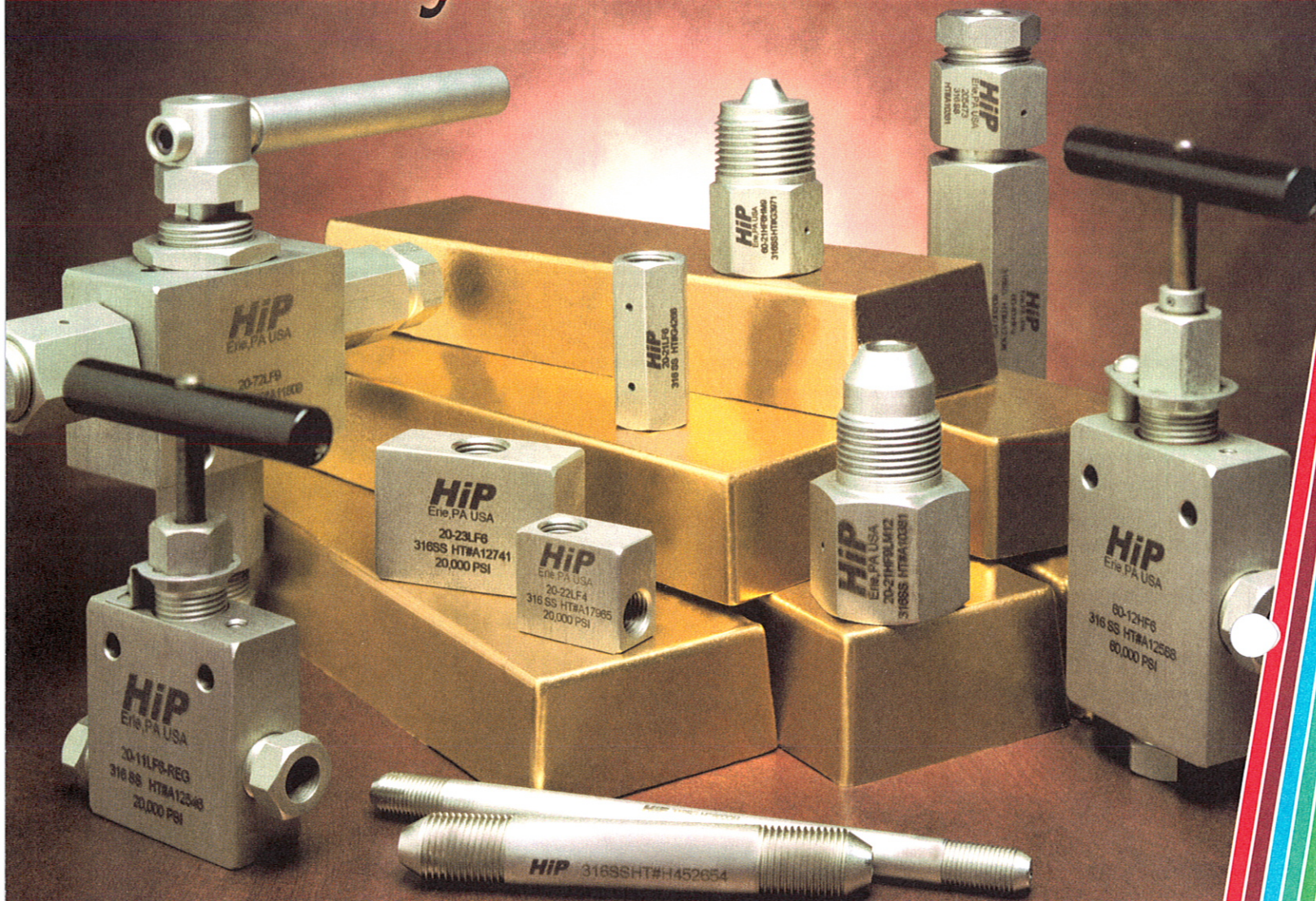


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**Jet News**

JUNE 2003

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## Hydrodemolition On A Nuclear Reactor Dome



A waterjet cut kerf on the nuclear reactor dome. During the first stage, a 20,000 psi, 80 gpm jet cut concrete 12 inches deep. The reinforcement bars were cut during the second stage. During the third stage, the kerf was cut to the full depth of 24 inches. The kerf cutter used a 3.6mm-diameter ceramic nozzle. An elaborate structure of steel, plywood and rubber was constructed under the dome prior to the cutting operation in order to control the flow of the cutting water. See article on page 2. Photograph reprinted courtesy of North American Services Group.

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### 2003 American Waterjet Conference

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*If you are interested in being a  
sponsor, exhibiting or  
demonstrating your equipment at  
the conference, contact Ken  
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Hydrodemolition On A Nuclear Reactor Dome, from page 1

North American Services Group, a New York State based corporation, performed the world's first hydrodemolition opening of a nuclear reactor dome. The general contractor, Bechtel Corporation, hired North American to create two openings in the reactor dome at Sequoyah Nuclear Plant in Soddy-Daisy, Tennessee (near Chattanooga). North American's hydrodemolition services were instrumental in completing this \$160 million dollar project.

North American Services Group, one of the largest specialized industrial service companies in the United States, excels at unique projects such as this. The hydrodemolition division spent the past year completing the design, engineering and testing of its hydrodemolition robot, tracking system, water containment and treatment facility, said Jack Sirois, senior project manager for North American. North American cut two 1,500 square foot openings in the containment dome, which allowed Bechtel to remove and replace the steam generators. North American used high pressure water blasting technology at 20,000 psi, 80 gpm, to create the two openings. The concrete slabs that were removed weighed over 200,000 pounds each. The actual hydrodemolition phase took approximately two weeks to complete.

The entire project went 24 hours a day, seven days a week, for three months to complete the replacement of four steam generators at this nuclear power facility. Tennessee Valley Authority project manager, Mr. Bob Rausch, stated that this project proceeded extremely well and was the most extensive equipment upgrade in the Sequoyah Nuclear Plant's history.

For additional information, please contact Rick Fitzgerald at North American, 800-866-6247, rfitzgerald@naisinc.com, or visit its website at www.naisinc.com.



An oval of reinforced concrete approximately 45 feet in diameter and 24 inches thick suspended on a 200,000-ton capacity crane. The picture above shows the concrete oval just lifted from the dome. The picture on the right shows the concrete oval being lowered. The oval of reinforced concrete weighed 160 tons. This high capacity crane was used to provide a large factor of safety during lifting. This crane is one of the largest in existence. It used four million pounds of counterweight and arrived on site in 157 tractor-trailers. Photographs reprinted courtesy of North American Services Group.



WJTA Conference Exhibitors

(updated through June 15, 2003)

- AccuSTREAM
- Aimm Technologies, Inc.
- Ameri-Force Labor Services
- Aqua-Dyne, Inc.
- Autoclave Engineers, Fluid Components Division of Snaplite, Inc.
- Barton Mines Co., LLC
- Bingham Manufacturing
- Boatman Industries Inc.
- Boride Products
- Business & Industry Connection (BIC) Magazine
- BuTech Pressure Systems
- CADCRAFT AB
- CAT PUMPS
- Chemac, Inc.
- Cleaner Times Magazine
- EBBCO, Inc.
- EuroNavy/Gts Group
- Flow International Corporation
- Flow-Tech Products GmbH
- Gardner Denver Water Jetting Systems, Inc.
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- JGB Enterprises, Inc.
- Jet Edge
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- LaPlace Equipment Company, Inc.
- Millennium Enterprises, Inc.
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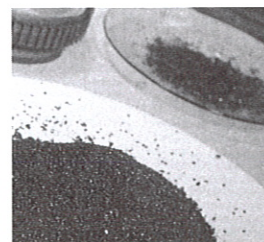
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## Flow International Announces Sale Of Division

Flow International Corporation has announced that it has completed the sale of the assets of its Hydrodynamic Cutting Services (HCS) business to UWG Group. HCS uses ultrahigh-pressure abrasive jet technology to provide cutting services on oil wells and offshore structures.

"In February we announced a two-year restructuring plan to return the company to profitability and reduce debt, by closing, consolidating or divesting non-core businesses," stated Stephen R. Light, Flow's President and Chief Executive Officer. "Consistent with this plan we have completed the sale of this small non-core division. We are pleased with our on-schedule progress on the other aspects of the restructuring plan as we continue to

reduce headcount, working capital and occupied square footage."

UWG, based in the United Kingdom, is a leading supplier of abandonment services for wells and offshore

structures. It has offices in Norwich and Aberdeen in the United Kingdom, Rio de Janeiro, Brazil, and Dubai, United Arab Emirates. UWG will operate the business under the name WellCut™ Inc.

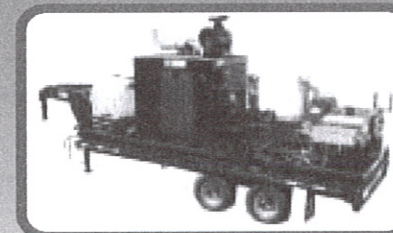
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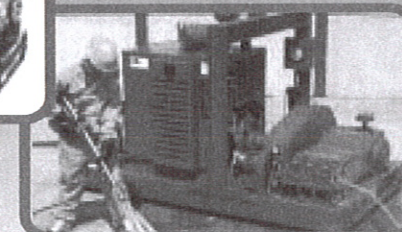
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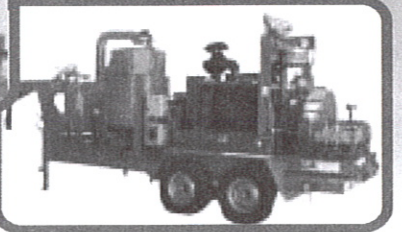
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**2003 WJTA American Waterjet Conference**  
**Papers To Be Presented**  
 August 18 and 19, 2003

**Applications**

- A Method for Suppression of Building Fires, While Providing Access for Interrogative Equipment, Samir Dorle, D.A. Summers, and A. Gupta
- A Mobile Waterjet Training Module, Gary W. Toothe
- Acoustic Emission of Plain Water Jets, A. Bortolussi, R. Ciccu, W. Cuccu, A. Marcus, G. Massacci, and S. Usala
- An Abrasive Suspension Waterjet for Drilling Small-Diameter Holes, P.W. Johnson, A.J. Graettinger and C.H. Sewell
- Developments in Abrasive Waterjets for Micromachining, D.S. Miller
- Formation and Application of a Rectangular Jet, E.S. Geskin and B. Goldenberg
- Improvements in a Multi-Use Waterjet Tool for Humanitarian Demining, R.D. Fossey, D.A. Summers, J.G. Blaine, G. Galecki and S. Dorle
- Inside Abrasive-Waterjet Nozzles, Mohamed Hashish
- Manufacturing Case Study Involving Major Oil Company, Michael T. Gracey and R.O. Berry Jr.
- Pipe Threads – What is the Limit?, D. Wright, J. Wolgamott and G. Zink
- Recommended Practices for the Use of High Pressure Hose, Paul Webster and Stephen Johns
- WJ Decoating, M. Annoni and M. Monno
- Waterjet Nozzle Material Types, D. Wright, J. Wolgamott and G. Zink

- Cutting Mechanism and Cutting Efficiency for Water Pressures Above 600 MPa, H. Louis, M. Mohamed and F. Pude
- Modulation of Cutting Operation With Abrasive Waterjets, Axel Henning and Engelbert Westkämper
- Erosion of Natural Stone by an Abrasive Grains, M. Monno, W. Polini, C. Ravasio and S. Turchetta
- Feasibilities of Abrasive Water Jet Multipass Cutting Technique, B. Jurisevic, K.C. Heiniger, A. Schuetz and M. Junkar
- Investigation of the High-Speed Water Slugs, O. Petrenko, V. Samardzic, E.S. Geskin, G.A. Atanov, B. Goldenberg and A. Semko
- Measurement of Particle Velocities in High Speed Waterjet Technology, Anuja Dorle, L. John Tyler and David A. Summers
- Modeling Jet Cutting of Oil Sands, J.T. Bartley and B. Singh
- Monitoring of the AWJ Cutting in the Submerged Conditions, Andrej Lebar, Bostjan Jurisevic and Mihael Junkar
- Radiological Decontamination of Armored Personnel Carriers with Continuous and Pulsed Waterjets at Umea, Sweden, M. Vijay, W. Yan, A. Tieu, T. Cousins and B. Sandstrom

(continued on page 7)

**WJTA Conference Live Onsite Demonstrations:**

*(participant list as of June 15, 2003)*

Aqua-Dyne, Inc.  
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 Jetstream of Houston, LLP  
 NLB Corporation  
 Reliable Pump, Inc.  
 StoneAge, Inc.  
 TurtleSkin WaterArmor by Warwick Mills  
 Universal Minerals  
 VLN Advanced Technologies, Inc.

**Research**

- An Analytical Model for Prediction of Residual Stresses in Water Jet Peening, N. Ramesh Babu and G. Vikram
- Modelling of Wear Mechanisms at the Abrasive Waterjet Cutting Front, Axel Henning and Engelbert Westkämper
- Comparative Performance Study of Polyacrylamide and Xanthum Polymer in Abrasive Slurry Jet, S.V. Chacko, A. Gupta and D.A. Summers

**An Overview of Waterjet Fundamentals and Applications 2003**

*Revised and Updated*

**Scheduled for Saturday, August 17, 2003, in conjunction with the WJTA American Waterjet Conference (see page 15).**

**The Cutting and Cleaning Programs will be presented concurrently**

Cutting Program	Cleaning Program
<b>Waterjet Fundamentals</b> by Andrew Conn, PhD Conn Consulting	<b>Introduction to Waterjetting</b> by David Summers, PhD University of Missouri-Rolla (UMR)
<b>Jet Material Interaction</b> by Mohamed Hashish, PhD Flow International Corporation	<b>Waterjet Fundamentals</b> by Andrew Conn, PhD Conn Consulting
<b>Equipment and Tools Overview</b> by Thomas Kim, PhD University of Rhode Island (URI)	<b>Waterblast Equipment</b> by Michael Woodward, PhD Gardner Denver Water Jetting Systems
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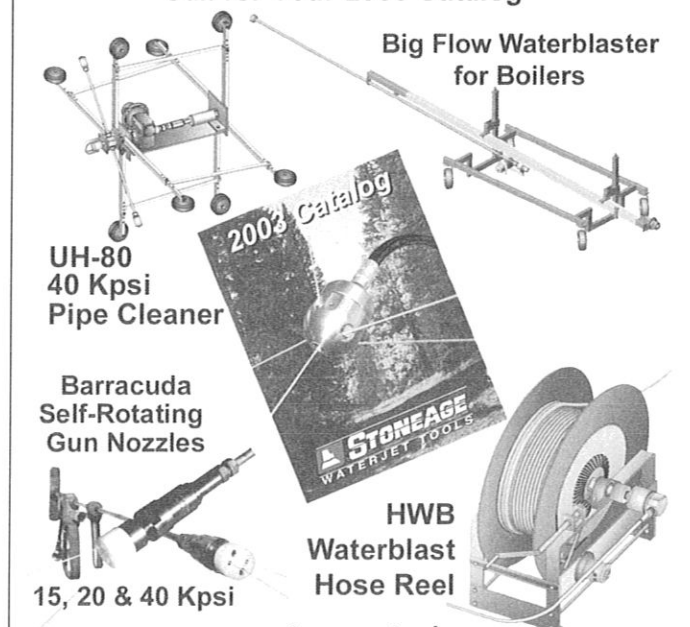
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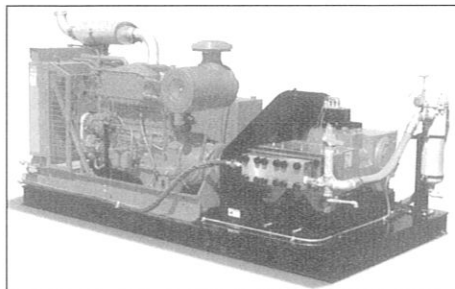
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## NLB 350 Pumps Combine Convertibility With High Horsepower



NLB 350 Series - Convertible Waterjet Pump Unit

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The 350 Series includes diesel and electric units, in 350 horsepower as well as 425 horsepower. All feature NLB's dependable plunger pump design, which minimizes wear and reduces operating costs. Conversions can be performed quickly, using the industry's simplest, most economical kit — which provides all fluid end conversion parts in a convenient case.

The NLB 350 Series also features hard-coated valves and plungers, and lots of corrosion-resistant stainless steel, to extend operating life. Maintenance is simple (5-minute packing changes, for example), and so is operation.

The new units extend NLB's line of convertible waterjet pumps — the

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broadest in the industry — to six models, making it even easier for users to match pumps to their specific applications.

NLB, a leader in high pressure and ultra-high pressure waterjet technology, manufactures a full line of quality waterjetting systems and accessories for contractor and

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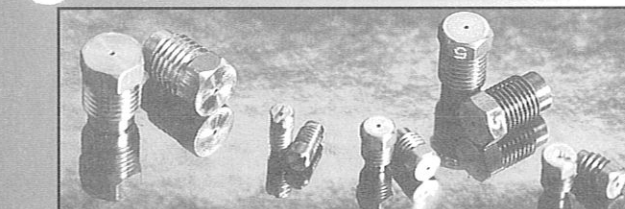
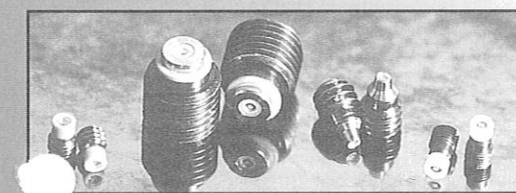
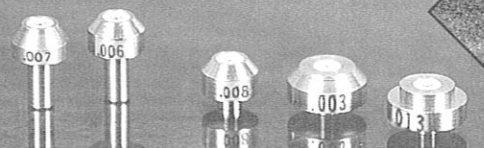


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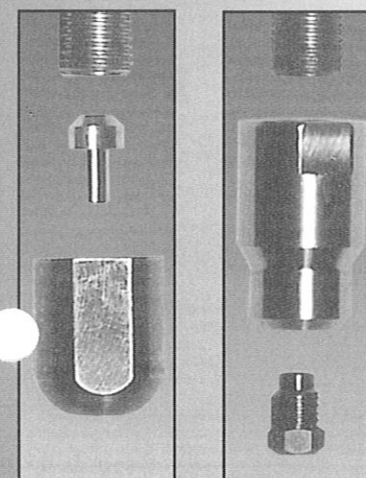
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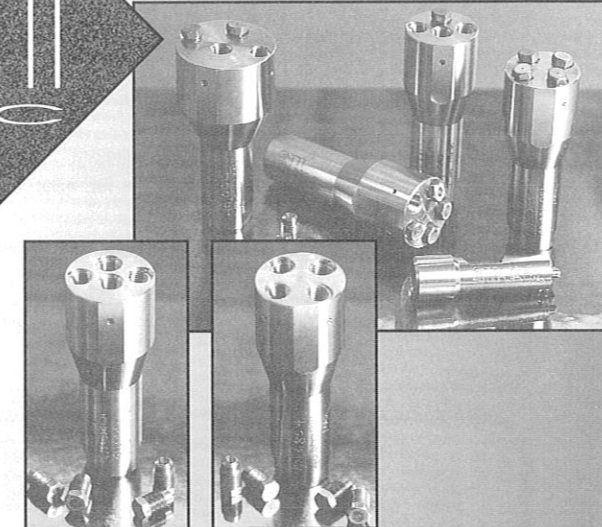
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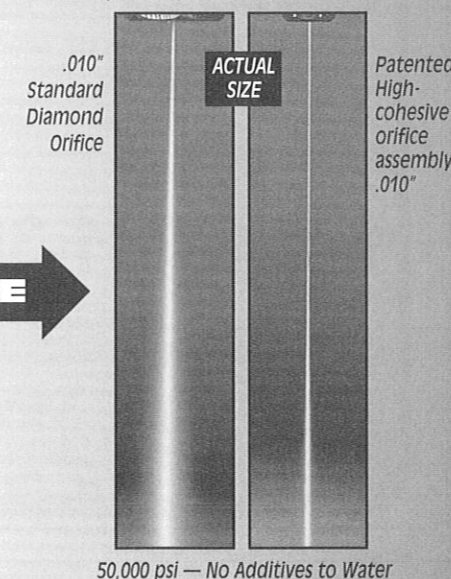
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## 2003 WJTA American Waterjet Conference

August 17-19, 2003, Adam's Mark Hotel, Houston, Texas  
Preliminary Schedule of Events

### Sunday, August 17, 2003

8:00 a.m.-5:00 p.m.  
Concurrent Pre-Conference Workshops  
• Simultaneous Overview Sessions for Cutters and Cleaners  
• Advanced Topics on Surface Preparation  
6:30 p.m.-9:30 p.m.  
Welcoming Reception, Official Opening of Exhibit Hall

### Monday, August 18, 2003

8:00 a.m.-10:00 a.m.  
Onsite Live Demonstrations  
10:00 a.m.-11:30 a.m.  
Poster Session In Exhibit Hall  
10:00 a.m.-5:00 p.m.  
Exhibits Open  
11:30 a.m.-1:00 p.m.  
Lunch in Exhibit Hall  
1:00 p.m.-5:00 p.m.  
Research, Development, New Technology: Paper Presentations  
1:00 p.m.-2:45 p.m.  
Winning Strategies for Doing Business In Industry – Alligator Management & Marketing by Earl Heard, President, The BIC Alliance  
3:00 p.m.-4:00 p.m.  
Contractor's Roundtable: Technology Issues for the Contractor  
Moderated by:  
David A. Summers, Ph.D.  
Curators' Distinguished Professor of Mining Engineering and Director of

the Rock Mechanics & Explosives Research Center, High Pressure Waterjet Laboratory, University of Missouri at Rolla

Speakers:  
Jack Russell, Dow Chemical and Art Walters, Exxon Mobil

5:00 p.m.-6:00 p.m.  
WJTA Membership Meeting  
7:30 p.m.-10:30 p.m.  
Awards Presentation/Party

### Tuesday, August 19, 2003

8:00 a.m.-10:00 a.m.  
Onsite Live Demonstrations  
10:00 a.m.-11:30 a.m.  
Poster Session in Exhibit Hall  
10:30 a.m.-5:00 p.m.  
Exhibits Open  
11:30 a.m.-1:00 p.m.  
Lunch in Exhibit Hall  
1:30 p.m.-5:30 p.m.  
Research, Development, New Technology: Paper Presentations  
1:00 p.m.-2:30 p.m.  
Contractor's Roundtable: Safety Issues for the Contractor  
Moderated by:  
Tim Bonvillian, Vice President  
HydroChem Industrial Services, Inc., Deer Park, Texas  
Speakers:  
William Walker, Equistar Chemical; Buddy Kinney, Exxon Mobil;  
Dennis Cobb, Dupont Engineering

## Rain Bird Puts Sportsplex League Ahead, from page 10

Lord tied into an existing four-inch main line that looped through the sportsplex. To fit the unusually thick C900 PVC material, Lord had to use special, large metal fittings with thrust blocks behind them. The irrigation system took about two months to complete.

Every zone at the Sportsplex is watered at least 10-15 minutes each night, depending on the weather, according to Bolen. During dry conditions, he also runs the system during the day to keep fields moist. The system exceeds expectations, according to Bolen. I am finding new ways to use the controllers each day, especially with rain delays," said Bolen.

"The fields look great. They even looked great over winter when rye was planted in them," said O'Donnell.

## Future System Expansion

Bolen hopes to expand the system to cover areas beyond the playing fields. When the Sportsplex adds Maxicom2 Central Control in the future, Bolen plans to use the system to control the ball field lights as well. He's also considering a liquid

fertilization, which he would inject into the irrigation system, to further reduce maintenance hours.


As far as Bolen is concerned, the League City Sportsplex fields already hold a winner — Rain Bird. "The system, all together, is great."

Article reprinted as a courtesy of Rain Bird Corporation from [www.rainbird.com](http://www.rainbird.com).



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# Rain Bird Puts Sportsplex League Ahead

## Rain Bird System Provides Home Field Advantage for League City

The new League City Sportsplex has scored success within the growing Texas League City community thanks to the hard work and creativity of many individuals and the value of Rain Bird. Today, 19 athletic fields on more than 30 acres have replaced former rice fields and small areas of wetlands.

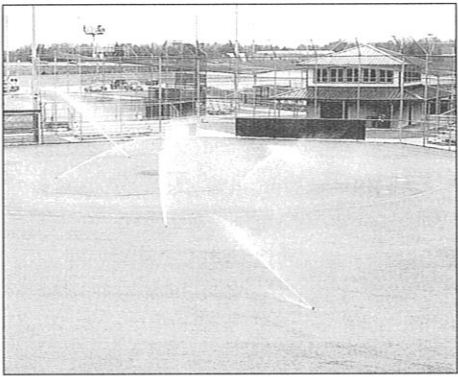
“The fields are almost constantly in use, year-round,” said Rusty Bolen, the Sportsplex maintenance supervisor. Programs range from city and community Little League, youth football, ASA girls softball, and youth soccer to winter flag football and summer volleyball.

The sports complex, which opened in March of 1998, includes a total of ten baseball fields, seven soccer fields, one regulation football field (or two smaller fields) and six sand volleyball courts as well as batting cages.

## Rain Bird Is the Winning Choice

Planning for the sports complex began in 1997. The irrigation system for the League City Sportsplex was originally specified with a competitor’s products. However, when contractor Jeff Lord of Irrigation Concepts began reworking the design and reviewing the budget, he saw a better option. He and distributor John O’Donnell of AMC Industries compared the competitor’s components to Rain Bird’s components and found Rain Bird was a more cost-effective option.

With more than 630 rotors and almost 85 zones, the Sportsplex was the largest job Lord had handled to date. The massiveness of the site and sheer number of heads was a challenge, according to O’Donnell.



**League City Sports Complex.**  
Image provided as a courtesy of Rain Bird Corporation

“Rain Bird gave us good service which allowed us, in turn, to give League City good service,” said Lord. To keep the athletic fields lush, Lord chose Rain Bird Falcon rotors.

“The Falcon rotor’s water distribution pattern was outstanding,” he explained. “Close-in watering was just as good as watering 60 feet away.” The Falcon rotor uses three orifices to ensure this uniform distribution for long-, mid-, and close-in watering.

“The distribution pattern that the Falcon has is superior to other heads...It does a great job,” added O’Donnell.

The Falcon rotor’s patented Rain Curtain™ nozzles produce large water droplets that minimize the effects of wind and reduce misting for superior coverage and water savings. Lord also liked the small diameter of Falcon rotor head and rubber covers to prevent injury.

Lord installed 84 PGA two-inch electric remote control valves throughout the site. The PGA valves, made of durable PVC, offer a globe/angle configuration for greater flexibility in design and installation. Rain Bird 44RC quick-couplers were also specified for every field.

## Taking Control with Rain Bird

To control the system, four ESP-MC controllers offer four independent programs with eight start times each. The controllers can easily be upgraded to Maxicom2 Central Control, which is an addition the Sportsplex is planning in the future.

The ESP-MC controllers’ Cycle+Soak™ feature, which allows station run times to be split to minimize puddling and runoff, was important for the Sportsplex, where sandy and clay soils are prone to runoff, according to Bolen.

The controller’s testing program has made it easy to test problems with heads, make adjustments or manually inspect the system from the controller by turning on one station at a time, explained the maintenance supervisor.

“The system has cut my maintenance time in half,” he said.

The site uses water from a well, drawn into a 40,000-gallon tank and supplemented by city water.

(continued on page 11)

## WJTA Members - Welcome Back

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Fraunhofer Society  
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Germany  
Phone: [49](711)9701775  
Fax: [49](711)9701004

## Papers To Be Presented, from page 4

- Some Aspects of Hydroabrasive Suspensive Jet Cutting of Marble, A. Perec
- Study of Ice Particle Production Using Experimental and Computational Fluid Dynamic Methods, D.K. Shanmugam and Y. Morsi
- Waterjet Researches at São Paulo University: Part 3 Waterjet Methods of Cutting Dimensional Stone, Guillermo Ruperto Martín Cortés, Carlos Tadeu Lauand, Alexandre Sant' Anna and Wildor Theodoro Hennies

## Cutting

- A Study of Abrasive Waterjet Machining of Kevlar Composite, Rahmah Bte Abdullah, Ahsan Ali Khan and M. Ramulu
- Abrasive Waterjet as a Tool for Producing Materials Test Specimens, U. Andersson, G. Holmqvist, and K.M.C. Öjmertz
- Advanced Error Correction Methodology Applied to Abrasive Waterjet Cutting, J. Olsen, J. Zeng, C. Olsen and B. Guglielmetti
- Bending Radius Dependence in AWJ Machining of Stone Free-Form Profiles, L. Carrino, M. Monno, W. Polini and S. Turchetta
- Development of a Production Line for Packaging with Waterjets, Axel Henning, Bernd Biesinger, Peter Willems and Wolfgang Rauh
- Potential of Polymeric Additives for the Cutting Efficiency of Abrasive Waterjets, H. Louis, F. Pude and Ch. von Rad
- Pure Waterjet for Sandwiches – The Second Step, Franz H. Trieb
- Quantitative Study of Abrasive Contamination in a Ductile Material During Abrasive Aqua Jet Machining (AAJM), K. Patel and F. Chen
- WJ Forming: A New Opportunity, E. Grossi, M. Monno and A. Vergari

## Poster

- Abrasive Waterjet Machining of Aerospace Structural Sheet and Thin Plate Materials, I. Connor, M. Ramulu and M. Hashish

- Application of Abrasive Waterjet Machining in Undergraduate Engineering Courses, D.G. Taggart, D. Chelidze, W.J. Palm, B.E. Stucker and T.J. Kim
- Formation and Application of Fine Ice Abrasives, K. Kluz, E.S. Geskin, D.V. Shishkin, B. Goldenberg and O. Petrenko
- Mathematical Modeling of Ultra High Pressure Waterjet Peening, S. Kunaporn, M. Ramulu and M. Hashish
- Physical Basis of High-Pressure Hybrid Water-Abrasive-Ice Jet Application for Surface Treatment, P. Borkowski
- Pure Water-Jet Cutting of Fresh Meat Reduces the Risk of Contamination, M. Alitavoli
- Development of Airport Runway Rubber Glue Removing Vehicle in China, Shengxiong Xue, Zhengwen Chen, Haojun Peng, Yibin Fan, Yongqiang Wang, and Xu Zuo

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## Medway Bridge Rehabilitation With Hydrodemolition

An Aquajet HVD6000 hydrodemolition robot is currently being used for rehabilitation work on the Medway Bridge project in Kent, United Kingdom.

The new M2 road bridge across the River Medway is situated at the western end of a 17km-long motorway widening project on the A2/M2 route between London and the Kent coast.

A new four-lane bridge is being built to carry west bound (London bound) traffic over the river. The new structure is located between the existing Medway Bridge and the new Channel Tunnel Rail Link crossing.

While the new bridge is being constructed the old bridge is being modified for use of coast bound (east bound) traffic.

The bridges form part of an ungrading project of the M2 motorway, which has been deemed necessary because of expected traffic volume increase over the next decade.

The United Kingdom's Highways Agency awarded the £124 million road widening project to the CSM Joint Venture, which comprises Costain, Skanska and Mowlem.

The 17km-long project was awarded to the joint venture in November 1999 and is scheduled for completion in 2003.

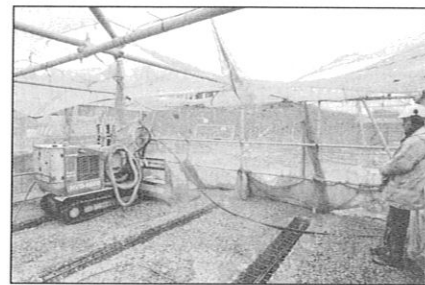
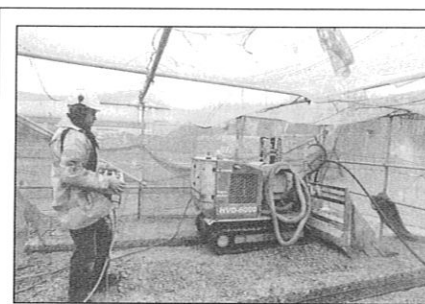
The entire project involves widening the route to four-lanes in each direction, which will be achieved by constructing a new bridge for London bound traffic alongside the existing bridge, and then modifying the original motorway bridge for coast bound traffic.

United Kingdom-based Rentajet - a specialized hydrodemolition company - has been sub-contracted to aid rehabilitation and bridge strengthening of the old Medway crossing.

Using its Aquacutter HVD6000 hydrodemolition robot from Aquajet Systems AB, the contract requires that sections of the old concrete bridge deck be removed so that new rebars can be inserted. This work is necessary according to the Highways Agency to allow the old structure to cope with heavier traffic volumes and larger trucks.

The old bridge deck is being strengthened at intervals close to its abutments, which are located near to the bridge access roads.

The Aquacutter HVD6000 is removing concrete to a depth of 30mm with each section 300mm wide by approximately 15m-long. The robot not only removes the old concrete deck in these designated sections but



Medway Bridge rehabilitation with hydrodemolition

also cleans the rebars of any debris and rust.

Rentajet says that it is removing three identical sections on either end of the old bridge. As the deck is 300mm

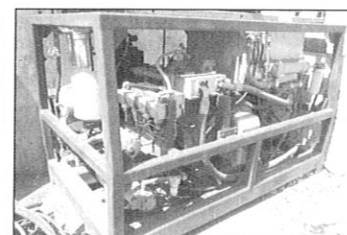
(continued on page 9)

### WaterJet Equipment For Sale



The equipment for sale is the following:  
High Flow (jetpac) built by Flow International in 1985/6 powered by a 510 HP, CAT driving two Abex Denison P7P-1L1A-100A and B pumps powering two intensifiers to deliver 10 GPM @ 24.8 KSI at the nozzle.  
NOTE: the intensifiers were rebuilt in 1991. (Trailer mounted at 18,000 lbs.)

The equipment for sale is the following:  
A High Pressure High Flow Waterjet Power Pack powered by a 250HP electric motor to a Rexroth pump Model #A2V 250HD GL5GZ driving a single large intensifier to develop 6.8 GPM @ 55 KSI  
NOTE: (Skid frame at 11,000 lbs.)



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## Medway Bridge Rehabilitation, from page 8

thick in these areas, a gantry has been set-up underneath the bridge to collect debris from the hydrodemolition operation.

Being supplied with 226 liters of water per minute by a WOMA 550 horsepower high-pressure pump, the Aquacutter is advancing 1m every 15 minutes.

Another section close to the western end of the old bridge is also to be removed to allow for new rebar insertion. Measuring 500mm x 500mm, the Aquacutter robot will aid removal of this section by cutting around its perimeter, while a crane lifts the section out in one piece.

According to John Ward, Rentajet's on-site foreman, the Aquacutter was chosen for this project because of its speed and reliability. "We could do this

work with hand lances but that would be more time consuming and need more manpower," he says. "With the Aquacutter we just need one operator."

Previously, the Aquacutter robot was used for removing sections of the old bridge's central parapet, which previously divided east bound traffic from west bound. The robot removed concrete to depths varying from 200mm to a maximum of 450mm - close to abutments, with two lengths of 160m completed in five weeks.

For further information please contact: Stefan Hilmersson, Aquajet Systems AB, Brunnsvägen 15, SE-570 15 Holsbybrunn, Sweden, telephone - [46](0)383 508 01, fax - [46](0)383 507 30, email - aquajet@aquajet.se.

## Safety Committee Solicits Comments On Improvements To Recommended Practices

The WJTA Safety Committee solicits comments regarding improvements to the publication, *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment*. While the Recommended Practices is reviewed periodically at the biennial conferences of the WaterJet Technology Association, your comments and suggestions for improving the publication are invited and welcome anytime.

Please address your comments and suggestions to: Safety Committee, c/o WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1419, fax: (314)241-1449, e-mail: wjta@wjta.org, web site: www.wjta.org.



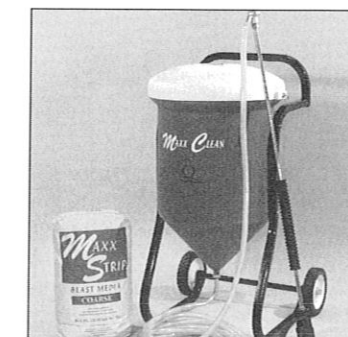
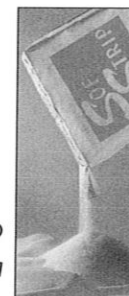
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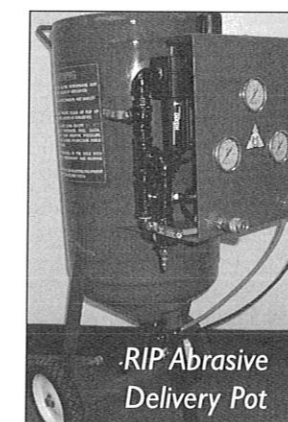


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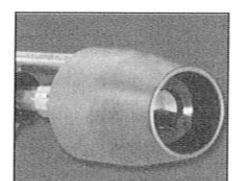
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