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Waterjet Technology
Association



Jet News

AUGUST 1998

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for the benefit of its
members*

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Airborne Waterjets



Photograph courtesy of Erickson Air Crane Company, Central Point, Oregon.

Erickson Air Crane Company of Central Point, Oregon manufactures the S-64F "Helitanker," a helicopter with a 2,500 gallon water tank. The "Helitanker," designed to fight fires, combines the capacity of a fixed wing airplane tanker with the return time and accuracy of a helicopter.

An optional "water cannon" nozzle attachment uses the hydraulic power of the helicopter to propel a 140 psi stream of water up to 160 feet at a rate of 350 gallons per minute. The cannon's water supply is a tank attached to the helicopter. This arrangement allows for sustained jetting flow of up to eight minutes.

The "water cannon" was created to fight high rise structure fires in congested inner city areas too high for the effective use of ground-based fire fighting systems. With the "water cannon" the helicopter can hover outside a burning structure

(continued on page 2)

SPIR STAR Develops New Type 3/4 Flex Lance

SPIR STAR, Inc., manufacturer of high pressure thermoplastic hose has announced the addition of **Type 3/4** the smallest ultra high pressure flex lance available for the waterjet industry. With an operating pressure range from **20,000 to 30,000 psi** and a **MAX OD of .42** even the smallest exchanger and the tightest bends will be within reach of today's higher working pressures. It is available with 1/4-28 short nozzle nipple and Type M end fittings.

For additional information, contact SPIR STAR, Inc. 11983 FM 529, Houston, TX 77041, telephone: (800) 890-7827.

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Airborne Waterjets, from page 1

and direct a stream of water into the building which can either fight the fire directly or break windows to facilitate evacuation.

To date the cannon has not been used on a high rise fire, but several agencies in Japan, Australia, and California are very interested in using it after seeing many effective demonstrations.

Erickson Air Crane can be contacted at 3100 Willow Springs



In 1993 Erickson Air Crane removed Thomas Crawford's bronze "Statue of Freedom" from the dome of the U.S. Capitol and replaced the statue after it was cleaned. The cleaning was accomplished by Linda Merk-Gould of Fine Objects Conservation, Inc. using waterjets. A description of the use of waterjets to clean this statue is contained in the article entitled, "Waterjets Clean Statue Atop the U.S. Capitol," on page 3. Photograph courtesy of Erickson Air Crane Company, Central Point, Oregon.

Road, P.O. Box 3247, Central Point, OR 97502, telephone (541)664-7615, (800)424-2413, fax: (541)664-7613.



The components of the Erickson S-64F Helitanker are identified on the photograph above. Note that the water tank can be refilled in 45 seconds while hovering over the water. Photograph courtesy of Erickson Air Crane Company, Central Point, Oregon.

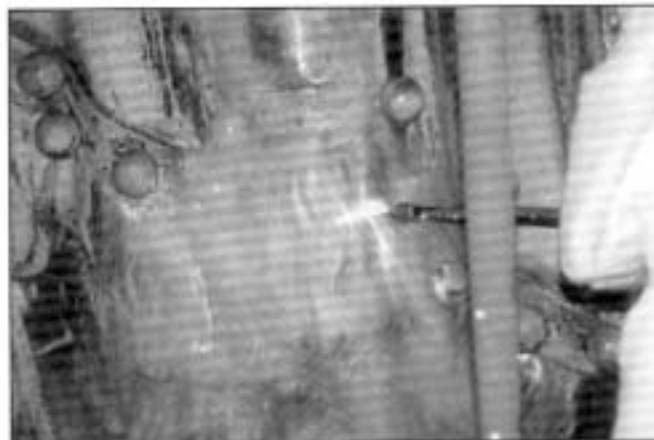
Waterjets Clean Statue Atop The US Capitol

The photograph on page 2 shows the **Statue of Freedom** being helicoptered to the ground in 1993 for its first systematic cleaning since it was placed on the U.S. Capitol in 1863. The 15,000 pound (6800 Kg) bronze statue had become disfigured by uneven areas of green corrosion and black pollution.

Linda Merk-Gould of Fine Objects Conservation, Inc. of Westport, Connecticut has coauthored a report with David Summers, Robert Fossey, and Jim Blaine of the University of Missouri-Rolla on the use of waterjets to clean this statue. The report is entitled: "Thomas Crawford's **Statue of Freedom**: Research and Selection of Waterjets as the Corrosion Removal Method."

This study determined waterjetting parameters which provided a safe and effective method of corrosion removal. A systematic parametric study was necessary to ensure an acceptable level of corrosion removal while avoiding damage to the metal of the **Statue of Freedom**.

This research led to the selection of a 25 degree fanjet operating at 4,000 to 5,000 psi, four gallons per minute, at a working distance of six to eight inches.



A fan jet removing corrosion from the Statue of Freedom.
Photograph courtesy of David Summers, Ph.D., University of Missouri Rolla.

Jets with these parameters successfully removed the corrosion and pollution from the statue thereby

(continued on page 13)

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Black Liquor Evaporator Tube Cleaning Improvements

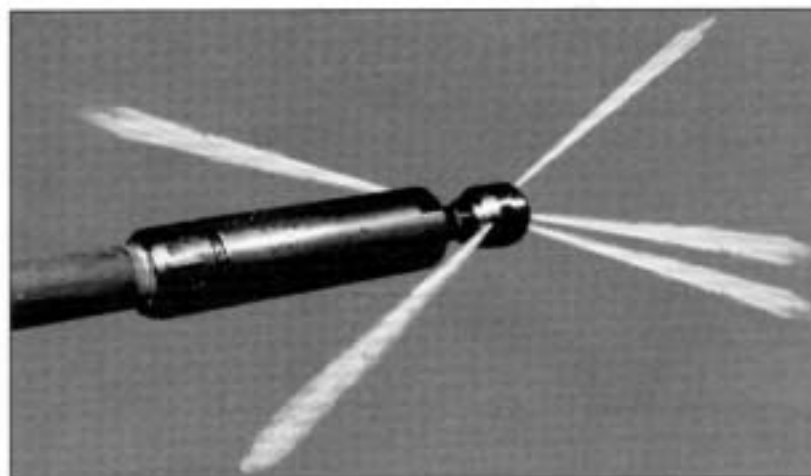
Black liquor evaporators used in pulp and paper mills are large, vertical heat exchangers with 1500 to 3000 tubes, 1-7/8 inch diameter, up to 40 feet long. It's common to encounter 30 to 70% of these tubes plugged when the pulp mill is shut down for scheduled maintenance. The deposits are hard and difficult to clean. Furthermore, the physical size and location of these units make it impractical to setup a rigid tube lancing machine. High speed rotating "free-spinner nozzles" on a short lance and hose are used by several men inside the top head to clean these units. The work place is congested with workers, hoses, and safety dump valves. Poor lighting and water mist from jetting operations limits visibility for the workers. The need for a safer, and more productive way to do the job led Canadian contractor Ceda Reactor (headquarters Edmonton, Alberta) to team up with StoneAge, Inc. (Durango, Colorado) to develop better tools.

Small "free-spinner nozzles" were the best tool compact enough for these tubes in the past. But with power lost to a leaky high pressure seal, excessive rotation speed, and imperfect jet quality — goals for improvement were easy to set. The first goal was a positive high pressure seal — which is well-established technology using an expendable plastic

seal in StoneAge tools.

The second goal of controlled rotation speed presented the greatest challenge.

It is also quite important. With "free-spinner nozzles" spinning at speeds up to 10,000 revolutions per minute, the waterjets are racing along at 56 miles per hour around the pipe ID. That leaves too little dwell time, and allows too much jet deterioration due to air drag for effective cleaning power. StoneAge manufactures a number of



A Marten self rotating nozzle.

controlled-rotation nozzles used to clean pipes and tubes, but nothing small enough for black liquor evaporator tubes, until the new Marten nozzle was developed. The Marten self-rotating nozzle incorporates new technology in viscous fluid governor design, for which StoneAge has applied for a patent. The new technology allows the tool diameter to be as small as 1-1/4 inch, making it ideal for the black liquor evaporator tubes. Rotation rate is controlled in the 300-500 revolutions per minute range.

Finally, flow turbulence was minimized by the straight-through design and smooth passage through the rotating head. The Marten can handle up to 25 gallons per minute at pressures up to 15 Kpsi with pressure loss of only 370 psi. The rotating head uses 5 drilled jets at various angles to accomplish both unplugging and wall cleaning.

Durability and effectiveness of the new tool was tested by Ceda Reactor at a pulp and paper plant in northern Saskatchewan. Of 2,000 tubes in the evaporator, 1,192 were plugged with



A view of a workman inside the top head of the heat exchanger.

(continued on page 8)

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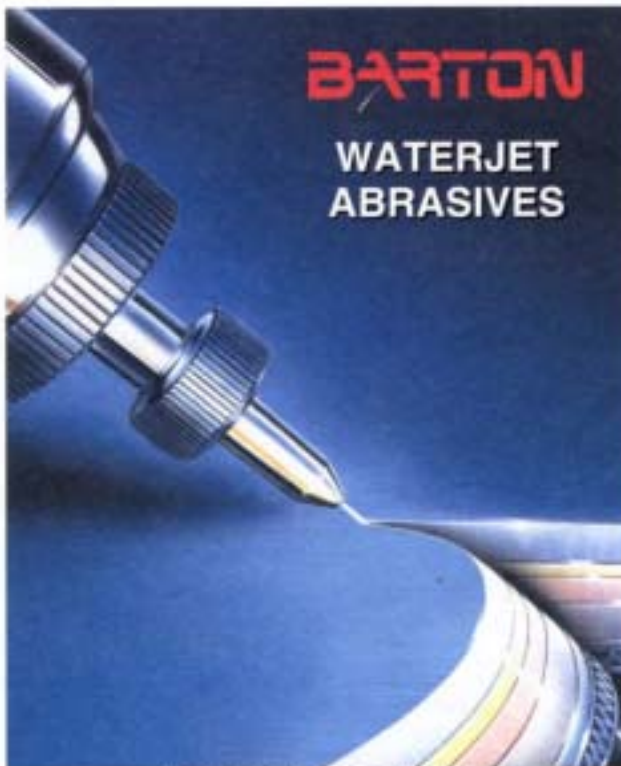
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Join us for "Advanced Topics..." on November 14th in Orlando, Florida and stay for the SSPC national meeting. The popular SSPC Basic Tutorial is scheduled for Thursday, November 19th. Get registration information or get on our mailing list by contacting:



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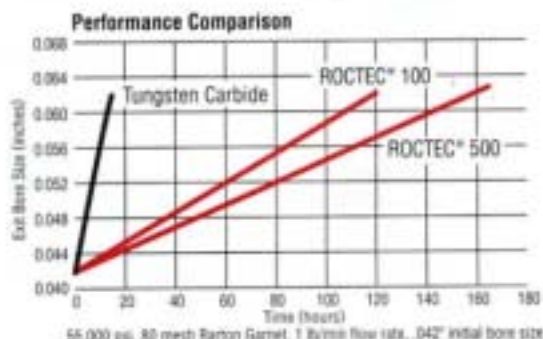
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Planting Seeds With Waterjets

Waterjets are used to apply seed, fertilizer and mulch for landscaping, erosion control, stabilization and to establish greenscapes on loose or freshly worked soil.

The Finn Corporation of Fairfield, Ohio is a leader in the use of waterjets in landscaping.

Shown above is the Finn Model T-90 Series II Hydroseeder. This machine contains a 940 gallon tank capable of storing seeds and mulch in a slurry and a four-inch by two-inch centrifugal pump which provides 170 gallons per minute at 100 psi and is capable of pumping 3/4-inch particles.

The Finn Corporation can be contacted at 9281 LeSaint Drive, Fairfield, OH 45014, telephone: (513)874-2818, (800)543-9166, fax: (513)874-2914.



Photo courtesy of the Finn Corporation, Fairfield, Ohio.

FLOW Announces Availability of New Garnet Abrasive

Flow International Corporation has introduced PASER[®] Plus Garnet, a premium quality garnet developed to optimize performance and reduce operating costs for abrasive waterjet users. FLOW also announced a new warehouse system to distribute PASER Plus Garnet.

Available exclusively from FLOW, PASER Plus Garnet is processed specifically for abrasivejet cutting. Abrasive waterjet users benefit from faster cutting speeds, reduced cost per inch, and improved part quality, as compared to other abrasives. Special processing techniques eliminate dust. Mesh size options include 50, 80 and 120 mesh, packaged in 55 pound bags, one-ton or two-ton supersacks. Prices range from \$.20 to \$.30 per pound, F.O.B. warehouse.

FLOW's new regional warehouse system guarantees availability and significantly reduces users' transportation costs. Warehouse locations include Baltimore, Maryland; Houston, Texas; Long Beach, California; Portland, Oregon; Chicago, Illinois; and Jacksonville, Florida.

"Reducing the cost of abrasivejet operation is a core strategy of Flow International Corporation," said Richard M. Sepe, product manager, aftermarket products and services, FLOW. "FLOW is the only waterjet manufacturer that supplies garnet, therefore ensuring the low price, premium quality and availability of the abrasive. The value pricing of PASER Plus allows abrasivejet users to reduce cost per inch by as much as 25 percent, while matching or improving performance versus other abrasives."



For more information, contact Flow International Corporation, 23500 64th Avenue South, Kent, WA 98032, telephone: (206)850-3500, fax: (206)813-3285.

Black Liquor Evaporator Tube Cleaning Improvements, from page 4

varying blockage. All the plugged tubes were cleaned using the 1-1/4" diameter StoneAge Marten self rotating nozzle. This included 175 tubes which had not been unplugged in over three years. With the Marten, cleaning time per tube was cut by 50-75%, operator fatigue was reduced, and more effective cleaning resulted. Three nozzles were in operation simultaneously, with spares on-hand so that field maintenance of the tool would not slow progress. Each tool was operated at 20 gallons per minute and 10,000 psi. The entire job was completed in three and a half days, running 24 hours a day. That's an average of 12.7 minutes per tube — based on the entire duration of the job.

Weyerhaeuser asked Ceda to try and clean an additional 300 tubes in a different evaporator which had been impossible to unplug with the high speed "spinner nozzles." These tubes had been plugged for over three years. All 300 tubes were cleaned in 16 hours using two Martens, an average of 6.4 minutes per tube.

Compared to the high speed "spinner nozzles," the balanced jet configuration of the Marten nozzle allowed cleaning to be effective both going into, and retracting from the tube. Secondly, hose twisting was eliminated. As a result, operator fatigue was significantly reduced. In final analysis, development of the Marten nozzle illustrates how cooperation between a contractor and tooling manufacturer can yield big improvements in productivity, making a tough job easier!

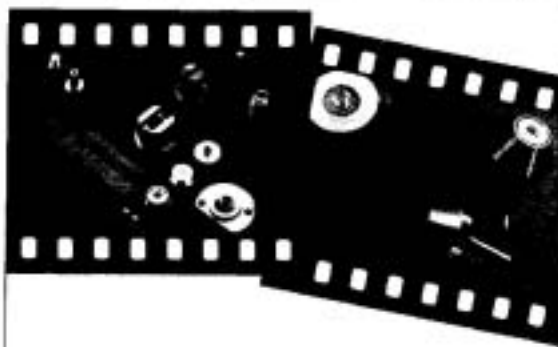
For more information contact: Mark House, StoneAge, Inc., at (970)259-2869 or Dave Bell, Ceda Reactor Ltd., at 403-472-6766.

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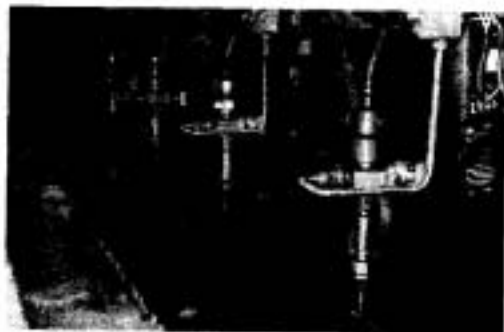


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First Announcement And Call For Papers

Impressive progress and a fast-growing understanding of the diversified applications of waterjet technology are generating a growing excitement in the industry. New techniques and applications are being developed and current ones are being improved upon. Waterjet 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 10th American Waterjet Conference will focus, from a practical and scientific viewpoint, on the most up-to-date industry advances in waterjetting equipment, techniques, and applications. Some of the areas to be addressed include but are not limited to:

- Abrasives, Water, and the Environment
- Advanced Industrial Applications
- Advances In High Pressure Technology
- Automotive Applications
- Cleaning and Coating Removal
- Components and Systems
- Construction and Non-Manufacturing Applications
- Contractor Applications and Processes
- Demilitarization, including removal of land mines (demining).
- Drilling Applications
- Excavation, Tunneling, and Mining Applications
- High Pressure Equipment and Systems
- Jet Mechanics
- Jet-Material Interaction
- Manufacturing Processes
- Market and Future Needs
- Novel Jets and Applications
- Process Modeling and Control Studies
- Rock Cutting
- Safety, Training, and Environmental Protection

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 Waterjet Technology Association. The deadline date for submission of abstracts is November 1, 1998.

An Abstract Review Committee consisting of four referees, chosen from the Organizing Committee and the International Advisors, will review the abstracts. Authors will be advised by February 3, 1999, regarding the decision of the Abstract Review Committee.

The 10th American Waterjet Conference is organized by the Waterjet Technology Association and is endorsed by the International Society of Water Jet Technology. The Waterjet Technology Association looks forward to providing this forum and to your involvement and participation.

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For each paper to be submitted for consideration, please complete this form, **attach a copy of the abstract**, and mail or fax to WJTA by November 1, 1998. Authors will be advised by February 3, 1999, regarding the decision of the Abstract Review Committee. Please send this form even if you e-mail your abstract.

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

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- ☐ Modeling (theoretical)
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Jets

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

Process

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

Material

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

Related Industry

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

Environment

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

*August 14 is reserved for the Waterjet "Short Course" and Conference Welcoming Reception.

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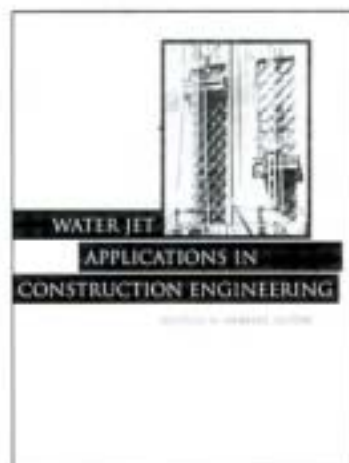
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The cost of the book is \$80 (US dollars). For more information, contact: Dr.-Ing. Andreas W. Mombert, WOMA Apparatebau GmbH, Werthausen Straße 77-79, 47226 Duisburg-Rheinhausen, Germany, telephone: [49](2065)3040, fax: [49](2065)304200.

FLOW Names Terry Alkire, Dick LeBlanc To New Positions

Flow International Corporation recently named **Terry Alkire** as Senior Vice President, International Operations and **Dick LeBlanc** as Senior Vice President of Sales, The Americas.

Terry Alkire will head the operation of FLOW's European and Asian subsidiaries.

Alkire's responsibilities will entail the restructuring of all international operations to meet the demands of FLOW's

future growth and product offerings. In this new position, he will have responsibility for the general operation of FLOW Europe, head-quartered in Darmstadt, Germany; Foracon, in Bretten, Germany; FLOW Japan, with offices in Tokyo and Nagoya; and FLOW Asia, headquartered in Hsin Chu, Taiwan, with offices in mainland China.

Most recently, Alkire has been the General Manager of Foracon, a recent

FLOW acquisition, located in Bretten, Germany. Earlier in his career, Alkire was Vice President of European Sales and Marketing, where he played a significant role in establishing and strengthening the company's European sales and marketing activities.

In addition to his native English, Alkire speaks fluent German, French, Italian and Spanish. Alkire received his bachelor of arts degree in Spanish from the University of Montana. He obtained his MBA in management of engineering and high technology from City University, Frankfurt.

Dick LeBlanc will be responsible for directing all of FLOW's cutting, surface preparation, automotive, and automation sales efforts in Canada, North America, Mexico, South America, Australia, and New Zealand. Prior to assuming his new responsibilities, LeBlanc was FLOW's Vice President of Sales, where he has been instrumental in leading the growth of domestic sales for FLOW.

"Dick has demonstrated a keen ability to identify customers' needs and requirements and then address them in a creative sales process by presenting FLOW's unique capabilities," said Ron Tarrant, Chairman, President and CEO of Flow International Corporation. "Couple this with his drive to win, and I think we have an ideal person to take us to the next level of growth in these markets."

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Waterjets Clean Statue Atop The U.S. Capitol, from page 3



A manually operated waterjet being used to clean the Statue of Freedom. The Statue of Freedom is approximately 30 feet tall. Photograph courtesy of David Summers, Ph.D., University of Missouri-Rolla.

revealing the fine detail that the corrosion had obscured. The waterjet caused no damage to the bronze surface of the statue.

For more information contact: Dr. David Summers, Rock Mechanics and Explosives Research Center, University of Missouri-Rolla, Rolla, MO 65409-0660, telephone: (573)341-4314, fax: (573)341-4368.



Cleaning the Statue of Freedom at a standoff distance of six to eight inches. Photograph courtesy of David Summers, Ph.D., University of Missouri-Rolla.

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Powered by one of several Aqua-Dyne high pressure waterjetting units the *Shell Side Bundle Cleaner* typically operates at 15,000 psi with a maximum water flow of 200 gallons per minute. Its ten waterjet nozzles are mounted at various angles to allow for maximum cleaning through and between the heat exchanger tubes. A rotary head is also available as an option.

The *Shell Side Bundle Cleaner* can handle bundles up to 30 feet long and



eight feet in diameter yet collapses for shipping within a 30 foot road trailer.

For additional information call (800)324-5151, (713)864-6929, fax: (713)864-0313, e-mail: info@aqua-dyne.com, website: www.aqua-dyne.com

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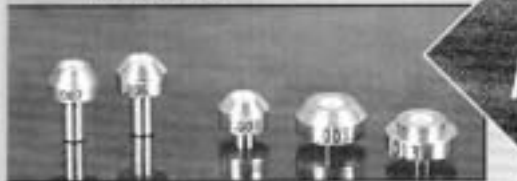
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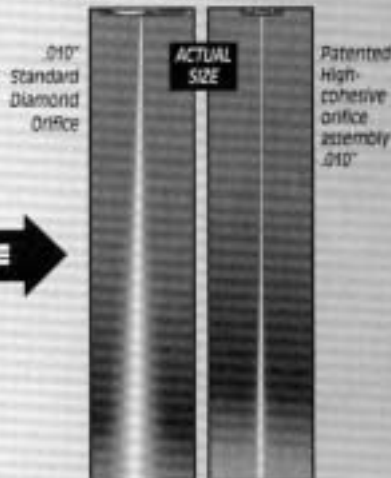
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WJTA Request For Proposals

The Waterjet Technology Association (WJTA) is requesting proposals for the preparation of reports on topics of interest to our membership. These reports will be literature searches, surveys, and data gathering activities only, not research and development work. These reports will then be made available to WJTA members at a minimal cost.

The following topics are of interest:

1. Spark hazard, or lack of, with abrasive waterjets.
2. The use of pipe threads and other pipes found in high pressure connections.
3. Concrete demolition rates using waterjets.
4. Market size for waterblast equipment or services.
5. An index of papers in WJTA publications, cross-referenced by subject and author.
6. Types of abrasives — characteristics and applications.

Please submit your proposals to: WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1413.

Include a description of the scope of work to be performed, total cost, author's credentials and anticipated time to complete the work. Proposals will be evaluated and funds committed by the WJTA Monograph Committee (John Wolgamott, Thomas J. Kim, Ph.D., Lydia Frenzel, Ph.D., and Mohamed Hashish, Ph.D.). Once a topic has been assigned, it will be announced in *Jet News* and members will be encouraged to submit information to the author(s). Proposals for reports on other topics will also be considered.

A total of \$5,000 has been budgeted for the first reports. The number of topics this will fund will depend on the cost of each report. If the initial reports are judged as worthwhile, more funding will be made available and additional reports will be solicited. WJTA members are encouraged to submit ideas for other topics to study.

1998 Calendar Of Events

- **September 21-23:** 14th International Conference on Jetting Technology, Brugge, Belgium. For more information call: 44(0)1234750422 or fax: 44(0)1234750074.
- **September 24-26:** Pumper and Cleaner Environmental Expo, Long Beach Convention Center, Long Beach, California. For more information, contact: Phil Lane, Cole Publishing, 1720 Maple Lake Dam Road, P.O. Box 220, Three Lakes, WI 54562-0220, phone: (800)257-7222, fax: (715)546-3786.
- **October 5-8:** PowerClean '98, Las Vegas, Nevada. For more information call: (800)441-0111.

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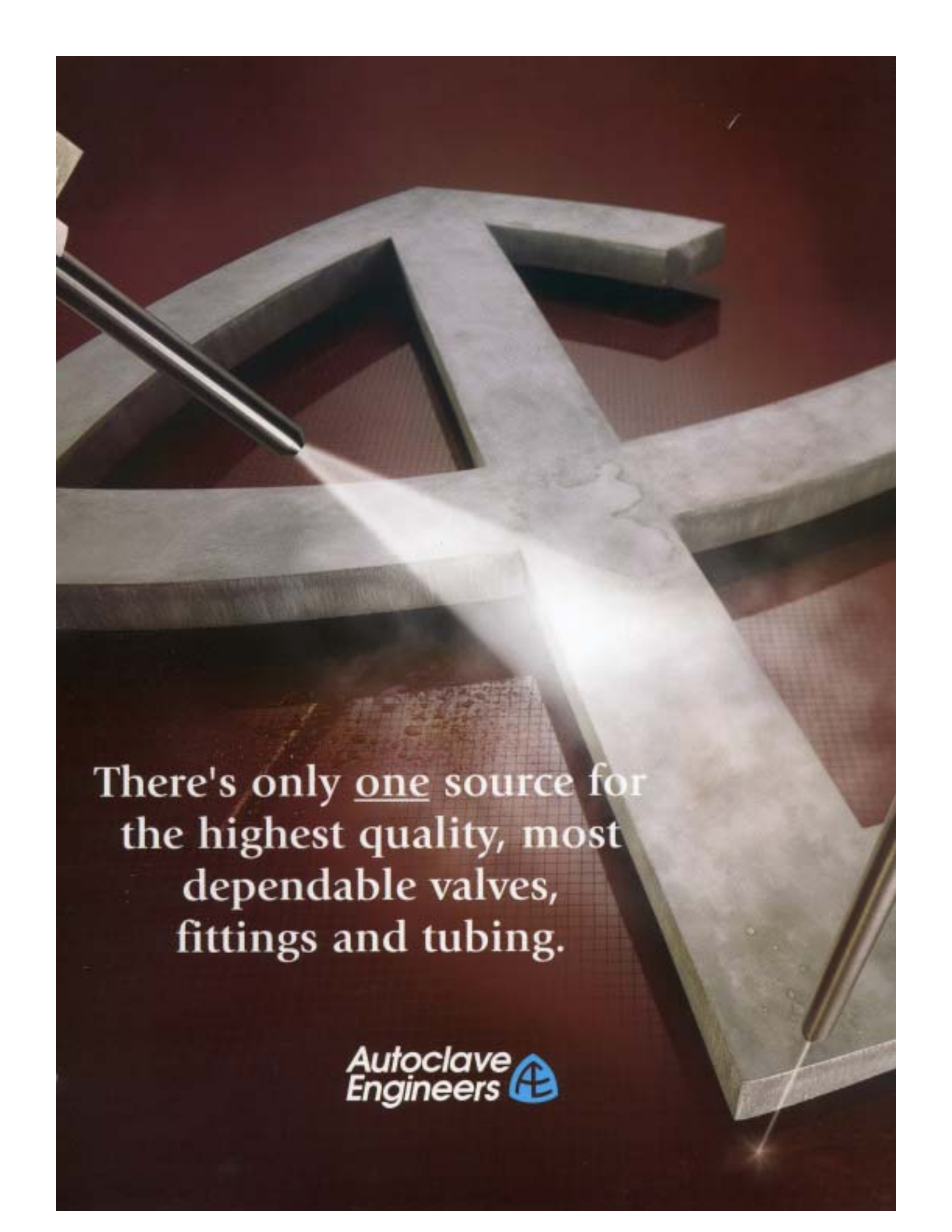
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