



## California Highway Department Uses Abrasive Jet Drill To Install Earthquake Protection On Bridges



This photo shows the abrasive jet drill on a pillar.



This photo shows four of the pillars in which slots were cut.

**A**merican Water Jetting of Richmond, California, recently used an abrasive jet drill to cut more than 1,000 slots (3-in. x 8-in. x 48-in.) in reinforced concrete highway pillars at the intersection of I-805 and I-8 in San Diego, California. This cutting was performed as part of the California Highway Department program to retrofit overpasses with earthquake protection.

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## Member News

### *Mark House and Doug Wright Join StoneAge Engineering Staff*

**M**ark House, a chemical engineer from Rice University in Houston, Texas has joined the StoneAge engineering staff as sales engineer. Mark has 26 years of experience in polymer resin manufacturing and processing. Douglas E. Wright is a mechanical engineer from the University of Missouri at Rolla where his Master's thesis was the development of water jet-assisted systems for hard rock excavation in a non-explosive environment.

## Demilitarization Of Munitions

**G**lobal Environmental Solutions (an Alliant Techsystems subsidiary) has been researching the environmentally safe demilitarization of munitions for over a decade and has spent the last five years perfecting the use of high-pressure abrasive water jets (AWJ) on high-explosive warheads. In Photo A, two AWJ heads operating at 45,000 psi are sectioning 25 mm high-explosive-incendiary (HEI) projectiles used by the main gun in the M3 Bradley Fighting Vehicle.

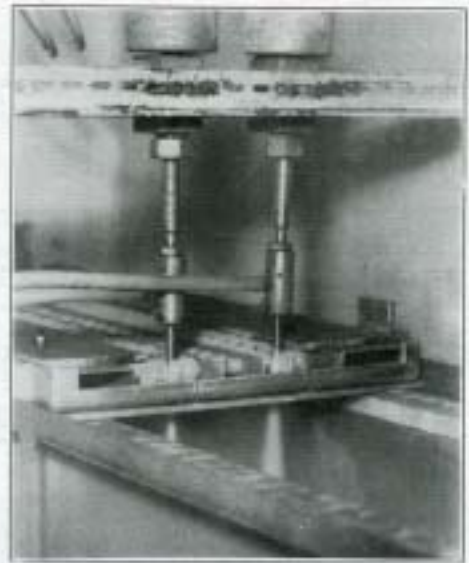


Photo A

As part of Global Environmental Solutions (GES) research program, over 200,000 high explosive projectiles were cut at pressures of 45,000 - 50,000 psi to establish the safe operating parameters. Additional high explosive targets were tested at pressures up to 147,000 psi (1 GPa) under controlled conditions to establish the effects of waterjet impact on explosives. The projectiles shown in Photo B are 30 mm GAU 8/A high-explosive-incendiary (HEI) anti-tank projectiles used effectively by the A-10 *Thunderbolt II* aircraft during Desert Storm to destroy Iraqi tanks.



Photo B

Global Environmental Solutions opened two high speed, multiple station, demilitarization lines last year in the former Soviet Union for the purpose of recovering the high-explosives used in the Soviet ammunition by means of high-pressure



Photo C

(continued on page 6)

## In Memoriam

### Josiah James Phillips

Josiah James Phillips of Federal Way, Washington, died at St. Frances Hospital on January 2, 1996. He was 66.

Mr. Phillips was born November 7, 1929, in Forth Worth, Texas.

He was self-employed in machine repair. Mr. Phillips was a longtime WJTA member and former board member. He was also a member of the National Rifle Association and enjoyed hunting and fishing.

He is survived by his wife, Doris Phillips of Federal Way; three sons, Mike Phillips of Renton, Clint Phillips of Puyallup, and Kevin Phillips of Kent; four sisters; his mother, Lucy Inez Phillips of SeaTac; and seven grandchildren.

Memorials can be made to the American Cancer Society.

## Prize Winners For Outstanding Papers At Eighth American Water Jet Conference

Larry Moers of MPW Industrial Services, Hebron, Ohio and Mohan Vijay, M.K. Lai and M. Jiang of the National Research Council of Canada, Ottawa, Canada will be honored as the authors of the most outstanding papers presented at the 8th American Water Jet Conference held in August, 1995 in Houston, Texas.

Mr. Moers paper, "High Pressure Water Blast Training: A Primer For Training Your Trainer," was selected as the best paper dealing with applications of water jets.

The paper written by Messrs. Vijay Lai and Jiang, "Computational Fluid Dynamic Analysis and Visualization Of High Frequency Pulsed Water Jets," was selected as the best research paper.

Each author will receive an award, in the form of a plaque, at a ceremony at the 9th American Water Jet Conference to be held August 23-26, 1997, in Dearborn, Michigan. The association congratulates these outstanding award winners.

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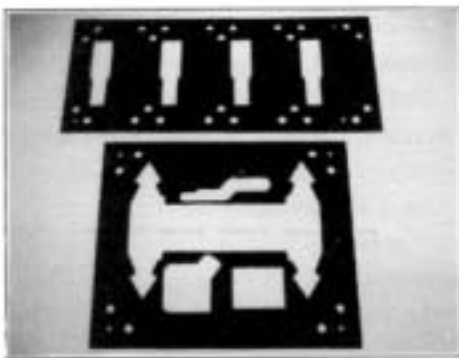


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# Vulcan Waterjet Shapes Up Savings

**V**ulcan Waterjet Cutting Services recently utilized its integrated capabilities to enhance quality and slash lead time for a major U.S. manufacturer of thermal blister packaging equipment.



Each heat sealing machine requires gaskets unique to the particular blister packed item it will fabricate. The gaskets are made of a silicone/fiberglass/silicone rubber composite cut to the specific profile needed. A single machine can handle up to 46 gaskets, or blister packs, at one time. During any given week, the company may produce up to 15 machines. Previous production of the composite gaskets included formation of a metal template on a CNC mill, and **hand** cutting each gasket from the template. The procedure was costly, labor intensive, and very time inefficient.

Vulcan Waterjet's alternative has not only reduced lead time dramatically, but has improved the accuracy of the gaskets, and allowed a valuable, experienced employee at the equipment plant to contribute to other areas of the operation. The gasket fabrication at Vulcan now begins on Thursday mornings, with the manufacturer logging on to Vulcan Waterjet's host computer system, and transmitting CAD drawings of the new week's parts requirements.

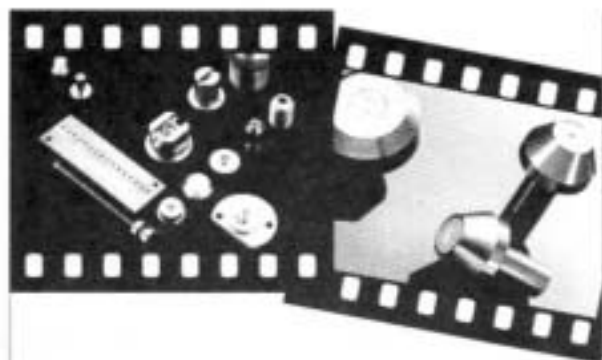
Machine code for the waterjet is developed from the transmitted drawings, and since there are no set up to tooling steps, the robotic water jet can begin cutting **within about 10 minutes!** Time savings multiply quickly. The electronic data exchange allows Vulcan Waterjet to quickly begin cutting parts never seen before. The 0.005" diameter jet (55,000 psi moving at over 2,000 feet per second) precisely cuts the 1/8" gasket composite material at a rate in excess of 100 inches per minute! In addition to maintaining the composite material inventory for the blister packaging equipment manufacturer, Vulcan Waterjet nesting software automatically nests the parts for maximum material yield. The total turnaround time for the above has been reduced to **just 2 days!**

## 1996 Calendar Of Events

**February 11-13:** Power Washers of North America's Fourth Annual Meeting and Exposition, Adams Mark Hotel, Charlotte, North Carolina. Call PWNA Headquarters toll-free at (800)393-7044.

**March 21-23:** International Liquid Waste Haulers Equipment & Trade Show, Opryland Hotel, Nashville, Tennessee, USA. Contact Cole Inc., P.O. Box 61, Three Lakes, WI 54562 or phone toll-free in the U.S. and Canada (800)257-7222; elsewhere (715)546-3346; fax (715)546-3786.

**March 25:** Lydia Frenzel Conference Series, S.O.S. — Salts On Surfaces, Nashville, Tennessee. Contact The Lydia Frenzel Conference Series, P.O. Box 850, Sutter Creek, California 95865, phone: (209)267-0992, fax: (209)267-0992.



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## An Aerospace Application: Cutting An Array Of Holes In Aluminum

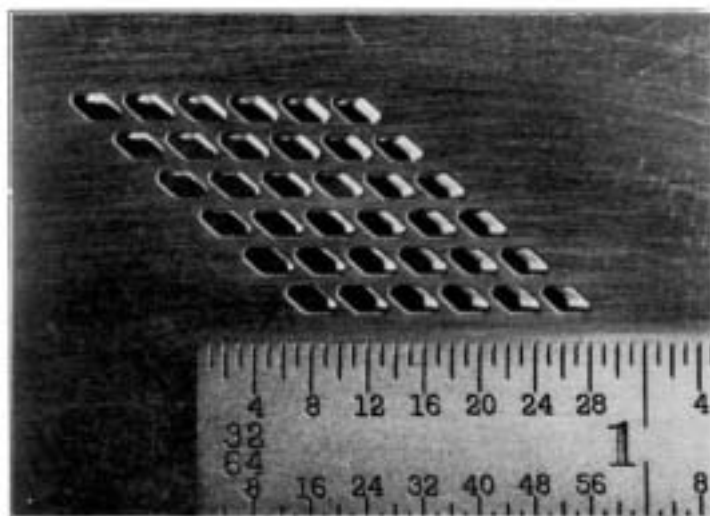
**A**erospace applications can provide the most demanding requirements for water jet cutting. A recent job performed at the Jet Edge R&D facilities is a good example. As part of the flight control system for an advanced jet fighter, our customer needed two parallelogram-shaped aluminum panels pierced with 9,280 holes per part arrayed in a matrix of 40 rows and 232 columns. Each hole was diamond-shaped with a side-to-side width of 0.060 in. (1.52 mm) and a corner radius of 0.015 in. (0.38 mm). The web thickness varied in both the horizontal and vertical with 0.025 in. (0.64 mm) in one direction and 0.018 in. (0.46 mm) in the other. In addition, the size of each hole was accurate within  $\pm 0.002$  in. (0.051 mm). The positional accuracy for all diamond shaped holes was  $\pm 0.004$  in. (0.10 mm). All in all a very demanding job and, of course, with most aerospace jobs — it was needed yesterday!

Based on a plate thickness of 0.19 in. (4.8 mm) and 2024 T4 aluminum, Jet Edge selected a 0.007 in. (0.18 mm) orifice and a 0.020 in. (0.51 mm) nozzle in combination with a 50,000 psi water pressure. For abrasive, we selected a 150 grit size Barton garnet and a feed rate of 0.27 lb./min. (0.12 kg/min.). With these parameters, the cycle time was 10.5 seconds/hole or more then 27 hours per part. Tool compensation was adjusted during the run to maintain hole accuracy.

The work was successful and the customer was pleased with the results. Once again, water jet technology was brought to bear on a critical problem and because of its inherent parameter flexibility, the part was processed successfully in a timely manner.



With the plate clamped onto the table, the last of the 9,290 holes are cut.



5x magnification showing a test hole pattern.

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# WJTA New Members

11/1/95 — PRESENT

## Corporate

### **BC Taechang Ind. Corp.**

*S.S. Kim, Director  
E.H. Park, Manager  
Pusan, Korea*

### **Idrojet S.a.s.**

*Antonio Di Grazia  
Fabio La Ferla  
Piano Tavola, Italy*

### **Idrodinamica Mediterranea S.a.s.**

*Renato Nunziante  
Manlio La Ferla  
Piano Tavola, Italy*

### **Shin Toyo Engineering Co. Ltd.**

*S. Yokoyama  
H. Tanaguchi  
Kobe, Japan*

### **Spir Star, Inc.**

*Tony Bessette  
Jake Vogler  
Houston, TX*

## Corporate Individual

### **Tom Chapman**

*RMF Industrial Services, Inc.  
Toledo, OH*

### **Marty Martin**

*RMF Industrial Services, Inc.  
Toledo, OH*

### **Robert Nielsen**

*Meylan Enterprises, Inc.  
Omaha, NE*

### **John Xu**

*Jet Edge, Inc.  
Minneapolis, MN*

## Individuals

### **Grigori Abramov**

*Borehole Mining Intl, Inc.  
Lakewood, CO*

### **Clifford Brudno**

*Clifford Brudno Co.  
Cleveland, OH*

### **Doug Chappell**

*Phillips Industrial Services Corp.  
Mt. Pleasant, SC*

### **Nilsson Gustav**

*Ganex AB  
Ronneby, Sweden*

### **Thomas P. Higgins**

*The Aulson Company, Inc.  
Middleton, MA*

### **Kenneth Jones**

*Enginetics  
Huber Heights, OH*

### **Greg Mitchell**

*MCS Pressure Washers Ltd.  
Langley, BC, Canada*

### **Kenneth J. Plunko**

*Elizabeth Carbide Components  
Latrobe, PA*

### **Charles Ritchie**

*Business Trend Analysts  
Commack, NY*

### **Sakanishi Shunichi**

*Sankit Co. Ltd.  
Kobe, Japan*

### **Chris Smith**

*SIS Industrial Service  
Mobile, AL*

### **Kristen E. Zaleski**

*Arthur D. Little  
Cambridge, MA*

## Demilitarization Of Munitions, from page 2

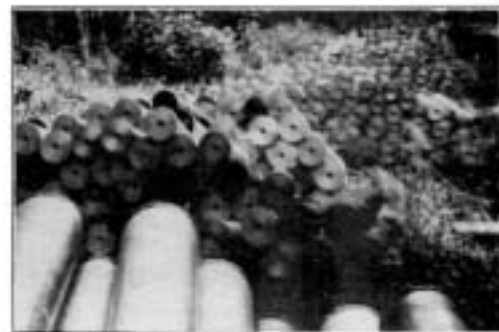
water jets. These lines are located in both Ukraine and Belarus with future lines currently being planned. Photo C is of two U.S. 105 mm artillery rounds being fed into the automatic feeders in the Minneapolis-based test facility prior to being shipped to Ukraine.

Global Environmental Solutions currently uses multiple banks of high-pressure water jets for the automated disassembly of surplus Soviet munitions. Photo D is of the water jet pump gallery built by GES in Ichnya, Ukraine. A similar operation is located in Dobrush, Belarus.



**Photo D**

Photo E, Russian 122 mm artillery shell casing stacked up in Ukraine as part of the high-speed waterjet demilitarization operation designed and developed by Global Environmental Solutions.



**Photo E**

Photographs courtesy of Alliant Techsystems Inc.

## New Developments, Products, Services

**C**RS Power Flow has introduced the new Vulcan Series 36,000 psi rotating high pressure water blasting gun. This gun features direct drive gearing which eliminates the messy chain or belt drive systems found on other guns. Composite motor vanes permit the gun to operate without lubrication when oil mist is undesirable. The gun also features a totally enclosed swivel housing and built in metering valve for speed control. A full range of 36,000 psi products are available to compliment the new rotary gun. For more information call toll free 1-800-580-FLOW or fax 1-713-939-1628.

**Chesapeake Specialty Products**, manufacturer of METgrain steel abrasive used in rotary wheel and air blast operations, has introduced JETgrain and JETgrit — two new abrasive products for the water jet industry. The two new abrasive products are engineered, high density iron oxide products developed through extensive testing and field trials for use in high pressure and ultra high pressure water jetting systems.

JETgrain is designed for use in cutting steel, concrete, etc. JETgrit is designed for use in water jet cleaning of steel surfaces and improves productivity in the removal of paint, rust and mill scale while imparting an anchor pattern that extends the life of the coating system.

For information about JETgrain and JETgrit, contact Chesapeake Specialty Products, Inc. at (410)388-5055.

**StoneAge Waterjet Engineering** has introduced a new self-rotating, 3-dimensional waterjet tool capable of complete spherical coverage inside a tank or process vessel, from one position. Self-rotating about two axes, the **Hurricane** produces jet paths in all directions, leaving no surface untouched by hard-hitting cleaning power. The design is unique in that rotation speed is adjustable, allowing a cleaning contractor to use one tool with pumps ranging from 50 to 500 HP, flows from 15 to 80 gpm. The **Hurricane** replaces solvent cleaning in many processes, thereby eliminating volatile organic emissions, personnel exposure, fire and spill hazards. In some cases, the tool replaces labor-intensive and often ineffective manual scraping methods. The jets produced by water pressure up to 10,000 psi are capable of cutting many polymers, elastomers, waxes, coke and other industrial deposits. With stainless steel construction and positive seals, the **Hurricane** is durable and dependable in any environment. For more information call StoneAge at (970)259-2869.



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# Letter To The Editor

Dear *Jet News*:

I read the contribution of Mr. Fulmer from Carolina Equipment as well as your response to the problem of a medical alert card for water blasters with great interest.

As you wrote, a standard medical alert card has not been produced which is specific to water jet blasting. This is not true for Europe, or at least for Switzerland. The Society of High Pressure Water Jet Contractors of Switzerland has produced a water proof medical card which needs to be carried by water jet operators. This card covers a very critical aspect of injuries due to water jets.

More information can be obtained from: Schweizer Fachverband für Hydrodynamik am Bau, PF 71, CH-5303 Würenlingen, Schweiz.

— Andreas W. Momber, WOMA Apparatebau GmbH, Duisberg, Germany

The following medical card has been translated from German to English, courtesy of Andreas Momber.

## Medical Direction

This person works with a high pressure water jet system. The maximum technical parameters of these jets are 3,740 bars, 3867 kg/m<sup>2</sup>, 914 m/s.

In case of an accident, these facts need to be absolutely considered. At low temperatures, uncommon microorganisms may appear. This could be gram-negative germs which can be found in sewage water. In case of medical treatment, bacteriological examination is recommended. Blood cultures may be helpful.

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# WJTA To Exhibit At Liquid Waste Haulers Show

The Water Jet Technology Association will join an expected 325 companies exhibiting at the International Liquid Waste Haulers Equipment & Trade Show, March 21-23, 1996, at the Opryland Hotel in Nashville, Tennessee. Thousands of professionals from around the world will attend the meeting, dubbed one of the world's largest annual conventions and trade shows for liquid waste management and sewer/drain cleaning professionals.

Sewer/drain cleaners and liquid waste management companies will discover a variety of products and services on display in the exhibit hall, including combination jetting/vacuum machines; wet/dry vacuum loaders; catch basin cleaners; video inspection equipment; pipeline rehabilitation equipment; high pressure water blasting equipment; cable and bucket machines; sewer jetters and rodding machines; septic and industrial vacuum trucks and tankers; vacuum/pressure pumps; hose and couplings; portable toilets, trailers, sinks, chemicals and service trucks; sludge application/injection equipment; sludge dewatering equipment; grease separation equipment; and safety equipment.

## Ryman Exhibit Hall Schedule

March 21, 1996 10 a.m.-5 p.m.

March 22, 1996 9 a.m.-5 p.m.

March 23 9 a.m.-5 p.m.

*Be sure to stop by and visit  
WJTA representatives in booth #294!*

A variety of educational seminars, demonstrations and workshops will also be featured at the meeting.

In a special seminar sponsored by the Water Jet Technology Association on Thursday, March 21, participants will have an opportunity to learn how to move up from pressure cleaning to 10,000 psi water jetting. WJTA board member **Bruce Wood**, director of engineering and technology for MPW Industrial Services, Hebron, Ohio, will present *Stepping Up From A Pressure Cleaner* beginning at 3:00 p.m. on March 21. Bruce will discuss from a contractor's point of view what water jetting is all about, what jobs can be done, equipment requirements, water blast guns versus lances, training, safety and other facets of water jetting. This seminar will show pressure cleaners how to branch out into water blasting and capitalize on equipment that is available to make tough jobs easy.

To receive an information brochure and registration information, contact: Cole Inc., P.O. Box 61, Three Lakes, WI 54562 or phone toll-free in the U.S. and Canada 800-257-7222; elsewhere 715-546-3346; fax 715-546-3786.



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