WJTA Jet News

Water Jet Technology Association

FEBRUARY 1995

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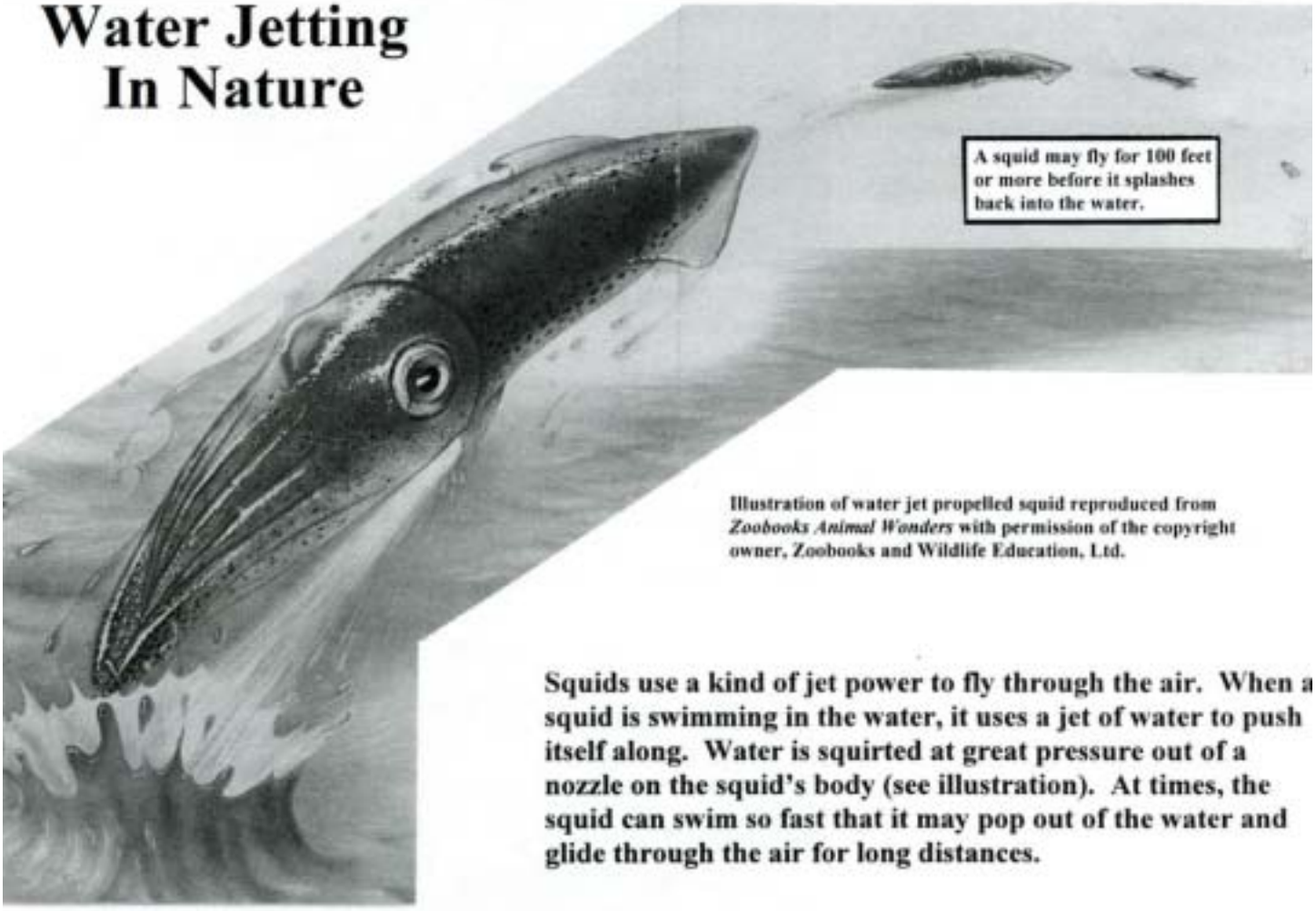
Water Jetting In Nature



A squid may fly for 100 feet or more before it splashes back into the water.

Illustration of water jet propelled squid reproduced from *Zoobooks Animal Wonders* with permission of the copyright owner, Zoobooks and Wildlife Education, Ltd.

Squids use a kind of jet power to fly through the air. When a squid is swimming in the water, it uses a jet of water to push itself along. Water is squirted at great pressure out of a nozzle on the squid's body (see illustration). At times, the squid can swim so fast that it may pop out of the water and glide through the air for long distances.

Pipeline Coating Removal

Pipe corrosion caused by 30 to 40 years of burial can be a danger to the integrity of a pipeline, hence pipelines must be rehabilitated periodically. The rehabilitation process consists of removing the old coating (typically coal tar enamel, asphalt or polyethylene tape) and replacing it with a new protective coating.

Water jets are used to remove old coating materials from pipelines by CRC-Evans Rehabilitation Systems of Houston, Texas. Their patented HydroKleaner™ uses 20,000 psi, 20 to 40 gpm jets to strip away old

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Report On WJTA Board Meeting

By: George A. Savanick, Ph.D.
President

The Officers and Board of Directors of the Water Jet Technology Association met on Saturday, January 14, 1995, at the J.W. Marriott Hotel in Houston, Texas. Following is a report on action taken by the Board of Directors.

1. Decided to accept 60 papers for presentation at the 8th American Water Jet Conference and to publish up to 75 papers in the official *Conference Proceedings*.

2. Set the price of a 10'x10' exhibit booth space in the exhibit hall at the 8th American Water Jet Conference at $600.

3. Agreed on the program for the short course to be held in conjunction with the 8th American Water Jet Conference.

4. Decided to print 500 hard-bound copies of the *Proceedings*.

5. Decided to sell volumes of the *6th and 7th American Water Jet Conference Proceedings* at a discount at the 1995 Conference.

6. Decided to have a social event at the Greenfield Village Henry Ford Museum in Dearborn, Michigan, in conjunction with the 1997 Conference in Detroit.

7. Set the schedule of registration fees for the 1995 Water Jet Conference to be the same as that of the 1993 Conference.

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Pipeline Coating Removal, from page 1

coating materials leaving only the primer stain. The pipe surface is not damaged in the cleaning process. The HydroKleaner can handle pipe diameters from 6 inches to 48 inches and the product flow in the pipeline is normally uninterrupted while the cleaning process is performed.

Figure 1. Model 24/48 HydroKleaner on 36-inch pipeline. *Photo courtesy of CRC-Evans Rehabilitation Systems, Inc., Houston, Texas.*

HydroKleaner water jetting is the first step in a process whereby one mile or more of pipeline can be processed per day. Water jetting on steel pipelines can be done in-the-ditch and out-of-ditch. In the latter, because of the flexibility of the pipeline, the pipeline is actually cradled up off of the ground as the HydroKleaner travels along the pipe (Figure 1). For asbestos removal, an affiliated company, CUPS Systems, Inc., uses the EnviroSystem™ which employs the HydroKleaner enclosed in a metal shroud (Figure 2) that collects the water and asbestos containing coatings and thereby prevents asbestos from escaping into the atmosphere.

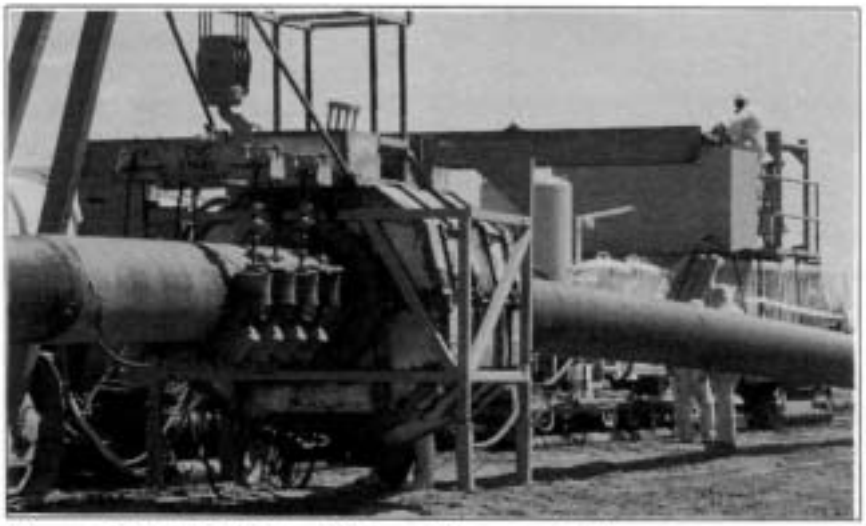

Figure 12. EnviroSystem™ travelling on pipeline. *Photo courtesy of CUPS Systems, Inc., Houston, Texas.*

Since 1989, CRC-Evans has cleaned over 800 miles of pipeline. They have worked in almost every state in the United States and Canada, and are currently negotiating several contracts in the Eastern Hemisphere.

Nominations Open For WJTA Board Of Directors

"Nominations for the Water Jet Technology Association (WJTA) Board of Directors are now open," announced Dr. Andrew Conn, secretary of the Water Jet Technology Association.

"With rapid advances in fluid jet technology, the Water Jet Technology Association is growing rapidly. The Association needs dedicated directors to lead the members as the WJTA grows." says Mohan Vijay, Ph.D., chairman of the 1995 Committee on Nomination. "The duties of the directors are truly challenging and rewarding."

The two-year terms of office of Thomas J. Kim, Josiah Phillips, George Rankin, Forrest Shook, Mohan Vijay, Ph.D., and John Wolgamott, will expire on August 27, 1995. Therefore, nominations are sought for six (6) board members, each to serve a four-year term of office beginning August 27, 1995.

According to the WJTA bylaws, each of the above-named individuals are eligible for re-nomination and re-election to the WJTA Board of Directors.

Nominations/Elections Procedures

In accordance with the bylaws of the Water Jet Technology Association, revised in 1993, nominations and elections to the Board of Directors include the following procedures:

- Two calls for nominations to the board of directors will be published in the *Jet News*. The first call for nominations appears in this issue and the second call will be published in the April 1995 *Jet News*. **Nominations will be accepted through June 30, 1995.**
- A list of the eligible nominees and a brief biographical sketch for each individual will be published in the June 1995 issue of *Jet News*.
- An official ballot listing the eligible nominees will then be forwarded by mail to all eligible voting members of the Association on July 14. **Signed and executed ballots must be mailed to the Association's office for tallying by August 15, 1995.**
- The names of newly elected board members will be announced on Sunday, August 27, 1995, at the WJTA general membership meeting held in conjunction with the 8th American Water Jet Conference in Houston, Texas.

Only eligible members of the Water Jet Technology Association may submit a nomination and nominees must be eligible members of the Water Jet Technology Association.

With regard to all first-time nominees, the WJTA bylaws provide that no more than one of the elected board members may be from the same company or organization. Therefore, board members may not be nominated from facilities that are already represented on the board by

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Israeli Water Jetters

Did you know that most of the world's water blasting nozzle inserts come from the Holy Land? In fact, these tungsten carbide parts are manufactured less than a 45-minute drive from Nazareth, in the Galilee.

Micro Tools, Ltd., a subsidiary of ISCAR, the cutting tool manufacturer, has been providing the industry with carbide inserts since 1983. Situated on the top of a mountain in the middle of the Galilee in Israel, the name means just that—a specialist in small, high-precision carbide and ceramic machine parts and tools. All the carbide inserts are pressed in-house, using a grade specially blended to meet the needs of water blasters in the 10-35,000 PSI range. Micro Tools can press carbide inserts with orifices as small as .001"!

Andy Conn, WJTA secretary, first discovered Micro Tools a few years ago during a visit to the "hi-tech" Tefen Industrial Park. Impressed by the fact that Micro Tools manufactures nearly 2.5 million carbide spray tip blanks annually for the airless paint spray industry, he suggested to apply the same technologies to the water blasting industry as well. Andy also encouraged Micro Tools' representatives to attend the 7th American Water Jet Conference in Seattle, Washington in August 1993, where they had the opportunity to meet, face-to-face, so many of the people representing the companies that have now become their (happy) customers.

For more information, write Micro Tools, P.O. Box 8, Migdal Tefen, 24959 ISRAEL, or call 011-972-4-9872296 or fax 011-972-4-9872298. Inquiries can also be sent to the U.S. distribution center by fax at (703)750-3779.

New NLB Lance Is Lightweight For Comfort And Ease Of Operation

A new lightweight lance, designed for operator comfort in applications involving water pressures up to 10,000 psi, is now available from National Liquid Blasting (NLB) Corporation of Wixom, Michigan.

The new NCG10-280 lance is easy to control and operate for extended periods. It weighs only 11 lbs. versus 17 lbs. for other models. An adjustable shoulder stock and hand grip allow the operator to find the position which best suits the application and is most comfortable.

NLB's NCG10-280 Lance

The trigger assembly features a one-finger latch to prevent inadvertent actuation. It requires a very light pull—only 3 to 7 lbs.— to actuate the valve, which reduces operator fatigue. The trigger assembly also features a unique manual shut-off feature in the unlikely event that the valve sticks open. All the operator has to do is push the trigger forward to open the valve and dump the pressure.

The valve itself is a proven pin and seat design that features a cartridge-type quick-change seal. It can be changed in seconds with a single 3/4" wrench. To access the seal, you simply pull a pin and swing the trigger assembly away. A dust shield around the trigger also keeps contaminants out of the seal area.

For more information, contact NLB Corporation, 29830 Beck Road, Wixom, Michigan 48393-2824, Phone: (810)624-5555, Fax: (810)624-0908.

FLOW Takes Key Step In Growth Strategy With Proposed Acquisitions Of Two Robotics Manufacturers

Flow International Corporation, which recently reported record second quarter revenues and earnings, today announced it has signed letters of intent to acquire the assets of two robotics articulation equipment manufacturers—a significant step toward achieving the company's strategic growth plan. Terms of the transactions were not disclosed. The company does not expect these transactions to be dilutive.

The two firms, ASI Robotic Systems, Jeffersonville, Indiana, a division of Cargill Detroit Corporation, and Dynovation Machine Systems Inc., Burlington, Ontario, Canada, are prominent manufacturers of precision robotics systems and related equipment. Combined, the two companies will contribute more than $20 million to FLOW's annualized revenues.

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New 40,000 PSI Valve, Fitting And Tubing Line Offers Higher Flow

Autoclave Engineers has introduced a new line of valves, fittings and tubing (VFT), with a larger bore size to facilitate increased flow rates for a variety of fluids. This line of VFT utilizes a 9/16" O.D. connection and is rated for service to 40,000 psi. These high pressure components have been specifically designed to address the demands of waterjet blasting and cutting applications as well as other uses requiring high flow and a 40,000 psi pressure capability.

The new valves and fittings feature outside dimensions identical to Autoclave's 9/16" O.D. 60,000 psi line

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BARTON

Garnet

nature's best deposit ...
man's best technology ...

Quality

The Barton deposit produces the hardest and sharpest garnet in the world. Enhanced by our state-of-the-art processing, Barton produces the highest quality and fastest cutting garnet available.

Consistency

Barton garnet is graded to the tightest specs in the industry. This means more consistent operations, and less down-time due to clogged jets or erratic abrasive feed.

Service

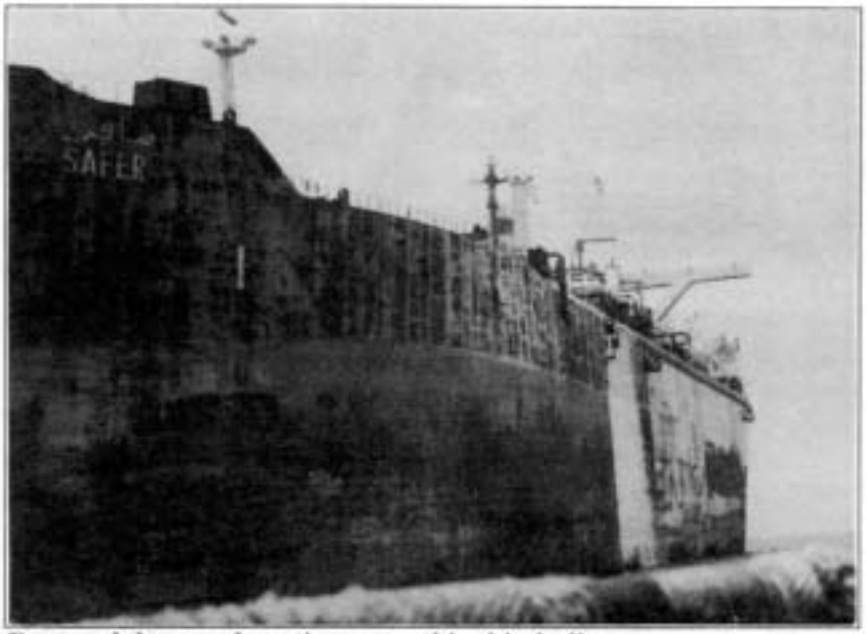
Barton's service, experience, and reliability have made us the world's largest supplier of garnet abrasives. Barton has been the world standard since 1878, and the water jet standard since 1982.

(518) 251–2296 **Fax: (518) 251–3655**
Barton Mines Corporation, North Creek, New York 12853

Ship Cleaning With Water Jets

Protecting sea going vessels from the effects of corrosion is a continuous process costing ship owners billions of dollars annually. The removal of rust and damaged coatings must be achieved quickly and economically in compliance with today's stringent environmental protection laws. Needle gun descaling has replaced environmentally restricted sandblasting, but it is extremely slow, difficult to perform, and labor intensive.

Aqua-Dyne, Inc., of Houston, Texas, has developed a high pressure water jetting system that cleans decks, hulls and walls quickly and economically. The Roto-Jet Blaster uses high pressure water with specially designed rigging and a rotary jet nozzle system to remove rust and damaged coatings on ships while at sea or in dry dock.



Rust and damaged coatings mar this ship hull. *Photo courtesy of Aqua-Dyne, Inc., Houston, Texas.*

The Roto-Jet Blaster system is a self-powered high pressure water jet unit for surface preparation of the hull or deck of a ship. The water jetting system automatically cleans loose paint, rust and scale to meet the SA 2-3 standard.

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1995 Calendar Of Events

March 9-11: International Liquid Waste Haulers Equipment & Trade Show, Nashville, Tennessee, (800)257-7222.

March 28-31: Europropre 95, the 4th European Cleaning Exhibition, Paris, France, 33 (1)45 66 53 42.

April 2-6: Power Washers of North America's Third Annual Meeting and Exposition, Las Vegas, Nevada, (202)393-7044.

June 7-9: ISSA Interclean-Mexico Exhibition, Monterrey, Mexico, (708)982-0800

August 26-29: WJTA 8th American Water Jet Conference, Houston, Texas, (314)241-1445.

October 11-14: CETA PowerClean '95, Georgia World Conference Center, Atlanta, Georgia, (800)441-0111.

November 9-10: Second Asia-Pacific Conference On Recent Advances in Jetting Technology, Singapore, 733-2922.

Parker Hannifin Acquires Polyflex: European Thermoplastic Hose Manufacturer

Parker Hannifin Corporation acquired on January 1, 1995, the Polyflex Schwarz Group of companies with headquarters in Huttenfeld, Germany, for cash. Polyflex is a leading European manufacturer of thermoplastic hose, operating plants in Huttenfeld and Viernheim, Germany, Wissembourg, France, and Rogan and Shanley, a wholly-owned subsidiary in Houston, Texas.

> Rogan and Shanley, Inc. is now part of the Parflex Division of Parker Hannifin. The 'Rogan and Shanley' name will be phased out and will be replaced by 'Polyflex'. Accounting functions will be handled by the Parflex Division headquarters located in Ravenna, Ohio. Effective immediately, all purchase orders issued by the former Rogan and Shanley will carry the Parker Hannifin name. Vendors should continue to remit invoices to Polyflex at the usual address (4263 Dacoma, Houston, TX 77092), where they will be processed and forwarded to the Parflex Division headquarters for payment.

Polyflex makes reinforced high and ultra-high pressure hoses, hose fittings and assemblies for diverse markets, ranging from industrial hydraulics and pneumatics to paint spraying, coal mining, high-pressure pipe cleaning, lubricating, water jet cutting, instrumentation and control cables. The company has 225 employees and in 1994 recorded sales of approximately $28 million.

In joining the Parker Fluid Connectors Group, Polyflex forms a complimentary operation with the Group's Parflex Division in Ravenna, Ohio. Group President Donald A. Zito said, "Polyflex represents a key addition. The Polyflex lines, which enjoy an excellent worldwide reputation for product quality and reliability, will add new markets to those served by our Parflex lines. The skilled employees and the advanced manufacturing technology of Polyflex are a welcome addition to Parker and both Parflex and Polyflex will benefit from technological synergism between the two organizations."

Parker Hannifin is a $2.58 billion Fortune 200 company specializing in the manufacture of fluid power components and employs 27,000 people.

Report On WJTA Board Meeting, from page 2

8. Decided to allocate the front and back cover advertising space of the WJTA *Membership Directory* on a lottery basis. Companies must indicate interest in obtaining covers at prevailing rates prior to the closing date and a drawing will be conducted to select the winners.

9. Set the next Board meeting for noon on Friday, August 25, 1995, at the J.W. Marriott in Houston.

Ship Cleaning With Water Jets, from page 6

The cleaning unit is lowered down the hull of the ship to the bottom, moved sideways using on-deck rigging and then brought back up to the deck while cleaning a one meter path with each up and down pass.

The lightweight on-board rigging requires a crew of three to four men to position the unit and rigging on the ship. The rigging is designed so that the high pressure water jetting unit can be lowered and raised at variable speeds depending on the degree of cleanliness desired.

High pressure water provided by an Aqua-Dyne, Inc., "Valve-In-Line" pump powers the Roto-Jet Blaster nozzles and a single operator has complete control of the unit's movement over the hull from the ship's deck during the cleaning operation. The speed of rotation of the high pressure cleaning jets is set on deck before lowering the system over the side of the ship.

The Roto-Jet Blaster cleans up to 70 square meters of area per hour and a variety of surface preparation results can be obtained simply by varying the nozzle rotating speed and the output of the high pressure pump.

The Roto-Jet Blaster cleaning loose paint, rust and scale. *Photo courtesy of Aqua-Dyne, Inc., Houston, Texas.*

J.W. Marriott Hotel In Houston Is Site Of 1995 WJTA Conference

The J.W. Marriott Hotel in Houston, Texas, has been selected as the Conference hotel for the Water Jet Technology Association's 8th American Water Jet Conference, August 26-29, 1995.

Plans are underway for an interesting and informative Conference program. Details regarding the meeting schedule and registration will be forwarded to you soon.

In the meantime, it's not too early to make your hotel arrangements at the J.W. Marriott. The Marriott features spacious and luxuriously appointed guest rooms located in a contemporary 23-story building. Amenities include a convenient gift shop and beauty/barber shop. An indoor/outdoor swimming pool, full service health club with exercise equipment, jacuzzi, dry sauna and steamroom, racquetball courts and a basketball court are also available. For the convenience of international guests, most Marriott staff members are fluent in several languages, including English, French, German and Spanish.

Make your hotel reservations at the J.W. Marriott early to take advantage of the WJTA Conference rate of $90, single or double occupancy. Use the convenient form below to make your reservations or call the Marriott directly. In Texas, dial (800)392-5477; in the U.S. outside of Texas, dial (800)231-6058. International callers dial (713)961-1500. Be sure to identify yourself as a participant in the Water Jet Technology Association Conference.

Don't delay. Start making your plans now to join us in Houston, August 26-30, 1995!

Water Jet Technology Association

8th American Water Jet Conference

HOTEL RESERVATIONS FORM

August 26-29, 1995 Houston, Texas

Please print or type

Name _____ Company _____

Address _____

City _____ State _____ Address: ❑ Home ❑ Company

Country _____ Postal Code _____

For arrival on _____ (Day / Date / Time) Depart on _____ (Day / Date / Time)

Room type preference: ❑ King ❑ Double/Double

Smoking Preference: ❑ Non-Smoking ❑ Smoking

Which preference is more important: ❑ Bed type ❑ Smoking Preference

Please list names of guests sharing your room _____

_____

Special requests _____

Reservations received after **8/5/95** will be confirmed on an availability basis.

Rates: **$90**, single or double occupancy.

The JW Marriott regrets that it cannot hold your reservation after 6:00 p.m. on the day of arrival without a credit card, or first night's room deposit by check or money order (do **NOT** send cash). Deposits will be refunded only if cancellation notification is given up to 24 hours prior to arrival. If more than one room is requested, please enclose list of names with addresses, indicating which guests share rooms.

❑ Check or money order enclosed - Amount $ _____ ❑ American Express ❑ Carte Blanche

❑ Master Card (Please include interbank # directly below card #) ❑ VISA ❑ Diners Club ❑ Discover

Credit Card Number _____ Expiration Date ____/____

Signature _____ Telephone ( ) _____

JW MARRIOTT HOTEL

5150 Westheimer • Houston, Texas 77056 • (713)961-1500

Check-out time is noon. Rooms may not be available for check-in until after 3:00 PM. **RESERVATIONS REQUESTED BEYOND THE CUT OFF DATE, AUGUST 5, 1995, ARE SUBJECT TO AVAILABILITY. ROOMS MAY STILL BE AVAILABLE AFTER THE CUT OFF DATE, BUT NOT NECESSARILY AT THE ABOVE RATE. PLEASE APPLY 15% SALES AND LODGING TAX TO THE ABOVE RATES. (Tax rates subject to change.)**

FLOW Takes Key Step In Growth Strategy With Proposed Acquisitions Of Two Robotics Manufacturers, from page 4

Robotics Systems provide motion control for FLOW's ultrahigh-pressure water jet equipment to enable customers in a variety of industries to perform highly precise, often complex cutting, cleaning and surface preparation operations. FLOW currently works with ASI and Dynovation as well as a number of other suppliers to provide its customers with systems specific to their industrial requirements. By acquiring the assets of ASI and Dynovation, FLOW will be able to invest directly in the development of specialized robotics systems and reinforce its position as a worldwide leader in water jet technology.

"These acquisitions give FLOW the total system capability that is integral to our strategic plan to generate $208 million in revenues by 1998," said Ronald W. Tarrant, chairman, president and chief executive officer of Flow International Corporation. "Dynovation and ASI's management teams offer dynamic leadership, knowledge of their respective industries, and are highly regarded both within their organizations and their customer bases. The two companies have strong robotics engineering expertise, which is important to us and our customers because it further strengthens our worldwide technological leadership." FLOW will retain the current management teams of both Dynovation and ASI.

Dynovation designs and manufactures modular water jet cutting cells and automated assembly systems. The company offers two- and three-axes cutting systems for flat-surface water jet cutting operations, as well as sophisticated work cells for three-dimensional cutting. These cell configurations are used in numerous applications including cutting automotive components such as carpets, headliners and door panels, as well as composites and metals. Dynovation's turnkey assembly systems include vibratory and centrifugal bowl feeders used in the medical, automotive, pharmaceutical and electronics industries. "The combined strengths of FLOW and Dynovation will result in a better quality, more market-driven product for our customers," said Dave Bunker, president, Dynovation Machine Systems. "With FLOW's vision of the future, we'll enter a new age of advanced machining."

ASI is a market leader in the design and manufacture of advanced gantry robots with a product line of three-, five- and six-axes equipment. ASI developed FLOW's AF-5800 shapecutting system, which allows customers to easily convert from a three-axes to a five-axes system for contoured cutting applications. The company is particularly strong in the aerospace industry, where FLOW and ASI have installed multi-axes water jet systems for Boeing, McDonnell Douglas, Lockheed and other aerospace manufacturers. ASI also manufactures a line of automated assembly line systems used for pick-and-place part applications and orientations.

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

Nominations Open For WJTA Board Of Directors, from page 3

individuals whose terms expire in 1997. These facilities include: Conn Consulting (Andrew F. Conn, Ph.D.); Quest Integrated (Mohamed Hashish, Ph.D.); Scire Corporation (Thomas J. Labus); U.S. Bureau of Mines (George A. Savanick, Ph.D.); University of Missouri-Rolla (David A. Summers, Ph.D.); or MPW Industrial Services (Bruce Wood).

According to the WJTA bylaws, any WJTA member in good standing (1995 membership dues paid) may submit a nomination(s). Nominees must also be WJTA members in good standing. The deadline for making nominations is eight (8) weeks prior to the biennial business meeting scheduled for Sunday, August 27. Therefore, your nomination(s) should reach the WJTA office no later than **June 30, 1995**.

To submit a nomination(s), complete the form below and return to:

Mohan Vijay, Ph.D.
Chairman, Committee On Nomination
Water Jet Technology Association
818 Olive Street, Suite 918
St. Louis, MO 63101-1598
Phone: (314)241-1445
Fax: (314)241-1449

Remember, nominations must be received no later than June 30, 1995.

WJTA Nomination Form

Name Of Nominee _____
Title _____
Address _____
City _____ State _____
Country _____ Postal Code _____
Telephone ( ) _____ Fax ( ) _____

Attach biographical information with a brief statement of your nominee's mission and vision for WJTA.

Name Of Nominator _____
Title _____
Address _____
City _____ State _____
Country _____ Postal Code _____
Telephone ( ) _____ Fax ( ) _____

WJTA Administration

Chairman of the Board
Dr. Mohan Vijay
(613)993-2731

President/Newsletter Editor
Dr. George Savanick
(612)725-4543

Vice-President
Thomas J. Labus
(414)275-5572

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

Treasurer
John Wolgamott
(303)259-2869

1993-1995 Directors

Dr. Mohamed Hashish
(206)872-8500

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

Joe Phillips
(206)839-2582

George Rankin
(713)864-6929

Forrest Shook
(313)624-5555

Dr. David Summers
(314)341-4311

Bruce Wood
(614)927-8790

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

NRC·CNRC

INFORMATION

Fluid Power Systems Program

The main goal of this program is to assist industry in the design, development and maintenance of fluid power systems through both strategic and applied collaborative research. The group has an international reputation and over 20 years' experience in high-pressure fluid jet technology. Program researchers have expertise in high-speed liquid jets and water hydraulic systems, in computational fluid dynamics analysis of complex high-speed liquid flows, and in the testing and safety standards of high-pressure components. Facilities include high-pressure plunger pumps, intensifier pumps, lasers and high-speed photographic systems for flow visualization, and abrasive feeding systems.

Abrasive-Entrained Water Jets
Research in this area includes using abrasive-entrained water jets for precision cutting applications, drilling and fragmentation of concrete, hard rocks or any other material. Design and development of abrasive resistant nozzles is an important part of this work.

Cavitating Water Jets
Cavitating liquid jets can be used to enhance the performance of pure water jets. The program has developed several new types of nozzles for applications in open atmosphere or under high ambient pressures. A specially designed high-pressure chamber equipped with flow visualization systems is available for simulating the complexity of the flows at high ambient pressures and temperatures, such as would be found in deep oil wells.

Pulsed Water Jets
Extensive research has shown that pulsed water jets at fairly low pressures and hydraulic powers can be used to fragment hard rocks and concrete. They are also useful for many cleaning applications. Our pulsed water jets are generated by modulating high-speed continuous water jets using patented ultrasonic waves and high-voltage electric discharges in the nozzles. This research has strong industrial collaboration.

National Research Council Canada
Institute for Machinery Research

Conseil national de recherches Canada
Institut de recherche sur les machines

Water Hammers
An industrially-supported research project on the development of down-the-hole water hammers is in progress. Water-powered reciprocating and rotary motors are suitable for underwater drilling, marine work and many other applications. These concepts can also be used to develop moderate frequency pulsed water jets.

Flow Visualization
Excellent facilities, including pulsed lasers, are available to visualize the complex high-speed flows encountered in many practical situations. Visualization is very useful to improve the performance of several types of industrial devices.

Computational Fluid Dynamics (CFD) Analysis
CFD is a powerful modelling tool to understand the complexity of flows that occur in many industrial devices. The tool can be used to minimize or eliminate extensive experimental testing, and to accelerate the development and design of devices to improve performance.

NRC Institute of Machinery Research
The Fluid Power Systems Program is part of the National Research Council's Institute for Machinery Research (IMR). IMR develops technical solutions to machinery design, operation and maintenance problems faced by Canadian industry. These solutions lead to increased productivity, greater machine reliability, and reduced maintenance costs, resulting ultimately in an improvement in competitive advantage. Canadian industry currently invests more than $70 billion per year in machinery and equipment, and nearly one-third of that money is spent on maintenance alone.

Collaboration with IMR
At IMR, our emphasis on advanced machinery technology, state-of-the-art research facilities and multi-disciplinary expertise can provide you and your organization with the tools, technology, information and skills needed to solve complex machinery problems. We are actively seeking collaborations and alliances on projects ranging from client-driven proprietary research to strategic research directed toward specific objectives.

For further information, contact:
Dr. Mohan M. Vijay
Institute for Machinery Research
National Research Council
Ottawa, Ontario
K1A 0R6 Canada
Tel: (613) 993-2731
Fax: (613) 952-1395

November 1994
Aussi disponible en français

Rogan and Shanley Inc.

- a polyflex company -

4263 Dacoma
Houston, Texas 77092-8607
Ph # 713-686-5236
Fax # 713-686-1292

Toll Free # 800 - 446 - 5236

ThreadMate™

The ultimate extreme duty anti-gall lubricant and thread sealer.

8oz Brush Top Can

Reduces *Galling*

Reduces *Tightening Torque*

Promotes *Reliable Sealing*

ThreadMate ™ is an extreme duty lubricant developed to reduce galling during the assembly of threaded parts. A feature of ***ThreadMate***™ is that it promotes reliable sealing of pipe threads (even at extreme pressures) by reducing friction and galling during tightening. This results in higher contact pressures of the sealing surfaces, and a better metal-to-metal contact. ***ThreadMate*** ™ also reduces the torque needed to make pressure tight connections and tighten fasteners.

A "must have" for professionals with no time to lose.

Rogan and Shanley Inc.

Specialists in high pressure engineering
. . . . . member of the POLYFLEX - group

Did you know that Rogan and Shanley **"STOCKS"** High Pressure, Medium Pressure and NPT Stainless Steel Fittings?

High Pressure Fittings

30,000 to 60,000 psi

Stock Sizes:
1/4" 3/8" & 9/16"

Medium Pressure Fittings

20,000 psi

Stock Sizes:
1/4" 3/8" 9/16" 3/4" & 1"

NPT Fittings

10,000 to 15,000 psi

Stock Sizes:
1/8" 1/4" 3/8" 1/2" 3/4" & 1"

Built to Blast

Reliable valves, fittings and tubing built for water blasting applications

- High flow 1" series for pressures to 30,000 psi
- Worldwide technical and product support
- Custom design products available

Quality...
the Autoclave difference

Autoclave Engineers

Autoclave Engineers Group
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New 40,000 PSI Valve, Fitting And Tubing Line Offers Higher Flow, from page 4

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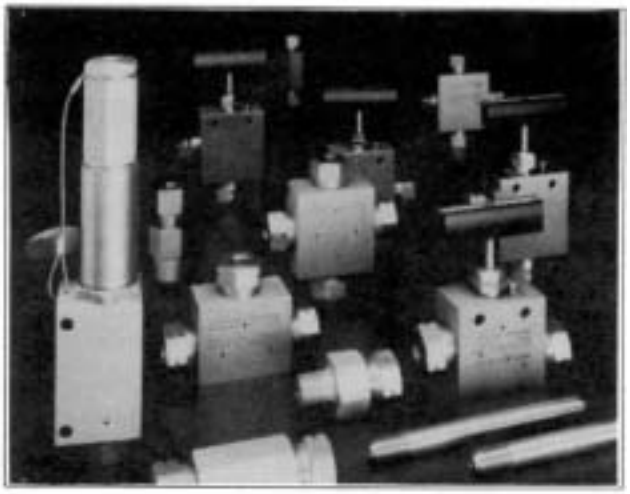

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The Water Jet Technology Association's

8th American Water Jet Conference

August 26-29, 1995

JW Marriott Hotel Houston, Texas

Preliminary Schedule Of Events

Saturday, August 26

8:30 a.m. - Noon	Short Course on the Fundamentals and Applicatior of Water Jet Technology
Noon - 1:30 p.m.	Luncheon for "Short Course" Participants
1:30 p.m. - 4:30 p.m.	Short Course, cont'd.
6:30 p.m. - 9:30 p.m.	Welcoming Reception In The Exhibit Hall
	Exhibit Opens

Sunday, August 27

8:30 a.m. - 11:00 a.m.	Applications Workshops
8:30 a.m. - 11:30 a.m.	Research & Development Sessions
9:30 a.m. - 5:00 p.m.	Exhibits
Noon - 2:00 p.m.	Awards Luncheon
2:30 p.m. - 4:30 p.m.	Applications Workshops, cont'd.
2:00 p.m. - 4:30 p.m.	Research & Development Sessions, cont'd.
5:00 p.m. - 6:00 p.m.	WJTA Biennial Business Meeting

Monday, August 28

9:30 a.m. - 2:30 p.m.	Exhibits
8:30 a.m. - 11:00 a.m.	Applications Workshops
8:30 a.m. - 11:30 a.m.	Research & Development Sessions
Noon - 2:00 p.m.	Luncheon In Exhibit Hall
2:00 p.m. - 4:30 p.m.	Applications Workshops, cont'd.
2:00 p.m. - 5:00 p.m.	Research & Development Sessions, cont'd.
6:30 p.m. - 11:00 p.m.	Texas Theme Party

Tuesday, August 29

9:30 a.m. - 3:00 p.m.	Technical Tour And Field Demonstrations