Systems
Purchases SSI
Robotics**

PaR Systems Inc. has announced the acquisition of SSI robotics, a provider of laboratory automation products and life science equipment development and manufacturing services, based in Tustin, CA.

PaR Systems provides automation and material-handling solutions to a variety of industries including aerospace, military, government laboratories, medical, and manufacturing. SSI Robotics will become the core of PaR Systems' new Life Sciences Automation product line focusing on biotechnology, laboratory, medical and pharmaceutical applications. The acquisition gives PaR Systems access to the life-science market and supplies SSI Robotics with expanded automation and robotics expertise to offer these customers. Paul Smith, founder of SSI Robotics, was named the general manager for the new business.

"SSI Robotics specializes in laboratory automation, a specialized market requiring the ability to integrate multiple instruments and intricate automation systems," said Brian Behm, president of PaR Systems, Robotics. "SSI Robotics has an excellent reputation with top biotechnology, medical device, and pharmaceutical firms that we intend to build on."

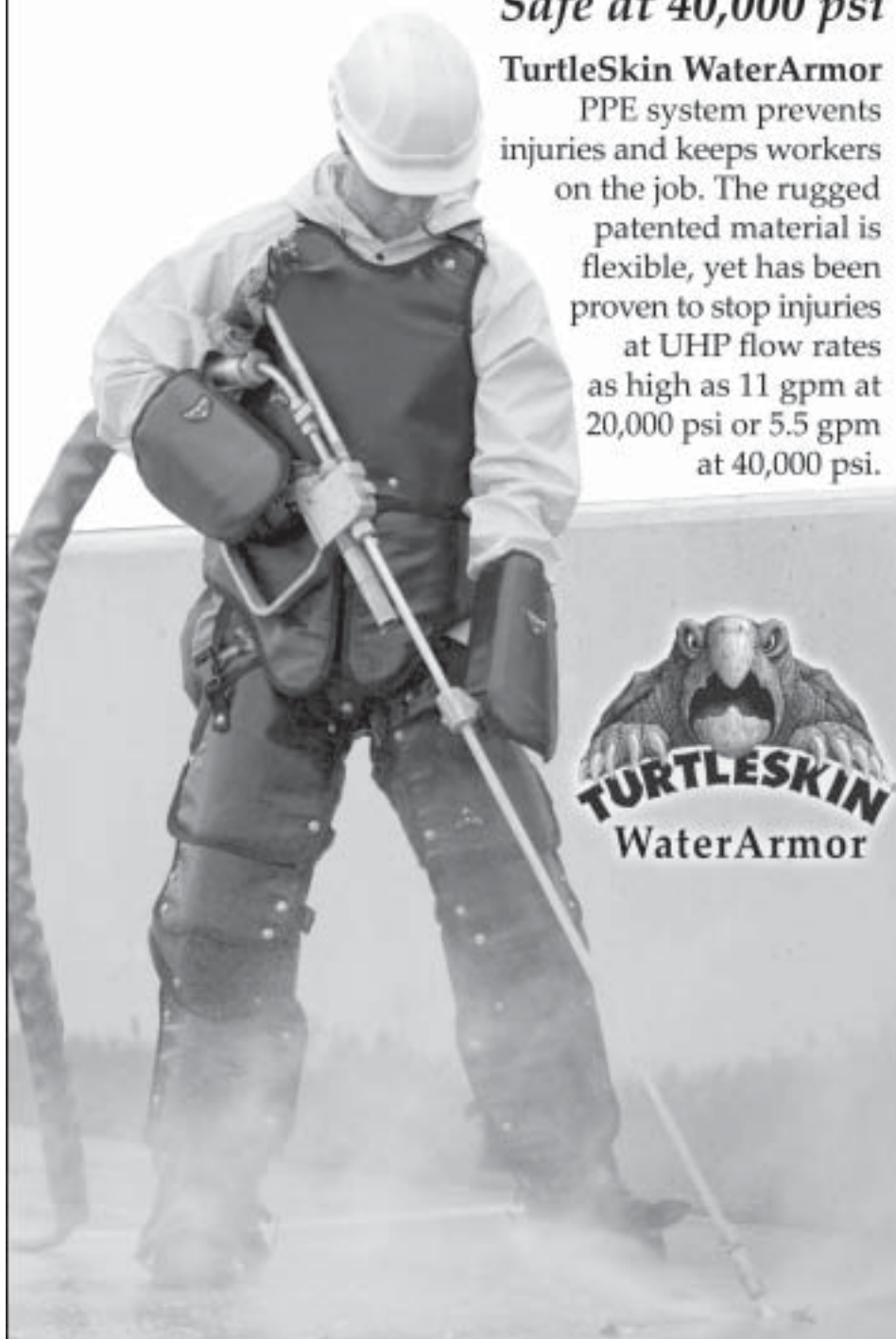
PaR Systems purchased SSI Robotics from their bankruptcy sale process. PaR Systems will retain the SSI Robotics facility in California.

For more information, visit www.ssirobotics.com.

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Abrasive Waterjets For Surface Finishing Of Marble

Abrasive waterjets are most common in cutting applications. Bortolussi et al.* presented a paper on their experimental study on using Abrasive waterjets for surface finishing of marble. Here are the highlights.

As the last stage of stone processing, surface finishing has to meet aesthetic and durability requirements. Smoothing and polishing is the most common surface finishing method of stone elements used for interior decoration. However a smooth stone surface may present a slippery condition that becomes a safety concern. To address this safety issue, currently several processes are available for roughing up the surface, including bushhammering, sand blasting, flaming, shot peening, milling, laser beam engraving, and waterjetting. Each of these methods has its advantages and limitations. When aesthetic values and safety are equally important, abrasive waterjets may present an opportunity to meet the requirements.

An experimental parametric study was done to determine the effects of abrasive waterjets process parameters on the stone surface. A well known marble material, "Bianco Carrara", was used in the tests. 300 tests were done by changing one of the 7 factors at a time. These 7 factors are: Pressure (100 and 330 MPa), Orifice Diameter (0.25 and 0.50 mm), Focusing Tube Diameter/Length (3/27.3 and 1.4/27 mm), Abrasive Flow Rate (55.4 & 158.7 g/min for coarse garnet and 78.5 & 183.2 for fine garnet), Traverse Speed (1000, 6000, & 10000 mm/min), Stand-off Distance (50, 100, 150 mm), and Average Garnet Particle Size (0.4775 – coarse & 0.2835 – fine).

The effects on the marble surface were indicated with the width of erosive bands, depth of kerf, and image analysis (scale of "Grey"). Based on these data, regression equations (refer to the original paper for these equations) were developed to relate "Outer Band Width", "Inner

Band Width", "Depth of Kerf", and "Density of Impacts" to the 7 factors.

The width of erosive bands is most significantly related to Stand-off Distance. Particle size has no impact.

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Wear-Ring Now Included On Every StoneAge Badger

StoneAge's engineers have come up with a simple design that will extend the life of both the Badger 15k and Badger 20k psi tools. They have added a heat-treated 4130 steel wear-ring that will be included with all new Badger tools being assembled. The wear-ring can also be easily installed on any existing Badger. Look for these on your next Badger purchase and if you would like any wear-rings for your existing tools just let StoneAge know.

The StoneAge SM-Air is getting a gearbox upgrade. The SM-Air is most

commonly used in boilers, tanks, and other confined spaces where the demands on waterblasting equipment are the toughest. Contractors use as much as 300 gpm with 10,000 psi to penetrate the thick deposits. To meet these demands, StoneAge now uses a more durable Boston Gearbox. The new gearboxes are in stock and all future SM-Air units will come standard with this upgrade.

For more information, visit www.stoneagetools.com, call (970) 259-2869, or email: sales@stoneagetools.com.

IMPORTANT NOTICE REGARDING SPAM

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The WJTA 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 membership.

Abrasive Waterjets For Surface Finishing Of Marble, from page 9

Other process parameters have some small effects. Depth of kerf is strongly related to Pressure and Stand-off Distance. Other parameters show secondary effects. Density of Impact is strongly related to all parameters except for Particle Size. Diameter of Focusing Tube has the highest impact. In fact it is the ratio of Focusing Tube vs Orifice that matters the most.

The authors concluded that it is possible to use abrasive waterjets for surface treatment, carving, and drawing, and as a substitute to sand blasting.

* Bortolussi, A., Manca, M.G., Careddu, N., Ciccu, R., & Olla, S. (2002) Surface finishing of marble with abrasive waterjet, in Proceedings of the 16th International Conference on Water Jetting, Aix-en-Provence, France, October 16-18, p.425-435.

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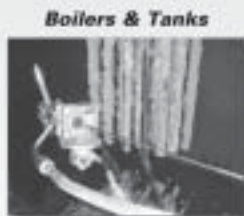
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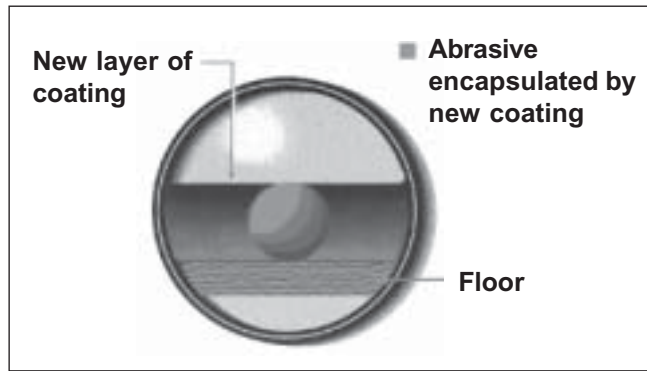


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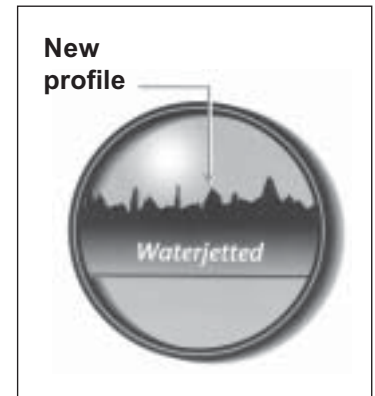
Waterjetting Effects on Concrete Moisture Level, from page 6

increase the moisture level in the concrete and thus cause blistering, delaminating and other forms of coating failures. To provide a scientific answer to this question, a series of tests were done under controlled conditions. The tests were done on smooth and clean concrete surfaces. The target environmental condition

was a sunny day with 75°F and 50% relative humidity. The actual condition was 77°F and 55% relative humidity as well as a light to variable wind at 3 miles per hour. The moisture level of the concrete surface was measured with a specialized tool, which measures the electric impedance of the concrete. The subject concrete surface was divided into 4 different zones. Zone 1 was base concrete, used as a reference. Its moisture was measured and the value was 3.4% throughout the test duration. Zone 2 was prepared with a “SpinJet” at 40 kpsi and 6 gpm within a time frame of 7 seconds. A vacuum recovery system was employed to remove the waste water. The moisture level was increased from 3.4% to 4.5% immediately after cleaning, but then dropped to 2.9% after just 2 minutes. The reason why afterwards moisture value was lower (2.9% compared to 3.4%) was because the reading prior to cleaning was affected by some “Iron” deposits. The same test was repeated on the cleaned surface and the result confirmed this (same 2.9% prior to and 2 minutes after cleaning). Zone 3 was similar to Zone 2 but without vacuum recovery. The moisture level dropped back down to 3.3% after 25 minutes. Zone 4 was



The abrasive material that remains on the floor compromises the new coating.



Water jetting exposes the aggregate in the concrete, proving an excellent bonding surface for the new coating system.

soaked with running water for a 3-hour period to simulate saturation from precipitation. The moisture level returned to 3.4% after 35 minutes. The table below shows the moisture variation in the tested period.

The conclusion was that waterjetting at 6 gpm and 40 kpsi with a vacuum recovery system does not cause any measurable increase in moisture level of concrete surfaces.

* *Shawyer, Todd. A. (2005) The effects of UHP surface preparation on concrete moisture levels using UHP water jets, in Mohamed Hashish (Ed.), Proceedings of the 2005 WJTA American Waterjet Conference, Houston, Texas, USA, August 21-23, Paper 5B-4.*

Article reprinted with permission from the *Quality Waterjet Newsletter*, August 29, 2006, published by QualJet LLC, www.qualjet.com

Time In Minutes	ZONE #1 Base Concrete (% Moisture)	ZONE #2 SpinJet With Vacuum Recovery (% Moisture)	ZONE #3 SpinJet Without Vacuum Recovery (% Moisture)	ZONE #4 Water Saturation (% Moisture)	ZONE #2 RETEST SpinJet With Vacuum Recovery (% Moisture)
0	3.4	3.4	3.4	3.4	2.9
0.5	3.4	3.5	6.1	6.1	3.4
1	3.4	3.3	6.1	6.1	3.1
2	3.4	2.9	6.1	6.1	2.9
3	3.4	2.9	6.1	6.1	2.9
4	3.4	2.9	6.1	6.1	2.9
5	3.4	2.9	6.1	6.1	2.9
6	3.4	2.9	6.1	6.1	2.9
7	3.4	2.9	6.1	6.1	2.9
8	3.4	2.9	6.1	6.1	2.9
9	3.4	2.9	6.1	6.1	2.9
10	3.4	2.9	6.1	6.1	2.9
15	3.4	2.9	6.1	6.1	2.9
20	3.4	2.9	5.9	6.0	2.9
25	3.4	2.9	3.3	4.2	2.9
30	3.4	2.9	3.3	3.7	2.9
35	3.4	2.9	3.3	3.4	2.9

Jet Edge Exhibiting At Fabtech, EuroBLECH 2006

Jet Edge, Inc. will demonstrate its latest waterjet cutting technologies at the FABTECH International and AWS Welding Show, Oct. 31-Nov. 2, at the Georgia World Congress Center in Atlanta, GA.

During FABTECH, Jet Edge sales engineers will conduct live abrasive waterjet cutting demonstrations on Jet Edge's High Rail Gantry System utilizing the new high-powered iP60-50 intensifier pump, AquaVision Di[®] motion controller, and Digital Readout for Multi Head Positioning. The Georgia World Congress Center is located at 285 Andrew Young

International Blvd. N.W. Look for Jet Edge in booth #8110. FABTECH hours are 9 a.m.-5 p.m. Oct. 31, 9 a.m.-6 p.m. Nov. 1, and 9 a.m.-4 p.m. Nov. 2.

Jet Edge's waterjet cutting systems cut nearly any material, from food products to hardened tool steel to titanium. The company's systems are being used by airlines, automotive and aerospace manufacturers as well as industrial manufacturing companies and machine and job shops around the world. Jet Edge's customers include Ford, Toyota, General Motors, Boeing, American Airlines, and General Electric.

"Our cutting systems have many advantages," said David Dumas, Jet Edge director of sales. "We are known for our very large work areas and accuracy. We can hold an accuracy of 0.005 inch with a repeatability of 0.001 inch over the entire work envelope. Our cutting systems are powered by hydraulic intensifier pumps that can offer 15,000 to 30,000-plus hours of operation on the hydraulic pump, depending on the model. This, of course, means greater productivity and lower operating costs.

(continued on page 13)



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Jet Edge Exhibiting At Fabtech, EuroBLECH 2006, from page 12

The cutting systems are controlled by a state-of-the-art AquaVision Di[®] motion controller that guides users through the project step-by-step.”

During FABTECH, show participants can see for themselves the remarkable versatility and speed of Jet Edge’s High Rail Gantry System. They also can see Jet Edge’s iP60-50 intensifier pump in action. The “heart and soul” of the Jet Edge waterjet cutting system, the iP60-50 intensifier pump is rated for 60,000 psi and features an extended-life hydraulic system. The iP60-50 intensifier pump provides easy access for all service and maintenance. It features non-threaded high-pressure components in the high-pressure cylinder, an improved performance check valve, and low torque values. The Jet Edge iP60-50 intensifier pump leads the industry with ease of operation and low operating cost. It requires very few tools to maintain.

The cutting system is controlled by the AquaVision Di[®] motion controller that guides users through the process from job set-up to production. With the AquaVision Di[®], single parts, part arrays, mirroring, scaling, rotation, and plate alignment are right at users’ fingertips. The AquaVision Di[®] is fully networkable, allowing part programs to be generated offline and easily transferred to the system’s hard drive for production. Feed rate and acceleration are automatically varied, based on known features of a specific job. Dynamic tool offset, or “cutter compensation,” is employed real-time, and an optional real-time pump control allows remote starting and stopping of the pump, dual pressure set points for piercing hard-to-pierce materials, and unlimited data logging of every process parameter imaginable.

The AquaVision Di[®] includes a full-featured hand-held pendant that allows feed rate override, return-to-path, program zero set points, and XYZ axis control.

Jet Edge’s Digital Readout for Multi Head Positioning, which improves productivity by reducing setup time, digitally displays cutting head positions, eliminating manual measurement.

Jet Edge, Inc. will also demonstrate its new iP60-50 ultra-high pressure waterjet intensifier pump at EuroBLECH 2006, Oct. 24-28, at the



Exhibition Grounds in Hanover, Germany. Look for Jet Edge in Hall 16, Booth D17.

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KMT's Waterjet Cutting Head Updated For Ease Of Use

KMT Waterjet introduced the new Autoline II™ abrasive cutting head at the IMTS show in Chicago. The new cutting head maintains all of the same features which earned it the position as the number one performing head (in terms of overall efficiency and cutting performance), as tested against nine other heads by the University of Missouri-Rolla, however, has new features which make it even easier to use.

Shajan Chacko, one of the lead engineers behind the new cutting head, said that some of the key new features include a weep hole to indicate whether the orifice is seated correctly, a larger and relocated wear insert for quicker replacement, and a new abrasive inlet for easier connection of the abrasive feed line.

The new cutting head is designed for rapid changes of the orifice, without tools, making it very easy to

use larger orifice sizes with narrower focusing tubes for emphasis on faster cutting rather than efficiency. The ideal ratio between focusing tube and orifice is 3:1, however, using a 2.2:1 or 2:1 ratio will allow faster cutting at the expense of shorter focusing tube life. For example, overall it is more efficient to use a .007" orifice with a 0.021" focusing tube. However, substituting a larger orifice allows more water and more energy into the

head for faster cutting. The AUTOLINE II™ makes it possible to change the orifice very quickly.

All of the features were added while still protecting the efficient cutting performance and reliability. The AUTOLINE II™ efficiently uses abrasive to maximize cut speeds.

For more information, visit www.kmtwaterjet.com or call (620) 856-6239.

SPIR STAR Relocates To New Facility

SPIR STAR, manufacturer of Thermoplastic High Pressure Hose, has announced a move to its new assembly facility located at 10002 Sam Houston Center Dr., Houston, TX 77064. The new telephone number is (281) 664-7800 and the new fax number is (281) 664-7850. This move accommodates growth and expands SPIR STAR's capabilities.

Flow Introduces Latest Waterjet Cutting Technology at IMTS 2006

Flow International Corporation (NASDAQ: FLOW) introduced its latest waterjet cutting advancements at IMTS 2006 in Chicago, IL.

IFB with 87,000 psi with HyperPressure Technology

Flow's latest IFB waterjet machine incorporates 87,000 psi waterjet cutting. Flow's HyperPressure technology enables faster, more cost-effective cutting. Waterjet cutting at 87,000 psi provides a host of benefits to manufacturers including:

- Faster cutting, lower part cost and higher production, including cutting speeds that are 20-30% faster than 60,000 psi

- 20-30% lower part cost than 60,000 psi
- Increased power density and jet efficiency
- 40% higher velocity
- Lower abrasive consumption, with 30-50% less abrasive used than 60,000 psi
- Reduced part taper
- Simpler, faster maintenance

MicroJet Waterjet Cutting System

Flow's new MicroJet waterjet machine is a highly accurate, small envelope waterjet system capable of cutting highly intricate and accurate

parts. Benefits of Flow's MicroJet system include the ability to:

- Perform precision machining
- Complement EDM operations with higher speed waterjet cutting capability
- Cut and drill holes with same machine
- Cut fine parts used in medical and other industries requiring highly precise parts
- Cut with exceptional detail, with a kerf width of 0.015 inch (380 micrometer)" and radius of 0.0075 inch (140 micrometer)"

For more information, visit www.flowcorp.com.

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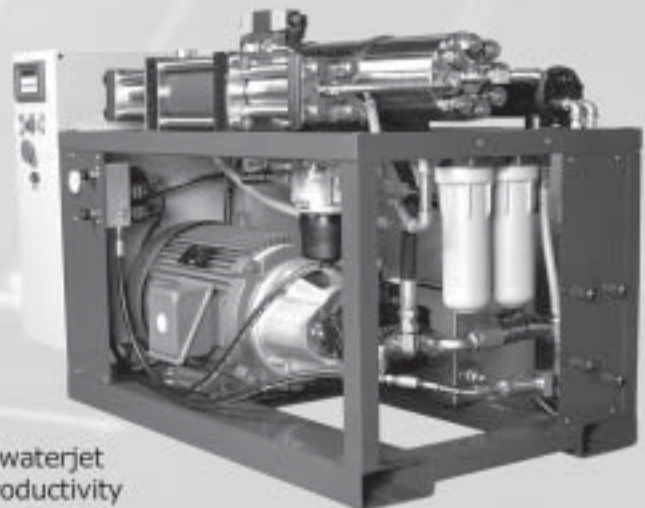
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At bicmagazine.com, visitors will find the same great feature articles as found in the print edition plus some other Web-only features. Take a peek at the animated online magazine by clicking on the image of the BIC magazine cover. (Be sure to allow "pop-ups.") Users will find an interactive version of the magazine that allows them to click for more information on a given topic.

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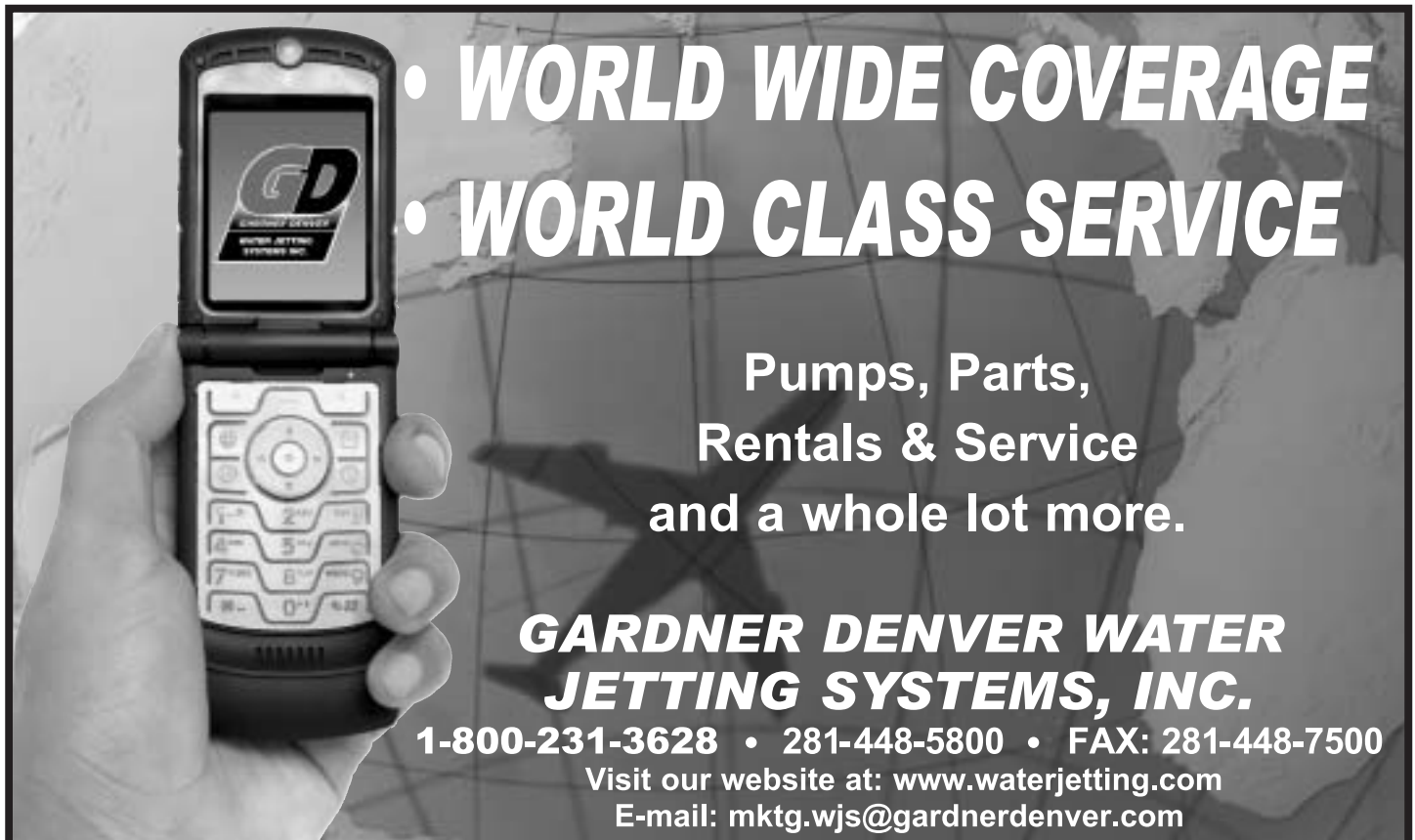
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Heard or Jon Guillaume at (800) 460-4242 or Terry Grover in Houston at (281) 486-1500. E-mail: tgrover@bicalliance.com.

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.



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Jet Edge Introduces New Waterjet Intensifier Pump Check Tube

Jet Edge, Inc. has introduced a new check tube design for its ultra-high pressure waterjet intensifier pumps. The new check tube has double the life of previous models and is easier to service, resulting in lower operating cost.

Jet Edge intensifier pump check tubes feature a low-pressure poppet and high-pressure poppet that open and close, allowing low-pressure water to flow into the high-pressure cylinder and ultra-high pressure water to leave the high-pressure cylinder. The new check tube design includes an improved low-pressure poppet, poppet housing and simplified check tube design. The design allows the low-pressure poppet assembly to be secured by a single hollow screw and does not require an adhesive such as Loctite®, eliminating the waiting



period for the adhesive to cure. This improved design has been incorporated into Jet Edge's new iP6050 intensifier pump. It also is available as a direct replacement part for all other Jet Edge Ultra-high Intensifier Pumps.

With the most comprehensive warranty in the industry, Jet Edge backs its high-pressure components,

check tubes, high-pressure cylinders and attenuators with a one-year unlimited hour warranty against defects and cracking. All Jet Edge high-pressure key components are tracked with serial numbers.

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

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

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