WJTA Water Jet Technology Association

Jet News

JUNE/JULY 1996

Published by the Water Jet Technology Association for the benefit of its members

818 Olive Street, Suite 918 • St. Louis, MO 63101-1598, USA • Telephone: (314)241-1445, Fax: (314)241-1449

Old Faithful Water Jet

By Paul Rozycki

Old Faithful. Photograph courtesy of the National Park Service

Some of the best known and spectacular exhibits of Mother Nature's water jetting prowess are the geysers of Yellowstone National Park in Wyoming. The biggest tourist attraction in Yellowstone is the Old Faithful geyser. This geyser has regularly jetted steam and water 150 to 200 feet above ground level. Giant Geyser, a less regular but higher pressure eruptor, will sometimes jet as high as 300 feet.

Eruptions from Old Faithful normally last from one to five minutes. Typical eruptions by Old Faithful hurl 10,000 gallons of water into the air with major outbursts of 12,000 gallons. The flow rate during Old Faithful's eruption is about 2,000 gallons per minute.

(continued on page 2)

On The Inside

Serv-Tech And HydroChem To Merge

Serv-Tech, Inc. recently announced the signing of a letter of intent to merge with HydroChem Industrial Services, Inc. of Houston. The letter of intent calls for both parties to negotiate and finalize a definitive merger agreement by July 1, 1996. Consummation of the merger will be subject to approval by the board of directors and shareholders of each company, and upon usual and customary conditions, including necessary regulatory approvals.

HydroChem provides hydro blasting, chemical cleaning, vacuum and other specialty industrial cleaning services to various industrial markets. Serv-Tech provides speciality maintenance, engineering, construction and environmental services and products to various industrial markets worldwide.

WJTA Administration

Chairman of the Board
Thomas J. Labus
(414)275-5572

President/Newsletter Editor
Dr. George Savanick
(612)432-7594

Vice-President
John Wolgamott
(970)259-2869

Secretary
Dr. Andrew F. Conn
(410)484-3628

Treasurer
Bruce Wood
(614)927-8790

1995-1997 Directors

Paul T. Bowser
(814)833-9000

Pat DeBusk
(713)499-8611

Lydia M. Frenzel, Ph.D.
(209)267-0992

Dr. Mohamed Hashish
(206)872-8500

Dr. Thomas J. Kim
(401)792-2186

Forrest Shook
(810)624-5555

Dr. David Summers
(314)341-4311

Honorary Members

Mohan Vijay, Ph.D.
(613)993-2731

Fun-Den Wang, Ph.D.
(303)273-3653

Association Managers

Mark S. Birenbaum, Ph.D.
Kenneth C. Carroll
(314)241-1445

Old Faithful Water Jet, from page 1

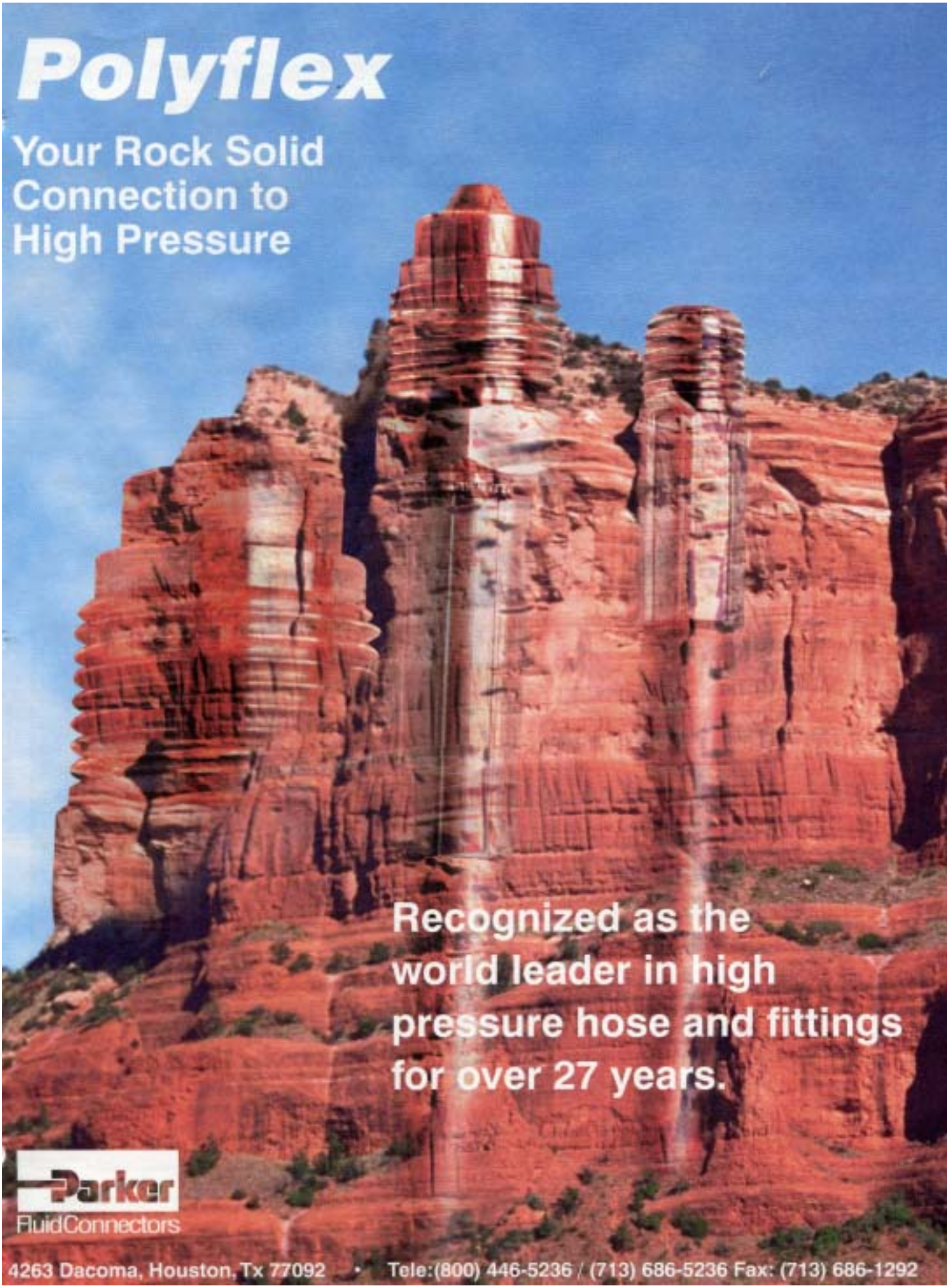
Geysers draw their jetting power from heat energy within the earth. Hundreds of meters below the surface water takes on heat from hot rocks. Because of the pressure at these depths, the water does not boil at 212° F but is superheated — estimates are as high as 450° F.

A geyser is formed when water flows through permeable rock to a silicate rock lined "plumbing system" that leads to the surface and is both watertight and pressurized. An eruption occurs when the temperature of the water becomes so hot that it is able to create enough pressure to overcome the weight of the column of water in the root of the geyser and the weight of the air above it. When the rising water bursts through an opening at the surface the confining pressure drops and the water boils. Then the water jets out in an awesome, dazzling display that has attracted tourists from all around the world.

Old Faithful. Photograph courtesy of the National Park Service

Yellowstone/Peaco. Photograph courtesy of the National Park Service

Recently stories have circulated that Old Faithful has slowed down and become less "faithful." In October 1993 an earthquake hit Yellowstone. Following this, several of Yellowstone's geysers stopped erupting while others awakened after long periods of dormancy. Then Old Faithful began experiencing fewer short intervals between eruptions, which made it seem to some that the geyser was slowing down and getting less predictable. Yet Old Faithful's intervals have always been and are still directly related to the duration of its eruptions. One can still correlate the duration of its eruptions to the interval separating its subsequent outburst to within plus or minus ten minutes. Old Faithful is still predictable and "faithful."


Polyflex
Your Rock Solid Connection to High Pressure
Recognized as the world leader in high pressure hose and fittings for over 27 years.
Parker
FluidConnectors
4263 Dacoma, Houston, Tx 77092 • Tele:(800) 446-5236 / (713) 686-5236 Fax: (713) 686-1292

Water Jets Erase Gang's Signs

By Paul Rozycki

Water jet technology is now a significant weapon in the effort to fight the number one problem in America — crime. The city of Alton, Illinois is using a 4,000 psi, 14 horse power hydro-sand blasting device to erase gang graffiti. This device is manufactured by Hydro-Sander of Columbia, South Carolina. It uses a model T9261 General Pump driven by a Kohler engine.

According to Don Huber, Alton township's supervisor, with the help of the sand blaster's prompt removal of graffiti the township is able to send the message to gangs, "We won't put up with your mess." Major David Hayes of the police department adds that this combats the image that nobody cares; shows that gangs are not in charge and rewards the residents, who have a watch and report system. The water jet sand blaster also works hand-in-hand with a city ordinance that requires a quick response to any graffiti. Alton requires private property owners to remove graffiti within 15 days. Failure to do so results in walk-on rights established for the police and township officials, where the job is then billed to the owner. Public officials promptly blast off graffiti on public property if on a brick wall. (Wood walls are quickly painted over.)

Huber bought the $5,000 water jet sand blaster. As of now, he's very satisfied with his investment. The unit is mobile and adaptable to fire hydrants. At the moment he is building a trailer with a water tank and generator to increase his mobility and speedy response.

A quick and effective response to graffiti is especially effective and highlights the value of the water jet sand blaster. It takes only an hour and a half to two hours to spray clean a wall 150 feet long. Hayes cites one wall, a highly graffitied and visible one, where a removal was initiated. Three days later, more graffiti occurred and was promptly removed. Another three days, and more was promptly removed. Then a week, a quick removal, and the wall stayed clean for a whole year before another attempt — as usual, under the cover of night — to graffiti the wall was made. This too was swiftly removed, and now it's been two years since anyone painted graffiti on the wall.

Graffiti messages, unreadable to most audiences, are often written in the gang's secret script. Before removal, graffiti is first photographed by police for analysis. At times, with the help of a book police use to decipher the writings, gang war activity has even been detected before violence could occur.

The purpose of graffiti removal is much more than to convince gangs to use other communicative devices. Much of graffiti writing is a sort of territory marking, according to Major David Hayes, Alton's second-in-command in the police department. Hayes agrees that graffiti writing, one gang often spraying over another gang's, is exactly like the marking activity of dogs. "Half of what they are doing is 'dissing' the other gang," says Huber. "That other half is territory marking."

9th American Water Jet Conference

August 23-26, 1997 • Hyatt Regency Dearborn • Dearborn, MI • USA

First Announcement And Call For Papers

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

The **9th American Water Jet Conference** will focus, from a practical and scientific viewpoint, on the most up-to-date industry advances in water jetting equipment, techniques, and applications. Some of the areas to be addressed include but are not limited to:

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

Commercial and academic authors are encouraged to submit titles and abstracts for consideration. To submit an abstract(s), please complete the Abstract Submission Form on the back of this sheet, attach a copy of your abstract(s), and forward to the attention of the Conference Coordinator at the Water Jet Technology Association. **The deadline date for submission of abstracts is November 1, 1996.**

An Abstract Review Committee consisting of six referees, chosen from the Organizing Committee and the International Advisors, will review the abstracts. Authors will be advised by February 3, 1997, regarding the decision of the Abstract Review Committee.

The 9th American Water Jet Conference is organized by the **Water Jet Technology Association** and is endorsed by the **International Society of Water Jet Technology**. The Water Jet Technology Association looks forward to providing this forum and to your involvement and participation.

Water Jet Technology Association, 818 Olive, Suite 918, St. Louis, MO 63101-1598, telephone: (314)241-1445, fax: (314)241-1449, E-mail: wjta@aol.com

WJTA
Water Jet Technology Association

9th American Water Jet Conference
August 23*-26, 1997
Hyatt Regency - Dearborn, Michigan

Abstract Submission Form

For each paper to be submitted for consideration, please complete this form, **attach a copy of the abstract**, and mail to WJTA by November 1, 1996. Authors will be advised by February 3, 1997, regarding the decision of the Abstract Review Committee.

Paper Information

Paper Title .....
Authors .....

Contact Person

Name .....
Position/Title .....
Company .....
Street Address .....
City, Province ..... State .....
Country ..... Zip/Postal Code .....
Business Telephone ..... FAX .....

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

Type of Study
- ☐ Modeling (theoretical)
- ☐ Experimental study
- ☐ Hardware development
- ☐ Contractor case study
- ☐ Manufacturing case study
- ☐ Software development
- ☐ Economic analysis
- ☐ Legal
- ☐ Other _____

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

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

Jets
- ☐ Waterjet
- ☐ Abrasive-waterjet
- ☐ Abrasive suspension jet (Diajet)
- ☐ Pulsed
- ☐ Cavitation
- ☐ Polymer Jets
- ☐ Other _____

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

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

Mail completed form and abstract, **NO LATER THAN NOVEMBER 1, 1996**, to: **Conference Coordinator, 9th American Water Jet Conference, Water Jet Technology Association, 818 Olive Street - Suite 918, St. Louis, MO 63101-1598, USA, (314) 241-1445; FAX: (314) 241-1449**

* August 23 is reserved for a waterjet "Short Course" and Conference Reception.

WJTA New Members

Individuals

Kari Anderson
Western Garnet International
Coeur d'Alene, ID

Rusty Blevins
U.S. Pipeline Service, Inc.
Safety Harbor, FL

Michael V. Curcio
Pen Argyl, PA

Robert Dean Jr.
Synergy Research Corporation
Hannover, NH

Ken Flatt Jr.
KR Industrial Services Of Alabama
Decatur, AL

Mike Harless
HydroChem Industrial Service
Reno, OH

Perwez Kalim
Wilkes University
Wilkes-Barre, PA

Tim Lawson
Advanced Cutting Systems, Inc.
Ft. Wayne, IN

Guy Lever
Cavi-Tech, Inc.
Kennesaw, GA

John Naughter Jr.
The Kenwood Company
Maplewood, MN

Ronald M. Radomski
Cutting Techniques, Inc.
E. Rutherford, NJ

Friedrich Rehkopf
Egnating, Germany

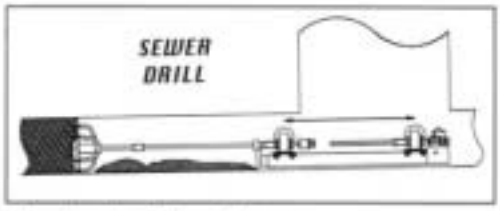
Jeff Schwoebel
Resource Enterprises, Inc.
Salt Lake City, UT

Robert Swidberg
Water Blasting, Inc.
Brookfield, WI

Baltimore Airport Flooding Averted

New concourse construction at the BWI terminal last fall caused a problem that challenged StoneAge engineers Doug Wright and Jerry Zink. The 18-inch-diameter sewer draining the terminal roof was plugged with high strength concrete used for foundation pilings. Since replacing the sewer would have interrupted airplane traffic on the taxiways, water jet excavation made a lot of sense. Two water blast pumps supplied 40 gpm at 15,000 psi to custom StoneAge equipment that was lowered 12 feet down a manhole into the sewer.

November rains were a problem, requiring numerous interruptions to vacuum water out of the sewer. Even so, the air-rotated nozzles cut through the 16-foot plug in about 20 hours of operation, demonstrating the durability of the **SG** swivel and new box-rail system. So bring on the rain and snow, BWI is finally ready for winter weather!



Artwork courtesy of StoneAge, Inc.

David Summers Named Director Of Rock Mechanics And Explosives Research Center At UMR

Dr. David A. Summers, Curators' Professor of Mining Engineering at the University of Missouri-Rolla and director of UMR's Waterjet Laboratory, has been named director of UMR's Rock Mechanics and Explosives Research Center, effective July 1.

Dr. Hamish D. Miller, UMR professor of mining engineering, who has served as director of the center since 1992, has chosen to leave the university and move to Canada with his family. Miller has a permanent residence in that country.

"We had applications from a number of qualified people and we interviewed several of them from the list of applicants, each of whom had impressive backgrounds," says Dr. Lee W. Saperstein, dean of UMR's School of Mines and Metallurgy. "The search process reminded us that we have an extremely capable person, with an international reputation for research, right here in Dr. Summers."

Summers has been a member of UMR's faculty since 1968. He received a first-class bachelor of science degree in mining engineering and a Ph.D. from the University of Leeds in England.

Waterjet Systems, Inc. Honors Jet Edge

In recognition of quality products and services throughout 1995, Waterjet Systems, Inc., a subsidiary of Pratt & Whitney, recently recognized water jet specialist Jet Edge as its Supplier of The Year.

Jet Edge provides the intensifier pumps needed to power 19 Waterjet Systems, Inc. installations currently in the field. Located in Huntsville, Alabama, Waterjet Systems, Inc. designs systems used in the stripping of coatings and paint from jet engine parts. Included in the list of Waterjet Systems, Inc. clients are such airline giants as Northwest, Delta, United and Japan Airlines.

Milwaukee's Vulcan Waterjet Cutting Services Displays Artistry At Olympic Ceremonies

Vulcan Waterjet Cutting Services recently announced that the company has completed cutting several sets of "100" numerals and the five interlocking rings for the centennial Olympic logo. These elements are part of four traveling state cauldrons used in "passing the torch" ceremonies from Los Angeles to Atlanta.

Traveling Olympic cauldron displaying centennial logo manufactured by Vulcan Waterjet Cutting Services, Milwaukee.

Each cauldron displays three centennial Olympic logos that are not only decorative, but are the freestanding supports for the actual flame holder. The cauldrons are 40-inches in diameter across the base, and stand 5-feet tall. In the process of accompanying the Olympic flame across the United States, one cauldron will be installed on a river boat stage while another travels with a truck stage, and yet another is secured to a sailboat.

Vulcan Waterjet was chosen by the cauldron manufacturer, Wave Air Corporation of Atlanta, to cut the intricate designs from 1/2-inch thick brass plate. Because scheduling was tight, there was no time for sample cuts, test pieces, or transportation of materials between Atlanta and Milwaukee. Wave Air transmitted designs by fax, Vulcan Waterjet procured all materials, set up machine cutting code, cut the requisite parts and returned them to Wave Air all in the space of only five working days! Brass parts were then hand worked and pressed into the final curved shape necessary for the cauldron tops. Because the water jet cuts cleanly and without any heat affected zones to change the hardness of the material, there was no delay in moving the cut parts on to the polishing and plating shops for the final touches.

"The net result of Vulcan Waterjet's quick turnaround," stated Wave Air Corporation engineer, James Hogan, "was that one cauldron was available early enough for the stage truck crew to finish their construction with an actual cauldron in place. The remaining cauldrons were completed in time to be lit by the Olympic flame when it arrived in Los Angeles."

Vulcan Waterjet has also cut a similar set of Olympic logos for the cauldron that rides on the special 60-foot long, 80-ton railcar manufactured by Northern Railcar of Milwaukee. The special edition car is part of the unique train that carries the Olympic flame over long stretches of its journey.

(continued on page 8)

Aqua-Dyne, Inc. Becomes Charter Sponsor Of Advisory Council

George Rankin, president of Houston-based Aqua-Dyne, has announced his firm's financial commitment and support of the newly formed Advisory Council.

According to Dr. Lydia M. Frenzel, Executive director of the Advisory Council, the new group is a non-profit, privately funded organization that provides a forum for dialogue and dissemination of accurate information pertaining to the economic effects of technology development throughout the world. As part of its mission the Advisory Council will serve as an industry advocate and information clearinghouse of the water jetting industry.

Aqua-Dyne is one of the first water jet related companies to pledge support to the Advisory Council. "There are many misunderstandings, misconceptions, and confusion regarding the role an application of water jet technology and its functionality in surface cleaning, preparation and coating removal. The Advisory Council will help provide leaders in many different industries with a clearer understanding of both the usefulness and limitations of high pressure water and water jetting. The Advisory Council will also be actively coordinating the exchange of non-proprietary information within the water jetting community," reports Mr. Rankin.

The Advisory Council can be contacted at: Box 850, Sutter Creek, CA 95685, voice/fax: (209)267-0992, council@ifbbs.com.

New Nozzle

For special purposes in the automotive industry, Comadur SA Division Thun developed a nozzle with a sloping exit for the water jet. A patent for this industrial-first is applied for. The nozzle can be provided with exit-angles between > 0° and 90° and the common hole diameters of ordinary water jet cutting nozzles.

For the above mentioned application, the highest level in precision was achieved by the engineers of Comadur SA. The material to be cut was a sandwich-construction with approximately 2 mm fiber strengthened plastic, 15 mm foam material and a plastic foil. When changing the nozzle, the orientation of the water jet will vary +/-2° at most. The maximum diameter of nozzle body is 10 mm, the cutting velocity is 2 m/min by a working pressure of maximum 4,000 bar.

Mounted sloping jet cutting nozzle.

The slim body of the nozzle makes cutting in the depth of a part possible.

News From Jet Edge

Logo Cut With Water Jets

Water jets are used to cut through steel, concrete, rubber, carpet, and even food. The technology for this unique cutting tool has been around for nearly twenty years, yet the number of applications for this product still remain endless. As more companies make the switch to this "cutting-edge" technology, the company that provides it has also decided to jump on the bandwagon and put it to work for themselves.

Minneapolis-based Jet Edge recently took the idea of liquid blades to new heights in using the tool to cut their own corporate logo into company brochures. By forcing water through a nozzle the diameter of a human hair at speeds in excess of Mach 2.5, Jet Edge was able to harness a technology powerful enough to cut through cement, in order to create a cutting tool so precise, it cut cleanly and accurately through paper.

Cut with a Jet Edge pump on a XY cutting table, Jet Edge cutting systems handled up to 24 pages at a time without damaging or wetting the paper. Powered by a Jet Edge intensifier pump capable of adjustable output pressures of up to 55,000 psi, the Jet Edge system used only three glasses of water per minute to complete the project.

"One of the biggest obstacles we've faced by water jet cutting in the past was simply public unawareness, but as more people discover water jet technology, we see no limit to its number of potential applications," says Jet Edge General Manager, Jim Shunk. "I don't care if you're cutting fruitcakes or ping-pong balls, if you need it cut, water jet can more than likely do it for you.

To obtain a Jet Edge brochure, call 1-800-JET-EDGE.

News From NLB

Flexible Water Blaster Cleans Heat Exchanger Tubes Quickly

NLB ATL-35000

NLB Corporation's Model ATL-3500 tube lancer is a flexible, semi-automated water blasting system that cleans tubes in heat exchangers as long as 60 feet. Using water pressure of up to 15,000 psi, the ALT-3500 removes built-up oils, catalyst, and minerals at lance speeds of from one to four feet per second.

The compact, portable tube lancer is very easy to use. The operator simply holds the lance gun against the heat exchanger tube sheet and actuates the triggers. He then moves the lance from tube to tube. There is no need for the operator to touch the flexible lance, which delivers the high-pressure water. The lance can be adjusted to automatically stop moving when the nozzle passes the tube sheet at the far end.

The NLB Model ATL-3500 is pneumatically-driven, so no electricity is required. It is designed for horizontal or vertical cleaning, and a typical tube can be completely cleaned in 30 seconds with water pressure of 10,000 psi. The unit has a built-in shut-down mechanism to dump pressure and stop the flex lance's movement if the gun pulls away from the tube sheet.

Track Crawler Automates Abrasive Water Jet Cutting

A new abrasive water jet cutting track crawler from NLB Corporation lets users cut steel plate — such as that used in refinery tanks — in straight or curved patterns. Model 36K-ATS-1 guides an NLB abrasive cutting nozzle, which focuses ultra-high pressure water (36,000 psi, or 2,484 bar) to cut in the desired pattern. The system cuts flat surfaces, either vertical or horizontal.

Track sections are flexible, so can be easily bent to produce curved cuts. The curve radius ranges from four inches to four feet (10 cm to 122 cm). Sections are mounted to the steel plate with pneumatic suction cups.

The NLB 36K-ATS-1 includes an electric-powered hydraulic power pack to drive the crawler and a control station. It is designed for use with NLB's ULTRA-CLEAN 36® ultra-high pressure water jet systems.

For more information, contact NLB Corporation at (810)624-5555.

Vulcan Displays Artistry, from page 6

Vulcan Waterjet Cutting Services provides customers with the advanced technology of high-speed, abrasive cutting on virtually any material up to 5-inches thick. The Vulcan water jet is ideal for cutting industrial parts with intricate patterns, creating signage, flooring, sculpture and unique custom designs. Advantages of the Vulcan waterjet include prototype to production with no tooling, full CNC capability, single pass cutting, no thermal deformation, multidirection cutting, environmentally sound kerf and water recovery and reduce dust emission. Vulcan Waterjet provides FREE sample cuts upon request. For more information about Vulcan Waterjet Cutting Services, contact Kelly Halverson, Division Manager, at (414)645-2040 or 800-932-5323.

News From Flow International

$3.5 Million Contract From Northrop Grumman

Flow International Corporation (NASDAQ:FLOW) announced the sale of a multi-process machine tool valued at $3.5 million to Northrop Grumman Corporation (NYSE:NOC).

Northrop Grumman will use the complex 8-foot by 46-foot system for precision machining of three-dimensional composit parts for the F/A-18 jet fighter. FLOW's robotics division, ASI Robotics in Jeffersonville, IN, will manufacture the multi-axis gantry robot and automatic tool changer that controls the multi-process equipment.

New Abrasive Jet Machining Center

Flow International Corporation (FLOW) introduced the *BENGAL*, an abrasive jet machining center priced in the low $80,000 range. Application for the *BENGAL* include machining prototypes and short run jobs involving virtually any material.

The *BENGAL* features FlowMaster™, FLOW's new, PC-based control system, the *PASER® 3* abrasive water jet, an X-Y motion system and a 39.3 inch by 19.6 inch work table. Linear accuracy of +/-.006 and repeatability of +/-.004 is attained. All components are integral and the *BENGAL's* compact footprint allows it to fit easily in small shop areas.

FlowMaster software is an easy to use, Windows compatible package that simplifies abrasive water jet machining. *FlowMaster* comes pre-programmed with cutting parameters for a wide variety of materials. To produce parts from a DXF or CAD file, users select material type and thickness and click on icons to execute water jet commands. The software determines optimum cutting parameters for the application. No special knowledge of abrasive jet machining is necessary.

The *PASER 3* abrasive water jet system further simplifies *BENGAL* operation and achieves "peak performance" — machining at the fastest speed and lowest cost. A monitor analyzes cutting conditions and signals any deviation from peak performance. Operators track conditions via an easy-to-read display. The monitor also measures tool wear and signals when tooling replacement is necessary.

For more information, contact FLOW International Corporation, 23500 64th Avenue South, Kent Washington 98032, telephone: (206)850-3500, fax: (206)813-3311.

ASME Code Stamped Vessels Highlighted In New Product Sheet

High Pressure Equipment Company has published a new four color product sheet detailing their line of reactors and pressure vessels that meet or exceed the requirements of ASME pressure vessel code. HiP has over 250 standard reactor designs which address varied size, material, pressure and temperature requirements. In addition, HiP will customize your reactor to incorporate appropriate approvals (including ASME), specific options, exotic materials, unusual sizes and connections.

The new product sheet also provides a reactor selection guide which describes HiP's complete line of reactors. Among the reactor designs covered are O-ring seal, confined gasket closure, bolted closure, clover leaf, O-ring closure, micro reactors, tubular reactors and custom reactors. The selection guide provides a description of each reactor series, standard materials of construction, maximum operating temperature, maximum working pressure and standard capacities.

High Pressure Equipment Company designs, manufactures and markets products used in the chemical, petrochemical, oil and gas, water jet cutting and blasting, industrial research and development, general industrial, university and pharmaceutical industries. These products include valves, fittings and tubing, reactors, intensifiers, gauges, pumping systems, pressure vessels, gas booster systems and pressure generators.

For more information, contact High Pressure Equipment Company, 1222 Linden Avenue, Erie, PA 16505, telephone: (814)838-2028, fax: (814)838-6075.

Water Jet Coating Removal System Brochure

TAFA Incorporated, a supplier of thermal spray equipment and materials, also designs and manufactures Waterjet Coating Removal systems for eliminating various alloy, carbide, ceramic or rubber coatings from parts. Traditional techniques, such as machining, grinding, grit blasting or chemical baths are time-consuming, expensive, and often present environmental problems.

Environmentally conscientious companies searching for alternatives to hazardous and costly methods of coating removal will appreciate the informative, full-color ***WaterJet Coating Removal System*** brochure from TAFA. The power, performance and precision of the automated Ultra High Pressure (UHP) WaterJet System are illustrated with full color photographs, diagrams and explanatory text in an easy-to-read format.

TAFA also provides a computer demonstration disk for customizing nozzle design to meet exacting specification for any coating and substrate combination. To request a free brochure or other information contact: Joan Rich, TAFA Incorporated, 146 Pembroke Road, Concord, NH 03301, telephone: (603)224-9585, fax: (603)225-4342, internet address: HTTP://WWW.TAFA.COM

BARTON

GARNET ABRASIVES

THE INDUSTRY STANDARD
FOR ALL WATERJET CUTTING

- PERFORMANCE
- QUALITY
- CONSISTENCY
- SERVICE
- AVAILABILITY
- COST EFFECTIVE

Barton Mines Corp., Lake George, NY
(518)798-5462 Fax: (518)798-5728