Troy Acoustics Corporation

NOISE IS HAZARDOUS TO YOUR HEALTH

There Is ONE and ONLY One Acoustical Sound Absorption And Noise Abatement System That Meets The Needs Of Military, Government, And Law Enforcement Ranges…

The Troy System is the ONE and ONLY acoustical sound absorption and noise abatement system that:

- Meets OSHA guidelines for noise exposure limits under CFR Section 29 and the Air Force ETL
- Guarantees a 1.25 reverberation time (RT60)
- Certified by United States Air Force for anti-ricochet properties
- Inch for inch, dollar for dollar the highest NRC and STC ratings in the industry
- Absorbs 95% of all muzzle blast energy, at all frequencies
- Reduces overall peak loudness by at least 5 dB
- Offers up to a 5-year free replacement warranty
- Acoustic properties guaranteed for the life of the range
- Tested and proven since 1997 in over 60 military, government, and civilian indoor and outdoor installations including: U.S. Secret Service(2 Ranges), U.S. Customs and Border Protection (5 ranges), Wright Patterson AFB (2 Ranges)

The ONE and ONLY One System proven, tested, and guaranteed … Troy

28358 Constellation Road Suite 640 Santa Clarita, CA 91355-5039 800-987-3306 www.troyacoustics.com

The Worlds Highest Acoustical Rating …. The Industry's Only Guaranteed Solution

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Comparative Data

Sound Absorption Coefficient (NRC)

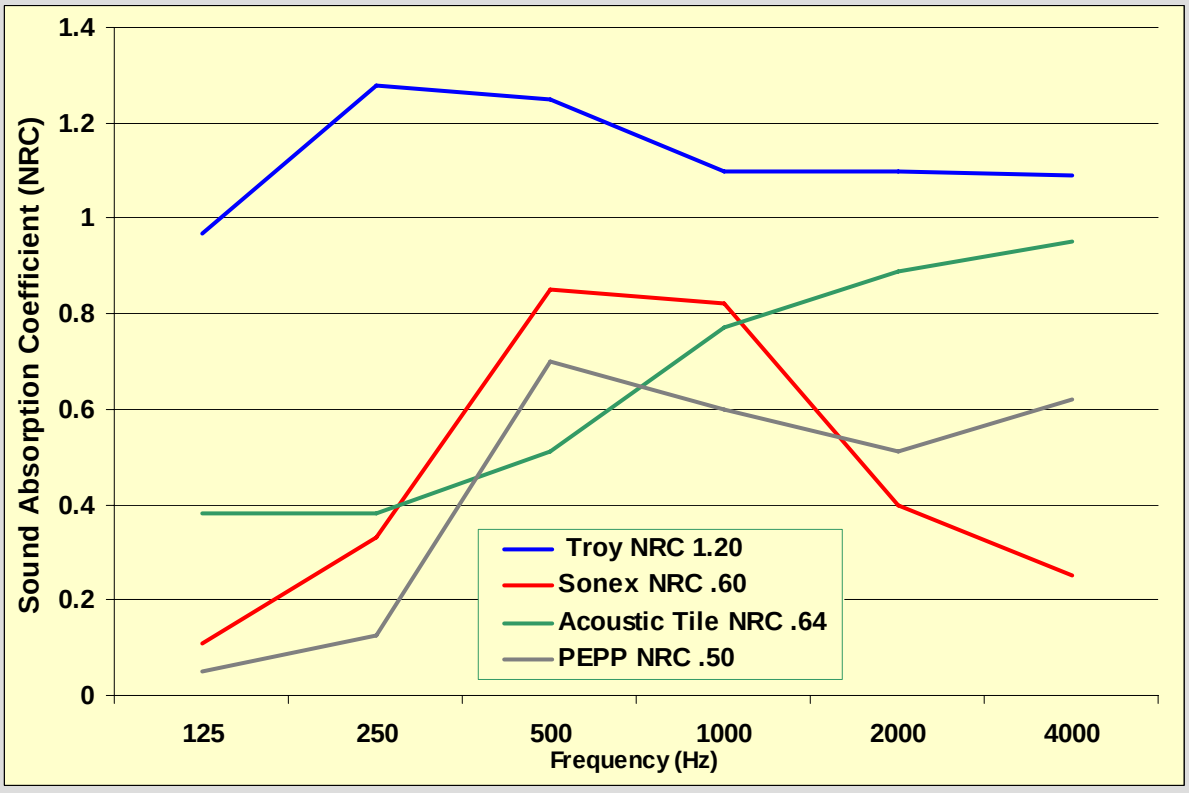
Chart 1 shows a comparison of the sound absorption coefficients (NRC) at the prescribed ATSM standard frequencies between the Troy System, Sonex 2", PEPP, and Acoustic Tile. (2" rubber commonly known as Dura-Block is not represented as there are no published NRC values at the key frequencies only an overall rating of .65)

The peak sound power of a weapon fired in a shooting range varies from 200Hz to 1000Hz.

Gunfire sound level that is not absorbed is reflected back into the range. This reflected sound, (reverberation), causes a buildup of harmful sound, thus elevating noise hazards.

Chart 1

Comparison of NRC – Troy System, Sonex, PEPP, Acoustic Tile



- It can be seen that the Troy System offers almost a flat sound absorption at all frequencies with an overall noise reduction coefficient of 120%, absorbing 97% at 125Hz, 128% at 250Hz, 125% at 500Hz, 110% at 1000Hz and 2000Hz, and 109% at 4000Hz.

- The data for the Sonex foam shows absorption factor of 82% at 500Hz and 82% at 1000Hz, but at the key low frequencies of 125Hz and 250Hz only 11% and 33% respectively, and at frequencies known to cause serious temporary and permanent hearing loss, 2000Hz and 4000Hz, the foam absorbs 40% and 25% respectively.

- The PEPP foam exhibited a similar frequency absorption characteristic as the Sonex but with better high frequency absorption of 51% at 2000Hz, and 62% at 4000Hz. The overall NRC of the PEPP is only 50%.

- Surprisingly, common ceiling acoustic tiles had the best high-frequency absorption, other then the Troy System, with 89% at 2000Hz and 95% at 4000Hz. At the low end of the spectrum the acoustic tile was better then Sonex, and PEPP absorbing 38% at 125Hz and 250Hz respectively. Overall the NRC value of the acoustic tiles was 64%, while superior to Sonex and PEPP it does not offer enough sound absorption, reverberation reduction, and noise abetment as seen in *Case Study 2,* below where direct comparison measurements were taken before and after treatment with the Troy System at Wright Patterson Air Force Base.

Reverberation Time (RT60)

Chart 2 shows a generic comparison of the reverb time (RT60) in an indoor small arms range that is; untreated, treated with wedge foam, PEPP, 2" Rubber, and the Troy System. It can be seen that effectiveness of the PEPP, and 2" Rubber is moderate at mid and high frequencies and almost non existent at low frequencies. The acoustic foam effectiveness is totally uneven showing a reverb time of 2.4 at 400 Hz and 5.64 at 200 Hz. On the other hand the Troy System displays an almost flat reverb time with an overall RT60 less than 1.25 seconds.

Reducing the reverberation time in a range is critical to reducing the noise hazard and sound transmission into adjoining offices, class rooms, and outside the range structure.

Reducing the reverberation time in a shooting range is paramount in protecting the health and wellbeing of the personnel that work and train there. Their welfare should be the number one concern in any range design.

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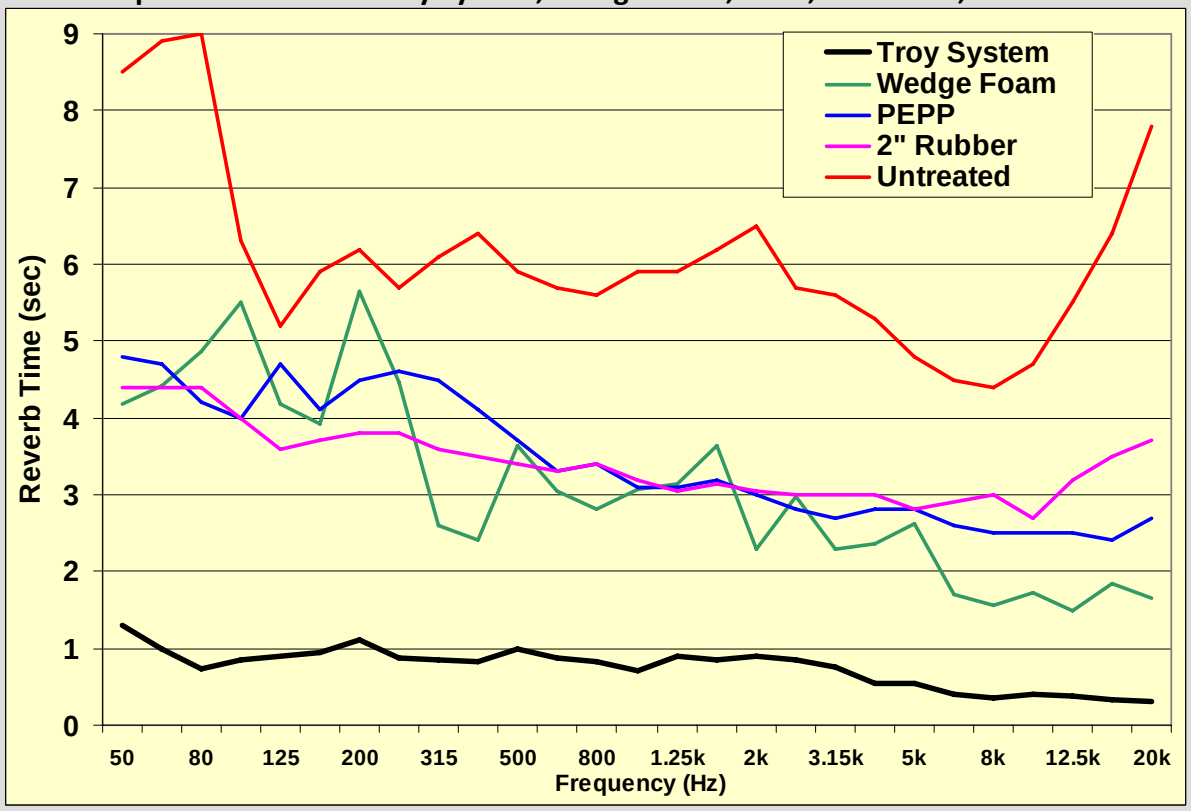
Chart 2

Comparison of RT60 – Troy System, Wedge Foam, PEPP, 2" Rubber, Untreated



Benefit to Cost

When selecting a sound absorption and noise abatement system for a firing range there are critical cost benefits to consider. While one product may be less expensive to initially purchase one needs to consider near term and long range savings:

- Does the manufacturer, designer, architect, consultant **guarantee** their choice of acoustical treatment to meet all health and safety standards?
- Are the potential of lawsuits and disability claims being factored into any initial dollar savings?
- Is the acoustical performance of the sound absorption/noise abatement system **guaranteed** for the life of the installation?
- Does the manufacturer offer a 5-year free replacement warranty?
- Is there a confidence that the range will be OSHA qualified for full operation and not limited to restricted hours (as in *Case Study* 1)?
- Is there a high degree of confidence that the lower priced acoustical treatment will not have to be completely replaced (*Case Studies 1*, and *2*, below)

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The data from the previous charts conclusively shows a significant difference in the in performance of the Troy System verses any other product. It is because of this documented and proven acoustic performance that Troy offers **the only unequivocal acoustical guarantee** in the industry.

Case Studies:

Study 1

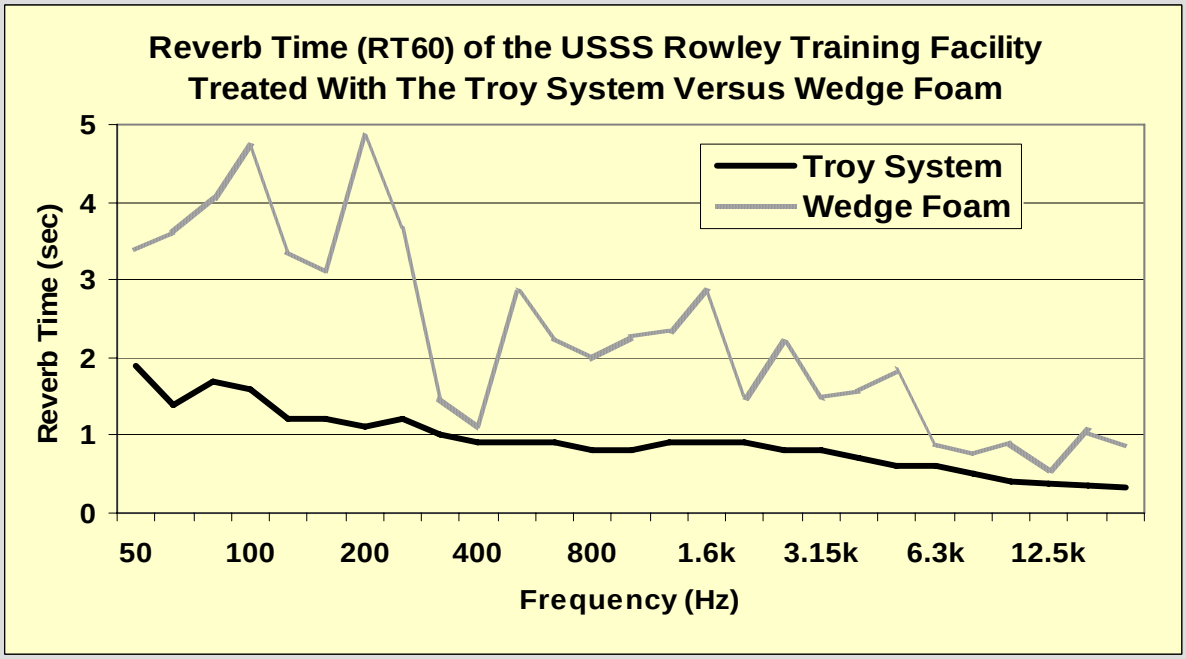
United States Secret Service, James J Rowley Training Center, Beltsville, MD

In 2007 Troy Acoustics Corporation was contacted by the United States Secret Service, their training facility in Beltsville, MD had been cited by OSHA for high noise exposure limits in the range and control booth, and was ordered to reduce range instruction time. The two 12 lane ranges were at that time treated with an acoustical wedge foam product (such as Sonex).

Troy Acoustics Corporation supplied the acoustic design, removal of the acoustical wedge foam, installation of the Troy System, and before and after sound testing. After the installation of the Troy System the ranges met all standards and were approved for full operation.

Chart 3 below shows a comparison of the ACTUAL before and after ASTM RT60 results for one of the 12 lane small arms ranges at United States Secret Service, Beltsville, MD

Chart 3



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Study 2

Wright Patterson Air Force Base, Dayton, OH

Wright Patterson Air Force small arms facility consists of two ranges: a 25 meter, 21 lanes and a 25 meter, two-lanes. The ranges are fixed point and were constructed with acoustic ceiling tile attached to the plywood over the baffles and safety ceiling. Since the facility was opened there have been numerous complaints about noise hazard inside the two ranges and in the adjoining offices and class rooms.

Chart 3 below shows the comparative reverb time (RT60) for the large range (21 lanes) at Wright Patterson Air Force Base, Dayton OH, before and after treatment with the Troy System. The range was built with acoustic tile on the baffles, the side and rear wall were smooth concrete. It can be seen the Troy System reduced the reverb time RT60 in the large range from 3.51 seconds measured in the bay to 1.21 seconds, and from 3.02 seconds in the shooters stall (lane 11) to 1.16 seconds.

Chart 3

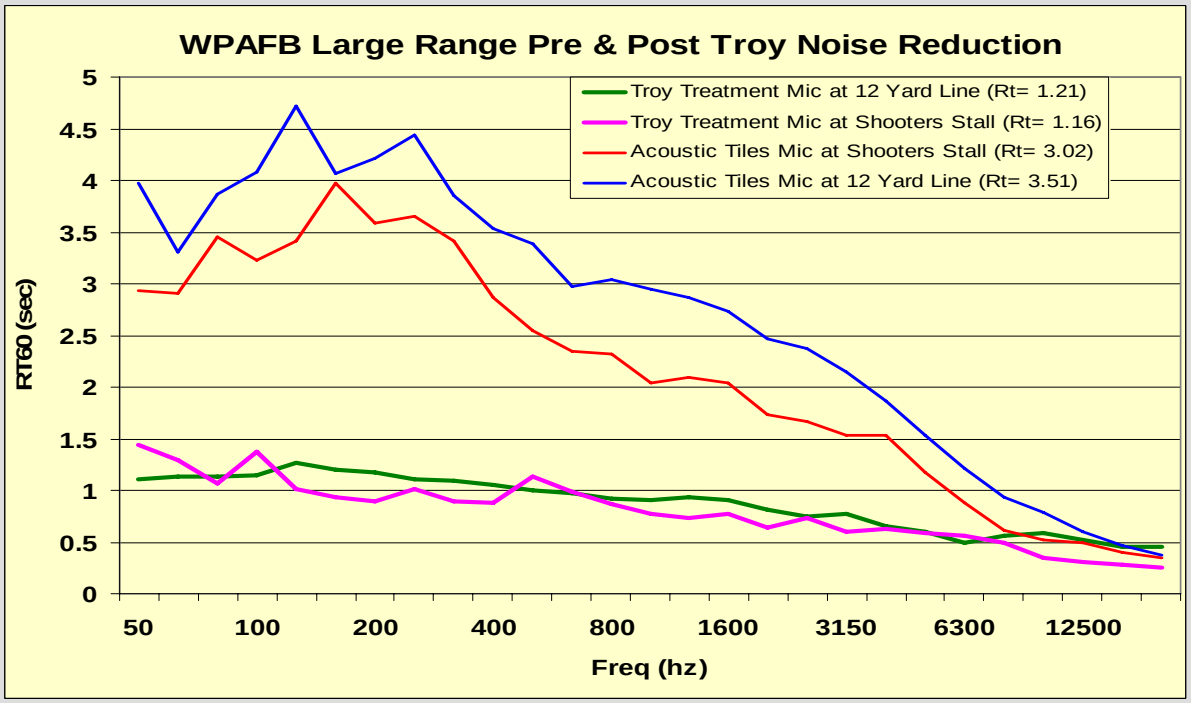

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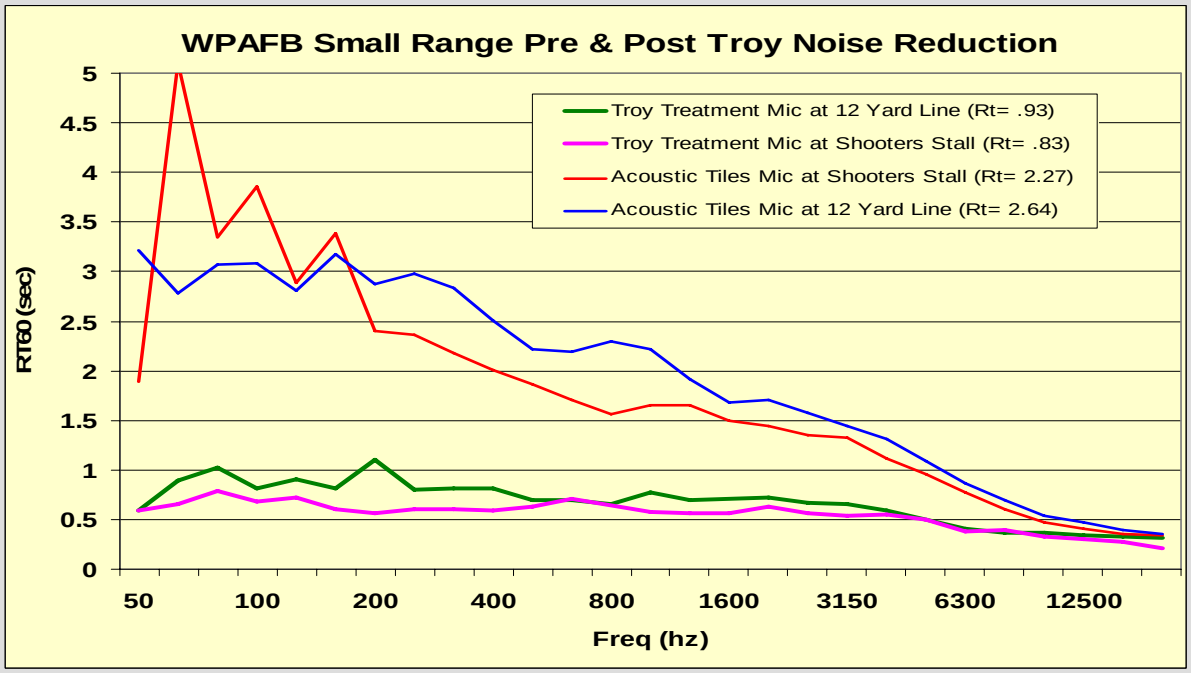
Chart 4 shows the shows the comparative reverb time (RT60) for the small range (2 lanes) at Wright Patterson Air Force Base, Dayton OH, before and after treatment with the Troy System. The range was built with acoustic tile on the baffles, the side and rear wall were smooth concrete. It can be seen the Troy System reduced the reverb time in the small range from 2.64 seconds in the bay to .93 seconds and from 2.27 in the shooters stall (lane 2) to .83 seconds.

Chart 4



After the completion of the Troy System acoustical treatment in the small range but not in the large, a Three-Star General fired an M4 in the two ranges, it was commented that the sound difference from the untreated to the treated range was going from a “boom” to a “pop.”

Troy’s Comprehensive Testing Methodology

In November of 2009 Stephen Katz, Troy Acoustics Corporation’s VP, Applied Research and Technology instituted a comprehensive testing methodology for small and large arms ranges. The testing utilizes over 16 instrumentation microphones and body sensors recorded as audio files on a 192k/24 bit recording system so that the data can be post analyzed.

The body testing, which is unique, was instituted by Troy Acoustics Corporation to better understand the influence on the body of high pressure waves. Although, the effect of impulse noise on hearing is widely studied and understood there is very little data on the physiological effects on shooters and instructors that train and work in these ranges.

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The first facility to be comprehensively tested was the small and large indoor ranges at Wright Patterson Air Force Base, Dayton OH, prior and after the installation of the Troy System. A full report is forthcoming. (*For a presentation of more data from the Wright Patterson Air Force Base testing please contact Joan Drucker at Troy Acoustics Corporation, 800-987-3306 Ext. 400)*

Ballistics

Under the auspices of the United States Air Force, a test was designed and witnessed by Mr. Rolland Roth, HQ AFSFC/SFXW, and Mr. Jeffrey Nielsen, HQ AFCESA/CEOA, to evaluate the performance of the Troy System in retaining bullet splash-back and mitigating ricochets, as compared to standard plywood covering (United States Air Force Engineering Technical Letter ETL 08-11: Small Arms Range Design and Construction, Section 7.5 Ballistic Safety Structures for shooting ranges). The test resulted in a formal approval to allow the Troy System in lieu of 2 layers of plywood. Troy Acoustics has been advised, in writing, that this test procedure will be published in the summer 2010 edition of the ETL. (For a copy of the test procedure visit www.troyacoustics.com/download.htm.) Troy is the only acoustical sound absorption and noise abatement system to receive such an endorsement.

The picture below shows a round fired at Wright Patterson AFB, taken after the comprehensive acoustical testing, where a round errantly struck a baffle.

The picture below shows the Santa Ana Police, Santa Ana, CA training facility with wedge foam (Sonex) acoustical wall and baffle treatment after one year of use. Troy Acoustics was called in because the wedge foam was offering almost no acoustical benefit.

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Who We Are: Troy Acoustics Corporation

Bill Bergiadis, Chief Executive Officer

- Inventor and patent holder of the Troy System™ sound wall design
- Has provided acoustical consulting and design/engineering services for: City of Los Angeles, LAPD, NYPD, Santa Monica Police Department, City of Pasadena, Pasadena Police Department, Chula Vista Police Department, FBI, NASA Ames, US Navy, US Secret Service, Lawrence Livermore National Laboratory, Lawrence Berkeley Nation, City of Manhattan Beach Fire Department, the City of West Hollywood, City of Thousand Oaks and many various private Fortune 500 Companies.
- Established more sophisticated criteria for shooting range acoustic performance

Bob Bledsoe, Chief Operating Officer

- COO of Troy Acoustics, Bledsoe has overall responsibility for operations, including construction design review, materials handling and installation of the Troy System.
- Bledsoe brings over 30 years of executive management experience in construction and manufacturing.
- Bledsoe is owner of Coastal Building Systems and was a distributor of aerated concrete systems and builder of specialty homes for several years.
- Bledsoe was also organizer and president of Brunswick Foreign Trade Zone, Inc. in Brunswick GA and past president and chief executive officer of Concrete Products, Inc. in Brunswick. GA. They manufactured cement/wood fiber roof deck and pre-cast concrete roof decks, a product similar to the Troy Board.

- He served in various management positions with Ideal Cement Company and worked for the Tennessee Valley Authority in Tennessee
- Project manager for major shooting range acoustic solution installations including US Customs and Border Protection, Harper's Ferry WVA; US Secret Service, MD; Niagara Falls Police Dept; Ankeny Iowa Police Dept., US Navy installations and Wright Patterson AFB

Joan Terry Drucker, Vice President, Marketing and Business Development

- Over 25 years business management experience in environmental products and services
- Former Vice President, General Manager, Savage Range Systems: manufacturer and developer of shooting range equipment
- Former President, founder of Environmental Visions, Inc.
- Former senior management of division of United Technologies Corporation
- Over 15 years experience in firearms related industry
- Developed a series of Architectural Seminars: Design and Development of Shooting Ranges
- Chairperson NRA Range Development and Operations Conference, Vendor Night

Stephen Katz, Vice President, Applied Research and Technology

- Over 40 years acoustical and sound engineering experience
- Won an ***Academy Award*** for the co-development of Dolby Stereo
- Has over thirty feature film credits including, *Star Wars, Close Encounters of the Third Kind, Altered States*
- Recording engineer for Jimi Hendrix, Chuck Berry, Ike and Tina Turner, Barry Manilow, and the St. Louis Symphony
- Designed and built recording studios for Dolly Parton and Porter Wagner, the original Cherokee Ranch (Steely Dan, *aja*), and Grand Funk Railroad
- Founding partner Eventide Electronics, one of the first manufacturers of professional digital audio equipment including digital delay lines, auto-locators, and pitch changers