

# CASE STUDY

Sound Answers Inc.  
Strategic Partner

Sound and Vibration Consulting  
USA

*The Sound Answers/Brüel & Kjær partnership started in November 2006 when Sound Answers selected Brüel & Kjær as its hardware and software strategic partner. Sound Answers wanted to partner with a software/hardware manufacturer in the sound and vibration domain through which they could offer their services while enabling the partner to provide total solutions to customers. Brüel & Kjær was chosen for its test focus, reputation, best-in-class products, sales network, its strength in all its relevant markets and, most importantly, the management vision to provide a complete solution by leveraging consulting for pull-through product sales. Sound Answers President, Paul Goodes, says, "Partnering with Brüel & Kjær was the best choice for both companies because of our similar vision and goals".*

*Photos courtesy of Sound Answers Inc.*

*Sound Answers shares the Brüel & Kjær Application Research Center (ARC) in Canton, Michigan*



## Sound and Vibration Expertise Combined with Technology of Strategic Partners

Sound Answers Inc. was formed in October 2005 when MTS Systems Corporation discontinued its Noise and Vibration division. The Sound Answers founders and directors, consisting of President, Paul Goodes, Director of Engineering, Dr. Gabriella Cerrato and Director of Sales & Marketing, D. J. Pickering have over 65 collective years of experience and have addressed NVH issues for everything from refrigerator compressors to satellites.

**SOUND** *answers*

A Sound & Vibration Consulting Firm

**Fig. 1**  
President, Paul Goodes



Today, Sound Answers Inc. is an independent sound and vibration consulting firm with focus on providing complete NVH design, development and implementation solutions, by linking its sound and vibration expertise with the technology of its strategic partners.

The partnership with Brüel & Kjær started in November 2006. Paul Goodes says, "The partnership made perfect sense for what both parties wanted to accomplish". He continues, "Gabriella, DJ and I had previously worked with Alan Humphrey and Alun Crewe, two of Brüel & Kjær's Vice Presidents. This familiarity and trust has proved to be an important factor in the ongoing success of our partnership".

"In 2010, Brüel & Kjær test services projects represented 24% of Sound Answers' sales turnover," says D.J. Pickering, "so it is an extremely important strategic partner for the Sound Answers business".

In addition to Brüel & Kjær, Sound Answers' partners include Applied Technology Inc., a CAE design and engineering services company and TUV SUD a multinational product testing and certification organisation". Paul explains, "Both these relationships are highly complementary to the partnership with Brüel & Kjær. By aligning with strategic partners, Sound Answers is able to provide customers with a more complete solution".

**Fig. 2**  
The Desktop NVH Simulator – helping customers design the sound of their products

Sound Answers moved into the state-of-the-art Application Research Center (ARC) with its world class laboratories in 2008. ARC facilities include:

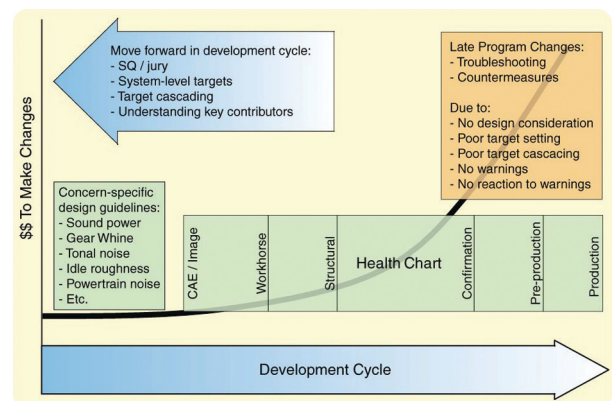
- 4WD NVH chassis dynamometer
- Sound Transmission Loss (STL) suite
- Sound quality and jury listening room
- Hemi-anechoic chamber with bedplate
- Over \$1M in Brüel & Kjær software and hardware including microphone arrays and a vehicle simulator lab



According to D. J., the ARC "provides Sound Answers with second-to-none physical test facilities." He continues, "We use around 70 days of test time a year in the ARC".

## Solutions with Sound and Vibration Performance in Mind

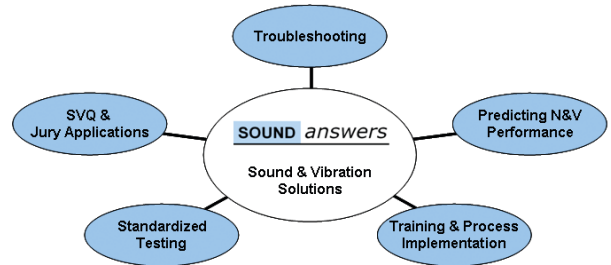
Sound Answers' mission is to "...help companies optimize their engineering development process for noise and vibration to achieve their product image goals for a more pleasant customer experience". The company focus is on automotive manufacturers and sub-suppliers, agriculture and construction, the medical industry, household goods and appliances, the defence industry as well as the wind energy market. In all the above-mentioned industries, sound and vibration performance requirements continue to increase. Sound Answers works with customers at every level – from those who must react to a new sound and vibration issue to someone who would like to incorporate design solutions with sound and vibration performance in mind.



## Examples of Sound Answers Automotive Engineering Expertise

### *Sound and Vibration Quality and Jury Applications*

- Establish objective sound and vibration quality targets which correlate to end-user subjective preferences
- Help customers develop more representative pass/fail criteria, and incorporate these new targets in their manufacturing process taking the guesswork out of subjective sound quality specifications



### *Predicting Noise and Vibration Performance*

- Develop simplified procedures to estimate contributions for a customer's NV target from different sources and paths
- Integrate test and CAE data to help customers improve the efficiency of the product development and improvement cycle

### *Standardised Test Customisation*

- Performing standardized tests and developing test procedures
- Optimise lab efficiency by deploying standardised tests
- Realising the need of the modern lab to complement commercial-off-the-shelf (COTS) software/hardware systems with custom sound and vibration standardised test cells in order to meet increased efficiency requirements. In addition to providing customised sound and vibration training and services, provide relief to limited resources and efficiency concerns

### *Troubleshooting*

- Root cause sound and vibration issues and develop guidelines for countermeasures
- With access to state-of-the-art facilities and equipment, Sound Answers staff are ready to tackle any sound and vibration issue by leveraging the most innovative tools available

### *Training and Process Implementation*

- Provide a variety of how-to and technical training, with focus on transferring technology and expertise to customers
- Sound Answers can assemble a custom training course to meet specific needs, from fundamentals of acoustics and vibration to target development processes, from typical troubleshooting techniques to development of customised test solutions



**Fig. 3**  
Dr. Gabriella Cerrato  
teaching a NVH course  
at ARC

## Working Closely with Brüel & Kjær

**Fig. 4**  
Director of  
Engineering, Dr.  
Gabriella Cerrato



Sound Answers selected Brüel & Kjær as the hardware and software strategic partner for several reasons. These include test focus, reputation, best-in-class products, for example array systems and the NVH simulator, the sales network, its strength in all its relevant markets and the management vision to provide a complete solution by leveraging consulting for pull-through product sales. D.J. says, "As the result of Brüel & Kjær offering testing services, the customer learns how the equipment and software can be applied to the process before purchasing it".

**Fig. 5**  
Director of Sales &  
Marketing, D. J. Pickering

Enlarging on Brüel & Kjær hardware and software, Gabriella adds, "Obviously PULSE hardware and software is world class as all Brüel & Kjær products have been for many years". The PULSE systems are based on 24-bit with Dyn-X, REq-Ex and Brüel & Kjær transducers. "For efficiency of data retrieval and data analysis flexibility, we always acquire time history data and for this we use Time Data Recorder Type 7708. We have now started to use Reflex Core extensively for data post-processing and we love its layout, the user-friendliness and its reporting capabilities".



The relationship has evolved beyond project work and Sound Answers also:

- Performs application engineering role to promote products
- Teaches application training for signal processing, sound quality, jury, order tracking, etc.
- Develops and teaches a practical approach to problem solving
- Provides QA evaluations and feedback on new products
- Supports the sales process for customers needing an experienced consultant

Paul says, "Our relationship with Brüel & Kjær has worked exactly as expected; the sales for test services projects has grown each year and we have completed services projects in 13 Brüel & Kjær Sales Regions in America".

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## Research Focus and Future Growth

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Sound Answers leverages the government Small Business Innovative Research (SBIR) program along with large commercial projects to support internal R&D. Building on the expertise developed in other industries, Sound Answers has been awarded four federal research grants including a Phase II project to build a commercial software product that includes signal processing algorithms specifically tailored for the test environment.

This research success with the SBIRs and commercial research projects reinforces Sound Answers' technical credibility and their determination to:

- Continue to help customers improve their product performance through improvement to the design process for sound and vibration
- Continue to develop application specific software to make customers' jobs easier
- Continue to pursue strategic partnerships to strengthen our offering to the customer

When asked about the future, D.J. commented, "Our research projects, both military and commercial, will continue to grow our intellectual property, while our partners, Brüel & Kjær included, will continue to grow our customer base".

In the more immediate future, however, Brüel & Kjær and Sound Answers are working together to create an NVH training program for automotive customers in the Americas. In this way, Brüel & Kjær can leverage the expertise and application experience of Sound Answers to deliver the best possible training class to the automotive market while showcasing their world class hardware and software.

*Please contact Brüel & Kjær to discuss test services provided by Sound Answers using the ARC.*