ultrasonic industry association
UIA
News from the Ultrasonic Industry Association

Vibrations

Jeff Vaitekunas, Editor

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# UIA Hosts 30th Annual Symposium

The theme was "New Millennium—New Vision for Ultrasonics"— the event, the 30th annual UIA Symposium. Over 100 people attended the 30th annual UIA symposium at the Hyatt on Capitol Square in Columbus, Ohio on June 11-14, 2000. The event was packed from morning until night with presentations, technical courses, exhibits, networking opportunities, and much more.

Speakers representing six countries from industry and academia presented the latest in ultrasonics. More than twenty technical papers were presented in four areas: Industry Applications, Sonically Enhanced Processing, Material Fabrication and Joining, and Biology/Medical.

Dr. Karl Graff, Executive Director of EWI, opened the symposium with a presentation on "Power Ultrasonics 2000: Glancing Back, Looking Ahead." In glancing back, Dr. Graff provided a historical overview and noted the current status of the industry. In looking ahead, he takes advantage of the unique opportunity of a new century, which is everyone's favorite time to predict the future, and attempts some prognosticating in power ultrasonics. His research included a detailed survey that enlisted some of the leading companies and experts in the ultrasonics field.

Renowned speakers from around the world included Dr. Kenneth Suslick, University of Illinois, who kicked off the Sonically Enhanced Processing session; Oleg Abramov, TechSonic GmbH; Don Feke, Case Western Reserve University, Oleksandr Kozlov, National Academy of Sciences of the Ukraine, and Juan Gallego-Juarez, Institute de Acustica Calle Serrano all of whom presented in the Industrial Applications session. Dr. Lawrence Crum, University of Washington led the Biology/Medical session and Jiromaru Tsujino, Kanagawa University, Japan was featured in the Material Fabrication and Joining session.

Three technical courses were featured during the conference. Emery Rose of E.S.R. presented, "Synthesis of a Discrete Time Adaptive Phase Lock Loop." Dave Grewell of Branson Ultrasonics captivated his audience with, "Amplitude and Force Profiling in Ultrasonic Welding of Thermoplastics." Computer Aided Engineering Associates', Pat Cunningham, presented "Use of Finite Element Methods for Ultrasonic Applications."

Jennifer Schramm of Purdue University was the

*Continued on page 4.*

## UIA Sustaining Members

American GFM Corporation
AmTech
APC International, Ltd.
Arichell Technologies, Inc.
Branson Ultrasonics Corporation
Bullen Ultrasonics, Inc.
CAE Blackstone
Crest Ultrasonics
Dentsply Interna'l Preventive Care
Dukane Corporation
Eastman Kodak Company
EDO Corporation, Acoustics Div.
Ethicon Endo-Surgery Inc.
FibraSonics, Inc.
Greer Manufacturing. Inc.
Herrmann Ultrasonics, Inc.
Hyde Park Electronics
Lewis Corporation
Midwest Ultrasonics
Misonix, Inc.
Morgan Matroc, Inc.
Piezo Kinetics, Inc.
Piezotech, LLC
The Procter & Gamble Company
Sonicor Instrument Corporation
Sonics & Materials, Inc.
Sonic Systems
Sonobond Ultrasonics
Sono-Tek Corporation
Spembly Medical Limited
Stapla Ultrasonics Corporation
Staveley Sensors, Inc.
Telsonic Ultrasonics
Valleylab, Inc.
Zevex, Inc.

# President's Message ...Mark Schafer

What a time! The 30th Annual UIA Symposium was a huge success, with our largest attendance ever. The topics ranged from welding plastics to welding arteries, with everything in between. Our thanks go to the Symposium cochairs, the session organizers, the speakers, the exhibitors, and our management company, all of whom worked hard to make this year's meeting such a record event.

How do we top it? Plans are underway to have next year's meetings coordinated with other organizations, allowing the UIA to reach out to new members, and allowing our members access to new "connections". We are also planning a one-day "focussed" meeting in the Spring, with a single topic, that will permit a full immersion for both the novice and the expert.

Look for more information in the months to follow. The next year promises to be an exciting one for our organization!

-- Mark Schafer, President

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# Stapla Ultrasonics Opens Chicago Office

Stapla has named Tim Crider as Midwest Operations Manager of their newest office in Chicago, IL. Stapla Ultrasonics is a world leader in state of the art ultrasonic metal welding and they are extending this technology to the plastics assembly industry. The Chicago office will provide customer sales and service in the Midwest and is serving the automotive, electronics, medical and appliance markets.

Tim Crider has held positions of increasing responsibility in customer service, leading to his current position. Tim spent 10 years handling customer service and sales for manufacturing production equipment companies in the plastics industry and at Stapla for the past two years. Tim's territory is the north central states.

For more information, contact Stapla's Chicago office at (630) 462-5997 or Email: info@staplausa.com.

# Acoustical Metrology



**New Developments in Underwater Acoustics**

The frequency range over which underwater acoustic hydrophones can be calibrated depends on the size of the tank in which the measurements are performed. At 1 kHz, sound in water has a wavelength of 1.5m and tanks have to be large enough to accommodate several wavelengths of the acoustic signal.

NPL has recently installed a new large open tank which extends the range of hydrophone calibrations down to 1 kHz. The wooden tank is 5.5 m in diameter and 5 m deep and is equipped with a high-resolution positioning system which allows transducers to be located and moved with great accuracy and precision. We believe that it is the most accurate positioning system in any underwater acoustic test facility in the world.

Not only do we provide a hydrophone calibration service based on this new facility, but we can use the tank to investigate the properties of acoustic positioning systems to understand the effects of underwater noise on such systems, and to predict the far-field behavior of transducers from near-field measurements. In the near future, we will be commissioning an acoustic pressure vessel which will allow us to simulate ocean conditions at depth and over a range of temperatures. These two new developments represent a substantial improvement in NPL's underwater acoustics facilities, allowing us to respond to a wider variety of customer needs and to undertake a challenging program of research.

**Finite Element Modelling of Acoustic Transducers**

Modelling and prediction of the performance of acoustic transducers are challenging tasks. The properties of transducer materials are not well understood and the mathematics of the nonlinear acoustic fields generated by these transducers is complex.

NPL, in conjunction with a commercial software company and researchers at Bath University, is developing a Finite Element (FE) modelling program that will enhance the design capability of UK transducer manufacturers. A model ultrasound physiotherapy transducer has been designed and built and is undergoing tests to confirm the theoretical performance predicted by the FE package. The work is funded under NPL's Strategic Research Program.

The purpose of the work is to extend the use of the FE package to the higher frequencies needed for applications in medical ultrasonics. This will provide improved methodologies for calibration and testing and form the basis of a service to transducer manufacturers, allowing a clearer understanding of vibroacoustic design fundamentals.

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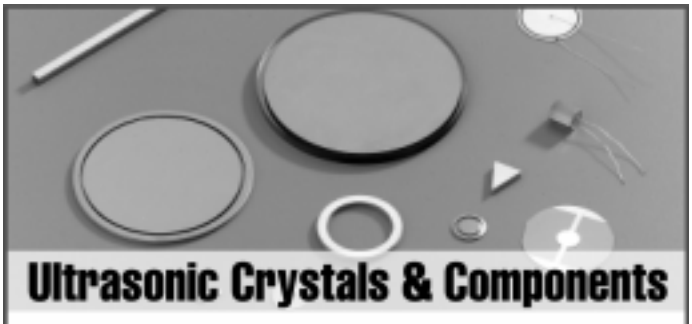

# More of the 30th Annual Symposium (continued from page 1)

recipient of the annual Procter & Gamble Graduate Research Award. Michael McDonald of P&G presented Jennifer with a plaque and a $1,500 scholarship. Jennifer studied at Purdue under the direction of Dr. Inez Hua, Assistant Professor, also a speaker at the symposium. Jennifer presented her work on "Ultrasonic Decomposition of the Pesticides Dichlorvos and Alachlor: Identification of By-Products and Reaction Kinetics" at the member's annual meeting. As an added bonus, Jennifer's parents were in attendance to see her receive her award as well as present her research.

Association business was conducted at the member's annual meeting where officers Mark Schafer, Kevin Klein, Ron Manna, and Alan Broadwin were reelected to serve another term. Two new directors were elected to the Board: Paul Fentonof AXYA Medical, Inc. and Tom Kirkland of Dukane Ultrasonics.


Attendees also enjoyed the opportunity to network with fourteen exhibitors, many of which demonstrated the latest in ultrasonic equipment.

Sam Berliner continued the UIA Profile Series on the pioneers of ultrasonics featuring Robert S. Soloff, innovator and entrepreneur, from Sonics & Materials, Inc. Mr. Soloff was instrumental in the development of ultrasonic welding of plastics as it is practiced today and in several other related technologies. The Profile Series has featured the following in prior years: Janet Devine, Sonobond; Howard

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# Profiles of the Pioneers: Robert Soloff, *Innovator and Entrepreneur*

*by S. Berliner, III*

UIA Profile Series

Robert (Bob) S. Soloff is one of the younger "old-timers" of ultrasonics. Born in Brooklyn in 1939, he was always interested in electro-mechanical pursuits, starting with his Erector set, went to Brooklyn Technical High School and graduated from Cooper Union as a Mechanical Engineer in 1960. He started with Kearfott, where a small group "dabbled" in ultrasonics and was concerned with cleanliness of Polaris missile inertial guidance platform parts, wanting a system to remove all particulates after a rinse cycle. Bob was handed a rough schematic of an oscillator, told what it was to drive, and asked to make it work. Using his knowledge of electrical engineering, he made cavitation bubbles in the cleaning tank at 25kHz.

He developed a reputation as the ultrasonic maven. Kearfott had a Canadian, Bill Fortman, working on pneumatic sound generators (Hartmann whistles); Bob worked with him on bird repelling, defoaming chemical reactions, and an ultrasonic spray nozzle for shipboard oil burning.

Bob worked for Kearfott for about eight months and then went with a company of which Bill Fortman was one of the founders, Astrosonics, and got his first patents, for sound generating and spray nozzle devices. The recession interfered and Bob left for Branson in February, 1962, working with pneumatic sound generators for drying heat-sensitive materials (he published an article in the Journal of the Acoustical Society). They presented the device to a major pharmaceutical company - "This is great! Look at this; you can dry it without damaging it!" The flow specs required a scale-up factor of about a thousand! That ended that project and, Bob thought, his career at Branson.

Stan Jacke, who hired Bob, wanted an applications engineer at Danbury; Bob was asked if he was interested (ca. early '63). Danbury Division's main business was the SONIFIER liquid processor, then promoted as a cell disruptor.

Branson was seam welding films, trying compete with Ultra Sonic Seal; passing thin plastic films under a probe to seam weld bags and tubes. Bob worked on mechanisms to transport the film and the probe; on some injection-molded parts, you went around the edges, the seam area, with a probe and got a sort of weld. It was not economically viable. One of Bob's first nominally-successful projects at Branson was seam welding multi-layer Kraft paper bags (with a polyethylene liner).

Bob had a Scotch Tape dispenser on his desk and a probe in his hand and brought the probe onto the face of the Scotch Tape dispenser and the two pieces welded together. His first thought was, "Well, this Scotch Tape dispenser is really finished" but, on second thought, said, "Wow, this is a heck of a lot easier than running a probe all around the edge of the part." Here was a solution for applications they'd had to write off. "So, that very same day, I went out and bought a basket full of toys,--actually I think a harmonica was one of them, some figures - -people, whatever, cut them open--they had been glued together,--contacted the parts and, lo and behold, they welded!" He immediately wrote up a disclosure on "remote" or "far field" plastic welding.

He called Ideal Toy Company; "I have this ultrasonic device which joins plastics together. Are you interested?" One engineer finally said, "Yeah, sure, come on down, demonstrate it." Bob drove down with a Model S-110, barely cranking out a hundred watts; they brought out all kinds of plastic toys and he started welding them, and more people came out and said, "Wow! This is great stuff, but you just can't use this as a hand tool like this and go into production." Bob went back to Danbury, got a Stanley drill press stand from home, modified it to hold the convertor and half-inch step horn, took it back to Ideal, and they said, "Ah, you got something a little better now but we still can't use that in production because it depends too much on the operator." So, he took it back, found an air cylinder, a valve, and a couple of mechanical timers, mounted them all together, wired to turn the ultrasonics on and off, with a weld timer, a hold timer, and a foot switch, and took it back to Ideal; they wanted to buy it right there, exactly the way it was, saying "How much you want for it?" Bob said, "Two thousand dollars" (a lot of money in 1963). Ideal wrote a check, took the unit, and talked about more - the first job was for a Roy Rogers stagecoach cowboy kit.

Bob wrote up the disclosure for remote far-field plastic welding, Branson filed for a patent, and the patent examiner wrote back, saying, "We really don't quite believe what it does." Bob drove to Washington with Erv Steinberg and Stanley drill press unit #2, and made a presentation, saying, "See that Scotch Tape dispenser on your desk? Let me have it!" He welded it together and the examiner said,"Wait a second. I got this broken {plastic} keychain {tab} in my desk." The application had been filed December 6th, 1963, and the patent issued December 21, 1965, #3,224,916, "Sonic Method of Welding Thermoplastic Parts"; the beginning of ultrasonic plastic welding as we know it today.

Bob then wrote the first article ever to appear on ultrasonic welding of this sort, in *Modern Plastics*, March, 1964.

Next came ultrasonic staking of plastics, covered by Bob's Patent Number 3,367,809, filed in May, 1964, and issued in February, '68, in response to Electrolux, which had to attach a vacuum impeller to a metal ring. Bob said, "Well, if you could stick some projections up through the metal ring, maybe we could squeeze 'em down." They did, he mashed them over, and that was ultrasonic staking, now a business unto itself.

Insertion came early on; with a variation of the Cavitron patent. Cavitron was the first to do metal insertion; they contacted the metal insert with the probe. Bob did it by contacting the plastic and driving the plastic against the metal insert, achieving the same results, but without wearing the surface of the

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## Profiles of the Pioneers: Robert Soloff, *Innovator and Entrepreneur* *(Continued from page 5)*

horn or the insert itself.

Welding, insertion, and staking came first; the next development was the energy director. Polystyrene crystalware was glued, stems to goblets, etc., but the glue crazed. Bob welded the parts, still getting crazing due to bubbles in the joint; "What if we made little projections in the area to be welded and focused the energy into that defined projection?" The welds were clear and energy directors became part of the technology and, in basically the same shape, still are today.

In 1964, Bob drove the welder across country and back with his wife, Carole, visiting cleaner sales reps and getting them started in this field. Bob was the "bad boy" of Branson for pushing them into the welding business. That Stanley drill stand with the same timers, air cylinder, and valve, was sold for over two years as a product, probably a thousand of them.

Ultrasonic welding equipment needed a booster horn, a mechanical impedance gain transformer, and another thing that came along accidentally. The relatively-fragile convertor was held on its bottom ring in the Stanley drill stand; all the load being transferred to it. Bob said, "Let's put a dummy half-wavelength holder in between", developing the booster horn, which changed the gain ratio, giving a different amplitude at the radiating face.

All of this occurred literally within six months of welding the Scotch Tape dispenser, and all of the features and configurations that were developed then are, in essence, still being used today.

Bob spent three years out in the field, until about 1968, when he went back to Danbury as Manager of New Product Developments and worked on rotary ultrasonic machine tools, diamond-coated, to drill very delicate ceramics, glass, etc.

He worked on ultrasonic metal riveting, for both aluminum and titanium rivets, mainly for titanium rivets for the Boeing SST ('nuf said?).

Bob left Branson in 1969 and, on April 30, 1969, started Sonics & Materials (S&M, Sonics), manufacturing tooling for users of Branson, Cavitron, and Ultra Sonic Seal machines and making horns. They got several patents, especially for ultrasonic welding and staking, and a unique, basic convertor patent. Their patents on plastic assembly were application patents, not equipment patents. Sonics was the first to use castings in ultrasonic welders, and, within about six to eight months, had their own welder, an automated system, sold the first to Pall Corporation toward the end of 1969, and had the first public showing at the SAE show in Detroit in 1970, their S-series, which continued to sell for about ten years.

They started jammed in a rented office trailer in Danbury, at $125/month, depending on the neighbor for a rest room. They built a new facility and, later, a second, adjacent, building was acquired, and several years later, a third building on the property. When they got into vibration welding, they took over another building across town, and were in all those facilities for 29 years. Recently, they moved into a large building in nearby Newtown, Connecticut, which they transformed into a truly beautiful new facility.

In 1974, Sonics acquired Ultra Sonic Seal Company, founded by Howard Deans, an early pioneer in film welding (who is still the manager); they still focus on film welding and tube sealing.

In 1976, Sonics contracted with Heat Systems to build liquid processors; that lasted until about 1982, when Sonics started to market their own equipment, the VIBRA-CELL.

In 1985, Sonics developed a microprocessor-based ultrasonic welder and in 1988 introduced 15kHz equipment, which allowed making much larger horns to do bigger jobs, and ,ca. 1995, came out with a welding press operated by a digital stepper motor, giving very accurate control.

In 1995, Sonics developed its first vibration welder, at 200 to 250Hz; to weld bigger pieces and different materials.

Sonics now manufactures ultrasonic welders spin welders, hot plate welders, heat staking equipment, and vibration welders, as well as the VIBRA-CELL ultrasonic liquid processor and special systems for automating the welding process.

Sonics went public in February, 1996, and recently moved into a stunning, large, new building.

They acquired ToolTex, now a wholly-owned subsidiary, in 1997. Paul Spurgeon, President, was also an early pioneer in ultrasonics. ToolTex was acquired for their separate and unique ability to design one-off special systems profitably.

Recently, Bob received a patent for vibration welding of carpeting material to plastic substrate (for auto interior door panels); avoiding pin marks and combing. Bob's first patent was issued in 1962, and his latest patent issued this year; thirteen patents in his own name, spanning 38 years.

Bob is also rather pleased with Sonics' new Website, at *"sonicsandmaterials.com"*.

Sonics uses finite element analysis in horn design; "The nice part about FEA - - you can ADD metal to the horn and you don't have to throw it away."

Robert Soloff is "an avid tennis player", playing singles twice a week, doubles twice a week. He kept a 36' trawler on Long Island Sound until last year and thinks every CEO would benefit greatly by getting into Poker. Bob also enjoys working with his daughter, Lauren, who was very instrumental in the company going public, handling all the SEC work, and the design and building of the new facility; is an attorney, and has three children to keep her busy.

An unabridged version of this profile will appear on the UIA Website http://www.ultrasonics.org.

The author wishes to acknowledge the courtesy and cooperation of the profilee, Bob Soloff, who graciously gave up the better part of a working day for an oral-history interview.

# More of the 30th Annual Symposium (continued from page 4)

and three of the greats, Peter Bloch, Bob Fehr and Stan Jacke.

Company sponsors included Sonobond, Branson, Dukane, Misonix, Etrema, Staveley Sensors, EWI, and Zevex.

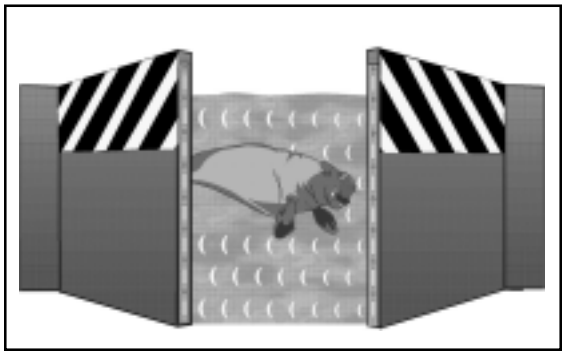
Mr. Chuck O'Connor, Vice President of the Center for Science and Industry (COSI) in Columbus, posed a challenge to each attendee. As the keynote dinner speaker, Mr. O'Connor took each participant back to the days when they were young asking them to remember who inspired or influenced their decision towards a career in science and technology. He challenged everyone to find a way either through volunteering or mentoring to influence the scientists of tomorrow and inspire them towards a career in technology.

The final day of the symposium, featured a tour of Edison Welding Institute (EWI). Technology demonstrations included ultrasonic levitation, vibration amplitude measurement, ultrasonic atomization, plastic welding, ultrasonic impedance measurement, film bonding, and ultrasonic metal welding.

Plans are underway for the 31st Symposium. A Call for Papers will be issued in early September. Watch the UIA website for more information at www.ultrasonics.org. If you are interested in being a Session Chair or Co-chair, presenting a paper, or exhibiting, please call Karen Malone at (614) 688-5111.

# MSI Piezocomposite Transducers help Harbor Branch

Materials Systems Inc. (MSI), Littleton, MA, recently contributed a key sensor technology to the new, highly successful Manatee Protection System designed by Harbor Branch Oceanographic Institution (HBOI) for the U.S. Army Corps of Engineers. Within the first few months of operation at the Port Canaveral Florida locks there were eight confirmed "saves" of manatees that might otherwise have been crushed by the closing lock gates.



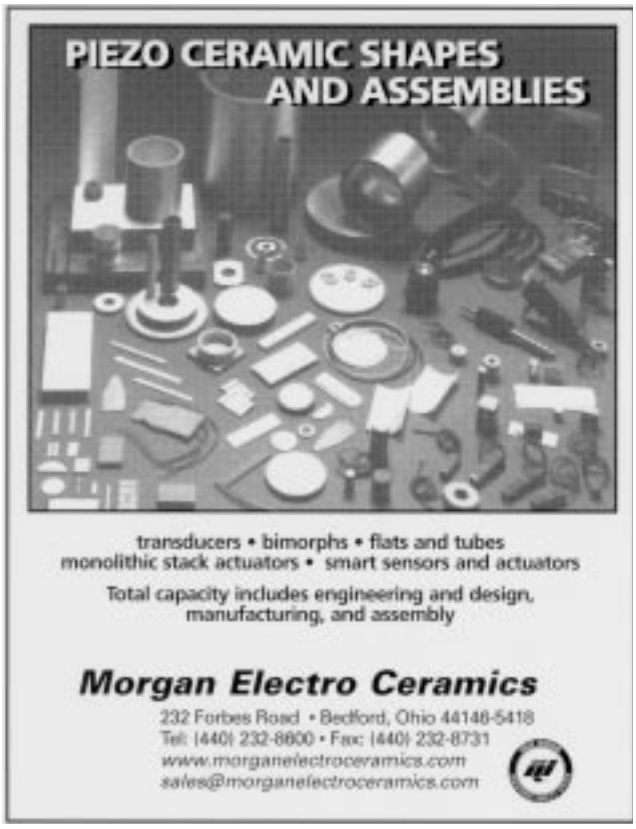
Manatees are large, slow moving marine mammals, sometimes known as "sea cows". Adults weigh from about 1,000 to 1,500 pounds and can grow to 12 feet in length. They are an endangered species that, due to their slow movements and habitat within the warm, brackish waters of Florida's Intra-Coastal Waterway, are often injured or killed by collisions with boats or entrapment in man-made structures and nets. The 1996 Florida Manatee Recovery Plan by the U.S. Fish and Wildlife Service lists entrapment in floodgates and navigation locks as the second largest cause of human-related manatee deaths.

The HBOI designed Manatee Protection System contains a total of 320 individual acoustic sensors installed in a "ladder array" configuration on the lock gates. The sensors are made from state-of-the-art piezoelectric composite transducer elements that operate as both transmitters and receivers. Transmitter units, vertically spaced about six inches apart along one gate, emit narrow high frequency acoustic beams directed toward corresponding receiver units on the opposite gate. A manatee in the path of the closing gates will break two or more of these beams, activating an alarm and automatically causing the gates to stop and reverse direction. Software records the time and acoustic "signature" of the manatee(s).

The MSI sensor technology used in HBOI's system was originally developed for use in Navy submarine sonar under Office of Naval Research SBIR funding. Les Bowen, MSI President said, "We are delighted that our advanced composite transducer technology, originally developed for state-of-the-art defense sonar, also works so well in manatee protection." Other applications of the piezo-composite material include surface ship mine hunting, nondestructive testing, medical ultrasound, and seismic exploration.

MSI, an eight year old company and maker of sonar





# Oceanographic Institution save Manatees

sensors, moved to Littleton, MA in 1992 after successfully outgrowing the business incubator where it got it's start. MSI is an example of how a business incubator's assistance can make the difference for a small, start-up company. The company has since more than doubled its space in Littleton's Beaver Brook Industrial Park increasing sales by an average of 50 percent per year over the past five years to an estimated $6 million in 1999. It employs 40 people and the business has been profitable every year.

His company developed a better way to make a composite material called piezo. This plastic material is already widely used in transducers which detect vibrations in sonar and medical imaging applications.

"When you squeeze on (pieces of piezo), they generate an electrical signal," he said. "They can sense vibrations. You can use them to send out ultrasonic signals and when they reflect back ships or fish in the sea or tumors inside the body, they can show the reflected material. You can make a picture from this."

The U.S. Navy has invested about $10 million in contracts helping MSI to develop the technology. Bowen said the Navy generates about 70 percent of MSI's sales with the remaining from defense companies and medical equipment manufacturers. He said the commercial side of the business is poised to take off in the year 2000.

A demonstration of the Manatee Protection System was held on March 24 at the Port Canaveral locks. A (human) swimmer activated the system by passing through the gates as they closed, demonstrating how the system works to detect and protect manatees from injury. For more information about the project, log on to MSI's website, www.matsysinc.com , or contact Ken Lannamann at MSI (978) 486-0404 ext. 207. Additional information can be found at the U.S. Army Corps of Engineer's website, www.saj.usace.army.mil/restore/projects/manatee , or by contacting Larry Taylor at Harbor Branch Oceanographic Institution (561) 465-2400 ext. 258.



## Acoustical Metrology (cont'd from page 3)

**New Material Makes Physiotherapy Equipment Safer**

Ultrasonic physiotherapy treatment heads are required to emit with an intensity of less than 3 W per $cm^2$. Until recently measurement of this critical safety parameter has demanded the use of expensive and time consuming beam-plotting techniques using miniature hydrophones.

NPL has brought an entirely new measurement capability to this area with the introduction of its aperture accessory for commercially available radiation force balances. The accessory consists of a set of apertures ranging in diameter from 4 mm to 30 mm and a holder which can be adapted for the particular radiation force balance to be used. A series of power measurements is made with the differing aperatures and the effective radiating area of the ultrasound equipment conveniently determined. The apertures are fabricated from a special polyurethane absorber material originally developed by the Ministry of Defense and extended by NPL to cover the MHz region. The aperatures are precision cut by water jets. The absorber material combines high transmission loss and high echo-reduction and is designed for use at frequencies above 0.7 MHz.

Sets of apertures are now available from NPL. Further applications for the material include targets for ultrasound absorbing radiation force balances and anechoic lining material for ultrasound test tanks.

# In the News...

## Patent Reviews are Expanded

UIA members please note that the Patent Review information posted monthly on the UIA website at http://www.ultrasonics.org/patentreview.html has now been expanded. The service will now provide both U.S. and International Patents.

For questions regarding the Patent Review service, please call UIA Headquarters at (614) 688-5111 or Alan Broadwin at (914) 833-2649.

# New Products...

## Ultrasonically Weld Multiple Connections to FFC

Stapla Ultrasonics' new Ultraindexer system is designed to accurately and automatically weld multiple connections or terminals to Flexible Flat Cable (FFC) as thin as 0.002" and other components.

The system includes modular tooling, Stapla's Condor Universal Welder, and the Stapla ST 3000 II controller. It supports sequential operations to automate production and simplify setup and operation. The St 3000 II features a large LCD screen that displays both numerical settings and a dynamic 3-D diagrammatic display to help operators set, store and retrieve up to 1,000 weld settings without reprogramming or changing the applicator. Built in controls ensure the quality and integrity of each weld by maintaining strict parameters including the compression of wires before welding and final weld height. At the same time, the interactive controller communicates all necessary preventative maintenance information and troubleshoots any malfunction.

For more information, contact Stapla Ultrasonics at 375 Ballardvale Street, Wilmington, MA 01876, phone (978) 658-9400.

## Sono-Tek Announces Shipment of Series 5000 Systems

Sono-Tek announced that is has shipped the first of its new Series 5000 Cleaning Systems to one of the world's leading 300 mm integrated circuit (ic) device manufacturers. According to James L. Kehoe, Chairman and CEO, "We believe that the delivery of these systems will become a significant milestone in the history of the Company by positioning us in the forefront of the semiconductor capital equipment market."

Kehoe said the Series 5000 family of cleaning units have been thoroughly designed and tested to meet rigorous industrial standards. With a demonstrated cleaning efficiency of greater than 96%, the nonaqueous cleaning system is a major advance in cleaning and drying technology for wafer and disk transport and storage boxes. This versatile tool, capable of cleaning transport and storage containers from all manufacturers for 150 mm, 200 mm and 300 mm wafer carriers has been CE Certified to enable shipment into countries in the European Union as well as to meet SEMI standards S2-93 and S8.

Sono-Tek Corporation is the leading developer and manufacturer of liquid spray products based on its proprietary nozzle technology. Founded in 1975, the Company's products have long been recognized for their performance, quality and reliability.

For more information contact James L. Kehoe, CEO at (914) 795-2020.

# UIA Board of Directors

If you are interested in participating on the Board of Directors or a UIA Committee, please contact Fred McGowen at f.mcgowen@herrmannultrasonics.com