

## Shale Gas – New Business for the Waterjet and Industrial Cleaning Community



The RAMVAC HX 12-27 at work on a well site vacuuming the sand from a frac tank. Boom reach, vehicle maneuverability, and vacuum capabilities are important elements of this equipment as the cleaning operation often has large distances and tight quarters to operate within. Photograph courtesy of RAMVAC.



Cleaning/vacuuming the reclaimed sand inside a frac tank. Photograph courtesy of RAMVAC.

See article on page 2.

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# Drilling Unconventional Resources Opens New Opportunities for the Waterjet and Industrial Cleaning Community

By Peter Wright, WJTA-IMCA

An oil and natural gas boom in the US and Canada, driven by horizontal drilling and hydraulic fracturing, has generated new opportunities for WJTA-IMCA members and waterjet/vacuum service providers while demonstrating the widespread applicability of high pressure waterjet technology.



Equipment positioned in place to vacuum out a frac tank. Photograph courtesy of RAMVAC.

## History/Technique

Hydraulic fracturing was first implemented by Halliburton in 1947 as a means of extracting natural gas from low permeability shale formations. Due to the low permeability of shale rock, conventional wells cannot economically tap these resources.

Within shale, natural gas or oil is trapped in natural pockets or is adsorbed onto the rock. The technique of hydraulic fracturing uses a high pressure flow of water (up to 15,000 psi but generally lower) at a relatively high flow rate (reaching up to 100 barrels per minute or 4,200 gallons per minute) to force open these natural fissures allowing the gas or oil to flow out and be captured by the well.

The process begins with a vertical well drilled to depths of thousands of feet, then turned and drilled horizontally once the target formation has been reached. While the depth depends on the formation, it is often around 7,000 feet, with the well extending thousands of feet more horizontally. After a casing of cement and steel pipe is put into place, the fracking fluid (a mixture of water; granular material, called proppant; and trace additives) is pumped in,

forcing open the fissures in the rock. The proppant holds the fractures open so that gas and oil can flow out. Engineers and geologists in charge of the fracturing monitor the formation and can adjust the flow and the amount of proppant added to achieve the best results.

Although the technique for hydraulic fracturing has been around for decades, the boom in shale gas and oil production of the last few years has been driven by refined multi-stage completion techniques, which place fractures at multiple strategic positions within the wellbore. The number of stages depends on the formation and other factors, but can often be done in around forty stages.

## Drilling Boom in US and Canada

The Marcellus Shale, which extends through New York, Ohio, Pennsylvania, and West Virginia, is proving to be an excellent source of natural gas. Pennsylvania in particular has seen the number of new wells drilled in the Marcellus increase from 195 in 2008 to 1,386 in 2010, with 851 already drilled in 2011 (through July 13) and around 2,000 permitted, according to the Pennsylvania

Department of Environmental Protection.

Shales rich in oil and natural gas are found in other formations throughout the US and Canada. The Bakken Shale in North Dakota, Montana, and Saskatchewan is rich in oil and has seen a boom in new wells drilled. The Eagleford, Barnett, and Haynesville shales in Texas and Louisiana are also continuing to be developed.

## Technology Used

The proppant used can be sand, which is mined in the US and abroad. Sand is mined, then washed and sieved before it is ready to be used. The recent boom in hydraulic fracturing has generated a great deal of business and led to the opening of new sand mines.

A desire for higher production has led operators to another source of proppant: spherical ceramics. This source of proppant has proven successful due to the hardness and the uniform size of ceramic beads, which allows for greater flow around the beads.

The pumps used for the hydraulic fracturing itself are specially designed frac pumps. These are large triplex or quintiplex reciprocating plunger pumps with pressures up to 15,000 psi, flow rates that can reach up to 100 barrels per minute (4,200 gallons per minute), and horsepowers to 2,500 hhp. They must be designed to contend with wear and tear from the abrasive, as well as long intervals at which they must operate.

In response to the demands of the gas and oil fields, WJTA-IMCA member Parker Hannifin has

(continued on page 23)



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## Technical expertise

**Pre-Conference Workshops - Monday 19th**

Applications of Waterjet Technology @ 8:30 a.m.

Cleaning Applications @ 12:45 p.m.

**Tool Boot Camps - Wednesday 21st**

Automated Waterblast Benefits @ 12:00 p.m.

Nozzle Selection @ 12:45 p.m.

**Live Tool Demonstrations - 20th & 21st 8-10 a.m.**

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# Waterjet Technology – Basics and Beyond

Monday, September 19 • 8 a.m.-3 p.m.

A one-day review of the basic techniques and applications of waterjet technology being held in conjunction with the 2011 WJTA-IMCA Conference and Expo, September 19-21 at the George R. Brown Convention Center, Houston, Texas.

**Who should attend:** Anyone with an interest in waterjet technology, ranging from first-time users and new employees to those seeking to increase their level of knowledge, including field techs, suppliers, support staff, engineers, marketing personnel, and potential new users.

## What You Will Learn:

- **History of Waterjet Technology:** Mining and Hydrodemolition; Cleaning, Coating, and Corrosion Removal; Precision Cutting, Industrial Field Cutting, and Medical Applications
- **Overview of Common Jetting Applications:** Cleaning, Cutting, Excavation
- **Equipment Considerations:** Basic System Components; Pump Options and Selection; Hoses, Tubing, and Connectors; Flow Controls and Accessories; Nozzle Design Considerations; Basics of Abrasive Jet Systems
- **UHP and Abrasive Cutting Applications:** Basic Waterjet System Platforms, Basic Cutting Applications and Trends, Advanced Waterjet Applications
- **Safety:** Dangers; Injuries; Safety Procedures; Job Site Safety and Hazards; Shotgun, Pipe, and Tube Cleaning; Equipment Checks; Waterblast Unit Safety; Equipment Maintenance
- **Cleaning Applications:** Factors Involved in a Waterblast Project; Understanding Pressure Loss, Jet Speed, and Optimizing Jet Power; and Choosing the Right Tools for the Job
- **Field Cutting Applications:** Mitigating the Risk for Cutting in Hazardous Environments; Cutting Composites; and Case Studies
- **Surface Prep:** Comparison Between Abrasive Blast and Waterjet Surface Preparation; Specifications for WJ Cleaning; Flash Rust, Rust Back, and Rust Bloom; New Visual Guide to Flash Rust; Waterjetting and Pressure Washers

## FACULTY:

**Lydia Frenzel, Ph.D.**  
Advisory Council

**Mohamed Hashish, Ph.D.**  
Flow International Corporation

**Bill McClister**  
Veolia Environmental Services

**Hugh Miller, Ph.D.**  
Colorado School of Mines

**Gary Toothe**  
FS Solutions

**John Wolgamott**  
StoneAge, Inc.

**Mike Woodward, Ph.D.**  
Gardner Denver Water Jetting Systems

**Basics and Beyond Manual** – Each attendee will receive a copy of the **Basics and Beyond Course Manual**, including each PowerPoint presentation **PLUS** these bonus sections: Historical Perspective, Fluid Mechanics of Jets, and Influence of Basic Jet Parameters and Physics of AWJ Cutting.

Registration is required. Member discounts are available. For details contact the WJTA-IMCA office by email at [wjta-imca@wjta.org](mailto:wjta-imca@wjta.org) or telephone: 314-241-1445.

## Vacuum Course Immediately Follows Basics and Beyond Course

**Understanding the Power of Vacuum and How Industrial Vacuum Loaders Work** by Phil Stein

Monday, September 19 • 3:00 p.m.-5:00 p.m.

Industry veteran Phil Stein uses informative and entertaining visual training models to illustrate how vacuum systems work. Stein's unique approach to training shows operators how simple things like vacuum hose diameter can have a huge impact on vacuum performance. This course will also be offered on Tuesday, September 20, 10:30 a.m.-12:30 p.m. The course is free, but pre-registration is recommended. All participants in the 9/19/11 or 9/20/11 vacuum session will receive a video recording of Phil Stein's presentation on CD-ROM, courtesy of the course sponsor **Vacuum Truck Rentals LLC**.



## Plan now to attend the WJTA-IMCA Conference and Expo

Details can be found on the WJTA-IMCA web site at [www.wjta.org](http://www.wjta.org)





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## Comments Solicited on Proposal for Color Coding of Pressure Hoses

The WJTA-IMCA Board of Directors assigned a subcommittee with the task of studying the identification of various pressure hoses by color. The Board of Directors has accepted the subcommittee's recommendation, which appears below:

**“Pressure hoses are designed for various pressures and could present a safety hazard if not used for its designated working pressure. In order to better identify the pressure in use, it is recommended that the following color code scheme is used for the applicable maximum working pressure:**

PSI	Bar	Proposed Color Code
10,000	690	Yellow
15,000	1,034	Green
20,000	1,379	Blue
30,000	2,068	Silver
40,000	2,758	Orange
55,000	3,792	Red

**The color scheme should be easily identifiable at least two feet from both hose ends.”**

The WJTA-IMCA Board of Directors is soliciting your comments on the proposed wording, which, when approved, will be added to the *Recommended Practices For The Use Of High Pressure Waterjetting Equipment* (Orange Book) and the *Recommended Practices for the Use of Industrial Vacuum Equipment* (Blue Book).

Please direct comments to the WJTA-IMCA office by email: [wjta-imca@wjta.org](mailto:wjta-imca@wjta.org), fax: (314)241-1449, or phone (314)241-1445. The recommendation will be discussed at the WJTA-IMCA General Membership Meeting, September 20, 2011, at the 2011 Conference & Expo in Houston, Texas.

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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## OMAX® Sponsors Winning Team at FIRST Robotics Championship

OMAX Corporation recently sponsored the FIRST (For Inspiration and Recognition of Science and Technology) Robotics team from Aviation High School in Des Moines, Washington. Following victory at the regional level, the team won the prestigious Creativity Award in the FIRST Championship held April 27-30, 2011, in St. Louis, Missouri.



Inventor Dean Kamen founded FIRST in 1989 to inspire young people's interest and participation in science and technology. The not-for-profit organization's FIRST Robotics Championship is an international event in which teams of high school students build a robot over a period of six weeks using the core principles of engineering and mathematics. The final teams – 8,600 students from 11 countries – were selected from more than 42,000 contestants who already competed at regional-level competitions around the world.

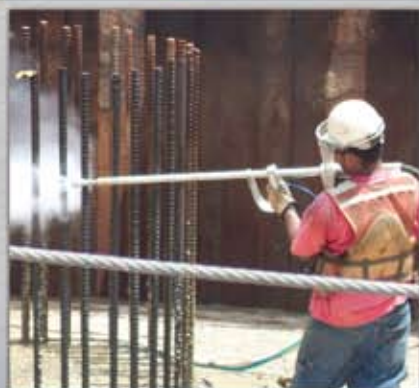
This is the third year that OMAX has sponsored Aviation High School's FIRST Robotics team. Each Friday evening during the team's build season, OMAX Lead Electrical Engineer Kevin Hay supervised the Aviation High School team as members cut parts for their robot at the OMAX headquarters. Using the MAXIEM® 1530 and OMAX 2652 models, the team was able to cut the precise parts needed for its prize-winning robot.

“Working with the kids is a lot of fun, but it also fits OMAX's goal of promoting science and engineering education,” said Kevin Hay. “Many of these kids will go on to have fruitful careers in an engineering-related field, and it feels good to have been a small part of that.”

OMAX plans to maintain its sponsorship of the Aviation High School FIRST Robotics team in the future and continue what is becoming a prize-winning tradition.

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*Steve Johnson, Division Manager  
CCS, Longview, WA*

"They worked with us until the operation was up and running smoothly. With Jetstream's help, we finished what would have been a two-week project in six days."

*Charlie Underwood, Operations Manager  
Midwest Waterblasting, Clinton, MI*

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## Congratulations to Newly Elected WJTA-IMCA Board Members

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**Kerry Petranek**

StoneAge, Inc.

**Forrest Shook**

NLB Corporation

Current board members who continue to serve remaining terms on the board of directors are:

**Bill Gaff**

Vacuum Truck  
Rentals, LLC

**Mohamed Hashish, Ph.D.**

Flow International  
Corporation

**Hugh Miller, Ph.D.**

Colorado School of Mines

**Gary Noto**

Veolia Environmental  
Services

**George A. Savanick, Ph.D.**

Consultant

The first meeting of the new board will be held on Sunday, September 18, 2011, at the George R. Brown Convention Center in Houston, Texas.

## Governor John Hickenlooper Visits StoneAge

On June 8, 2011, employees at StoneAge Waterblast Tools, Durango, Colorado, buzzed with excitement when they learned Colorado Governor John Hickenlooper was on the property to visit and tour the facility. Gov. Hickenlooper visited Durango as part of his statewide tour to sign 19 bills passed by the General Assembly this year.

Gov. Hickenlooper had an opportunity to see how waterjets operate when Doug Wright, StoneAge research and development manager, did live demonstrations of several StoneAge tools.

StoneAge was the 2011 recipient of the Governor's Award of Excellence in Exporting for a small-sized manufacturer, an award given to Colorado companies that demonstrate a commitment to international trade. Gov. Hickenlooper said that StoneAge represents Colorado and Colorado business because of how it treats its employees,



From left, Doug Wright, StoneAge research and development manager, Gov. Hickenlooper, and Bill Shires, StoneAge director of marketing and business development.

who receive 10 percent of the firm's profits.

StoneAge is a leader in producing tools and equipment for waterblast cleaning and exports its products to 43 countries.

StoneAge Vice President Jerry Zink says, "We sell more than half of our products outside of the country."

### Comments Solicited on Improvements to Recommended Practices

Comments are solicited regarding improvements to the WJTA-IMCA publications, *Recommended Practices for the Use of 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.

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](mailto:wjta-imca@wjta.org). Please specify which publication you are commenting on.



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## Barton Mines Company, LLC, Renamed Barton International

The Barton Group announced on July 1, 2011, that Barton Mines Company, LLC, will conduct its business under the name Barton International. As Barton International, the company will continue to manufacture and distribute garnet abrasives.

Board Chairman Charles H. Bracken, Jr. says, "Barton International better represents the company's renewed international focus and growing worldwide customer base. Since 1878, our family-owned company has continuously evolved to serve new and growing markets and to better serve our customers. Meeting the growing global demand for garnet abrasives with the highest quality and most innovative abrasive solutions and services is our goal."

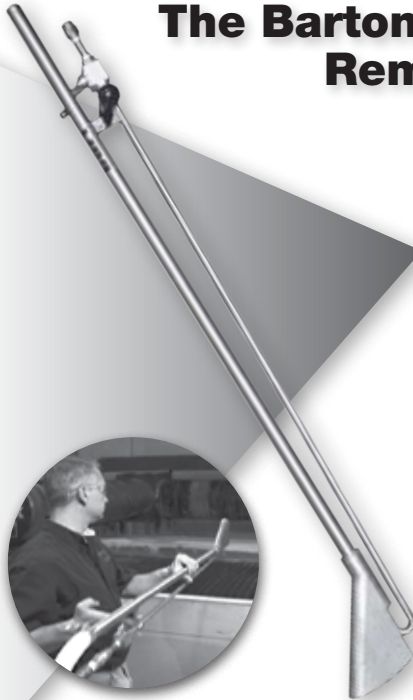
In addition to a very strong domestic market, the company has identified and is actively pursuing growth opportunities throughout Europe. Distributors have been established in numerous countries including Germany, France, Italy, and the United Kingdom. "The name Barton International fits our planned expansion into the European and Asian markets," says R. Randolph Rapple, president.

"While our company name is changing, all core elements of the organization will remain the same," states Bracken.

The company name change is effective immediately, and all future business activity will be undertaken with the new identity.

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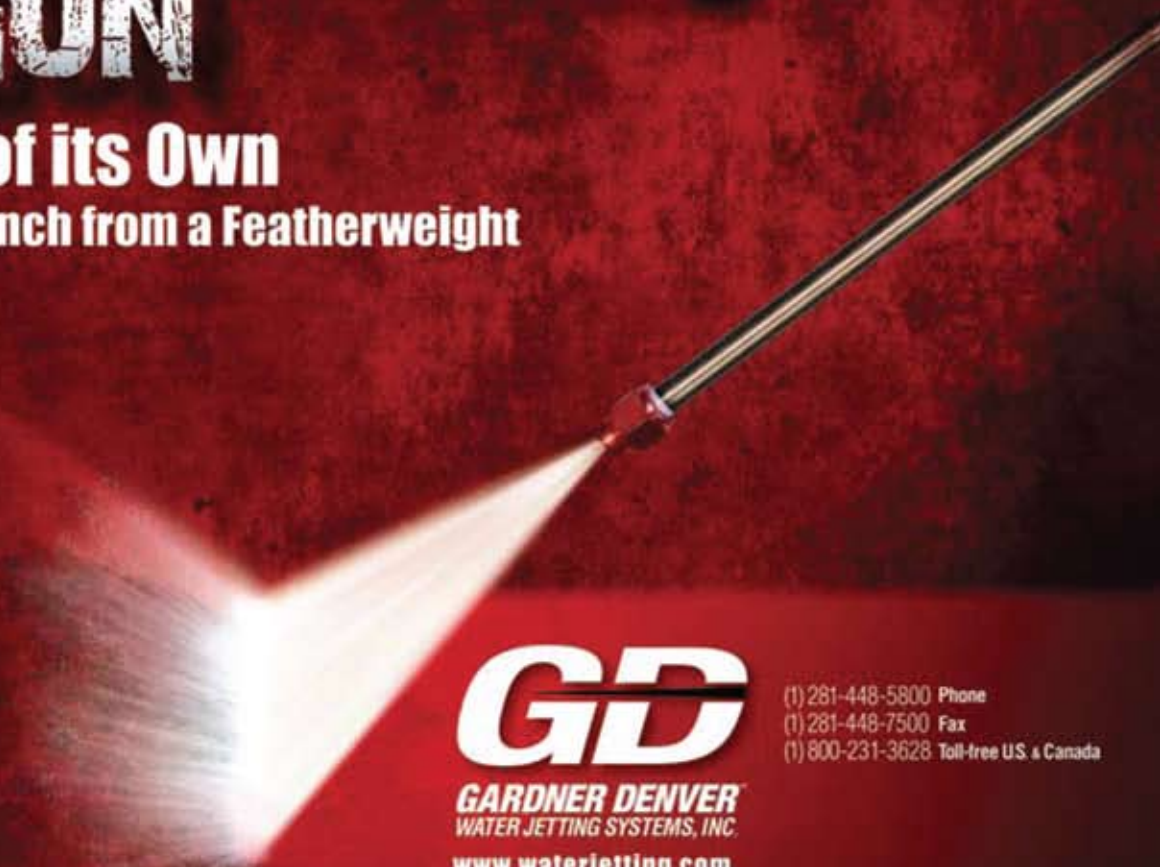


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## Metal Service Center Jacquet Mid Atlantic Adds WaterJet Cutting Machine

Jacquet Mid Atlantic has added a fourth Jet Edge waterjet cutting machine at its metal processing facility in Pottstown, Pennsylvania. The Mid Rail Gantry system is Jacquet's ninth Jet Edge waterjet nationwide.

Jacquet Mid Atlantic's newest waterjet cutting machine is capable of cutting materials up to 21-ft. x 13-ft. It features two abrasivejet cutting heads with mirroring capabilities to cut large parts twice as fast. Powered by a 100hp, 60,000 psi waterjet intensifier pump, the system features independent programmable Z carriages, programmable height sensing, a submerged cutting package, closed-loop water filtration, and a garnet removal system.

A subsidiary of Jacquet Metals of Lyon Saint Priest, France, Jacquet Mid Atlantic is one of five Jacquet metal service centers in North America. The company also has service centers in Charlotte, North Carolina; Houston, Texas; Racine, Wisconsin; and Irvine, California.

Jacquet specializes in supplying and processing stainless steel and nickel alloys for OEMs, fabricators, and machine shops that support primarily the oil and gas, power generation, pollution control systems, and water purification industries. Jacquet's North American service centers provide waterjet and plasma part cutting. The



company stocks 19 different grades of stainless steel and nickel alloy plates in a wide variety of sizes and thicknesses.

For more information, visit [www.jetedge.com](http://www.jetedge.com) or call (800)538-3343.

## Optional Trip to NASA's Johnson Space Center for Conference/Expo Participants

WJTA-IMCA has arranged an optional trip for Conference/Expo participants to visit NASA's Johnson Space Center on Sunday, September 18, 9 a.m.-5 p.m. Space Center Houston is located approximately 25 miles south of downtown Houston in the NASA/Clear Lake area.

"Intelligent fun" defines the way that groups describe their day at Space Center Houston. A day when they've touched a Moon rock, witnessed a shuttle launch, enjoyed a guided tour of NASA, seen real space-flown vehicles, explored the inner workings of the Pepsi Martian Matrix and much, much more! Group tickets include giant screen movies, the Discount Tire NASA Tram Tour, all the shows, new exhibits, demonstrations, and more. Over 250 Space Center Houston adventures are free with a Group admission ticket!

The Tram Tour, which takes visitors over to NASA, departs every 20 to 40

minutes and takes approximately 90 minutes to complete. The time spent inside Space Center Houston depends on whether visitors view any giant screen films, live shows, and/or take the Tram Tour. Usually three to five hours is sufficient, but visitors are invited to stay as long as they like.

The Tram Tour is the only part of the visit that will be guided. Touring the inside of the Center is completely self-guided. "Things to See and Do" brochures, including a map of the Center, will be available at the Information Desk.

Tickets are \$30 per person and include transportation. For more information, visit [www.wjta.org](http://www.wjta.org) or contact the WJTA-IMCA office by email: [wjta-imca@wjta.org](mailto:wjta-imca@wjta.org) or telephone: (314)241-1445.



The Lunar Vault is one of the very few places where visitors are allowed to actually touch a real Moon rock. Courtesy of Space Center Houston.



The Saturn V Experience is a big part of the famous NASA Tram Tour. Courtesy of Space Center Houston.



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## Live Demonstrations

### Aqua Sales, LLC

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### GapVax, Inc.

The GapVax® HV-57 High Dump option allows you to be more efficient, dumping into roll-off containers, keeping your GapVax at the jobsite longer. With the opportunity of outside demos, we want to show you its superior performance. With the capability of dumping into a 60-inch high roll off box in the fully raised and body dump position, you will see the ease of offloading into a dumpster as well as the effortlessness of vacuuming up any material on the job.

### Gardner Denver Water Jetting Systems

Gardner Denver will be showcasing many of their 40,000 psi tools, including, but not limited to, abrasive cutting equipment and surface preparation equipment.

### Guzzler NX

Check out the newly redesigned Guzzler NX vacuum loader during the WJTA-IMCA live demonstrations. Guzzler will demonstrate the patented VR (Vacuum Recovery) technology that ensures you never lose suction during the loading cycle because the baghouses are self-cleaning. This allows the 18 yd<sup>3</sup> hopper to be more fully loaded before dumping is required. Nearly 100% of vacuumed material can be discharged through the main hopper door when the bed is raised or vacuumed material can be packaged for disposal with one of Guzzler's many optional offloading systems. The NX maintains its best-in-class fuel economy and ultra quiet sound rating due to the unique drive system but is now lighter and more economically priced because the sound shroud is no longer required.

### Hammelmann Corporation

Hammelmann will be demonstrating our wireless remote unit for pump operation. We will also show how we can run two units in tandem without the need for two operators. Hammelmann will be showcasing many different tools which are beneficial for the industrial cleaning sector.

### NLB Corp.

NLB's fully-automated ATL-5000 tube lancer cleans heat exchanger tubes faster than manual methods. A powerful hydraulic drive inserts and withdraws the five lances at a rate of 39 inches per second. An adjustable lance stroke allows the system to be configured for bundles of various lengths up to 30 feet. All movements are controlled by the operator from an overhead station, which provides excellent visibility at a safe distance from the action.

### Peinemann Equipment

Portable, affordable, safe and easy to assemble are just some of the main characteristics of the new tube cleaning equipment: the Peinemann 2LTC tube cleaning equipment. Made to last and to withstand the toughest of cleaning conditions, this latest Peinemann development can be seen at the demo area for the very first time.

### Schedule for Live Demonstrations

8:00 a.m.-10:00 a.m.  
Tuesday, September 20, 2011  
Wednesday, September 21, 2011



(continued on page 18)



# WE ENHANCED THE LEGENDARY PRODUCTIVITY AND OFF-LOADED SOME OF THE PRICE.

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WJTA-IMCA Expo Booth #517



# Attend WJTA-IMCA

## Preliminary Schedule of Events

## 2011 WJTA-IMCA Co

### Monday, September 19, 2011

8:00 a.m.-3:00 p.m.

Waterjet Technology – Basics and  
Beyond Pre-Conference Workshop

3:00 p.m.-5:00 p.m.

Understanding the Power of Vacuum  
and How Industrial Loaders Work

**Sponsored by Vacuum Truck  
Rentals, LLC**

6:30 p.m.-8:30 p.m.

Industry Appreciation Reception –  
Exhibits Open

**Sponsored by CSM Supply**

7:30 p.m.-8:00 p.m.

Awards Presentation in Exhibit Hall

### 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.-2:00 p.m.

Boot Camp Sessions

10:30 a.m.-3:00 p.m.

Exhibit Hall Open

1:00 p.m.-3:00 p.m.

Paper Presentations



September  
George R. Brown Convent



**Boot Camp S**  
Preliminary To

### Tuesday, September 20, 2011

10:30 a.m.-12:30 p.m.

**Understanding the Power of Vacuum and How Industrial Vacuum Loaders Wo**

*Phil Stein, Consultant*

12:30 p.m.-1:00 p.m.

**Safety in Waterjetting**

*Ed Twaddell, TurtleSkin WaterArmor by Warwick*

1:15 p.m.-1:45 p.m.

**Reduction of Hydro Blasting Manual Labor at Dow Chemical**

*Hans Borgt, Dow Benelux, B.V.*

2:00 p.m.-3:00 p.m.

**Driving to Zero...Together! (NEW)**

*Kathy Krupp, The Dow Chemical Company*

3:15 p.m.-3:45 p.m.

**Hose Safety and Color Coding Recommendation**

*Paul Webster and James Kim, Parker Hannifin-EPD*

4:00 p.m.-4:30 p.m.

**Static Electricity - The INVISIBLE Enemy**

*Alan Browne, Stewart R. Browne Manufacturing Company*

*\*Participants in the vacuum session  
will receive a video recording of Phil  
Stein's presentation on CD-ROM,  
courtesy of the course sponsor  
Vacuum Truck Rentals LLC.*

For more information and to



# 2011 Main Event

## Conference and Expo

September 19-21, 2011

Convention Center • Houston, Texas

### Exhibitors

Advanced Pressure Systems  
Ameri-Force Industrial Services, Inc.  
Aqua Sales, LLC  
BIC Alliance  
Blasters, Inc.  
Boatman Industries, Inc.  
CSM Supply  
Carolina Equipment & Supply (CESCO)  
Cleaner Times  
Dragon Products, Ltd.  
FS Solutions  
Fruitland Tool & Manufacturing  
GMA Garnet (USA) Corporation  
GapVax, Inc.  
Gardner Denver Water Jetting Systems, Inc.  
General Pump  
Giant Industries, Inc.  
Guzzler Manufacturing  
Hammelman Corp.  
Heintzmann Corporation  
High Pressure Equipment Co.  
HoldTight Solutions, Inc.  
IMS Staff Services  
IVS Hydro, Inc.  
Idrojet S.R.L.  
Inland Industrial Services Group, LLC  
JGB Enterprises, Inc.  
Jack Doheny Companies, Inc.  
Jetstream of Houston, LLP  
Kroy Industries, Inc.  
LaPlace Equipment Co., Inc.  
Lemasa Ind. e Co. Ltda.  
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Maxpro Technologies, Inc.  
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PRESVAC Systems  
Ramvac Vacuum Excavators  
Red-D-Arc Inc.  
SPIR STAR  
Stewart R. Browne Manufacturing Co., Inc.  
StoneAge, Inc.  
Stutes Enterprise Systems, Inc.  
Super Products LLC  
Terydon, Inc. & Ultra High Specialties, LLC  
The Blast Bag Company, Inc.  
TurtleSkin WaterArmor by Warwick  
Under Pressure Systems, Inc.  
Vac-Con, Inc.  
Vacuum Truck Rentals LLC  
Wastequip  
Wilco Supply, LP



## Sessions

Topics

### Wednesday, September 21, 2011

10:30 a.m.-11:00 a.m.

#### Automated Tube Cleaning

*Todd Shawver, NLB Corporation*

11:15 a.m.-11:45 a.m.

#### Hydro-Excavation

*Brett Hart, Vactor Manufacturing, Inc.*

12 Noon-12:30 p.m.

#### Automated Waterblasting Equipment Benefits and Capabilities

*Kerry Petranek, StoneAge, Inc.*

12:45 p.m.-1:15 p.m.

#### Nozzle Selection

*Carrie Grant, StoneAge, Inc.*

1:30 p.m.-2:00 p.m.

#### High Pressure Waterblasting

*Gary Toothe, FS Solutions*

See more Conference and Expo details  
throughout this issue of the *Jet News*

to register visit [www.wjta.org](http://www.wjta.org)

## Live Demonstrations, from page 14

### Peinemann Equipment, continued

Very recently Peinemann has updated and further improved our already popular 3TLE tube cleaning equipment. At the demo area we have the 3TLE set up with the added option to operate rigid lances as well. Visit the Peinemann demo area for a closer inspection of our new, versatile and stronger 3TLE tube cleaning equipment.

### Red-D-Arc Inc.

Red-D-Arc Inc. will be showing the Aero 40 dry ice blasting machine complete with a 185cfm compressor. You will see how the system performs on mold remediation and small diameter pipe.

### StoneAge, Inc.

StoneAge, Inc. will be demonstrating the benefits of utilizing high pressure water to clean and remove rust, scale and deposits from drill well pipe. There will be two mechanized devices showing the automation of cleaning both the internal and external surfaces of the drill pipe.

### Stutes Enterprise Systems, Inc.

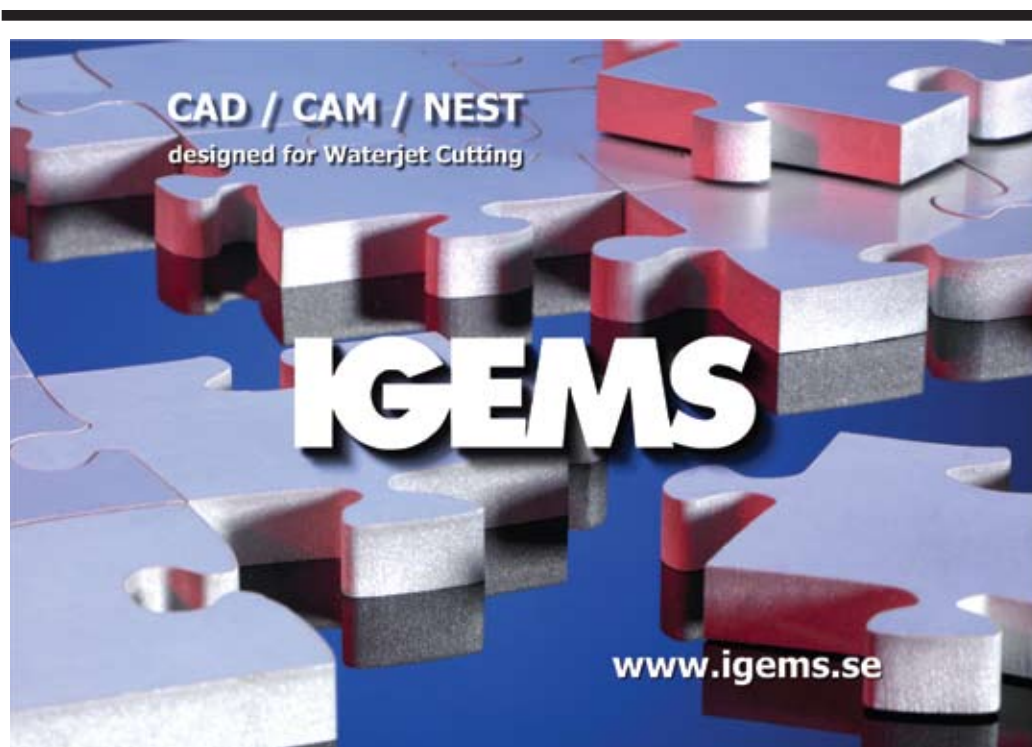
Stutes will be showcasing their new line of Quick Change convertible waterjetting units by Gardner Denver. These units can be converted from 10K-20K PSI with only removing the plunger and packing from the rear of the stuffing box saving time and money due to not removing the head, stuffing boxes and valves. 40K PSI change over only requires a quick manifold change. In addition, Stutes will demo the Stone Age BANSHEE nozzle cutting through concrete, rock and many others.

### Terydon, Inc.

Terydon will do a cutting demo with our Jack Track cutting track, and a demo of our HH40 Hand Held Surface Cleaner.

### TurtleSkin WaterArmor by Warwick

Seeing is believing!  
Turtleskin will provide a live demonstration of its MFA WaterArmor PPE system resistance to a UHP waterjet. This flexible component PPE system is the only product currently certified to meet the new proposed EN standard of a 40,000 psi, 2,800 Bar, 0 deg. waterjet at the standoff of 3 inches, 7.6 cm, and a swipe speed of 1.6 ft/sec., .5 m/sec. at a flow of 5.5 gal/min., 21 l/min.







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## Understanding the Power of Vacuum and How Industrial Vacuum Loaders Work by “Professor” Phil Stein

Geared to contractors, employees, and end users who use industrial vacuum equipment, are first-time users, or who are considering adding industrial vacuum technology to their services, this session will cover:

- Basic Types of Trucks
- How Pressure – High or Low – Works
- How to Measure Vacuum and Pressure
- Why Hose Diameter and Length is Important
- Viscous Materials
- Air Mover Configuration
- Special Operations
- When Things Go Wrong
- Major Safety Concerns

All participants in the 9/19/11 or 9/20/11 vacuum session will receive a video recording of Phil Stein's presentation on CD-ROM, courtesy of the course sponsor Vacuum Truck Rentals LLC.



Stein has been working in the industrial and municipal cleaning industry since 1969. His specialized “Science Lab” presentations have been given to over 2,000 individuals since the training programs started in 1996. The vacuum session will be presented twice: Monday, September 19, 3-5 p.m., and again on Tuesday, September 20, 10:30 a.m.-12:30 p.m.

## Paper Presentations

- AWJ Cutting with Reduced Abrasive Consumption, by *M. Hashish*.
- AWJ Trimming of Composites and Cutting of Other Materials Using 6-Axis Robots, by *D. Snider and M. Hashish*.
- Abrasive Grain Breakage Process During the High Pressure Waterjet Formation, by *A. Perec*.
- Abrasive Slurry–Injection Jet (AS-IJ) for CNC Cutting System, by *D. Liwszyc, A.J. Liwszyc, J.P. Liwszyc and A. Perec*.
- Current Practices in Design Standards and Criteria for High Pressure Waterblasting Tools and System Components, by *D. Wright*.
- Determination of Spatial Velocity Distributions of Abrasive Particles in Abrasive Water Jets Using Laser-Induced Fluorescence Under Real Conditions, by *R. Balz and K.C. Heiniger*.
- Effect of Diameter Ratio, Volume Fraction and Abrasive Grain Size on the Exit Velocity by Numerical Simulation of Flow Through Abrasive Water Suspension Jet Nozzle Using DOE, by *Deepak D, A. Devineni and N.Y Sharma*.
- Effect of the Uniaxial Compressive Strength of the Rock on the Cutting Performance of AWJ, by *I. Karakurt, G. Aydin, and K. Aydiner*.
- Efficient Operation of Abrasive Waterjet Cutting in Industrial Applications, by *A. Henning, P. Miles and D. Stang*.
- Energy Based Evaluation of Waterjet Peening for Industrial Application, by *A. Chillman, M. Hashish, M. Ramulu, C. Lavender, E. Stephens and Y.C. Chen*.
- Energy Loss From an Abrasive Waterjet for Rock Cutting, by *T. Oh and G. Cho*.
- How Automated Water Jetting Improves Tube Bundle Cleaning Efficiency, by *T. Shawver*.
- Influence of De-Painting Method on Substrate Surface Profile, by *H. Teimourian, H.V. Tamaddoni, B. Mutabi and A. Soleimanzadeh*.
- Jet-Forming Nozzles Made of Diamond Polycrystals for Gas- and Fluid-Abrasive Cutting and Processing Tools, by *N.I. Polushin*.  
IN PROCEEDINGS, NOT PRESENTED
- Measuring the Water Temperature Changes Throughout the Abrasive Water Jet Cutting System, by *M. Jerman, H. Orbanic, I. Etxeberria, A Suarez, M. Junkar and A. Lebar*.
- Methods for AWJ Cutting Process Control, by *A. Lebar, M. Cvjeticanin, H. Orbanic and M. Junkar*.
- Micro-AWJ Technology for Meso-Micro Machining, by *H.-T. Liu, D. McNiel, E. Schubert and A. Turpin*.
- Performance Optimization of Abrasive Waterjet Technology in Granite Cutting, by *G. Aydin, I. Karakurt, and K. Aydiner*.
- Selecting the Most Effective Waterblast Pressure and Flow for a Given Standoff Distance, by *D. Wright*.
- Stripping Coatings with High-Frequency Forced Pulsed and Ultra-high Pressure Waterjets: A Comparative Study, by *M. Vijay, W. Yan, A. Tieu, B. Daniels, M. van Wonderen and C. Mitchel*.
- Submerged Abrasive Suspension Jets Issuing from Sheathed Nozzle with Ventilation, by *H. Ito, G. Peng and S. Shimizu*.
- The Technology and the Machine for Quarrying Fashioned Sidewalk Parts from Rock Massive by UHPWJ, by *J. Asatryan and Kh. Suvaryan*.  
IN PROCEEDINGS, NOT PRESENTED
- Theoretical and Experimental Basis of Water Pipeline Renovation with High-Pressure Water Jet Technique, by *P. Borkowski*.
- Two Special Mechanisms for Controlling the Waterjet Gun and Eliminating the Reaction Force of the Jet, by *H. Teimourian, H.V. Tamaddoni, B. Mutabi and A. Soleimanzadeh*.
- What's Happening in Surface Preparation Standards for Paint, by *L. Frenzel*.





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## FS Solutions Center in Long Beach to Offer US DOT 407/412 Inspection Services



Federal Signal Environmental Solutions Group has announced that its FS Solutions Center in Long Beach, California, will be offering inspection services for any US Department of Transportation (DOT) 407/412 cargo tank equipped vehicles in California, effective immediately. Performed by FS Solutions' trained service technicians, these inspections include external visual inspection, internal visual inspection, leakage test, pressure test, and thickness testing.

Vehicles equipped with US DOT 407/412 cargo tanks are primarily used for the transportation of hazardous materials in commerce, and require inspection at certain intervals to keep the vessel or tank in compliance.

“Our industrial cleaning customers rely on FS Solutions for their vacuum truck related needs – including parts, accessories, service and equipment rentals – so the US DOT tank inspections are one more way we can provide value and convenience,” says Tony Fuller, director of industrial sales for FS Solutions. “By helping to ensure that our customer’s vehicles comply with US DOT 407/412 cargo tank regulations, customers are able to reduce downtime and minimize the potential for costly fines.”

## THANK YOU to the Sponsors of the 2011 WJTA-IMCA Conference and Expo

### Platinum Level



### Gold Level



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### Bronze Level



Additional FS Solutions centers are located in Birmingham, Alabama; Gonzales, Louisiana; Toledo, Ohio; and Streator, Illinois.

For more information about products and services available from the FS Solutions centers or to find the nearest location, call (800)822-8785, or visit [www.fssolutionsgroup.com](http://www.fssolutionsgroup.com).



## Drilling Unconventional Resources Opens New Opportunities for the Waterjet and Industrial Cleaning Community, from page 2

developed a special hose to replace metal pipe in conveying the fracking fluid into the well. This new 3-inch ID hose, developed for oil service companies, is rated to 15,000 psi. Replacing steel pipes with a much lighter weight hose will reduce the amount of manpower and heavy equipment needed onsite.

### Waterjet/Vacuum Truck Community

The widespread implementation of these techniques has led to a boom in oil and natural gas production that has generated a great deal of business for the waterjetting, vacuum truck, and industrial cleaning community. Recovered fracking fluid is often vacuumed up and moved to frac tanks for storage and subsequent treatment and reuse. Waterjetting services are also in great demand for cleaning the residue from the frac tanks.

At well sites, hydroexcavation is widely used because of the need to safely dig and locate without using mechanical means. Additionally, many operators see the value in a multi-dimensional piece of equipment that can be used for more than just vacuuming, particularly on crowded well sites.

In addition to the crowded space around a well, the wide geographical spread of the shale resources creates challenges for equipment manufacturers. According to RAMVAC Vice President of Operations John Wichmann, "The equipment must be able to operate in temperature regimes from -40°F to 100°F."

The opportunities and challenges of working on oil and gas sites has led RAMVAC to develop hydroexcavators with a temperature-controlled environmental chamber to

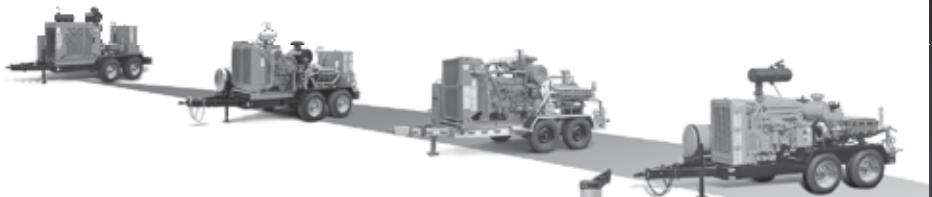
keep water from freezing and a shorter length to allow for maneuverability around the crowded well.

Operators must contend with demanding timetables as well, at times operating around the clock for days.

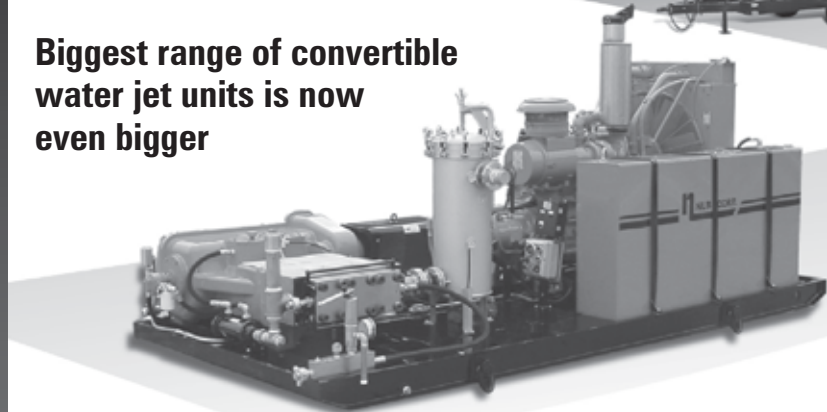
The demand for vacuum truck and waterjetting services, however, has led operators to purchase and rent more equipment. Service companies have expanded operations and new start-ups have sprung up to cope

(continued on page 26)

# NLB 605 combines 600 hp with 40,000 psi



**Biggest range of convertible  
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The NLB 605 convertible water jet unit, a contractor favorite for high flow and horsepower, now gives you even more: the ability to run at ultra-high pressure. It converts in a few simple steps to any of eight pressures, from 4,000 to 40,000 psi.

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**NLB Introduces 20,000 psi and 15,000 psi Self-rotating Nozzles**



NLB has introduced two new Typhoon™10 series self-rotating tube cleaning nozzles for tubes with diameters of at least 0.75 inches. The RPN 2020 is rated for a maximum operating pressure of 20,000 psi and the RPN 1520 for up to 15,000 psi.

Both new models rotate at 7,000 rpm, with maximum flow of 20 gpm. Both feature the latest NLB seal design that reduces leakage by 50 percent.

The Typhoon series now includes seven self-rotating nozzles, for tube diameters from 0.625 inches to 50 inches. Pressures range from 15,000 psi to 24,000 psi and flows from 9 gpm to 60 gpm.

For more information, visit [www.nlbcorp.com](http://www.nlbcorp.com) or call (248)624-5555.

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## Hilton Americas - Houston

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to the George R. Brown Convention Center via two indoor sky-bridges. The room rates are \$142 single/\$152 double occupancy. For reservations, call toll-free (800)236-2905, contact the Hilton directly at (713)739-8000, or register online.

Monday, August 29, 2011, is the deadline for guaranteed room availability. Reservations received after August 29 will be confirmed on a space available basis. Rooms may still be available after August 29, but not necessarily at the rates listed above.

### Alternate Hotels

The Hyatt Regency Houston, 1200 Louisiana Street, Houston, TX 77002, is a 15-minute walk from the George R. Brown Convention Center. The room rates are \$142 single, \$152 double occupancy. Reserve your room online or call 888-421-1442. When calling, mention that you are attending the WJTA-IMCA Conference and mention the grouping code G-WATE to receive the group rates.

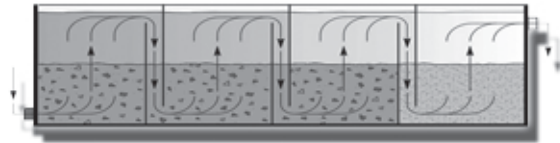
August 29, 2011, is the deadline for guaranteed room availability. Reservations received after August 29, will be confirmed on a space available basis. Rooms may still be available after August 29, but not necessarily at the rates listed above.

The Embassy Suites Houston – Downtown, 1515 Dallas Street, Houston, TX 77010, is a five-minute walk from the George R. Brown Convention Center. The room rates are \$159, single or double occupancy. Reserve your room online or call (888)482-0230. When calling, mention that you are attending the WJTA-IMCA Conference and the group code WJT to receive the group rates.

August 29, 2011, is the deadline for guaranteed room availability. Reservations received after August 29, will be confirmed on a space available basis. Rooms may still be available after August 29, but not necessarily at the rates listed above.



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# Drilling Unconventional Resources Opens New Opportunities for the Waterjet and Industrial Cleaning Community, from page 23

with the demand for waterjet and vacuum services from the oil and gas fields. Bill Gaff, vice president of sales and marketing for Vacuum Truck Rentals, LLC, states, "We have seen a significant increase in rental requests for hydroexcavation machines, vacuum trucks, as well as 130 BBL trailers. These requests are coming from all sizes of contracting companies who are looking to expand their businesses and to a large number of start-up companies."

## The Future

The future looks bright for oil and natural gas production in the US and

for related industries. The US Energy Information Administration (EIA) estimates in an April 2011 report that US shale gas production, which increased from 0.39 trillion cubic feet (Tcf) in 2000 to 4.87 Tcf in 2010, will further increase to 12.3 Tcf in 2035, accounting for 46% of US natural gas production.

Internationally, shale gas and oil will also be a major source of energy, with formations in South America, Australia, Canada, China, Mexico, South Africa, Poland, and more. Although France has moved to ban hydraulic fracturing altogether, work is progressing in other nations.

While opposition from environmental groups has sprung up in parts of the US, the absence of evidence for drinking water contamination and the importance of domestic energy sources suggest that work on shale formations will continue to progress.

As these unconventional resources continue to be developed over the next few decades, they will continue to generate opportunities for waterjetting, vacuum truck, dewatering, and hydroexcavation products and services. ■

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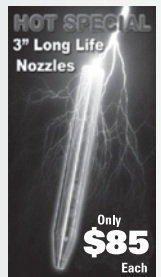


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## Super Products' New Mud Dog® 1600 Hydro Excavator Offers Larger Water and Debris Capacity Plus Robust Design for Harsh Environments

Super Products LLC designed and built its new Mud Dog 1600 to meet the demanding hydro excavation challenges inherent in oil field, mining, and cold weather applications. The unit features a 16 cubic yard debris body, standard 1500 gallon water capacity, and rear-mounted boom that in addition to offering 335 degree rotation can pivot down 25 degrees for eight feet of extra digging and access to hard-to-reach areas.



For outstanding digging performance, the Mud Dog 1600 offers water pressures up to 18GPM at 3000 PSI in combination with its eight-inch positive displacement vacuum system that provides air flow of 5800 cfm/28 Hg to ensure thorough clean up of debris. An onboard boiler with 714000 Btu/Hr capacity heats up the high-pressure water to break up frozen, stubborn material and flush out tight spaces efficiently. Winter recirculation, anti-freeze and air purge systems ensure the unit performs optimally in even the harshest of climates. Its heated aluminum cabinet offers easy access and increased storage capacity.

The Mud Dog 1600 hydro excavator also has several unique features that result in time and cost savings as well as increase operator convenience. Coupled with Super Products' industry-unique ejector plate technology, the unit's ability to tilt its debris body two feet enables fast, thorough unloading and washdowns. Additionally, the truckmounted hydro vac relies on a single engine design that can result in lower fuel costs and maintenance requirements, and a simple, easy-to-learn control panel setup.

Headquartered near Milwaukee, Wisconsin, Super Products LLC has been a leading manufacturer of innovative truck-mounted vacuum equipment for municipal, utility, industrial, and contractor use since 1972. The company's line of Supersucker® vacuum trucks, Camel® sewer and catch basic cleaners and Mud Dog hydro excavators are recognized for their high quality, durability and ease of operation

For more information, telephone (800)837-9711 or visit the company online at [www.superproductscorp.com](http://www.superproductscorp.com).

## A New Peinemann Tube Cleaning Device

Peinemann has added the new 2TLE to its line of tube cleaning devices, including the 1LTC and the 3TLE. The success of the 1LTC and 3TLE devices created a new demand for a piece of equipment that would increase tube cleaning capabilities compared to the 1LTC while remaining both portable and flexible in use.



The Peinemann 2LTC has the capabilities of cleaning both vertical and horizontal bundles at difficult to reach locations in combination with a relatively small HP pump. The added benefit is that the 2LTC has similar components to the 1LTC and it can be fitted on new or existing StoneAge indexing frames once equipped with the clamp plate. All in all the Peinemann 2LTC gives operators a new option in being effective in cleaning bundles for a relatively small investment.

For more information, contact Joost Ballieux or Wout Bol by telephone: +31 102955000 or visit: [www.peinemannequipment.com](http://www.peinemannequipment.com).



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## Hughes Pumps

In a typically reserved English way the success of Hughes Pumps isn't something they've gone out of their way to shout about! Even though for more than 40 years the company has been designing and manufacturing high pressure, positive displacement pumps and waterjetting equipment for use in some of the world's harshest environments, by some of the world's leading industrials in petro-chemical, construction, offshore, and contracting.

Hughes is also the only company in the UK that manufactures a complete high pressure pump range at its modern, purpose built, 15,000 square feet ISO 9001:2000 accredited UK factory. This gives it complete control of lead times, quality, development, spare parts stock holding, and vital after sales support.

Hughes' commitment to precision engineering provides the benefits of an established product range and the flexibility of a manufacturer willing to engineer a solution to any problem. Hughes pumps are ruggedly constructed and produced in nine frame sizes, each including a range of plunger sizes, allowing selection of the ideal pump for

the job. Operating pressures are from 70 to 2750 bar (1,000 to 40,000 psi) and flow rates to 773 lpm (170 igpm / 205 usgpm) with ratings from 30 to 375 kW (40 to 500 hp).

Hughes Pumps is interested in hearing from companies wishing to represent them in regions where they are not already represented. For more information, contact Hughes Pumps Ltd by telephone: +44 (0)1903 892358, email: [sales@hughes-pumps.co.uk](mailto:sales@hughes-pumps.co.uk), or visit [www.hughes-pumps.co.uk](http://www.hughes-pumps.co.uk).



## StoneAge® Introduces the Banshee® ProTex™ Splash Guard

StoneAge has introduced the new Flex-Lancing Guard designed for Banshee® tube cleaning nozzles.

The Banshee ProTex™ is a lightweight, durable splashguard designed to keep operators of hand-held flexible hoses safe from the potential hazards of using high pressure waterjets. The ProTex can be used with the entire range of Banshee rotary nozzles and the unique anti-withdrawal collet easily adjusts to fit many hose sizes. StoneAge offers an optional 3-ft. long tube for use as a stinger.



Banshee ProTex protects the hose sheath as well as the operator.

For more information, visit [www.stoneagetools.com](http://www.stoneagetools.com).



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# TECHJET Distributing Jet Edge Waterjet Pumps in Poland

Jet Edge, Inc. has announced that TECHJET is now distributing Jet Edge waterjet pumps in Poland.

Located in Malbork, TECHJET carries Jet Edge's full line of ultra-high pressure waterjet pumps for precision cutting, mobile cutting, and surface preparation, including 2,500 bar, 4,100 bar, and 6,200 bar models, electric and diesel, from 20-280hp. In addition to supplying Jet Edge pumps, TECHJET also offers precision waterjet cutting tables, waterjet parts, and service.

"We are excited to bring TECHJET on as our distributor for Poland,"



says Jet Edge President Jude Lague. "TECHJET shares our commitment

to customer satisfaction, innovation and continuous improvement. Their extensive knowledge of the waterjet cutting process is invaluable in helping customers select the right machine for their application."


TECHJET owner Adam Cegielski

noted that Jet Edge's innovative X-Stream pump technology coupled with TECHJET's economical motion systems will give cost-conscious customers a unique opportunity to access the productivity gains of 6,200 bar cutting within a budget they can afford.

"With JET EDGE's cutting edge 6,200 bar pumps and TECHJET's economical waterjet machines, our customers now have access to both the latest and most economical technology," he said. "It will be a veritable revolution in Poland."



For more information about TECHJET, visit [www.techjet.eu](http://www.techjet.eu), telephone: +48 55 273 52 78 , or email: [techjet@jetedge.com](mailto:techjet@jetedge.com). For more information about Jet Edge, visit [www.jetedge.com](http://www.jetedge.com), telephone: +1 763-497-8726, or email [sales@jetedge.com](mailto:sales@jetedge.com).

For more information about international distributorship opportunities with Jet Edge, contact Dave Anderson, international sales manager, by telephone: +1 763 497 8718 or email: [DaveA@jetedge.com](mailto:DaveA@jetedge.com).



## PEINEMANN

EQUIPMENT


**The Peinemann TLE has received a quality update**


The main changes come with an increase in power of 50% thanks to mounting the powerful air motors both on the top and lower part of the machine. The development of a new 'simple' and lightweight control panel makes it easy to operate the TLE. Added strength and durability is created by using new stainless steel side plates, using less wear parts and the use of more hard wearing materials.

The Peinemann TLE was already a popular choice for contractors world wide due to the 'simple' but effective design. We are confident that we created an even more durable and 'simple' tube cleaning machine suitable for the toughest of jobs.

For more information on our latest development please visit our website:  
[www.peinemannequipment.com](http://www.peinemannequipment.com) or contact us on +31-102955000.

**Peinemann Equipment iPhone App**





WJTA-IMCA Expo Booth #201

# WJTA-IMCA Welcomes New Members

## Corporate

### Plastic Tubing Industries of Texas, Inc.

*Marc Maroschak*  
*Christopher Petersen*  
*Pamela M. Sandoval*  
18121 Cochran Road  
Hempstead, TX 77445  
Phone: (706)465-2100  
Fax: (706)465-2109

### Midwest Mobile Waterjet, LLC

*Brian Gleeson*  
*Brian Daly*  
*Tom Luckemeyer*  
1038 Overlook Road  
Mendota Heights, MN  
55118-3653  
Phone: (651)755-7089  
Fax: (651)699-1761

### Wastequip Cusco

*Amy Wright*  
1901 Roxborough Road  
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## Individuals

### Ron Acee

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### Reto Balz

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### Sondra Hawkins

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### Robert Mahony

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Email: ohtaemin@kaist.ac.kr

## IMPORTANT NOTICE REGARDING SPAM

Email addresses and other member contact information published in the WJTA-IMCA Membership Directory are 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 Registration Form

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 Company \_\_\_\_\_ Title \_\_\_\_\_  
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 Information for name tag \_\_\_\_\_  
*Print name as you wish it to appear on your name tag*

### HOW TO REGISTER

- **Online** with a credit card at [www.wjta.org](http://www.wjta.org).
- **Telephone:** call (314)241-1445 with credit card information.
- **Fax:** fill out the registration form with credit card information and dial, (314)241-1449.
- **Mail:** fill out the registration form and mail with applicable payment to: WJTA-IMCA 2011 Conference and Expo, 906 Olive, Suite 1200, Saint Louis, MO 63101-1448.

**Payment Method:**  Enclosed is my check, payable to **WaterJet Technology Association** (U.S. DOLLARS ONLY).  
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By 9/6/11	After 9/6/11	By 9/6/11	After 9/6/11
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- OPTIONAL TRIP to NASA's Johnson Center, Sunday, Sept. 18** .....\$ 30 .....\$ 30.....\$ 30.....\$ 30..... = \$ \_\_\_\_\_
- Exhibit Hall/Live Demo Pass**  
Registration includes admittance to the exhibit hall, boot camp sessions, and live demonstrations on the day(s) that you are registered; and the Industry Appreciation Reception on Monday (9/19).
- Tuesday, September 20, and Wednesday, September 21 .....\$ 45 .....\$ 45.....\$ 45 .....\$ 45..... = \$ \_\_\_\_\_
- Tuesday, September 20 .....\$ 30 .....\$ 30.....\$ 30 .....\$ 30..... = \$ \_\_\_\_\_
- Wednesday, September 21 .....\$ 30 .....\$ 30.....\$ 30 .....\$ 30..... = \$ \_\_\_\_\_
- Full Conference** .....\$ 399 .....\$ 459.....\$ 459 .....\$ 519..... = \$ \_\_\_\_\_  
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- Combo** .....\$ 499 .....\$ 559.....\$ 559 .....\$ 619..... = \$ \_\_\_\_\_  
Registration includes all the activities in the Full Conference PLUS the Pre-Conference Seminar on Monday (9/19). You will also receive one copy of the Conference Proceedings on CD-ROM, one (1) lunch ticket, and two (2) lunch vouchers that can be used on Tuesday and Wednesday (one per day) at the lunch counter located in the WJTA-IMCA exhibit hall.
- Daily**  
Tuesday and Wednesday registrants will receive one (1) lunch voucher to be used that day at the lunch counter located in the WJTA-IMCA exhibit hall, and a "50% off" coupon to use toward the purchase of the 2011 Conference Proceedings on CD-ROM.
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### SPECIAL OFFER!

Cancellation Policy: Fees will be refunded in full for cancellations received at least four (4) weeks prior to the Conference. Cancellations received more than ten (10) days and less than four (4) weeks prior to the Conference will be subject to a \$50 charge. No refund will be made for cancellations received less than 10 days prior to the Conference. However, substitutions may be made at anytime. Refunds will not be processed until after the Conference.

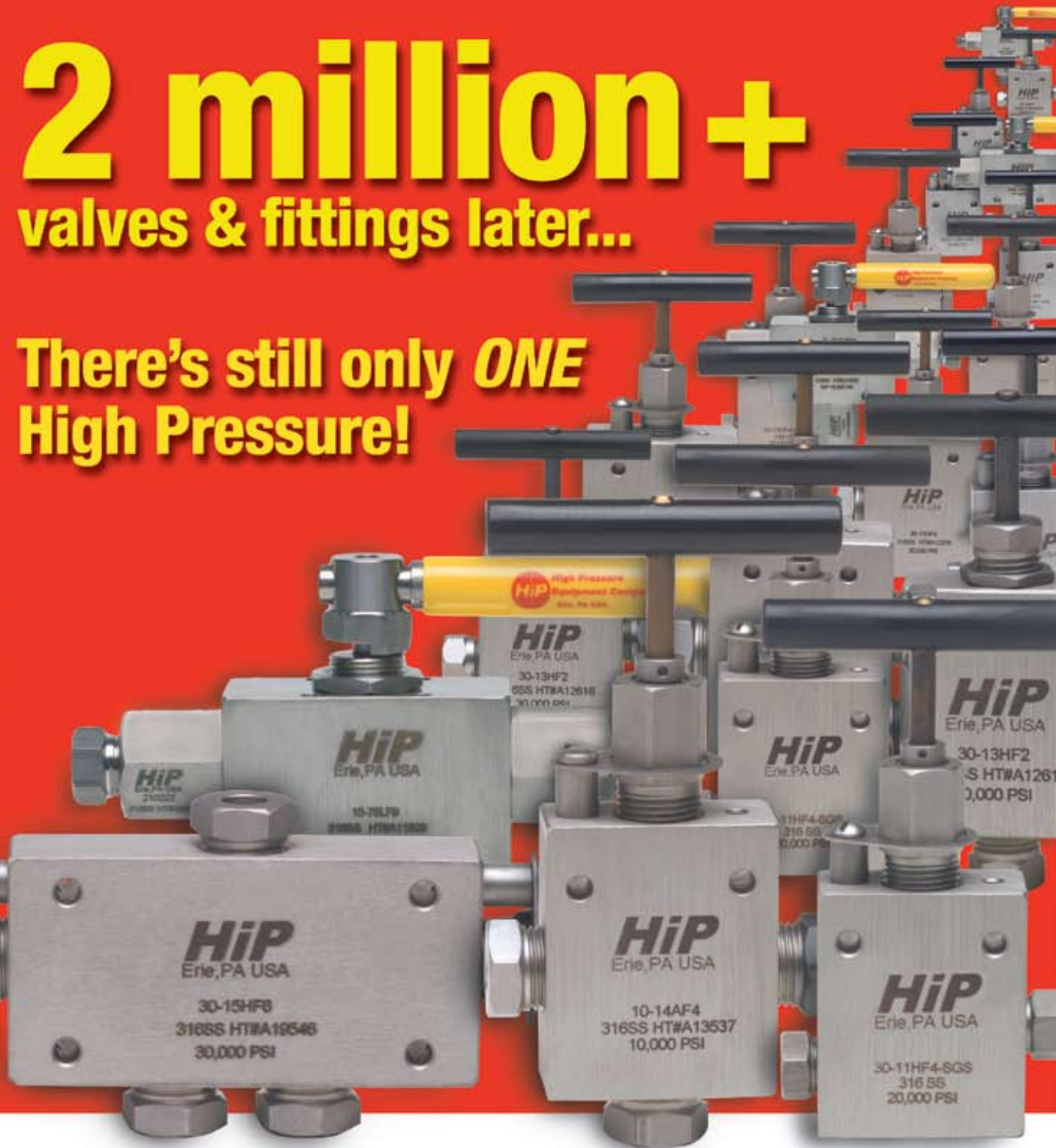
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