

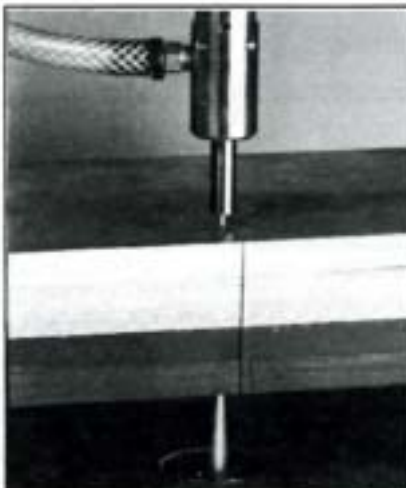


1991 CONFERENCE ISSUE



Cleaning

Cleaning cement residue from a mixer. Hear about advanced cleaning applications and procedures at the 1991 WJTA Conference.



Cutting

Advances in abrasive and non-abrasive jet cutting will be reported at the 1991 WJTA Conference.



Surface Preparation

Scarifying a concrete surface with pure water. Techniques for hydrodemolition will also be discussed at the 1991 WJTA Conference.

6th American Water Jet Technology Conference

August 24-27, 1991

Westin Galleria

Houston, Texas

Whether you are an expert, researcher, or novice in the rapidly growing industry of water jetting technology, don't miss this conference. Meet colleagues from around the world and review, discuss, and exchange ideas on all aspects of water jetting.

TECHNICAL PROGRAM, RESEARCH & DEVELOPMENT PAPERS	pg. 8-9
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From the president's desk...

Waterjets have a wide range of applications. As evidence of this, I cite the water jetting applications that I have been involved with recently. These include:

1. Abrasive jet drilling in reinforced concrete for bridge retrofit for earthquake protection.
2. Abrasive jet drilling of rock bolt holes.
3. Disaggregating frozen gravel.
4. Cutting slots in granite.
5. Restoring and strengthening a historic building.
6. Borehole mining.
7. Railroad bridge retrofit.
8. Creating sculpture.

Water jets excel in those applications which require precise placement of a high-energy density in hard-to-access locations. Applications are limited only by our imaginations. Few problems are insoluble when a versatile tool like water-jet cutting works in tandem with an inventive mind.

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Letters to the editor:

Dear Jet News:

Leeds Industries was very pleased to see the article in the "WJTA Jet News," April 1991 edition, about the cutting of the Berlin Wall by abrasive water-jet cutting technology. Leeds Industries did **this very special art cutting** and we are very disappointed that you did not research and mention in your article that Leeds Industries cut the Berlin Wall art piece.

We engineered for this project a new cutting tracker that cuts any angle, and circles fully automatically. We spent about 2 months in establishing how to move the wall without cracking it, setting and bracing the wall up for the cut, and locating the cut. This was quite a task due to the fact that the concrete contained newspaper, sticks, metal chips, rebar, and other particles.

Leeds Industries worked very closely with the artist, Edwina Sandys, from the beginning to the first presentation of the Wall at the IBM Building Art Gallery in New York City, opening on September 4, 1990, before it was shipped to Westminster College, Fulton, Missouri, for its final permanent display.

We at Leeds Industries are very proud and very excited to have participated in such an event.

We are sending you some pictures of the Wall while it was being cut and also some of the people who participated. We do have a number of videos that we could show to your members at a WJTA meeting. Leeds Industries is planning to join your association and we are hoping that you will in your next WJTA Jet newsletter mention that you have discovered that Leeds Industries cut the Berlin Wall art piece called "Breakthrough."

Sincerely,

Victoria R. Buwen, Marketing
Manager
Leeds Industries, Inc.
5 S. Front Street
Elizabethport, NJ 07206
(908) 355-7775



Leeds Industries President Bob Calandra and "Breakthrough" artist Edwina Sandys. Photo courtesy of Leeds Industries, Inc., Elizabethport, NJ.

The Editor's Reply:

I was pleased to receive Ms. Buwen's letter and to learn about the creation of "Breakthrough." This sculpture represents the breakthrough to freedom and commemorates the end of the Cold War. "Breakthrough" is made from eight concrete sections of the Berlin Wall. The 11 by 32 foot sculpture was executed by Edwina Sandys, using abrasive jet cutting equipment at Leeds Industries in Elizabeth, New Jersey. A 35,000-psi, 5.60-gpm abrasive jet was employed using garnet and a wooden template.

Edwina Sandys is a granddaughter of Sir Winston Churchill. She has an international reputation as both a painter and a sculptor. She has monumental sculptures permanently sited in Geneva, Vienna, New York and St. Louis. Her sculpture "Women Free" is permanently sited at the United Nations Center in Vienna. Another of her works "Branches of Promise" is the World's largest glass sculpture and is on display at the corporate headquarters of Monsanto Corporation in Creve Coeur, a suburb of St. Louis.

A videotape relating to the creation of "Breakthrough" will be shown at the Sixth American Water Jet Conference in Houston, August 24-27, 1991.

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*Come see us at the 6th
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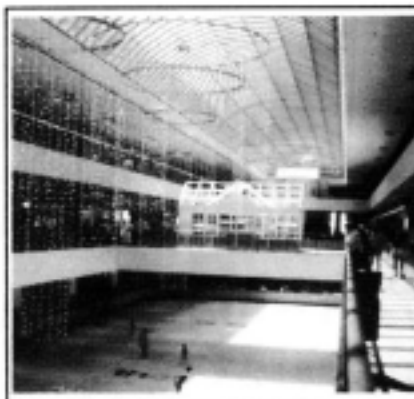
World's largest water jetting round-up headed for Houston, Texas



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1991 WJTA Conference Schedule of Events

SATURDAY, AUGUST 24, 1991

8:30 a.m. - 4:30 p.m.

6:30 p.m. - 8:00 p.m.

Water Jetting Short Course

Welcoming Reception

SUNDAY, AUGUST 25, 1991

8:30 a.m. - 4:30 p.m.

Noon - 5:00 p.m.

4:30 p.m. - 6:00 p.m.

Concurrent Sessions

- General Technical Session
- Water Jet Contractors and Users Workshop

Exhibits Open

WJTA Biennial Business Meeting

MONDAY, AUGUST 26, 1991

7:30 a.m. - 5:00 p.m.

8:30 a.m. - 5:00 p.m.

7:00 p.m. - 11:00 p.m.

Exhibits Open

General Session

Reception and Dinner Banquet

TUESDAY, AUGUST 27, 1991

7:30 a.m. - 10:30 a.m.

8:30 a.m. - Noon

Noon - 6:15 p.m.

Exhibit Hall Open

General Session

Technical Tour and Demonstration

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Water Jetting Short Course

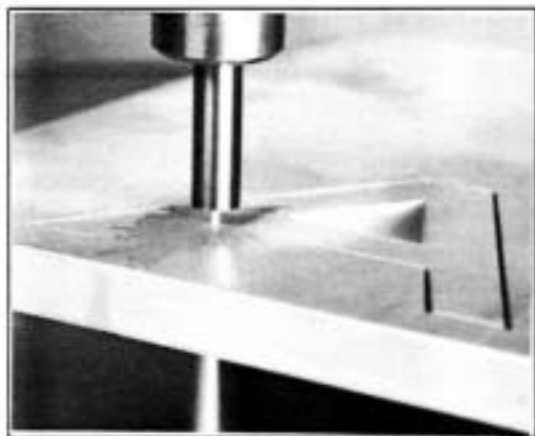
Saturday, August 24, 1991

8:30 a.m. - 4:30 p.m.

A one-day review of the basic techniques and applications of water jetting technology.

What you will learn about the basic techniques and applications of water jetting technology:

- The history of water jetting
- The fluid mechanics of various types of jets, i.e., pure water, abrasive, pulsed, cavitating
- Parameters that influence basic jet performance (pressure, nozzle diameter, flow rate)
- How the performance of abrasive and non-abrasive jets compare
- Performance capabilities of high pressure fluid jets
- The types and costs of high pressure jetting equipment and operations
- Applications of water jetting technology in industrial, construction, and mining environments, including
 - cleaning, cutting, deburring
 - coating removal
 - hydrodemolition
 - maintenance
 - surface preparation
- Integrating jets with automated equipment, including robotics
- Safety procedures for operating water jetting equipment



Abrasive water jet cutting the letter A from a piece of 1/2-inch-thick aluminum. At the Water Jetting Short Course you will learn about the fluid mechanics of various jets - pure water, abrasive, pulsed, and cavitating - and how abrasive jets can be integrated with computers for precision cutting applications.

Who should attend:

- **First-time users** of water jetting equipment
- **Experienced users** of water jetting equipment who want an update on state-of-the-art technology
- **Production and maintenance employees** who handle or will be handling water jetting equipment
- **Research and development personnel** who want a broad overview of water jetting technology
- **Students** in the sciences or in industries that frequently apply water jetting technology
- **Safety officers**

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The Water Jetting Short Course Handbook

Each attendee receives a copy of *Fluid Jet Technology - Fundamentals and Applications* packed with over 200 pages of information about water jets.

Written by leading experts in the field of water jetting technology, this handy reference book contains nine chapters on water jetting topics, including:

- Historical Perspective of Fluid Jet Technology
- Fluid Mechanics of Jets
- Influence of Basic Jet Parameters
- Abrasive Jets
- High Pressure Equipment
- Water Jet Assisted Technology
- Plant/Construction Applications
- Industrial Applications
- High Pressure Safety
- Fluid Jet Technology - Information Resources
- Fluid Jet Cutting Data

So that you may add additional information, the Water Jetting Short Course Handbook is bound in a hardcover 3-ring binder.

Technical Program, Research & Development Papers

SUNDAY, AUGUST 25, 1991**Session I: Abrasive Jets - Material Removal Mechanisms****8:30 a.m. - 10:30 a.m.**

1. Photoelastic Investigation Of Jet Piercing Process, by M. RAMULU, H. YEH, K.P. WONG, S.P. RAJU
2. Characterization Of Material Removal In The Course Of Abrasive Waterjet Machining, by F. HU, Y. YANG, E.S. GESKIN, Y. CHUNG
3. Prediction Equations For Depth Of Cut Made By Abrasive Water Jet, by S. MATSUI, H. MATSUMURA, Y. IKEMOTO, Y. KUMON, H. SHIMIZU
4. A Study Of A Leading Edge Profile For A Slot Formed During Hydro-Abrasive Cutting, by M. MAZURKIEWICZ
5. Effect of Target Material In Abrasive Waterjet Turning, by M. HASHISH, A. ANSARI

Session II: Excavation/Tunneling Applications**10:45 a.m. - 12:05 p.m.**

1. An Advanced System For Rock Tunneling - Results From A Field Experiment, by M. HOOD, X. LI, P. SALDITT, G. KNIGHT
2. Jet Power Optimization In Granite Kerfing Using Oscillating Nozzles, by A. BORTOLUSSI, R. CICCUCI, WAN-MO KIM, P.P. MANCA, G. MASSACCI
3. Tests On Walls Of A Railway Tunnel And Samples Of Concrete And Blocks Of Rocks With High Pressure Water Jet Equipment For Outdoor Applications In Czechoslovakia, by J. VASEK, J. FOLDYNA, J. NOVAK
4. The Impulsive Water Jetter Is A Qualitatively New Machine For Rock Breaking, by G. ATANOV

Session III: Abrasive Jets - Cutting Performance Characterization**1:30 p.m. - 3:00 p.m.**

1. High Precision Cutting Method For Metallic Materials By Abrasive Waterjet, by S. MATSUI, H. MATSUMURA, Y. IKEMOTO, H. SHIMIZU, I. TAKADA
2. Comprehensive Evaluation Of Abrasive Waterjet Cut Surface Quality, by P.J. SINGH, W.L. CHEN, J. MUNOZ
3. Characterization Of Energy Dissipation Phenomenon In Abrasive Waterjet Cutting, by J. ZENG, R. HEINES, T.J. KIM
4. Precision Machining With Abrasive Jets, by M. HASHISH

Session IV: Mining Applications**3:30 p.m. - 4:30 p.m.**

1. An Abrasive Jet Borehole Miner, by G. A. SAVANICK
2. Comparison Of The Performance Of High-Speed Abrasive-Entrained Cavitating And Plain Water Jets For Selective Mining Applications, by M.M. VIJAY
3. A High Pressure Waterjet System For Inseam Longhole Drilling In Coal, by P. KENNERLEY, R. PHILLIPS, G.D. JUST, D.A. SUMMERS

MONDAY, AUGUST 26, 1991**Session V: High Pressure Equipment and Systems****8:30 a.m. - 10:10 a.m.**

1. The Development Of An Inexpensive, Accurate And User Friendly Water Jet Motion Control Cutting Machine, by C.M. OLSEN, R.H. TODD
2. Procedure Optimization And Hardware Improvements In Abrasive Waterjet Cutting Systems, by K. ZARING, G. ERICHSEN, C. BURNHAM
3. Water Treatment For Water Jet Cutting Equipment, by R. MCFAUL
4. Integration of Ultra-High Water Pressure Jet Cutting With Multi Axis Control Devices, by S.T. JOHNSON

Technical Program, Research & Development Papers

MONDAY, AUGUST 26, 1991, cont'd

Session VI: Abrasive Jets - Fluid Mechanics and Nozzle Design 10:30 a.m. - 12:10 p.m.

1. Measurement Of Particle Velocities In An Abrasive Jet Cutting System, by A.L. MILLER, J.H. ARCHIBALD
2. Correlation Between Particle Velocity And Conditions Of Abrasive Waterjet Formation, by W.L. CHEN, E.S. GESKIN
3. Long Life Abrasive Water Jet Nozzles And Their Effect On AWJ Cutting, by G.A. MORT
4. Effect Of Parameter Selection On Abrasive Waterjet Performance, by E.J. CHALMERS
5. Laser-Velocimetry Investigations Of The Flow In Abrasive Water Jets With Varying Cutting Head Geometry, by U. HIMMELREICH, W. RIESS

Session VII: Construction, Non-Manufacturing Applications 1:30 p.m. - 3:00 p.m.

1. Investigation On Water-jet Cutting Of Concrete In Water Surroundings, by A. KLICH, A. KALUKIEWICZ
2. Effect Of Nozzle Traverse Rate And Number Of Passes On Soft Ground Cutting By Water Jet, by H. YOSHIDA, R. ASANO, H. KUBO, S. JINBO, S. UESAWA
3. One Of The World's Largest Hydro-Abrasive Cutters, by M. PILON
4. Water Jet Cutting Of Concrete, by A.W. MOMBER

Session VIII: Novel Jets and Applications - I 3:30 p.m. - 5:00 p.m.

1. Computational Fluid Dynamics Analysis Of Submerged Cavitating Water Jets, by M.K.Y. LAI, M.M. VIJAY, C. ZOU
2. Methods Of Process Control For Abrasive Water Jets, by H. LOUIS, G. MEIER
3. Cutting With High Pressure Abrasive Suspension Jets, by M. HASHISH
4. A Newly Developed Spiral Nozzle For Abrasive Acceleration In Jet Cutting Applications, by K. HORII, Y. MATSUMAE, X.M. CHENG, S. KAGE, H. SHODA, B. HASHIMOTO, T. J. KIM

TUESDAY, AUGUST 27, 1991

Session IX: Novel Jets and Applications - II 8:30 a.m. - 10:00 a.m.

1. Development Of A Cryogenic Waterjet Technique For Biomaterial Processing Applications, by P. TRUCHOT, P. MELLINGER, R. DUCHAMP, T.J. KIM, R. OCAMPO
2. Hole Piercing In Thin Metals Using Water Jets, by T.J. LABUS, K.F. NEUSEN
3. Hyper Pressure Waterjet Cutting Of Thin Sheet Metal, by C. RAGHAVAN, E. TING
4. Preparation Of Secondary Fiber Stock By High Pressure Waterjets, by G. GALECKI, M. MAZURKIEWICZ, D.A. SUMMERS, T. NIXON

Session X: Direct Pumping of Abrasive Suspension Jets: Basics and Applications 10:30 - Noon

1. Rheological Investigation Of The Abrasive Suspension Jet, by R.H. HOLLINGER, R.J. MANNHEIMER
2. DIAjet Cutting Of Dolomite And Chert - A Case Study At The St. Louis Arch, by J. YAO, D.A. SUMMERS, G. GALECKI
3. Field Trials And Developments Of The DIAdrill Concept, by J. YAO, D.A. SUMMERS, G. GALECKI, J.G. BLAINE, L.J. TYLER
4. The Future For Abrasive Jet Cutting, by D.S. MILLER, E.J. BLOOMFIELD

Poster

1. Surface Strengthening Of Metals By Water Jet, by L. XIAOLING



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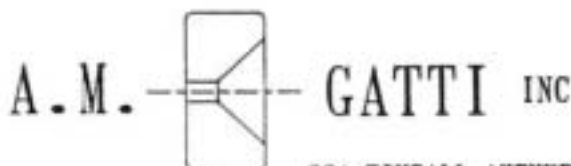
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See page 15 for registration
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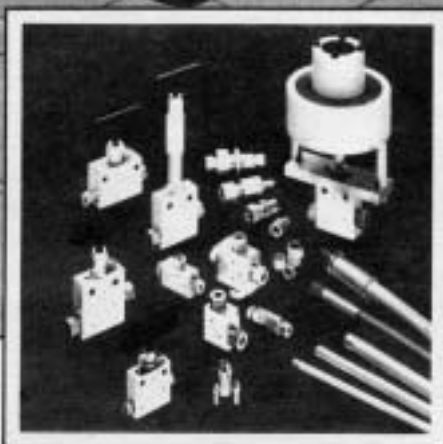
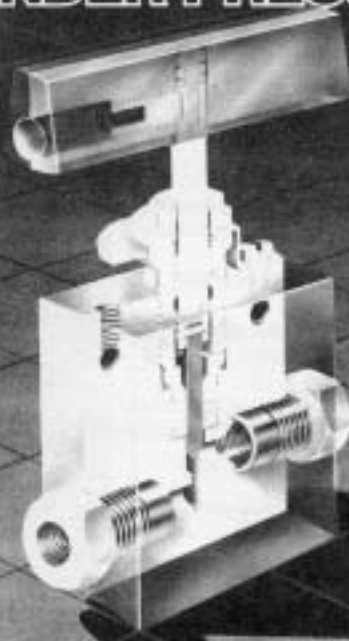
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Stop by and see us at the 6th American Water Jet
Technology Conference, Booth #103.

Contractors and Users Workshop

Sunday, August 25, 1991

9:00 a.m. - 4:30 p.m.

Learn the Latest About:

- **New Equipment** - for industrial cleaning, hydrodemolition, coating removal, surface preparation, and cutting
- **Money Matters** - bidding, budgeting, financing, purchasing, and leasing
- **Liability Protection** - preventing negligence lawsuits, what constitutes negligence, insurance
- **Safety** - procedures, training, equipment, and clothing
- **Problem Solving** - how to get help and find special equipment and fixtures
- **Comparing Technologies** - stationary vs. spinning nozzle heads, pumps vs. intensifiers, abrasives vs. non-abrasives, pressure vs. flow rate
- **Business Operations** - training equipment operators, maintaining equipment
- **Government Regulations** - EPA (hazardous waste), OSHA (safety)

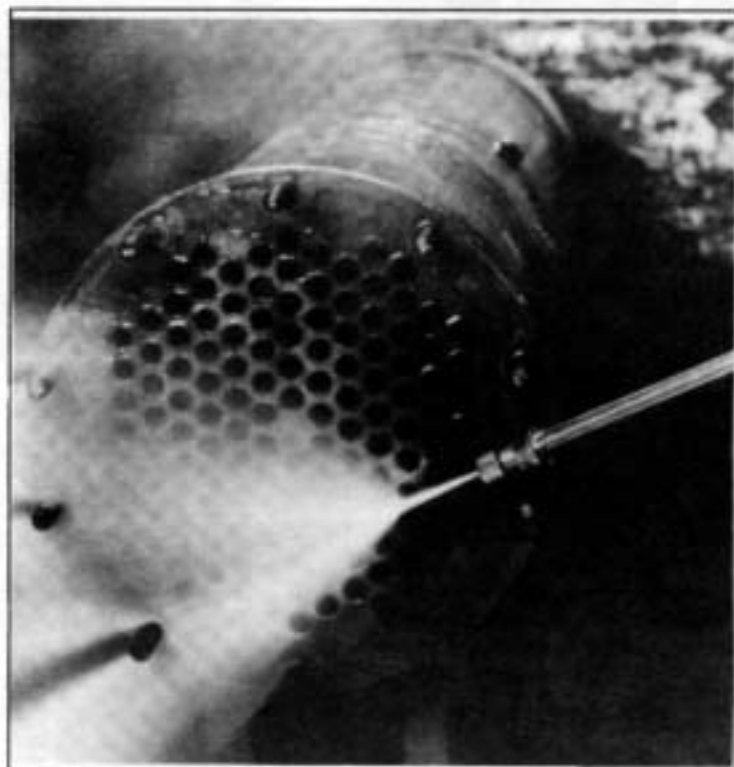
Topics include:

- High Pressure Flow Control Valves
- A New Rotary Water Jet Concrete Demolition Method
- A Hydrodemolition System Using 600 hp at 20,000 psi
- Practical Applications of Portable Ultra High Water Pressure Jet Cutting and Jet Blasting Equipment and Technology
- Self-Rotating Nozzle Heads
- Recent Developments in the High Pressure Water Blast Gun
- How to Reduce Your Exposure to Negligence Lawsuits

PLUS

• Panel Discussions

• Question and Answer Sessions



Manual cleaning of heat exchanger tube bundle with a waterjet. At the Contractors and Users Workshop you will learn about advanced cleaning methods for industrial and construction applications.

SESSION I:

New Equipment for the '90s

Presenters: *W. Hall Jr.*
G.G. Yie

SESSION II:

Water Jetting Safety and Liability Protection

Presenters: *E. Fitzgerald*
M. Rankin, Esq.

SESSION III:

Unusual Problems and Solutions

Presenters: *J. Turnbull*
T. Sakamoto
T. Isobe
M. Arai

SESSION IV:

Comparing Alternative Technologies

Presenters: *G. Zink*
J. Wolgamott
M.T. Gracey

SESSION V:

Maintenance, Economics, and Other Operational Topics

Presenters: *E.F. "Frank" Cole*

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- 1. FULL CONFERENCE:** Includes admission to all technical and scientific sessions (except Short Course), exhibition, coffee breaks, luncheons, receptions, banquet, and technical tour and demonstration. **Each full registrant also receives one hardbound copy of the official Conference Proceedings.**
- 2. COMBO:** Includes everything listed under Full Conference **PLUS** admission to the Water Jet Short Course.
- 3. DAILY ATTENDANCE:** Includes admission to all technical and scientific sessions, exhibition, coffee breaks, and luncheon for one day. Daily registration on Tuesday also includes the technical tour and demonstration.

NOTE: The official Conference Proceedings and admission to receptions and/or the banquet are **NOT** included in the daily registration fee. The Proceedings or optional function tickets must be purchased separately.

- 4. WATER JETTING SHORT COURSE:** Includes the manual *Fluid Jet Technology - Fundamentals and Applications*, coffee breaks, and luncheon.
- 5. EXHIBIT HALL ONLY:** Includes admission to the Exhibit Hall where you'll see 40 booths of water jetting equipment, supplies, and services on display.
- 6. TECHNICAL TOUR ONLY:** Includes round-trip bus transportation, boxed luncheon, and admission to four company sites where you'll see live water jetting demonstrations.

CANCELLATION POLICY

Fees will be refunded in full for cancellations received at least six weeks prior to the Conference. Cancellations received more than 21 days and less than six weeks prior to the Conference will be subject to a \$50 charge. No refund will be made for cancellations received less than 21 days prior to the Conference. However, substitutions may be made at any time.

Discounts for WJTA members and early-bird registrants!

WJTA members receive a special discount off the regular registration fees. You will also receive a special additional discount if your registration is postmarked or received in the WJTA office by **August 15, 1991.**

Hotel Accommodations

The Westin Galleria is the official hotel for the 6th American Water Jet Technology Conference.

The Westin Galleria is located in the Galleria Mall, one of the world's largest shopping malls with over 300 international shops, movie theaters, restaurants, and night clubs.

Reserve your hotel accommodations now to take advantage of the low group room rates of \$79 single occupancy or \$84 double occupancy.

To reserve your room(s), call the Westin Galleria directly at (713)960-8100. Be sure to identify yourself as a participant in the WJTA's 1991 Conference.

★ ★ ★ EXHIBITS ★ ★ ★

SCHEDULE:

Sunday, August 25	Noon - 5:00 p.m.
Monday, August 26	7:30 a.m. - 5:00 p.m.
Tuesday, August 27	7:30 a.m. - 10:30 a.m.

Get the most out of this marketplace of high-tech water jetting equipment, supplies and services. Learn how these industry vendors can best serve you:

Aqua-Dyne Inc.
Autoclave Engineers Group
Barry Bros. Specialized Services
Barton Mines Corporation
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Cleaner Times Magazine
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Flow International Corporation
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GTC Chemical Services Inc.
Hammelman Corporation
Hydro Environmental Services
Limited Partnership
Hydro-Pac
Industrial Pressure, Inc.

Ingersoll-Rand Water Jet Cutting Systems
Jet Edge, Inc.
Jetting Systems & Accessories, Inc.
LaPlace Steam Cleaning
Laser Applications Inc.
Leeds Industries, Inc.
NLB Corporation
Pipeline Supply & Service Co., Inc.
Power Track, Inc.
Schoeller-Bleckmann/Bafco/Toyo Glass
Machinery Co. Ltd.
StoneAge, Inc.
Sugino Corporation
Technicut
Wilco Supply Inc.
Woma Corporation

THREE EASY WAYS TO REGISTER



BY PHONE

Just call (314)241-1445 and have your credit card information ready. (MasterCard/VISA ONLY).



BY FAX

Here's our 24-hour FAX number for your convenience (314)241-1449. Fill out the registration form with your credit card information.



BY MAIL

Fill out the registration form and mail with applicable payment to:

WJTA
818 Olive Street - Suite 918
St. Louis, MO 63101 USA



YES,

I want to learn the latest water jet technology developments and applications. Please register me for the 6th American Water Jet Conference.

☐ Please keep me on your mailing list for additional information.

Name: _____

Title: _____

Company: _____

Address: _____

Postal Code: _____

Telephone No.: () _____

Information for name badge:

(give name as you wish it to appear on badge)

PAYMENT METHOD

☐ Check enclosed payable to **6th American Water Jet Technology Conference (U.S. DOLLARS ONLY).**

☐ MasterCard ☐ VISA

Credit Card Number _____

Exp. date _____

Print name as it appears on card _____

Cardholders signature (required for validation of payment) _____

CONFERENCE REGISTRATION FORM:

Join the Water Jet Technology Association now and receive a substantial discount off Conference registration fees.

WJTA MEMBERSHIP ☐ \$40 Individual membership ☐ \$250 Corporate membership = \$ _____

WJTA MEMBER

NONMEMBER*

Before
8/15/91

After
8/15/91

Before
8/15/91

After
8/15/91

☐ Full Conference ONLY

\$375

\$405

\$415

\$445

= \$ _____

☐ Combo (Full Conference and Water Jet Short Course)

\$510

\$540

\$550

\$580

= \$ _____

☐ Daily (check day)

\$150/day

\$165/day

\$165/day

\$180/day

= \$ _____

☐ Sunday ☐ Monday ☐ Tuesday

_____ days X \$ _____ = \$ _____

OPTIONAL

☐ Water Jet Short Course ONLY

\$195

\$210

\$215

\$230

= \$ _____

☐ Extra Conference Proceedings (1 copy included in Combo and Full registration packages)

\$ 75

\$ 90

\$ 75

\$ 90

= \$ _____

☐ Extra Banquet Tickets _____ @

\$ 45

\$ 50

\$ 45

\$ 50

= \$ _____

☐ Exhibit Hall Admission ONLY

\$ 10

\$ 10

\$ 10

\$ 10

= \$ _____

☐ Technical Tour & Demonstration ONLY

\$ 75

\$ 85

\$ 75

\$ 85

= \$ _____

TOTAL ENCLOSED \$

*Non-WJTA members who are members of the International Society of Water Jet Technology are permitted a 5% discount off nonmember registration fees.

*Full-time students may register at a 50% discount off nonmember registration fees.

Upcoming events

August 24-27, 1991 - Sixth American Water Jet Technology Conference, Houston, Texas. Please contact the Water Jet Technology Association (314) 241-1445.

September 24-26, 1991 - Geomechanics '91, Hrodec, Czechoslovakia. Please contact Z. Rakowski, Mining Institute of Czechoslovak Academy of Science, A. Rimana 176B, 70800 Ostrava Poruba, Czechoslovakia.

September 24-26, 1991 - Effective Waterjet Machining, Los Angeles, California. Please contact Kristin Dudash, Society of Manufacturing Engineers (313) 271-1500, extension 399.

If you want to change a man, start with his grandfather.

-G. B. Shaw

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Robotics and computerized control add precision to abrasive jet cutting of fiberglass. Attend the 6th American Water Jet Technology Conference and learn more about integrating jets with automated equipment.

"Anyone involved in water jetting research and development should be there. The WJTA Conference is the most important meeting of the year!"

- Dr. Mohan Vijay
Senior Research Officer Institute of
Mechanical Engineering
National Research Council of Canada

"A number of new contacts from the last WJTA Conference have proven useful in my business. Attending the WJTA meeting really pays off!"

- John Wolgamott
Vice President
StoneAge, Inc.

"Most of the innovations I hear about and study are presented at the WJTA Conference."

- Dr. David Summers
Curators' Professor of Mining Engineering
High Pressure Water Jet Laboratory
University of Missouri-Rolla



Abrasive water jet technology was used for the special cutting of the Berlin Wall to create "Break-through," shown here on display at Westminster College.

Attend the 6th American Water Jet Technology Conference and learn more about the Berlin Wall sculpture and abrasive jet cutting of stone, marble, and concrete.