

WJTA

**Waterjet Technology
Association**



Jet News

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members*

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The Jet d'Eau On Lake Geneva In Switzerland



The Jet d' Eau on Lake Geneva looking toward the source of the Rhône River in Switzerland.

(see article on pg. 2)

Safety Committee Solicits Comments On Recommended Practices

The Safety Committee hereby solicits comments regarding improvements to the publication, *Recommended Practices For The Use Of Manually Operated High Pressure Water Jetting Equipment*. The *Recommended Practices* is reviewed periodically at the biennial conferences of the Waterjet Technology Association. The next review will be at the 9th American Waterjet Conference, August 23-26, 1997, in Dearborn, MI. We invite your comments and recommendations for consideration.

Please address your suggestions to:
Safety Committee, c/o WJTA, 917 Locust
Street, Suite 1100, St. Louis, MO 63101-
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The Jet d'Eau: Geneva's Gushing "Geyser,"

from pg. 1

Signaling the coming of spring each year, as if from some mammoth whale, a column of water spouts 140 meters (390 feet) over Lake Geneva, Switzerland. Shooting 500 liters (132 gallons) per second (7270 gpm) through summer, and into fall, the Jet d'Eau (jet of water) is visible from all over town. Thus, it has come to symbolize Geneva around the world.

What became picturesque, began as practical. At the end of the last century, the new turbine house of the Rhône River produced too much water on days when water was not taken up by industrial work. To remedy the situation, an engineer by the name of Buttiaz developed a way to pump a 30 meter (98 feet) high stream of water into the air outside the building.

The first purely decorative jet, created in its present location on lake Geneva in 1891, reached 90 meters (270 feet). This grew to its present height over several stages, reaching 140 (390 feet) meters in 1951, when its independent pump was completed. It now operates every day from the beginning of March until the first Sunday in October, except during inclement weather.

A drop of water takes 16 seconds to complete the round trip from the lake to the tip of the Jet d'Eau and back. As it issues from the nozzle, the Jet

d'Eau is actually a hollow cylinder. If it were a solid column, the water would not disperse into fine droplets or descend gracefully, and the Jet d'Eau would not be visible from the lakeside. It would also be impossible to floodlight effectively. For this reason, the nozzle has an annular cross-section.



Located on Geneva's left bank, the Jet d'Eau is at the end of the Jetée de Eaux-Vives which juts out from Quai Gustave Ador. The shore here provides a haven for swans as well as small ferries which ply the harbor, while at the end of the jetty, a small metal column acts, miraculously, as the Jet d'Eau source. Pressurized by electric pumps, the weight of the water as it shoots in the air is seven tons.

From the week of Ascension Thursday in May until the first Sunday of October, the Jet d'Eau is illuminate at night.



ABB Flexible Automation and Ingersoll-Rand Waterjet To Form North American Joint Venture

ABB Flexible Automation Inc. and Ingersoll-Rand Company (I-R) have announced the forming of a U.S. joint venture to design and build waterjet cutting systems.

The new Company, ABB I-R Waterjet Systems L.L.C. located in Farmington Hills, Michigan, will combine Ingersoll-Rand's high-pressure intensifier technology with ABB's expertise in robotics and motion equipment to provide and continue to develop "world class" automated waterjet cutting systems.

The North American joint venture complements a European joint venture, called ABB I-R Robotized Waterjet AB, which was formed in 1991 and has successfully integrated the two technologies while serving the waterjet cutting systems market throughout Europe.

"This second joint venture allows us to become one of the leading waterjet systems manufacturers in the world," according to Steve Martin, president of Ingersoll-Rand's Production Equipment Group, which includes the waterjet operations. The Ingersoll-Rand Waterjet Division, headquartered in Farmington Hills, Michigan, has been producing commercial turnkey systems since 1971. I-R has built, sold, installed and serviced hundreds of waterjet and abrasive waterjet systems worldwide in virtually all industries.

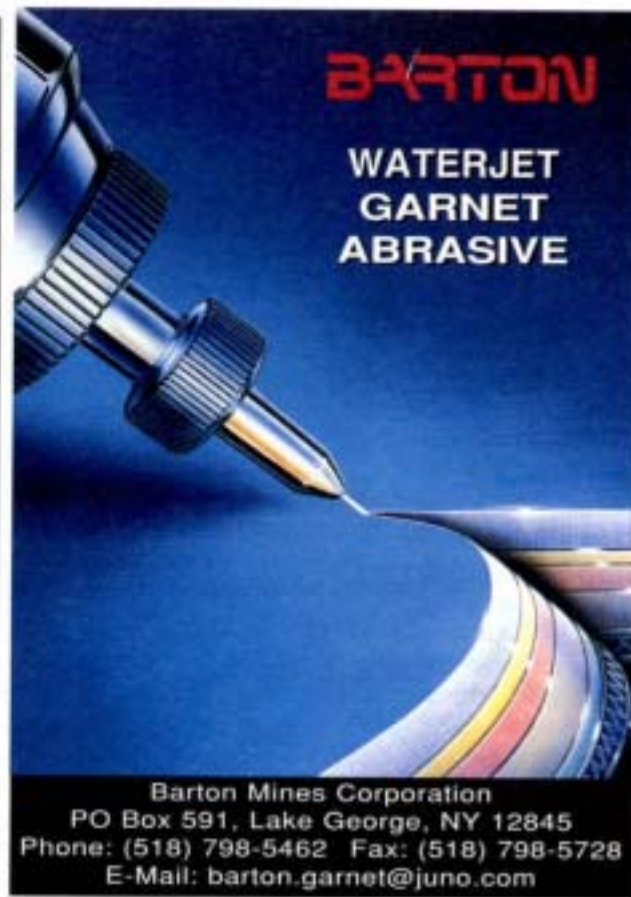
Joe Carney, president of ABB Flexible Automation's Automotive Systems said, "Now, working out of our two "Centers of Excellence" in Farmington Hills and Ronneby, Sweden, we will realize the full potential of the European and

American technologies for two-dimensional (2-D) and three-dimensional (3-D) standard and custom cutting solutions."

In addition, the two joint venture companies will be unique in providing local sales and service support worldwide through existing ABB and I-R operations in 24 countries.

Ingersoll-Rand Company, headquartered in Woodcliff Lake, New Jersey, is a leading manufacturer of air compressors, automated assembly equipment, construction and mining machinery, bearings and precision components, tools, golf carts and light-utility vehicles, architectural hardware and industrial machinery. In addition, through other joint ventures, Ingersoll-Rand is a leading supplier of pumps and hydrocarbon processing equipment and services.

ABB Flexible Automation is a leading supplier of robot products and systems, paint application and systems, and customer service used in a wide range of industrial and automotive applications. ABB's experience as a world leader in flexible automation systems is reflected in its worldwide installed base of more than 55,000 robots. In the Americas, ABB has Flexible Automation Centers in



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Auburn Hills and Warren, Michigan; New Berlin, Wisconsin; Ft. Collins, Colorado; Indianapolis, Indiana; Burlington, Ontario; Mexico City, Mexico; and Sao Paulo, Brazil.

Its parent, ABB (Asea Brown Boveri) Inc., headquartered in Norwalk, Connecticut, and its subsidiaries in 1996 had revenues of some \$5.4 billion and some 23,000 employees in the U.S. ABB Inc. is a business area within ABB Ltd. Which is headquartered in Zurich, Switzerland. In 1996, ABB Ltd. had worldwide revenues of \$35 billion and 215,000 employees.

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Parking Garage In Sweden Restored By A Hydrodemolition Robot

The leading Swedish specialist hydro-demolition contractor NCC Waterjet, with its fleet of seven Conjet Robot high pressure water jetting machines, has been employed by Sweden's giant electronics and telecommunications company Ericsson to carry out Skr7M of repairs to one of its reinforced concrete

multi-story parking garages at its head office just a few kilometers south of Stockholm. The four story parking garage was built in the 1970s and a combination of frost and de-icing salts, brought into the parking garage when vehicles are parking, has since caused extensive decay to the two intermediate floors and many supporting columns.

The bulk of the repair is to the 220 millimeters thick reinforced concrete floor slabs where NCC Waterjet is using one of its remotely operated, computer controlled Conjet Robots to selectively remove only the badly decayed concrete down to an average depth of 80 millimeters. But damage is so inconsistent the Conjet Robot is taking out substandard concrete to depths varying between 50 millimeters and 120 millimeters and in some instances even cutting right through the floor slab. The Conjet Robot has built in automatic quality control. Once the machine has been pre-set by the operator the Conjet Robot only removes weak and damaged areas of concrete to the pre-determined quality depth. This can be above or below any steel reinforcement, which, if exposed, is also cleaned of rust.

NCC Waterjet's Conjet Robot 230 uses a jet of high pressure water exiting from a special nozzle at supersonic speed and forcing its way



A Conjet Robot high pressure water jetting hydrodemolition machine repairing a damaged multi-story carpark at the head office of Sweden's telecommunications giant Ericsson.

into the damaged concrete's porous and cracked surface. The water creates an hydraulic over pressure in the concrete which breaks when this pressure rises above the tensile strength of the concrete. Water at a pressure of 1050 bar and flow of 240 litres per minute is fed through a 100-meters long flexible hose to the Conjet Robot's nozzle from a high pressure pump driven by a 550-kilowatt diesel engine housed in a silenced 20-foot long ISO container at ground level.

The nozzle, set at a predetermined angle of attack to the concrete, is mounted on an oscillating cassette, which is attached to a traversing cradle running back and forth along a feed beam. When the cradle reaches the end of its travel the nozzle swivels over to maintain the same angle which enables the jet to operate with a sweeping action to cut away concrete behind reinforcing bars.

The same time the machine moves back a predetermined distance ready to make the next adjacent cut. The entire nozzle assembly is covered by a protective safety shroud.

NCC Waterjet has to restore approximately 1350 meters² of deck in a sequence of 50 meters² bays. After the decayed concrete has been cut out from each bay, fresh concrete, with a strength of 40 megapascals, is poured in to complete the repair. The contractor has supplemented its Conjet Robot with a high pressure hand held lance to cut out similarly decayed concrete from around the bases of about 150 columns, which are being strengthened with short cast insitu concrete collars.

For further information please contact: Lars-Goran Nilsson or Carl Strömdahl, Conjet AB, P. O. Box 507, S-136 25 Haninge, Sweden, Phone: +46-8-741-3940, Fax: +46-8-741-3960.

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Meet The Candidates For 1997-1999 WJTA Board of Directors

In accordance with the bylaws of the Waterjet Technology Association, nominations to the board of directors will be accepted up to eight weeks prior to the biennial general membership meeting. The meeting will be held on **August 24, 1997**, in conjunction with the 9th American Waterjet Conference in Dearborn, Michigan. Nominations will, therefore, be accepted through **June 28, 1997**. Following is a list of nominees received as of press time:

Craig L. Anderson

Craig Anderson is the manager of Parker Hannifin Corporation's Polyflex Business Unit, Houston, Texas. Mr. Anderson joined the WJTA in 1996.

Mission: To involve the component suppliers in the initial stages of equipment design. It is my experience that too often this is not done until the design process is well along. In addition, I think that we should spend time establishing a standardized program for working pressure/safety factor ratios. I would also like to see something as simple as color coding of high pressure hose to reflect the working pressure of the hose; this would be a great safety enhancement. In short, I would use my position to continue to focus on bringing our industry to communicating key issues to each other in a non-threatening forum, and to promote the mutual advancement of high pressure technology to promote its use in general.

Nominated by: Richard Valdez, Polyflex Market Specialist, Parker Hannifin Corporation, Houston, Texas.

Daniel Bernard

Daniel Bernard is the general manager of Resto-Tech Ultrapressure Systems Ltd. in New Westminster,

British Columbia, Canada. Mr. Bernard has been a member of the Waterjet Technology Association since 1992.

Mission: To generally promote and advance the use of waterjet methods and techniques as they apply to a number of industries, including construction, manufacturing, petrochemical, rehabilitation and marine industries.

Nominated by: Lydia Frenzel, Ph.D., Lydia Frenzel Conference Series, Sutter Creek, California.

Andrew F. Conn, Ph.D.

Andrew F. Conn, Ph.D., an independent consultant in the design and development of specialized waterjet systems, is one of the founding members of the first board of directors of the Waterjet Technology Association. He has served as a member of the board or member of the Executive Committee for most of the years of existence of the WJTA.

Mission: If I am so fortunate as to be again returned to the Board, it will be my continuing mission to seek ways to expand the usefulness and relevance of membership in the WJTA for more of our prospective members. Identifying new services and benefits, as well as widespread "marketing" of the numerous benefits of waterjetting technology, are what I feel should be the Board's main goals.

Nominated by: R. Bruce Wood, MPW Industrial Services Inc., Hebron, Ohio.

Mohamed Hashish, Ph.D.

Dr. Hashish is vice president of advanced applications at Flow International Corporation, Kent,

Washington. Dr. Hashish is a founding member of the Waterjet Technology Association (WJTA), and he is currently a member of the WJTA board of directors. In 1993 Dr. Hashish was awarded the WJTA's first technology award in recognition of his accomplishments in the introduction of new and innovative ideas for the use of waterjet technology.

Mission: My mission and vision for the Association can be summarized in the following 10 points: (1) To spread the waterjet technology awareness in a wide range of industries. (2) To maintain the WJTA as the world's premier waterjet technology association. (3) To enforce the quality of proceedings and conferences. (4) To enhance waterjet visibility for jobshop and contractors work. (5) To set just criteria and participate in fairly selecting WJTA award recipients. (6) To broaden and enhance the quality of information transfer to members. (7) To present members views and their input to WJTA plans. (8) To increase the membership base and spectrum of industries to WJTA. (9) To control costs and affordability of meetings and fees to members. (10) To interact with other societies to further promote waterjet technology.

Nominated by: Thomas A. Cross, Executive Vice President and Chief Operating Officer, Flow International Corporation.

George A. Savanick, Ph.D.

George A. Savanick, Ph.D., is an independent hydraulic mining consultant based in Apple Valley, Minnesota. Dr. Savanick is a founding member of the Waterjet Technology Association, and he has been a member of the Board of Directors since 1981. Dr. Savanick has served

(continued on page 6)

Meet The Candidates For 1997-1999 WJTA Board of Directors, from pg. 5

as president since 1985, and he is the editor of the WJTA *Jet News* publication. A recipient of the WJTA Service Award in 1993, Dr. Savanick is a member of the WJTA Safety Committee, and he participated in the writing of the *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment*.

Mission: I would like to see the association continue to steadily increase in membership and influence. We need to accelerate our efforts to communicate the benefits and safe practices of waterjetting to the public. To this end we should do all we can to enhance the quality and effectiveness of our publications, especially our newsletter, *Jet News*. We should produce a safety video to be used in conjunction with our safety manual, *Recommended Practices For The Use Of Manually Operated High Pressure Water Jetting Equipment*.

Nominated by: David A. Summers, Ph.D., University Of Missouri, Rolla, Rolla, Missouri

David A. Summers, Ph.D.

David A. Summers, Ph.D., is a curator's professor at the University of Missouri-Rolla and director of both the High Pressure Waterjet Laboratory and the Rock Mechanics and Explosives Research Center, University of Missouri-Rolla. Dr. Summers is a founding member of the Waterjet Technology Association, and he is currently a member of the board of directors. Dr. Summers received in 1993 the WJTA Safety Award in recognition of his work in the area of safety and waterjet technology.

Mission: It has been a privilege to

help the WJTA grow from its original nucleus of dedicated individuals into a society with growing impact in the industry which has developed over the past twenty-five years. However we cannot stand on past work, the growing impact of the Electronic Age demands a change in our methods of communication and interaction, and the increasingly international nature of both industrial and research opportunities means that Board members must have a vision of the future, to keep the WJTA meeting the needs of its members. I have had the great fortune of helping the WJTA achieve its earlier visions, and look for the opportunity to help build and achieve a new vision for the future of the Association.

Nominated by: Robert Fossey, Research Specialist, Rock Mechanics and Explosives Research Center, University of Missouri-Rolla

R. Bruce Wood

R. Bruce Wood is the director of engineering and technology at MPW Industrial Services, Inc., Hebron, Ohio. Mr. Wood has been directly involved in the waterjetting industry since 1988, and he has been a WJTA member since 1990.

Mission: To help expand the field for contractors, manufacturers and others by continuing to involve the WJTA in educating industry on the uses of waterjetting; and (2) continued updating and refinement of the *Recommended Practices for the Use of Manually Operated High Pressure Waterjetting Equipment*.

Nominated by: Larry Moers, Training Manager, MPW Industrial Services, Inc., Hebron, Ohio.

Additional nominations will be accepted through June 28, 1997. To submit a nomination, contact:

Thomas J. Labus, Chairman,
Committee on Nomination
Waterjet Technology
Association
917 Locust Street, Suite 1100
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An official ballot listing the eligible nominees will be forwarded by mail to all eligible voting members of the Association on **July 11, 1997**. Signed and executed ballots must be received in the Association's office for tallying by **August 20, 1997**.

Important note regarding monetary reimbursement for official WJTA board related business travel, including board meetings:

Board members are reimbursed for actual travel expenses up to a limit of \$350 per meeting. Reimbursement for committee meetings is limited to one meeting every two years of service. Each board member is responsible for any expenses incurred over and above \$350 per meeting. If nominees wish further clarification regarding the WJTA expense reimbursement guidelines, they should contact the WJTA office by telephone at (314)241-1445.

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Preliminary Technical Program

AWJ Machining Operations

"Abrasive Waterjet Cutting And Piercing Of CFCC Materials," *Z. Guo, M. Ramulu, and M. Jenkins.*

"Abrasive Waterjet Process Dependent Performance Of Polymer Composites Under Dynamic Loading," *M. Ramulu, and D. Arola.*

"Process Developments And Apparatus For Discretized Abrasive Waterjet Milling," *K. Ojmertz, and G. Holmqvist.*

"Abrasive Waterjet Turning Of Diamond Grinding Wheels," *M. Nanduri, D. Taggart, T. Kim, and D. Sheldon.*

AWJ Machining Studies

"Surface Finish Evaluation For Abrasive Waterjet Cutting," *J. Zeng.*

"A Comparative Study Of Suspension And Injection Methods In Rock Cutting With Abrasive Waterjet," *A. Bortolussi, R. Ciccu, and A. Vargiu.*

"Experimental And Numerical Analysis Of Waterjet Impacting And Piercing Process," *M. Ramulu, and H. Yeh.*

"Transient Strains Of A Piercing Abrasive Waterjet," *Z. Guo, M. Ramulu, and M. Jenkins.*

AWJ Nozzle Wear and Optimization

"On Nozzle Wear," *M. Hashish.*

"Effect Of The Inlet Taper Angle On Abrasive Waterjet Nozzle Wear," *M. Nanduri, D. Taggart, T. Kim, C. Haney, and F. Skeeel.*

"Evaluation Of An Accelerated Wear Test For AWJ Nozzles," *D. Taggart, M. Nanduri, T. Kim, and F. Skeeel.*

Polymer, Suspension, Ice, and Cryogenic Jets

"Ultra High Pressure Non-Abrasive Polymer Jetting A Production Implementation," *R. Lombardi.*

"Abrasive Suspension Jet (ASJ) Machining Of Hard Materials," *M. Hashish, and P. Miles.*

"Investigation Of Icejet Machining," *E. Geskin, L. Tismenetsky, F. Li, and P. Meng.*

"Fine Powder Fabrication Using High Pressure Waterjet And Cryogenic Jets," *M. Hashish, and P. Miles.*

Modeling Studies- Jet-Material Interaction

"3D Simulation Of Macro And Micro Characteristics For AWJ Machining," *Z. Yong, and R. Kovacevic.*

"Experimental And Numerical Studies On The Mechanism Of Abrasive Jet Cutting," *M. Niu, Y. Fukunishi, and R. Kobayashi.*

"Three-Dimensional Model For Waterjet Cutting Simulation," *T. Sawamura, Y. Fukunishi, R. Kobayashi.*

Jet Flow Studies

"Visual Information Of The Mixing Process Inside The AWJ Cutting Head," *A. H. Osman, D. Buisine, B. Thery, and G. Hussaye.*

"Numerical Simulation For The Ultra-High-Pressure (High-Speed) Water Jet In The Well-Bottom Flow," *X. Li, Z. Weixing, W. Zhiming, and S. Zhonghou.*

"Theoretical An Experimental Study On The Conical Rotatory Water Jet Flow," *X. Li, F. Shuhua, W. Ruihe, and S. Zhonghou.*

"Jet Form Study In Air And In The Slot," *N. Ilias, A. Magyari, S. Radu, M. Achem, and A. Magyari.*

Pulsed Jets

"Generating Powerful Pulsed Jets With Electric Discharges: Fundamental Study," *M. Vijay, M. Bielawski, and N. Paquette.*

"Peculiarities Of Interaction Of Unsteady Water Jets With Targets," *G. Atanov.*

"The Study of Oscillating Jet Nozzle With Flow Control Oscillator," *T. Chuanlin, L. Xiaohong, L. Zhenfang.*

High Pressure Systems

"A Pulsation-Free Fluid Pressure Intensifier," *G. Yie.*

"Mechanics Of The Powder Hydro-Cannon With The Regard Of Wave Processes While Powder Burning," *G. Atanov, and A. Semko.*

"Finite Element Analysis Of Hydraulic Manifold Port For The Intensifier Pump," *J. Xu.*

"Performance And Dynamic Analysis Of Intensifiers And Intensifier Systems," *P. Singh.*

Manipulator and Control Systems

- "6-Axis Articulate Robot Waterjet Configurations," *D. Snider.*
- "Computer Aided Manufacturing For Three-Dimensional Abrasive Water Jet Machining," *A. Henning.*
- "High-Precision Waterjet Cutting Of Three Dimensional Contours In Industrial Productions," *F. Do, and M. Knaupp.*
- "Development Of A Robotic System For Cleaning Of Chemical Reactors," *E. Geskin, and L. Tismenetskiy.*
- "Waterjet Machine Tool Of The Future — A Vision," *M. Hashish.*

Quarrying, Mining, and Excavation

- "Development Of Water Jet Cutting In Extremely Hard Granite Quarries 10 to 20 Feet Deep" *P. Wyatt, and M. Peterson.*
- "Water Jet And Abrasive Water Jet Performances In Materials Cutting," *N. Ilias, A. Magyari, S. Radu, M. Achim, and O. Radu.*
- "Enhancing The Drilling Potential Of Polycrystalline Diamond Impact Tools," *R. Gertsch, D. Hall, and D. Summers.*
- "Tool/Rock Interface Assisted By High Pressure Waterjets," *J. Vasek, and M. Mazurkiewicz.*

Applications in Hazardous Environments

- "High Velocity Water-Jet Techniques Assist In Seismic Repair," *D. Bernard.*
- "Abrasive Water Suspension Jets For Nuclear Decommissioning Final Investigations For The First Application," *C. Brandt, H. Louis, G. Tebbing, and C. Witzsche.*
- "Practical Problems In The Demilitarization Of Munitions," *R. Fossey, K. Sims, J. Blaine, J. Tyler, M. Sabin, and D. Summers.*
- "Water Jetting Application In The Petro Chemical Industries," *Ted Kupscznk.*
- "Designing A Waste Retrieval System For Radioactive Waste Recovery," *G. Galecki, R. Fossey, and D. Summers.*

Submerged Cutting and Off-Shore Applications

- "Development Of A DYNAJET Cavitating Water Jet Cleaning Tool For Underwater Marine Fouling Removal," *K. Kalumuck, G. Chahine, G. Frederick, and P. Aley.*
- "Reach-Enhancement Of A Submerged Waterjet Using Air Shrouding," *A. Miller, and D. Daly.*

Cleaning, Stripping and Surface Preparation (1)

- "Mathematical Simulation Of Waterjet Cleaning," *P. Meng, E. Geskin, M. Leu, L. Decaro, and Z. Huang.*
- "Waterjet Nozzle Operation And Selection Criteria For Surface Preparation," *E. Ting.*
- "A Study Of Rotary Jets For Material Removal," *D. Wright, J. Wolgamott, and J. Zink.*

Cleaning, Stripping and Surface Preparation (2)

- "Removal Of Coatings With Low Pressure Pulsed Water Jets," *M. Vijay, R. Puchala, and N. Paquette.*
- "Mobile Full Recovery Waterjet Stripping Systems," *R. Rice.*
- "A Study On Descaling Of Water Injection Tubing by Water Jetting," *L. Gensheng, M. Jiaji, S. Xiaoming, and Z. Guangchen.*
- "Concrete Technology And Surface Preparations For Protective Coating, Flooring, and Lining Materials," *D. Bernard.*

Cleaning, Stripping and Surface Preparation (3)

- "Continuing Improvement Initiatives Of Surface Preparation With Waterjetting," *L. Frenzel.*
- "UHP Waterjetting Gains Acceptance For Surface Preparation," *R. Schmid.*
- "Cleaning Process Equipment With Automated High Pressure Water," *M. Gracey.*
- "Use Of Ultra-High Pressure Waterjetting For Rocket Motor Refurbishment," *G. Swenson, and B. Andrus.*

Safety, Information, and Business Aspects

- "Waterjet-Related Noise And Its Countermeasures," *H. Katkura, and H. Miyamoto.*
- "An Analysis Of Operating Costs For Waterjet Cutting," *A. Bennett.*
- "Building A Business In Waterjet Cutting/Machining," *R. Ward.*

Papers Not Yet Assigned To A Main Topic

- "The Study Of Oscillation Jet Nozzle With Flow-control Oscillator," *Tang Chuanlin, Li Xiaohong, and Liao Zhenfang.*
- "Application Of High Pressure Jet Grouting In The First Stage Of Three Gorges Project," *Chen Weiye, Zhang Yunshu, and Li Yan.*
- "Research On Equipment For The Cleaning Of Inner And Outer Surfaces Of Oil Pipes," *S.X. Xue, W.P. Huang, Z.W. Chen, Y.B. Fan, H.J. Peng.*
- "The HydroBlade™ Keratome; Principles And Microscopic Confirmation Of Surface Quality," *E.I. Gordon and P. Turdiu.*
- "Milling Ceramics With Abrasive Waterjets - An Experimental Investigation," *J. Zeng, J. Munoz, and Ihab Kain.*

New Equipment, Products, Developments

Oshkosh Trucking's Firefighting Vehicles

Oshkosh Trucking Corporation, Oshkosh, Wisconsin, produces aircraft rescue and firefighting vehicles used at many commercial and military airports around the world.

Shown above is the OshKosh T-1500 firefighting vehicle with an extendable waterway used to train firefighters at Duluth Minnesota Technical College. The T-1500 uses a single stage centrifugal water pump which emits 1520 gpm at 230 psi. The T-1500 has a 1500 gallon water tank and a 210 gallon tank for foam. The jet stream from the T-1500 is controlled manually from inside the cab. These jets have a discharge of up to 750 gpm. The jet port is infinitely variable from a straight stream to fully dispersed.



T-3000

The OshKosh T-3000 firefighting vehicle is shown above jetting foam onto an airplane. The T-3000 uses a 1950 gpm at 225 psi water pump. It has a 3000 gallon water tank and a 420 gallon foam tank on board.

Compact Aqua-Dyne Water Blaster Packs 35,000 PSI Punch

Aqua-Dyne, Inc. now rates its EK pump for 35,000 psi. The smallest of



T-1500

Aqua-Dyne's pumps, the EK Series positive displacement triplex pump, has all of the features found in Aqua-Dyne's larger pumps, including:



1) Sectionalized valve-in-line stainless steel fluid cylinders, 2) Solid ceramic plungers (optional plungers available), 3) Stainless steel valves and seats with self-adjusting spring loaded chevron packing, 4) Plungers and packing are non-drip, closed loop, pressure water lubricated, and 5) A discharge port (Under 15,000 psi - NPT connection; Over 15,000 psi - AE connection).

The EK pump is matched with an electric, gasoline, or diesel 10-25 HP power supply. The most common configuration is a 20 HP electric motor mounted under the pump on a wheeled cart/skid with four lifting eyes. The resulting system measures 26 inches by 21 inches and 4.5 feet tall. It weighs 920 pounds making it both easy to transport and easy to position. Although small in size, the pump can be adapted for pressures of 35,000 psi. Common pressure/flow rates are: 11.5 gpm at 3,000 psi, 3.4 gpm at 10,000 psi,

and 1.7 gpm at 20,000 psi and 1 gpm at 35,000 psi. The EK Series is a perfect transitional unit for companies expanding from pressure washing to high pressure waterjetting applications.

Patented Shapejet Water-jetting Nozzles Improve Performance and Operating Distance

Aqua-Dyne offers the Patented ShapeJet nozzles that increase waterjetting performance by up to 40% and/or increase the effective working range (stand-off) of any waterjet gun or cutting machine. The unique, non-round orifice of the ShapeJet nozzle helps prevent air swirl while producing a more cohesive water stream that equates to more power over a much longer distance.



Additional information is available from: AQUA-DYNE, INC., 3620 W. 11th Street, Houston, Texas 77008-6004.

LAI Southwest Opens New Plant In Phoenix

LAI Southwest Inc. announces the opening of its new manufacturing plant and regional headquarters in Phoenix, Arizona.

LAI Southwest, which uses waterjet technology to cut through all materials, including metals and composites, expects to expand its base

(continued on page 12)

New Equipment, Products, Developments, from pg. 11

of 11 employees as the company grows, said Morris McEntyre, vice president of operations.

"We see tremendous growth potential in the Southwest," McEntyre said.

The new climate-controlled plant features state-of-the-art abrasive water-jet capabilities centered around its five-axis waterjet station. Its six-by-eight-foot table is equipped with precision motion control devices and a four-head intensifier. The machine can achieve tolerances up to .005 inches and is capable of cutting steel up to 12 inches thick.

LAI Companies also announced it will expand its manufacturing plant and corporate headquarters in Minneapolis, Minnesota. LAI also operates a sister plant near Baltimore, Maryland. LAI, which was founded in Maryland in 1979, manufactures parts and equipment for the aerospace, automotive, computer, medical and heavy manufacturing industries.

For more information, contact LAI Southwest, 4619 S. 33rd Street, Phoenix, Arizona, phone: (602)304-1160.

Butterworth Introduces 36,000 psi Water Jetting Unit

Butterworth Jetting System's new ultrahigh-pressure water jetting unit offers new solutions for surface preparation, including paint and rust removal. It also addresses the market's need for a flexible, reliable ultrahigh pressure machine.

The Ultra-Blast 36™, Butterworth's new ultrahigh water-jetting unit, has a four-speed transmission that lets operators change from 36,000 psi to 25,000 psi and at various flow rates at the push of a button. With simple conversion kits, the unit can produce lower pressures at higher flows. This versatile unit is actually several

machines in one.

"Customers complained that ultrahigh units currently on the market are unreliable and expensive to repair," Mike Ginn, president of Butterworth Jetting Systems, Inc., said. "We tested our unit's pump for 10 million cycles before we introduced it into the market. Its design is state-of-the-art in geometry and materials and is purposely designed to operate at low rpms for long trouble-free service. There's nothing like it on the market... anywhere."

The engine is sized to run at 1800 revolutions per minute with power transmitted to the pump through a heavy-duty clutch, truck-style transmission and flexible coupling. Alignment is positive and vibration is extremely low. A sound-attenuating enclosure covers the engine and all drive components to reduce db levels to 85 at 3 meters. A convenient water-resistant panel houses all unit controls and displays pump and engine functions. Data loggers monitor pump and engine status and provide shutdown protection. A 50-foot pendant allows the unit operator to observe actual blasting and to shut down the pump in the event of an emergency; a significant safety feature.

Other features include an engine powered charge pump, air compressor, 100 gallon stainless water tank and 100 gallon fuel tank. The fuel tank is built into the unit base which also houses a large high pressure accumulator and 18 cubic feet storage compartment. Air or electric/air blast guns, surface cleaners and robots are a few of the accessories available for ultra high water jetting services.



Ultra-Blast 36™

Water Jet Tank Cleaning

A new brochure from NLB Corp. describes how high-pressure water jets clean tanks and reactors quickly and thoroughly, without the expense or risks of chemicals—while eliminating the need for personnel to enter a tank. The 8-page brochure includes cutaway illustrations, photographs and technical charts.

NLB's wide range of tank cleaning equipment and accessories, including 3-D rotating cleaning heads, telescoping lances, high-pressure pumps, and the SpanJet™ nozzle placement system, are shown and described. Comprehensive charts with key dimensions and volume and pressure ratings, make it easy to select the proper equipment for an application.

The brochure also features NLB's rotary stack cleaners, which apply rotating water jet technology to clear blocked pipes and tubes. Rotation speeds are adjustable up to 3,000 revolutions per minute.

To obtain a copy of the brochure, contact NLB Corp., 29830 Beck Road, Wixom, Michigan 48393-2824, Phone: (810)624-5555.

Dearborn/Detroit Highlights

- Henry Ford Museum & Greenfield Village. The Museum houses one of the most stunning car collections anywhere along with a not-to-be-missed collection of vintage railroad engines.
- Homes of the famous auto barons: the water-front mansion of Lawrence P. Fisher, founder of Fisher Body; the Scottish baronial home of Henry and Clara Ford; the Tudor home of Matilda Dodge Wilson and the English Cotswald-style estate of Edsel and Eleanor Ford.
- The largest exhibition of ancient Egyptian treasures to visit the U.S. on display at the Detroit Cultural Center's Institute of Arts. Displays include more than 200 masterpieces of Egyptian art, from the predynastic period to the

end of the Roman Empire. The Cultural Center is also home to the Historical Museum, the newly opened (April 1997) Museum of African American History and the Science Center.

- The headquarters of the Big Three Automakers: the imposing General Motors Building; the Ford Motor Company World Headquarters known in car circles as the "Glass House"; and Chrysler Corporation's new world headquarters and technical center.

- Windsor, Canada, just across the Detroit River, accessible via the Detroit-Windsor Tunnel. Windsor is a favorite destination for shopping, dining and casino gambling. You may be asked to show a picture I.D.; non-U.S. citizens will need a passport.

Hotel Reservations

Contact the Hyatt Regency Dearborn for hotel reservations.

Make your hotel reservations early to take advantage of the special WJTA Conference rates. Use the convenient form below, or call the Hyatt reservations system toll-free at 1-800-233-1234, or dial the Hyatt Regency Dearborn direct at (313)982-6880. Be sure to request the special group rate for the 1997 WJTA Conference.



WJTA 9TH AMERICAN WATERJET CONFERENCE HOTEL RESERVATION FORM

Hyatt Regency Dearborn Welcomes: 9th American Waterjet Conference

August 23- 26, 1997

PLEASE RESERVE ROOM ACCOMMODATIONS FOR:

Arrival Date ____/____/____ Arrival Time _____

Departure Date ____/____/____

Name _____

Hyatt Gold Passport* Card #* _____

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Sharing Room With _____

The Hyatt Regency Dearborn will only accept guaranteed reservations. You may guarantee your reservation with an accepted credit card number, expiration date, and signature or by an advanced deposit for one night's lodging. Please make check payable to the Hyatt Regency Dearborn.

Applies only to Hyatt exclusive gold passport members only.

Please check preferred accommodations. All rooms are subject to 6% sales tax and 7% county assessment tax. Business plan rooms include the following: fax machine, computer modem, iron and ironing board, continental breakfast, and access to business suite (includes business supplies and computer printer).

Accommodation Requests Smoking <input type="checkbox"/> Non-Smoking <input type="checkbox"/>	Check One	Rate Per Day	Business Plan
Single (one person)		\$103	\$118
Double (two persons, two beds)		\$103	\$118
Double (two persons, king, bed)		\$103	\$118
Triple (three persons)		\$128	\$143
Quad (four persons)		\$128	\$143

Reservation requests are based upon availability at time of arrival.

Credit Card # _____ Exp. Date _____

Signature _____

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☐ Discover ☐ Japan Credit Bureau

Check-in: 3:00 p.m. Check-out: 12 Noon

Please note: A \$25.00 departure charge fee will be incurred if there are any changes to the departure date after check-in.

To guarantee convention rates, reservations must be received by the Hyatt Regency Dearborn by **August 2, 1997**.

**Hyatt Regency Dearborn
Reservations Department
Fairlane Town Center
Dearborn, MI 48126**

Telephone: (313)982-6880 Fax: (313)982-6884

The Waterjet Technology Association's 9th American Waterjet Conference

August 23-26, 1997

Hyatt Regency, Dearborn, Michigan

Preliminary Schedule of Events

Saturday, August 23

- 8:30 a.m.-Noon Short Course on the Fundamentals and Applications of Waterjet Technology
- Noon-1:30 p.m. Luncheon for "Short Course" Participants
- 1:30 p.m.-4:30 p.m. Short Course (continued)
- 6:30 p.m.-9:30 p.m. Welcoming Reception In The Exhibit Hall — Exhibit Opens

Sunday, August 24

- 8:00 a.m.-Noon Applications Workshops
- 8:00 a.m.-Noon Research & Development Sessions
- 9:30 a.m.-5:00 p.m. Exhibits
- Noon-2:00 p.m. Awards Luncheon
- 2:00 p.m.-5:00 p.m. Applications Workshops (continued)
- 2:00 p.m.-5:00 p.m. Research & Development Sessions (continued)
- 5:00 p.m.-6:00 p.m. WJTA Biennial Business Meeting

Monday, August 25

- 9:30 a.m.-2:30 p.m. Exhibits
- 8:00 a.m.-Noon Applications Workshops
- 8:00 a.m.-Noon Research & Development Sessions
- Noon-2:00 p.m. Luncheon/Exhibit Hall/Poster Presentations
- 2:00-5:00 p.m. Applications Workshops (continued)
- 2:00-5:00 p.m. Research and Development Sessions (continued)
- 7:00 p.m. - 11:00 p.m. WJTA Party

Tuesday, August 26

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

A complete copy of the Preliminary Technical Program appears in this issue beginning on page 9.

ULTRA-CLEAN 36® strips it in no time



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The leader in high-pressure water jet technology

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<http://www.nlbcorp.com>

The tougher your cleaning and surface preparation jobs, the more you need an ULTRA-CLEAN 36® water jet system from NLB Corp. It features pressure of up to 36,000 psi and flow up to 6 gpm. So it quickly blasts away corrosion, paint, epoxy — just about anything — and leaves a WJ-1* surface.

The simple pump design minimizes wear, so it runs hour after hour, month after month. NLB customers have proven it in countless applications over the past 25 years.

NLB offers the broadest range of water jet pumps and accessories in the world, and the technical knowledge and customer service to make water work for you. Call NLB today.



*WJ-1 is an international surface standard, ref. NACE No. 5/SSPC-SP 12.

A Pressure Compensator For Cutting Fragile Materials

Vulcan Waterjet Cutting Services of Milwaukee, Wisconsin, recently installed a Dual Pressure Compensator to delicately carve fragile and brittle materials. The waterjet had previously established an excellent track record of cutting capabilities with dense and hard materials ranging from aluminum to marble. The new Compensator widens even further the range of materials that benefit from waterjet technology.

Regular cutting on the waterjet is achieved with a supersonic stream of water-entrained abrasive at a pressure of 55,000 psi. When the jet is activated, a focused stream of water hits the target material at this force level. When dealing with brittle materials such as hardened glass, stained glass, acrylics and laminates, this high pressure stream is sufficient to chip or crack some edges and surfaces. Fragile materials often required activating the jet outside the material, limiting its effectiveness to outside profile cuts.

The Dual Pressure Compensator, a hydraulic bleed down for a waterjet, is the result of hundreds of hours of research and development. It bleeds water out of the system when the jet is activated, allowing the water stream to hit the target material at zero pressure. The pressure is then increased ("ramped") up to full over a period of time that is predetermined based on the particular material. Size and thickness of the material are also factors in the timing of the pressure ramping stage.

With this type of zero pressure piercing, there are no defects, no chipping and no fracturing. Since



Dual Pressure Compensator makes cutting this glass nightlight possible.

installation of the Dual Pressure Compensator, Vulcan Waterjet has successfully cut both inside diameters and outside diameters as small as .100" inch and as large as 4 feet. Some of the fragile materials that have been cut recently are 1-inch hardened glass, 1/4-inch plastic glass laminates, 1/8-inch glass, and 2-inch bullet proof glass.

Vulcan Waterjet Cutting Services provides customers with the advanced technology of high-speed, abrasive cutting on virtually any material up to 5-inch thick. The Vulcan waterjet is ideal for cutting industrial parts with intricate patterns, creating signage, flooring, sculpture and unique custom designs. Advantages of the Vulcan waterjet include prototype to production with no tooling, full CNC capability, single pass cutting, no thermal deformation, multidirectional cutting, environmentally-sound cuttings and water recovery and reduced dust emission.

For more information about Vulcan Waterjet Cutting Services, call (414)645-2040 or (800)932-5323 or E-mail vwaterjet@aol.com.

WJTA New Members

Corporate

Cameco-Keylake Operation

Frank L. Larocque
Chris Astles
Doug Burgess
Saskatoon, Canada

Par Systems

Dennis DesMarais
Ken Bucher
Carrie Koliha
Shoreview, MN

Yuhan Technics & Service

Chang Soo Song
Republic Of Korea

Corporate Individuals

Jeff Shook

NLB Corporation
Woom, MI

Individuals

Rajab Anash

Glass Palace
Saudi Arabia

David Bolich

Beveled Glass Products
San Francisco, CA

Paula Clark

Portland Marble Works, Inc.
Portland, OR

Robert Daily

Daily Industries
Kent, OH

Stan Frownfelter

Seal-Jet Midwest Inc.
Maryland Heights, MO

Ralph Higs

Demers Met Fab Inc.
Calgary, Alberta, Canada

Billy Marthens

Marco
Davenport, IA

Paul Robinson

Stan-Blast Abrasives Co., Inc.
League City, TX

Larry Thyre

Turner Maintenance Corporation
Sulphur, VA

Parid Turdiu

Medjet Inc.
Edison, NJ

Eight Easy Ways To Attend The 1997 Waterjet Conference

- 1. FULL CONFERENCE:** Includes admission to all technical and scientific sessions (except Short Course), exhibit hall, coffee breaks, luncheons, receptions, WJTA Party on Monday, and technical tour and demonstration. **Each full registration also receives one copy of the Conference Proceedings.**
- 2. COMBO:** Includes everything listed under Full Conference **PLUS** admission to the Waterjet Short Course.
- 3. SAVE ON MULTIPLE EMPLOYEE FULL/COMBO REGISTRATIONS:** Companies that purchase three or more full or combo registrations receive a special discount for each additional employee registered after the first two. To take advantage of the special discount, register the first two (2) employees from your company at the regular FULL/COMBO rates and receive the discounted rate for the third and subsequent employee registrations.
- 4. DAILY ATTENDANCE:** Includes admission to all technical and scientific sessions, exhibit hall, coffee breaks, and luncheon on that day. **NOTE:** The official Conference Proceedings and admission to the WJTA Party on Monday are **NOT** included in the daily registration fee. The Proceedings and tickets to the WJTA Party on Monday must be purchased separately.
- 5. WATERJET SHORT COURSE:** Includes the manual *Fluid Jet Technology — Fundamentals And Applications*, coffee breaks, and luncheon.
- 6. EXHIBIT HALL ONLY:** Includes admission to the WJTA Exhibit Hall where you'll see waterjet equipment, supplies, and services on display. Does **NOT** include the luncheon in the exhibit hall on Monday. Luncheon tickets may be purchased separately.
- 7. TECHNICAL TOUR:** Includes round-trip bus transportation, luncheon, and admission to several company sites where you'll see live waterjet demonstrations.
- 8. STUDENTS:** The registration fee for WJTA student members is \$20.

Student registration includes admittance to technical programs and the technical tour, but does **NOT** include copies of books or admittance to any food/social functions. **NO** discount is available for students that are not members of the WJTA. WJTA student members must be enrolled full-time in a university graduate or undergraduate program.

CANCELLATION POLICY

Fees will be refunded in full for cancellations received at least four weeks prior to the Conference. Cancellations received more than 10 days and less than four weeks prior to the Conference will be subject to a \$50 charge. No refund will be made for cancellations received less than 10 days prior to the Conference. However, substitutions may be made at anytime.

Discounts for WJTA members and early-bird registrants!

WJTA members receive a special discount off the regular registration fees. You will also receive an additional discount if your registration is postmarked or received in the WJTA office by **August 15, 1997**.

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1997 WJTA Conference Registration Form

Name _____ Title _____
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Print name as you wish it to appear on your name tag

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 • Please charge my • MasterCard • VISA • American Express

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Print name as it appears on card

Cardholder's signature

**Join the Waterjet Technology Association
 now and receive a substantial discount off
 Conference registration fees.**

WJTA MEMBER

By 8/15/97 After 8/15/97

NONMEMBER*

By 8/15/97 After 8/15/97

Eight Ways To Register

• Full Conference ONLY	\$ 460	\$ 490	\$ 510	\$ 540	= \$	_____
• Combo (Full Conference PLUS Water Jet Short Course)	\$ 630	\$ 660	\$ 680	\$ 710	= \$	_____
• Daily						
• Saturday, Short Course (includes lunch)	\$ 245	\$ 260	\$ 270	\$ 285	= \$	_____
• Sunday (includes Awards Luncheon)	\$ 195	\$ 210	\$ 215	\$ 230	= \$	_____
• Monday (includes Luncheon In Exhibit Hall)	\$ 195	\$ 210	\$ 215	\$ 230	= \$	_____
• Tuesday, Technical Tour (includes lunch)	\$ 90	\$ 100	\$ 100	\$ 110	= \$	_____
• Exhibit Hall Admission ONLY	\$ 25	\$ 25	\$ 25	\$ 25	= \$	_____
• Student (WJTA members ONLY)	\$ 20	\$ 20	N/A	N/A	= \$	_____

MULTIPLE CORPORATE REGISTRATIONS (Applies to third and subsequent registrants from same company)

• Full Conference ONLY	\$ 385	\$ 415	\$ 435	\$ 465	= \$	_____
• Combo (Full Conference PLUS Water Jet Short Course)	\$ 555	\$ 585	\$ 605	\$ 635	= \$	_____

WJTA MEMBERSHIP • \$50 Individual membership • \$20 Student membership • \$350 Corporate membership = \$ _____

• Conference Proceedings Copies x \$99.00 = \$ _____
 1997 WJTA Conference registrants may purchase extra copies of the Conference Proceedings for only \$99. Regularly priced at \$155, you will SAVE \$56. Offer valid through 8/29/97.

SPECIAL OFFER!

EXTRA TICKETS — The Full and Combo registrations include one ticket per registration for the Awards Luncheon, Exhibit Hall Luncheon, and WJTA Party on Monday. Each Daily registration includes a luncheon ticket for the day registered: Saturday, Sunday, Monday and/or Tuesday. Additional tickets may be purchased for your special guests as follows:

• Awards Luncheon	\$ 30	\$ 35	\$ 30	\$ 35	= \$	_____
• Luncheon In Exhibit Hall	\$ 20	\$ 25	\$ 20	\$ 25	= \$	_____
• WJTA Party On Monday	\$ 65	\$ 70	\$ 65	\$ 70	= \$	_____

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

TOTAL ENCLOSED

\$ _____

THREE EASY WAYS TO REGISTER

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

By Fax: Fill out the registration form with your credit card information and call our 24-hour fax number at: (314)241-1449.

By Mail: Fill out the registration form and mail with applicable payment to: WJTA, 917 Locust Street, Suite 1100, St. Louis, MO 63101-1413.

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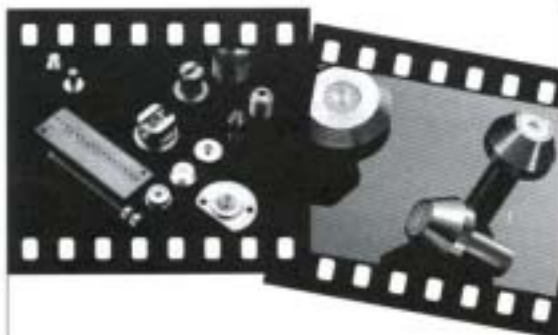
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