ultrasonic industry association
UIA
# Vibrations
News from the Ultrasonic Industry Association

Jeff Vaitekunas, Editor
Spring 2001, Vol. 11, No. 1

## Testing for Adhesive Bonding: The Problem, the Solution, and the Nationwide Fix...by Emmanuel P. Papadakis*

I built a plastic car from a kit over 20 years ago. It is mostly an epoxy-fiberglass assembly replacing the beetle body of a 1970 VW. The plastic body still looks good, but the metal is rusty. This month's article describes some problems with fabrication of plastic body components, bonding them together and nondestructively testing the result. This is good, modern NDT at its basic best. I wish that I had read it 20 years ago.

Frank A. Iddings
Tutorial Projects Editor

As kids most of you glued plastic models together such as jet planes, Old Ironsides, the Nautilus, and so on. Full size trucks are not much different, at least some parts of certain models. Major truck body parts like whole hoods with integral fenders may be molded in two or three section and adhesively bonded together.

I ran into a problem with the bonds which held heavy truck hoods together. The right and left halves of these heavy truck hoods with integral fenders were molded of sheet molding compound (SMC) which is a thermosetting plastic resin containing about 30 percent by volume of chopped glass fibers randomly oriented for reinforcement. The raw material comes in soft, pliable sheets that are cut to size, laid into molds, compressed to shape and thickness, and heated to cure into rigid complex shapes. These shapes, such as the right and left halves of a truck from the bumper to the windshield, are then bonded together with a thermosetting adhesive. The lap joint is typically at least 25 mm (1 in.) wide. The adhesive is supposed to spread throughout the joint area when the two parts are brought together and then is supposed to cure, holding the parts together. The parts in question were made by a first tier supplier and shipped to a truck assembly plant for final assembly into vehicles.

Failures of the adhesive bond can occur from several causes including unclean surfaces, lack of adhesive, precure of the adhesive if the parts are not put together soon enough, and spring back of the parts if they are not clamped into position during the cure. The problem I ran into was compounded by all of these causes, not just one. Contamination could never be ruled out because of the shipping and handling routine. Adhesive was applied by hand with things like caulking guns so that areas could be missed in a hurry up routine. Workers could take a cigarette break between the application of the adhesive and the joining of parts. Because the parts were not clamped but simply set aside, gravity and mismatch could cause parting of the adhesive line in the adhesive curing at room temperature. And, compounding the problem still further, a relatively rapidly polymerizing adhesive was used so that the parts would not have much time to sag apart before curing. This attempt to circumvent the spring back problem (without the use of clamping jigs) exacerbated the precure problem if there were assemble delays.

The problem showed itself in the field where fleets of new trucks were falling apart. Failure rates up to 40 percent were experienced. Since these heavy trucks were supposed to be durable for industrial jobs, the truck company's reputation was on the line. To complicate the situation, the first tier supplier was secretly repairing adhesive bonds in the field without informing the warranty arm of the truck company. When we found out, we calculated the actual loss to the truck company at $250 000 a year plus a large multiple for damage to reputation.

The most obvious solution, namely to change processes or to change suppliers, was complicated by contractual obligations and the time to renegotiate and plan, probably two years. The situation was so bleak that that truck com-

pany management had issued an edict declaring the use of adhesively bonded SMC parts to be infeasible in manufactured products. The next step would have been an order to stop production, bringing heavy truck production to a screeching halt. The threat of this action was real as was its implementation.

At that time, it was obvious that an NDT method was necessary, there was not one available. The truck company wanted to be able to test bonded truck bodies as they arrived at the assembly plant and to retrofit such inspection into the first tier supplier's plant. The truck company wanted a field portable method for obvious reasons.

At that point, the only test method available to the truck company was a gross test for the absence of adhesive. A feeler gage shim was used as a probe between the two layers of SMC to detect whether adhesive was missing. The test proved ineffectual because many truck hoods were observed with the edges of adhesive joints buttered over with extra adhesive, which prevented the entry of the shim. Sawing up these hoods revealed that the adhesive was missing from within the joints. Besides, the shim method did not address the question of weak bonds containing adhesive.

The plastics design group of the truck company assembled a task force and looked up as many NDT methods and instruments as they could find, they but got no definitive off the shelf answers. They came to me as head of the NDT research, development, and applications group to evaluate these leads or to invent a new method.

I put Gilbert Chapman, II, on the job, and he singled out an ultrasonic instrument as having potential. This was the Sondicator Mk II, which was manufactured at that time by Automation Industries and has now been redesigned by Zetek. The instrument used lamb waves at approximately 25 kHz propagating between two closely spaced probe tips. Actually, the wave motion involved both propagating waves and evanescent waves analogous to resonance near the tips. The received signal was compared in both amplitude and phase with the input signal by means of built-in circuitry, and poor bonds were signaled by a red light and an audible tone burst. The instrument required calibration against acceptable reference standards of adhesively bonded material.

The device was immediately found to be capable of differentiating between well adhered adhesive in the lap joints and the lack of adhesive over moderate areas, including buttered over vacant regions. However further work was required to detect the present but nonadhered adhesive and also adhesive with weak bond(s).

Chapman made a breakthrough on this challenge by making one important discovery. The instrument would reject almost all industrially made bonds if it was calibrated against perfectly made bonds in the laboratory. In reality, many of the industrially made bonds were strong enough to survive in the field. The test in this stage of development would have rejected all of production. Chapman's conclusion was that the perfect laboratory calibration standard was worthless. It followed that he had to create a calibration standard contain-



ing the requisite degree of imperfection to just barely accept bonds and reject the bonds that were actually made but unacceptably weak.

Chapman solved the problem of the creation of sufficiently imperfect reference standards by applying statistics to a large family of bond samples made in the supplier's factory by hourly personnel under production conditions. These samples Chapman tested and rank ordered with the instrument modified to give quantitative read out, not just the red light and tone burst no go alarm of its regular operation. Physical tensile pull tests then determined the instrument level corresponding to the rejectable strength level. The reference standard was born as the type of sample just good enough to exceed the minimum specifications of the pull test. With the reference standard, the no go test could be used.

Chapman then taught the method at the plant where the trucks were assembled. The truck company also instructed the first tier supplier on the use of the method and taught its own quality assurance surveillance agents to use the method so that high quality could be assured at the supplier and so that the nonconforming product would not be shipped to the assembly plant.

The quality management office of the truck manufacturer accepted the method after Chapman wrote it up in the standard format. The method then served to define a specification for an adequate adhesive lap join on a per unit length basis. No such specification had existed in the industry previously. The Chapman specification is now accepted as an exact parallel to the spot weld specification for steel.

The edict declaring adhesively bonded SMC to be infeasible in a manufacturing context was rescinded just weeks before the order to stop truck production was to have been issued. One can imagine the magnitude of disruption that would have occurred if the company had been forced to revert to steel truck bodies. It would have impacted the plastics industry, the company's stamping plants, steel sheet orders, fuel economy, corrosion lifetimes of bodies, and all the future designs for a variety of SMC parts for further trucks and cars. As feasibility of adhesive bonding of SMC was reestablished, the use of SMC was extended to other parts and other car lines, thus improving CAFÉ mileage and durability. The rescuing of SMC and the elimination of all the above problems is directly attributable to NDT applied with imagination and the requisite degree of smarts.

The cost of NDT for keeping the SMC bonding process under surveillance for a year was about $25 000 including wages and the cost of the instrument. The first tier SMC supplier reduced its failure rate from 40 percent to five percent simply because it became cognizant that it could be monitored by the NDT police function. Other parts went into production in later years because their bonding quality could be assured. NDT paid for itself many times over.

The references contain articles by Gilbert Chapman, II, on the method he developed as well as an economic analysis by Emmanuel Papadakis. For further study of proper management of NDT in industry and for further study of the cost of quality when detrimental conditions occur, one would be advised to take short courses on quality, finances, and NDT.

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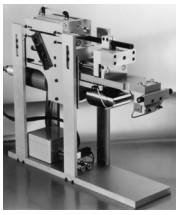
*A Ford LTL-9000 heavy truck with molded SMC hood. The adhesive bonding problem occurred in the L-9000 series. The solution to the problem permitted the illustrated truck and many other models to be built with SMC.*

# New Products

## New Ultrasonic Plastic Tube Sealer



Wilmington, MA…Stapla Ultasonics is introducing its new K1 Plastic Tube Sealer to hermetically end-seal thermoplastic and laminate tubes. The system incorporates advanced technology originally developed for Stapla's K1 high precision ultrasonic plastic welder for automotive, appliance, medical, and electonic applications. Using this new technology, the K1 Plastic Tube Sealer produces clean, high quality, wrinkle-free seals.

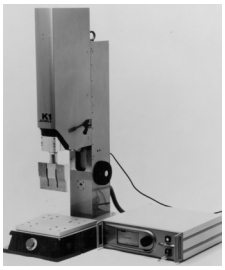
With an operation frequency of 20 kHz and a wide range of 3000 W, the K1 Plastic Tube Sealer features true "one button" operation. By turning and pressing this button, all relevant welding parameters can be adjusted. Once these are set, operators don't have to adjust the system to maintain tube seal quality, as the system automatically maintains the pre-set parameters. This simplifies the welding operation to improve quality control and maximize production rates.

With very fast operating cycle times, the K1 Plastic Tube Sealer is designed for production environments. It can be installed in filling stations and connected to external control units.

For more information, contact Stapla Ultrasonics Corporation at 375 Ballardvale Street, Wilmington, MA 01876, Telephone: 978-658-9400, Fax: 978-658-6550, Email: info@staplaultrasonics.com.



## New Ultrasonic Plastic Welding System



Wilmington, MA…Stapla Ultrasonics is introducing a new ultrasonic plastic welding system that incorporates advanced technology originally developed to support high precision ultrasonic metal welding applications in the automotive, appliance, and electronic industries. The K1 system combines Stapla's plastic welder with a state-of-the-art controller.

Although ultrasonic plastic is already widely used in the plastics industry, the Stapla K1 system was specially designed to meet the industry's high standards for superior quality welds. The Stapla K1 utilizes advanced technology to make it user-friendly to simplify production.

With an operating frequency of 20 kHz and a wide range of 3000 W, the generator, once programmed, permits one-button operation. The K1 combines precision with the flexibility to control time, energy, and both absolute and relative weld depth. The system feartures a user-friendly controller with a key switch on the input panel for selecting the operation level, an indexed exchange system for welding tools, and self-calibrating force measurement. Automatic data adjustment assures repetitive welding results.

Other key features include self-diagnostics, self-calibrating force measurements, and an optional PC control unit with touch screen.

Industries in which the Stapla K1 finds applications include automotive, medical, packaging, computer, data and telecommunications, toy, and others.

For more information, contact Stapla Ultrasonics Corporation at 375 Ballardvale Street, Wilmington, MA 01876, Telephone: 978-658-9400, Fax: 978-658-6550, Email: info@staplaultrasonics.com.

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**web: www.ultrasonics.org**

# New Products

## New Ultrasonic Splicer Features Rugged Modular Design

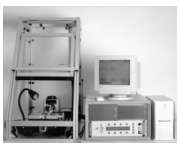
Wilmington, MA...Designed to operate in rough production environments, Stapla Ultrasonics' Raptor wire splicer is encased in a heavy metal shell to dampen vibrations, eliminate bends and deflections, and maximize the efficiency of vibration energy.

The system is easy to maintain with "drop-in" and "take-out" subassemblies that fit into the side and center cavities of the metal shell. Designed to splice wires ranging from 22 to 4 gauge in production environments, Raptor splice sizes range from 0.7 to 40 $mm^2$. The system is controlled by Stapla's new menu-driven ST 3000 II controller to support sequential operations, speed production, and simplify set-up and operation. The ST 3000 II features a large LCD screed that displays both numerical settings and a 3-D diagram to key components to help operators set, store, and retrieve up to 1,000 splice settings without reprogramming or changing the applicator.

Self-diagnostics and 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 aids in troubleshooting any malfunction.

For more information, contact Stapla Ultrasonics Corporation at 375 Ballardvale Street, Wilmington, MA 01876, Telephone: 978-658-9400, Fax: 978-658-6550, Email: info@staplaultrasonics.com.

## Ultasonically Weld Multiple Connections to FFC



Wilmington, MA...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 set-up 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 malfunctions.

For more information, contact Stapla Ultrasonics Corporation at 375 Ballardvale Street, Wilmington, MA 01876, Telephone: 978-658-9400, Fax: 978-658-6550, Email: info@staplaultrasonics.com.

## New Ultrasonic Welder Automates Microswitch Wiring

Wilmington, MA...Stapla Ultrasonics' new Microswitch ultrasonic system welds negative, positive, and ground leads to a microswitch in a single automated operation.

Designed especially for high volume production environments, the Microswitch system has three independently controlled transducer assemblies each with its own ultrasonic generator and controller. Modular tooling simplifies set-up and maintenance and accommodates a wide variety of microswitch sizes, while allowing welds to be made on different sides of a microswitch at the same time.

The three Stapla ST 3000 controllers, provided with the system, enable production personnel to set and control energy, time, compaction, and other parameters for each weld individually. The environmentally friendly welding process uses no consumables—solder, flux, etc.—and generates no heat.

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# In the News

## New Management Team in Place at Sensor Technology

Collingwood...A company that has grown dramatically in the past 18 years has added a second shift and has named a new management team.

Sensor Technology Limited of Stewart Road has started a second shift because of the volume of orders being received from around the world, said Rick Blacow, newly named by Sensor's Board of Directors as Vice-President of Operations.

The number of employees at Sensor Technology is 32, and this is expected to increase. The company started in 1985 as a division of Blue Mountain Hi-Tech, which started in 1983.

Joining Blacow on the management team are Dr. David Waechter, Manager of Research and Development; Dr. De Liufu, Manager of Materials Processing; Vincent D'Souza, Manager of Transducer Products; and George Czerny, Business Development Manager.

Blacow has been with Sensor Technology for three years, and his previous experience ranges from running an internet company and computer troubleshooting to photography and auto mechanics. Blacow and his wife Kathy, who works at General and Marine Hospital in Collingwood, live in Nottawa.

David Waechter joined Sensor Technology two years ago. He previously worked for a large electro-optics company near Montreal. Prior to that, he worked with an internationally recognized manufacturer of military systems. He is a Collingwood resident whose roots are in the greater Toronto area, and he is a member of the local Knights of Columbus.

De Liufu, who has been with Sensor Technology since 1998, came from China, where he was deeply involved in the manufacture of ceramics. He was an associate professor at South China University of Technology before moving to Canada. He and his wife Xiao Hua Liang and their two children live in Collingwood.

Vincent D'Souza graduated from Mysore University, India. In 2000, he is proud to say, he became a Canadian citizen. He joined Sensor in 1997. He is involved in Knights of Columbus and Neighbourhood Watch program. He and his wife Christine, who also works at Sensor Technology, have two daughters and live in Collingwood.

George Czerny is well known as manager of the Great Northern Exhibition fairgrounds and will continue to work with volunteers from the Collingwood Agricultural Society. He was publisher of *The Enterprise-Bulletin* from 1977 to 1991 and transferred from the Georgian Triangle area with Thomson Newspapers, from 1992 to 1995, to publish the daily *Sentinel-Review* in Woodstock, Ont. He and his wife Nancy returned to the area in 1996 and live in Craigleith.

Sensor Technology is a world leader in the manufacture of piezoelectric ceramics and, in recent years, branched out into the manufacture of transducers and hydrophones for both military and commercial customers.

## Misonix Acquires Fibra Sonics

Misonix Incorporated announced on February 14, 2001 that it has completed the acquisition of Fibra Sonics, Inc., the Chicago-based, privately held producer and marketer of ultrasonic medical devices. The acquisition of Fibra Sonics gives Misonix access to three important medical markets (neurology, urology and ophthalmology) and will strengthen their current presence in the cosmetic surgery market.

Fibra Sonics has several strategic partners, including Aesculap in neurology, Circon in urology, and Genzyme in cosmetic surgery. The Chicago operation is being phased out, and a new, wholly owned subsidiary of Misonix, Fibra Sonics New York, will carry forward the efforts of the former firm.

Fibra-Sonics (with the desultory hyphen) started out in ultrasonics welding automotive after-market items and was an early member of the Ultrasonic Manufacturers Association, predecessor of the UIA. Its then Director of R&D and Vice-President, Dr. Edward J. Murry, made a major, personal effort to keep us on track when things came unglued a bit ca. 1972, after the merger of the UMA with the Ultrasonic Industry Council to form the UIA, even going so far as to put out a privately issued newsletter, *INTERCHANGE*, starting in the summer of 1973, replacing the original *ULTRASONIC TIMES* and preceding the present *VIBRATIONS*.

## Pioneer in Ultrasonics
## A Tribute to Carmine DePrisco

Born 07 March 1908
Died 19 December 1998

Carmine DePrisco entered the Ultrasonic Energy Arena in the early 1950s. He had already achieved recognition for pioneering work in radio communications and electronics as a member of the University of Pennsylvania Electronics Technology Laboratory. As US involvement in WWII was heating up, a major problem was communicating with moving military vehicles, such as trucks and jeeps. Noise and hash made reception unintelligible, and Carmine solved the problem. Every body section was bolted together after being painted, so that electrical continuity was not always complete, giving rise to randomly varying electromagnetic current flow. The solution involved attaching stranded (braided) copper straps between the major body and engine components and, where possible, welding assemblies.

Carmine joined Aeroprojects in 1950 as Chief Project Engineer on Ultrasonic Programs. He was the principal investigator on the program, which led to the invention of ultrasonic metal welding. Carmine designed the early nickel stack transducers and power supplies while working in conjunction with Professor William Elmore of Swarthmore College.

He pioneered control circuitry for on/off powering of SCR power supplies. Before the introduction of one-piece can bodies, he worked on machinery for welding the side seam of aluminum cans. These welds were five to seven inches long line spots, welded at rates up to 300 cans per minute, including time for insertion and ejection of the metal used to form the can.

Carmine also designed power supplies and control circuitry for applying Ultrasonic Energy to roll forming metal extrusions and co-extrusion of complex forms.

It is thus proper that we, the authors who had the privilege to know and work with him for over twenty years, pass on his name and achievements in the early days of Power Ultrasonics.

Equally important, he was a good thinker, highly respected as an individual and leader, and a good friend.

Submitted by Nicholas Maropis and James Young

# An Invitation to the UIA Symposium

This year, the Ultrasonics Industry Association is holding its annual symposium in Atlanta, GA USA on October 11-12, 2001. It will be a world class educational program on timely issues pertaining to the field of high power industrial and medical ultrasonics with presentations from the US, UK, Switzerland, Italy, and Japan.

It will provide presentations that will complement and have synergy with the IEEE International Ultrasonics Symposium and the World Congress on Ultrasonics being held immediately prior to the UIA 31st Annual Symposium at the same hotel.

This is the 31st time that the UIA is providing a forum for discussion and networking among professionals employed or interested in the science and application of ultrasonics. Past symposia have attracted attendees from such diverse backgrounds as:

- Engineering, marketing, and management from industrial and medical organizations
- Consultants and service providers with ultrasonic expertise
- Teachers, students, and researchers from academic institutions
- Regulatory people, standards developers, measurement laboratories, and government groups

The program will be of mutual benefit to people interested in the cross fertilization of ideas that is available from divergent applications and research using ultrasonic energy.

If you want to maximize your exposure to the field of ultrasonics while minimizing your travel time and expenses, the week of October 8th is a must on your calendar. You will learn from experts in low and high power ultrasonics. You will find out what the most current research programs are and what applications are being validated and used in the field. You will get reports on the status of international standards in the field of ultrasonics.

Please join us. See you in October!

2001 UIA Symposium Committee

ultrasonic industry association

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# International Workshop on Therapeutic Ultrasound Applications

**Immediately prior to the Leading Edge Conference**

## May 7, 2001 • The Tajmahal • Atlantic City, New Jersey

### REGISTRATION FORM

(PLEASE PRINT OR TYPE)

Name _____

Company/Institution _____

Address _____

City _____ State _____ Zip _____

Phone _____ Fax _____

E-mail _____

### REGISTRATION FEES*

Before April 23 ❒ $195
After April 23 ❒ $245

Total registration fee enclosed

$_____

*If you register for the UIA workshop, you will receive 50% off the Tuesday, May 8th Contrast Agent Workshop or 20% off the entire Leading Edge Conference.

### PAYMENT

❒ Check
(must be drawn on US bank in US funds)

-or-

Please charge $_____ to my credit card (please check card type)

❒ American Express
❒ MasterCard
❒ Visa

Card Number _____

Expiration Date _____

Signature _____

### ROOM RESERVATIONS

For room reservations, call 1-800-825-8786. The reservation deadline is April 23, 2001.

The Trump Taj Mahal is just 15 minutes from Atlantic City's International Airport and one hour from the Philadelphia International Airport. For hotel information and detailed directions, visit www.trumptaj.com.

Complete and mail this form with your check or credit card information to UIA, 1111 North Dunlap Avenue, Savoy, IL 61874
Phone: (217) 356-3182; Fax: (217) 398-4119;
E-mail: uia@ultrasonics.org

ultrasonic industry association

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# International Workshop on Therapeutic Ultrasound Applications

**Immediately prior to the Leading Edge Conference**

## May 7, 2001 • The Tajmahal • Atlantic City, New Jersey

**TENTATIVE SCHEDULE**

**The International Workshop on Therapeutic Ultrasound Applications will be held Monday, May 7, 2001 at The Tajmahal in Atlantic City, New Jersey. The following experts in ultrasound applications will share their knowledge with this exclusive group of industry professionals. Don't miss this opportunity to meet with industry colleagues...make plans to attend today! (All presenters, topics, and schedules are subject to change.)**

**Brian Fowlkes, Ph.D.**
*"Use of microbubbles in high intensity ultrasound"*
University of Michigan, Department of Radiology
Senior Associate Research Scientist

**Professor Barry Goldberg, MD**
*Luncheon Speaker*
Thomas Jefferson University
Director Ultrasound Institute

Chair
**Inder Raj S. Makin, M.B.B.S., Ph.D.**
Ethicon Endo-Surgery

**Kullervo Hynynen, Ph.D.**
*"The feasibility of using ultrasound contrast agents to aid in local delivery genes and drugs"*
Brigham and Women's Hospital, Department of Radiology
Director, Focused Ultrasound Therapy Program

**Frederic Lizzi, Sc.D.**
*"Modification of various types of tissue structures by intense ultrasound"*
Riverside Research Institute
Research Director

**Uri Rosenschein, MD**
*"Applications of high power ultrasound kHz and MHz frequencies"*
Tel Aviv University, Sackler School of Medicine
Senior Lecturer

**Narendra Sanghvi, Ph.D.**
*"Non-invasive surgery using HIFU: Past, present, and future"*
Focus Surgery Inc.
President

**Michael Slayton, Ph.D.**
*"Combination of imaging and therapy initiated from an ultrasound array"*
Guided Therapy Systems
President

*Would you like to gain recognition in the Ultrasonics Industry? Find out how to appear in Vibrations:*

**Contact Seth Hettinger, UIA**
**phone: (217) 356-3182**
**e-mail: sethh@assochq.org**

## President's Message... Mark Schaffer

Spring officially arrived last week, but the snow falling this morning leads me to doubt the calendar. The change of season does make us look ahead to new beginnings, and so it is with our organization. This will be a turning point for the UIA, in terms of expanding our scope, reaching out to new audiences, meeting together in new venues, and aggressively working toward our Vision statement.

First of all, you should have already received notice of our May program on medical applications of "intense" ultrasound. An internationally known panel of experts will provide a one-day intensive immersion in this exciting field. Topics range from tissue cutting to healing, contrast enhancement to drug delivery. We hope to bring together an audience of physicians, researchers, designers, and users for cross-disciplinary discussions. This meeting will be held in cooperation with the "Leading Edge" conference in Atlantic City, with an attractive discount package for attending both our meetings and one day of the other. Mark your calendars now.

While you have the calendar out, don't forget about our annual symposium this fall in Atlanta. The symposium is being coordinated with the IEEE UFFC Ultrasonics Symposium to allow members of both organizations a chance to "see the other side" of ultrasound. This will allow the UIA to reach out to new members and allow our members access to new "connections."

All of these plans follow from our Vision statement: *to be the forum for manufacturers, users, and researchers in ultrasonic technology.* With your help and support, our organization is poised to fulfill this challenge.

## Letter from the Editor

I invite all readers to consider attending the UIA's upcoming International Workshop on Therapeutic Ultrasound Applications being held May 7, 2001 at the Tajmajal in Atlantic City, New Jersey. We are providing this workshop on therapeutic ultrasound in medicine immediately preceding the Leading Edge conference in diagnostic ultrasound held annually by Thomas Jefferson University. In the medical industry, we continue to see diagnostic ultrasound and therapeutic ultrasound overlapping. The diagnostic ultrasonographers are seeing therapeutic uses for what have traditionally been diagnostic procedures with the increase in contrast agents and sonodynamic therapy, and surgeons are performing high intensity focussed ultrasound with what are effectively high power ultrasonic imaging devices. The UIA has put together a group of experts to specifically look at this area of overlap. Find an invitation to register for this exciting workshop included in this mailing of *Vibrations* or go to www.ultrasonics.org to find registration information.


## Ultrasonic Industry Association

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## 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*