ACOUSTICS AND NOISE CONTROL RESEARCH

Ray W. Herrick Laboratories
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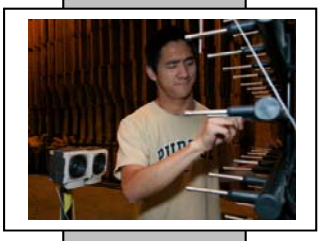
INTRODUCTION

The Acoustics and Noise Control Research Group of the School of Mechanical Engineering are based at the Ray W. Herrick Laboratories. The Herrick Labs was established in 1958 as an interdisciplinary laboratory with the aid of a large grant from Ray W. Herrick, who was then President of Tecumseh Product Company. The labs were funded with a mission to instill cooperative enterprise between Purdue University and industry. In the past 50 years, Herrick Labs has emerged as one of the world's renowned centers for their research and education program in Acoustics and Noise Control.

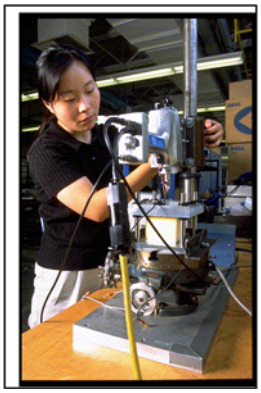
The research activities for acoustic and noise control at the Herrick Laboratories include the study of the wave propagation, voice production, vibration, human perception of sounds, control and abatement of environmental noise, and fluid dynamics as well as signal processing, numerical techniques, measurements, controls, and design theory applied to making our acoustical environment safer and more pleasant. Research applications include automobiles, water craft, aircraft, domestic products and appliances, heavy equipment, design of advanced acoustical materials for noise control, health care industries, trucks, compressors, heating/ventilating equipment, computers, and fans.

THE ACOUSTICS LABORATORY



The Herrick Laboratories, a graduate research facility in the School of Mechanical Engineering at Purdue University, consist of approximately 17,600 square feet (1,635 square meters) of engineering laboratory space; 10,500 square feet (975 square meters) of office space for faculty, students, and clerical staff; and 3,470 square feet (322 square meters) of machine shop and equipment space. Several facilities within the Mechanical Systems Laboratory are dedicated to research in the fields of engineering acoustics and noise control.

The main acoustics laboratory includes a reverberation room, an anechoic room and an audiometric room. The reverberation room measures 25 × 20 × 18 feet (7.6 x 6.1 x 5.5 meters) and has a practical lower limiting frequency of approximately 100 Hz. The anechoic room has a useful working volume of 12 x 12 x 12 feet (3.7 × 3.7 × 3.7 meters) and a lower limiting frequency of 100 Hz. Above this frequency, the background level is 20 dB or less. Both rooms have microphone boom systems, ventilation systems, and access doors and windows. In addition, the reverberation room has an adjacent, smaller reverberation chamber attached for transmission loss measurements of small panels. The audiometric room has interior dimensions of 8 × 8 feet (2.5 × 7.5m). It is used for jury testing and sound quality research.



There is also a large semi-anechoic room with a useful working volume of 41 × 27 × 18 feet (12.5 × 8.2 × 5.5 meters) is contained within a building addition of some 2,500 square feet (232 square meters). The building contains a dynamometer room, an instrumentation room, and mechanical equipment for ventilation and climate control of the semi-anechoic room. The room is designed for measuring the noise of large stationary and

mobile machinery and vehicles under simulated operating conditions; it has an exhaust ventilation capacity of 15,000 cfm (7.1 cubic meters/second).

Two other specialized test facilities are available. A 67-inch, two-wheel chassis dynamometer for automotive noise and vibration studies allows the simulation of road speeds up to 70 mph. A quiet wind tunnel with a test section of 18 × 24 inches (46 × 61 cm) allows aeroacoustic measurements for flow velocities up to 120 mph (60 m/sec).

A very large complement of acoustics and vibration analysis equipment is available, including microphones, omni-directional sound sources, accelerometers, a scanning laser vibrometer, analog and digital filters, real time one-third octave band analyzers, Fast Fourier Transform instruments, noise monitoring stations, Binaural Heads, maximum length sequence system analyzers, state-of-the-art sound level meters, and other PC-based data acquisition and control systems with high-speed digital signal processing boards.

RESEARCH FOCUS

Both experimental and analytical research is performed within the Research Group. Much of the experimental research is focused on finding better ways to identify noise sources and paths. Investigators within the Group continue to work on improvement of near-field acoustical holography and other array processing techniques that can be used to visualize noise sources. Others are investigating better methods of using modern, high capacity data acquisition systems to understand complicated machinery and other noise generators. For experimental aeroacoustics, the Group has built a quiet wind tunnel where aerodynamic sources of noise, such as air flow over automobiles and fans can be studied.

Other experimental research is focused on development of methods to diagnose and predict potential problems using sound and vibration signatures. These techniques are integrated into intelligent maintenance scheduling systems, and into control systems designed to manage and optimize safe operation of impaired systems and thus avoid catastrophic failure. These methods utilize advanced signal processing and data reduction techniques to identify fault-sensitive parameters. Models are then developed for observation of fault propagation dynamics, and these are used to diagnose and predict fault behavior.

Research, in collaboration with faculty in Psychological Sciences and in Hearing Sciences, is aimed at understanding and quantifying human reaction to noise: to understand the characteristics of sounds that people respond to and how these characteristics combine to give a person an overall impression of sound. These psychoacoustic models are combined with acoustical source-path models to have people-focused optimization of acoustic environments. Recent applications include quantifying annoyance due to environmental noise, the sound quality of refrigerators, HVAC systems, diesel engines, and chillers, and the impact of vehicle interior noise on speech intelligibility for older drivers.

Another collaborative research effort is in the design of compressors that use sound to control cooling. This combination of thermal science and acoustics research is called thermoacoustics. Recent effort has focused on the translation of successful small-scale experiments into a practical system that could be employed in applications such as refrigeration. An important part of much of the research at the Laboratories is accepting and solving the scientific challenges that arise when developing practical

engineered systems. Another group of acoustics and cooling research projects are focused on lowering noise while maintaining electronics cooling performance; these are part of the **Cooling Technologies Research Center** based in Mechanical Engineering.

Hybrid analytical/experimental methods are also pursued in order to find the fundamental mechanisms that control the acoustic and vibration behavior of machines, systems and materials. Currently, these methods are used to understand noise generation in tires, window-seal assemblies in automobiles, information technology equipment, bearings, brakes, cooling fans, and in the human vocal tract and in artificial vocal fold systems.

Many of the analytical studies are intended to develop models that can be used to design machinery or acoustical treatments in order to avoid noise problems. A significant body of research work is ongoing to develop general purpose numerical procedures to complement popular finite element and boundary element methods. These efforts include new finite element procedures to predict the behavior of porous acoustical materials and new finite element and boundary element methods to predict structural/acoustic behavior at high frequency. Advanced numerical models are also developed for the prediction of sound propagation outdoors in a complex urban and sub-urban environment.

An important outcome of much of the acoustics group's research is the development of new noise control treatment methods. This includes the design and optimization of the acoustical characteristics of both acoustical materials and composite systems of materials. Applications include fuselage-trim assemblies for aircraft, car door treatments and low-noise wall construction for buildings. In all research at the Laboratories, there is a strong interest in system performance in practical environments, and hence techniques are being developed for *in-situ* determination of the acoustical properties of sound absorption materials. . The Group is also involved in the investigation of active noise and vibration control approaches and "intelligent" noise control treatments: devices that adapt themselves to changes in operating conditions or the environment in order to maintain optimal performance. Examples include smart foams, adaptive engine mounts, and adaptive mufflers.

The Acoustics and Noise Control Research Program is also involved in a University Transportation Center, entitled the **Institute for Safe, Quiet and Durable Highways** (SQDH), sponsored by the U.S. Department of Transportation. This is a multi-disciplinary center, primarily with the Purdue University School of Civil Engineering, focused on finding techniques to make tires and pavement quiet while maintaining or improving current standards of safety, durability, and cost. As a result of the Institute, world class facilities have been built at Herrick Labs for testing tires and realistic pavement sections. It is expected that the research of the Institute will result in less dependence on noise barriers along highways and an improved environment particularly for people living in heavily populated areas.

The Ray W. Herrick Laboratories faculty are also active in the Center of Excellence for the **Partnership for Air Transportation and Noise Emission Reduction** (PARTNER) program, supported by the Federal Aviation Administration (FAA). The main thrusts of these efforts are aimed at understanding and mitigating the effects of low frequency aircraft noise, examining existing and new metrics to quantify the effect of airport noise on communities, land-use around airports and website design for informing the public about airport noise. A sponsored project by NASA in conjunction with FAA PARTNER program is the study of human annoyance to sonic booms. The perceptual attributes of transient events caused by shaped boom of supersonic aircraft are being examined. Further studies are

concentrated on how these perceptual attributes lead to human annoyance in reaction to these events and to understand the response of the human auditory system to shaped booms.

Within Mechanical Engineering faculty in the Acoustics and Noise Control group interact very closely with the Mechanics and Vibrations program since noise radiation and transmission often result from the vibration of machine elements (e.g. the shells of compressors). The Ray W. Herrick Laboratories acoustics research is part of a broad range of acoustics research activity on campus. Examples of research in this campus-wide group include: study of ultrasonic sound to promote thermonuclear fusion reactions (Nuclear Engineering); speech quality and speech to text translation (electrical and computer engineering); hearing aid design and modeling of the auditory system including effects of hearing damage (Speech, Language and Hearing Sciences); impact of environmental noise on wildlife (Forestry); effects of noise on cognitive performance (Psychological Sciences); acoustics of pianos and guitars (Physics); biomedical acoustics and acoustics biosensors (Biomedical Engineering).

LIST OF ME FACULTY IN ACOUSTICS AND NOISE CONTROL GROUP
J. Stuart Bolton, Kai Ming Li, Patricia Davies

COLLABORATING FACULTY
Anil Bajaj and James Braun

Aimee Surprenant (Psychological Sciences, Memorial University, St. John's, Newfoundland)

LIST OF THESES IN ACOUSTICS, NOISE CONTROL AND VIBRATION

Ray W. Herrick Laboratories, School of Mechanical Engineering, Purdue University

	Name	Degree		Thesis Title*	Major Professor
1.	D.R. Ahlbeck	MSME 1959		An Investigation of Acoustical Systems by Electrical Analog Methods	E.J. Wellman
2.	S. Vigander	MSME 1959		On the Use of Resonators as an Acoustic Muffler in Fluid Flow Machinery	R.C. Binder
3.	R.L. Lowery	PhD 1961		High Speed Compressor Valve Noise and Vibration Studies	R. Cohen
4.	M.G. Pottinger	MSME 1963		Pressure Oscillations in the Exhaust Chamber of a Refrigeration Compressor	R. Cohen
5.	H.L. Oh	MSME 1963		Dynamic Strains on a High Speed Compressor Discharge Valve	R. Cohen
6.	W.S. Gatley	PhD 1967		Development and Evaluation of Methods for Design of Mufflers in Small Refrigeration Systems	R. Cohen
7.	M. Lal	MSME 1967	N-T	Noise Analysis of Bendix-Westinghouse Compressor Line	J.F. Hamilton
8.	R.C. Chanaud	PhD 1967		Experimental Study of Aero-dynamically Generated Sound Due to a Rotating Disk	R. Cohen
9.	W.T. Suzuki	MS 1969		Noise Reduction of a Household Refrigerator	R.C. Chanaud
10.	H. Khosrovani	PhD 1969		Response of a Thin Wall Cylindrical Duct to a Random Pressure Field	R. Cohen/ R.C. Chanaud
11.	C.N. Johnson	PhD 1969		Fractional Horsepower, Rotary Vane Refrigerant Compressor Sound Source Investigation	J.F. Hamilton
12.	W.R. Thornton	MSME 1970		Pressure Cross-Correlation of White Noise and Turbulence in a Cylindrical Duct	R.C. Chanaud/ M.J. Crocker
13.	L.E. Flory	MSME 1970	N-T	Characteristics of a Microphone Sampling Tube for Flow Noise Rejection	

	Name	Degree		Thesis Title*	Major Professor
14.	R.E. Hayden	MSME 1970		Sound Generation by Turbulent Wall Jet Flow over a Trailing Edge	R.C. Chanaud
15.	U. Bolleter	PhD 1970		Theory and Measurement of Modal Spectra in Hard Walled Cylindrical Ducts	R.C. Chanaud/ M.J. Crocker
16.	E. Padilla-Navas	MSME 1971		Computer Simulation of a Two-Cylinder Refrigeration Compressor with Special Attention to the Cylinder and Cavity Interactions	W. Soedel
17.	J.E. Warren	PhD 1971		Contributions to the Mathematical Modeling of Capacitance Microphones	J.F. Hamilton
18.	D.F. Buntley	MSME 1971	N-T	Study of Noise Produced in a 100 HP Centrifugal Fan	M.J. Crocker
19.	A.F. Seybert	MSME 1972		Noise Reduction of a Residential Air Conditioner	M.J. Crocker
20.	T.J. Trella	PhD 1972		Computer Simulation of the Vibratory and Acoustic Behavior of a Reciprocating Compressor Discharge Valve	W. Soedel
21.	J.P. Elson	PhD 1972		Gas Pressure Oscillations and Ring Valve Simulation Techniques for the Discharge Process of a Reciprocating Compressor	W. Soedel
22.	J.W. Moore	MSME 1972		The Low Frequency Sound Radiation Characteristics of Panels and Beams	M.J. Crocker
23.	V.M. Viebrock	MSME 1972		Analysis of Noise from Clocks	M.J. Crocker
24.	W.R. Thornton	PhD 1972		Noise Identification and Reduction for a Rotary Vane Compressor	J.F. Hamilton
25.	W.P. Uffman	MSME 1972		Reduction of Noise in a Canister Vacuum Cleaner	D.R. Tree
26.	R.M. Ellis	MSME 1972	N-T	Some Design Criteria for Muffler Components	M.J. Crocker/ D.R. Tree/ S. Czarnecki
27.	S.R. Jones	MSME 1973		The Design of Acoustic Enclosures for Diesel-Powered Commercial Vehicles	M.J. Crocker

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28.	C.J. Young	PhD 1973	Acoustic Analysis of Mufflers for Engine Exhaust Systems	M.J. Crocker
29.	R.A. Shryock	MSME 1973	Acoustic Investigation of a Small Rotary Vane Compressor	D.R. Tree
30.	D.A. Towers	MSME 1973	The Reduction of Diesel Engine Noise of Commercial Vehicles by Acoustic Enclosure	D.R. Tree
31.	J.S. Wang	PhD 1973	Optimization of Design of a Sampling Tube	M.J. Crocker
32.	J.Y. Chung	PhD 1974	Measurement and Analysis of Diesel Engine Noise	M.J. Crocker
33.	J.D. Antman	MSME 1974	Mathematical Simulation of Feedback Excited Oscillations in Gas Flames	R.G. Leonard/ V.W. Goldschmidt
34.	J.F. Riley	MSE 1974	A Transfer Function and Experimental Analysis of Feedback Excited Oscillations in Gas Flames	V.W. Goldschmidt
35.	R.V. Firth	MSME 1974	Calculation of the Natural Frequencies and Mode Shapes of a Compressor Discharge Line by Using Finite Elements	J.F. Hamilton
36.	G.T. Wolfbrandt	MSME 1974	Damping Characteristics of Mastic Type Noise and Vibration Coatings	J.F. Hamilton
37.	C.H. Gerhold	PhD 1974	Use of Shelters to Protect a Vehicle Pass-By Noise Measurement Facility	D.R. Tree
38.	J.W. Sullivan	PhD 1974	Theory and Methods for Modeling Acoustically-Long, Unpartitioned Cavity Resonators for Engine Exhaust Systems	M.J. Crocker
39.	S.L. Applegate	MSME 1974	Noise Reduction of a Lawn Tractor Mower Assembly	M.J. Crocker
40.	E. Sandgren	MSME 1974	Computer Simulation of a Two Cylinder Reciprocating Compressor and Associated Discharge System Using Acoustical Impedances	K. Ragsdell/ W. Soedel
41.	J.M. Baum	MSME 1975	Computer Simulation of a Four-Cylinder Air-Conditioning Compressor With Special Attention to Discharge Cavity Interactions	W. Soedel

	Name	Degree	Thesis Title*	Major Professor
42.	E.T. Buehlmann	MSME 1975	Combustion Noise Study On a Diesel Engine	M.J. Crocker
43.	G.R. Shashaani	PhD 1975	Propagation of Supersonic Rotor Sound Radiations in Jet Engine Inlet Ducts	P.G. Vaidya
44.	R. Singh	PhD 1975	Modeling of Multi-Cylinder Compressor Discharge Systems	W. Soedel
45.	B.R.C. Mutyala	PhD 1975	A Mathematical Model of Helmholtz Resonator Type Gas Oscillation Discharges of Two-Cycle Engines	W. Soedel
46.	K.M. Mulej	MSE 1975	Noise Source Identification for a Garden Tractor	D.R. Tree
47.	A.F. Seybert	PhD 1975	Estimation of Frequency Response in Acoustical Systems with Particular Application to Diesel Engine Noise	M.J. Crocker
48.	L.W. Tweed	MSME 1976	Noise Analysis and Preliminary Design of Acoustic Enclosures for Air Cooled Internal Combustion Engines	D.R. Tree
49.	D.P. Egolf	PhD 1976	A Mathematical Scheme for Predicting the Electro-Acoustic Frequency Response of Hearing Aid Receiver-Earmold-Ear Systems	D.R. Tree
50.	S.F. Ling	PhD 1976	A Finite Element Method for Duct Acoustic Problems	J.F. Hamilton
51.	D.F. Ross	PhD 1976	An Experimental Investigation of the Normal Specific Acoustic Impedance of an Internal Combustion Engine	M.J. Crocker/ J.W. Sullivan
52.	D.A. Feldmaier	MSME 1976	Noise Identification of a Rotary Vane Compressor with Special Emphasis on the Cylinder Pressure	D.R. Tree
53.	D.B. Jaeger	MSE 1976	Noise Source Identification and Noise Reduction of a Small Air Cooled Internal Combustion Engine	D.R. Tree
54.	K.S. Wang	PhD 1976	Propagation of Finite Amplitude Higher Order Mode Sounds in Rigid and Absorbent Ducts with Particular Application to the Multiple Pure Tone Problem	P.G. Vaidya

	Name	Degree	Thesis Title*	Major Professor
55.	J.R. Ryan	MSME 1977	Design and Development of an Indoor Simulation of the SAE J366b Measurement of Exterior Truck Noise	J.W. Sullivan
56.	M.L. Winiarz	MS 1976	Theoretical Modeling and Parameter Study of a High Frequency Acoustic Resonator	J.W. Sullivan
57.	H.F. Hornbostel	MSME 1977	Sound Power Determination of a Truck in a Semi-Anechoic Room	J.W. Sullivan
58.	F. Laville	PhD 1977	Muffler Design by Scaling Using Engine Characteristics	W. Soedel
59.	F.W. Chambers	PhD 1977	Acoustic Interaction with a Turbulent Plane Jet	V.W. Goldschmidt
60.	P.A. Hayes	MSME 1977	Experimental and Analytical Investigation of Diesel Engine Piston Impact and Noise	A.F. Seybert/ J.F. Hamilton
61.	E.T. Buehlmann	PhD 1977	The Measurement of the Mach Number and the Speed of Sound in an Engine Exhaust System by an Acoustical Method	M.J. Crocker
62.	S. Steinke	MSME 1977	Compressor Noise Study of a 1.75 Horsepower Hermetically Sealed Reciprocating Compressor	D.R. Tree
63.	B.M. Glover	MSE 1978	Effect of Holes in Close Fitting Acoustical Enclosures	D.R. Tree
64.	L.W. Tweed	PhD 1978	The Design of Close Fitting Acoustical Enclosures	D.R. Tree
65.	M.E. Wang	PhD 1978	The Application of Coherence Function Techniques for Noise Source Identification	M.J. Crocker
66.	U. Bergmann	MSME 1978	Investigation of a Sound Power Measurement Concept for Heavy Trucks	J.W. Sullivan
67.	N. Kaemmer	MSME 1978	Sound Power Determination from Surface Intensity Measurements on a Cylinder	M.J. Crocker
68.	R.K. Witwer	MSME 1978	An Investigation of a Simulated Drive-by Noise Measurement Concept for Heavy Vehicles	J.W. Sullivan

	Name	Degree		Thesis Title*	Major Professor
69.	R.W. Key	MSME 1978		Noise Study of a Lawn and Garden Tractor	D.R. Tree
70.	B.H. Forssen	MSME 1979	N-T	Noise Reduction of Mufflers	M.J. Crocker
71.	K. Nakayama	MSE 1979		Prediction of the Sound Pressure Level Inside a Vibrating Rectangular Steel Box Using Statistical Energy Analysis	M.J. Crocker
72.	R.T. Ruhnow	MSME 1979		Lawn Mower Deck Performance Study: Blade Noise	D.R. Tree
73.	J.K. Thompson	PhD 1979		Evaluation of the Conventional and Acoustic Intensity Methods of Noise Source Identification for Small Internal Combustion Engines	D.R. Tree
74.	M.C. McGary	MSME 1980		Noise Source Identification of Diesel Engines Using Surface Intensity Measurements	M.J. Crocker
75.	R.C. Sohaney	MSME 1980		Analytical and Experimental Model to Predict Valve Train Vibrations in Internal Combustion Engines	J.W. Sullivan
76.	S.T. Jenkins	MSME 1980		Reduction of Transmitted Vibration Forces Through the Support Springs of a Compressor	W. Soedel
77.	Y.S. Wang	MSME 1980		Analysis and Reduction of Noise of a Portable Air Compressor	J.W. Sullivan
78.	F.O. Thomas	MS 1980		Effect of Nozzle Geometry on Acoustic Interaction with a Turbulent Plane Jet	V.W. Goldschmidt
79.	M.G. Prasad	PhD 1980		Acoustical Modeling of Automotive Exhaust Systems	M.J. Crocker
80.	V.G. Cole	MSME 1980		Prediction of the Noise Reduction of a Rectangular Steel Box Using Statistical Energy Analysis	M.J. Crocker
81.	T.J. Baugh	MSME 1980		Noise Reduction of Two-Cycle Engine by Exhaust Shaping	W. Soedel

	Name	Degree	Thesis Title*	Major Professor
82.	G.A. Clark	MSME 1980	Surface Radiated Noise Investigation of an Eight-Horsepower, Air-Cooled Internal Combustion Engine	
83.	T.E. Reinhart	MSME 1980	Noise Source Identification of Diesel Engines Using Acoustic Intensity Measurements	M.J. Crocker
84.	B. Dhar	MSME 1980	Transient Gas Pulsation Model of Helmholtz Type Pulse Combustion Devices	W. Soedel
85.	V.T.C. Tung	MSME 1981	Combustion Noise of a Diesel Engine	M.J. Crocker
86.	L.E. Kung	MSME 1981	Noise Source Identification of a Lawn Mower Engine by Conventional and Ordinary Coherence Function Methods	J.W. Sullivan
87.	J.J. Allen	PhD 1981	Use of Harmonic Basis Functions in Acoustic Finite Elements	J.F. Hamilton
88.	G.P. Mathur	PhD 1981	Vibration and Sound Energy Flow in Three-Dimensional Box-Like Structures	M.J. Crocker
89.	L. Pande	PhD 1982	Engineering Applications of Plane Wave Duct Acoustics	M.J. Crocker
90.	Y.S. Wang	PhD 1982	Transmission of Sound Through a Cylindrical Shell and a Light Aircraft Fuselage	M.J. Crocker
91.	J. Buffa II	MSME 1983	Determination of Sound Power of Machines Using Intensity Methods	M.J. Crocker
92.	Z.A. Momin	MSME 1983	Finite Element Techniques in Wave Propagation Analysis	J.F. Hamilton
93.	B.H. Forssen	PhD 1983	Determination of Transmission Loss, Acoustic Velocity, Surface Velocity and Radiation Efficiency by Use of Two Microphone Techniques	M.J. Crocker
94.	J.H. Lee	PhD 1983	Computer Simulation of Pulsations in a Gas Fired Pulse Combustion Device and Predictions of Their Exhaust Noise for Single and Dual Combustion Chamber Designs	W. Soedel
95.	K.E. Heitman	MSME 1983	Investigation of the Noise Transmission into a Light Aircraft Cabin Using the Two-Microphone Sound Intensity Technique	M.J. Crocker

	Name	Degree	Thesis Title*	Major Professor
96.	M. Waser	MSME 1984	Noise Transmission Characteristics of the Hermetic Shell of Fractional Horse Power Refrigerant Compressors	J.F. Hamilton
97.	N. Gupta	MSME 1984	Analysis of the Transient Motion of a Compressor	R.J. Bernhard
98.	F. Thomas	PhD 1983	Development of a Two-Dimensional Turbulent Jet Under Natural and Excited Conditions	V.W. Goldschmidt
99.	S. Marshall	MSME 1984	Investigation of Acoustic Resonance in Cavities	R.J. Bernhard
100.	L. Kung	PhD 1984	Vibration Transmission of Structures	W. Soedel
101.	S.M. Price	MSME 1985	Identification of High Frequency Noise Paths and Noise Mechanisms in Reciprocating Hermetic Compressors	R.J. Bernhard
102.	C. Kipp	MSME 1985	Prediction of Sound Fields in Acoustical Cavities Using the Boundary Element Method	R.J. Bernhard
103.	D. Carey	MSME 1986	Dynamic Modeling and Optimal Control Design of Passive and Active Electro-Magnetic-Acoustic Transducers	R. Shoureshi
104.	D. Allaei	PhD 1986	Vibration Analysis of Shells of Revolution Deviating from Axisymmetry with Application to Tires	W. Soedel
105.	B. Roys	MSME 1986	On the Acoustics of Shell Enclosed Compressors with Special Attention to Gas Pulsations on the Suction Side	W. Soedel
106.	N. Denton	MSME 1986	Investigation of Air Mover Noise Testing Method	R.J. Bernhard
107.	E.R. Green	MSME 1986	Normal Incidence Sound Transmission Through Panel Constructions Containing Relatively Stiff, Partially Reticulated Plastic Foam	J.S. Bolton
108.	W.L. Krasson	MSME 1986	Noise Mechanisms of Turbochargers	J.S. Bolton

	Name	Degree	Thesis Title*	Major Professor
109.	D.W. Larsen	MSME 1986	High Speed Rotor Dynamics of Systems Using Fluid Film Journal Bearings	J.F. Hamilton
110.	J.D. Mickol	MSME 1986	An Investigation of Energy Transmission Due to Flexural Wave Propagation in Lightweight Built-Up Structures	R.J. Bernhard
111.	B.K. Gardner	MSME 1987	Noise Source Identification Using a Numerical/Experimental Helmholtz Integral Equation Method	R.J. Bernhard
112.	J.R. Milner	PhD 1987	Acoustic Shape Optimization	R.J. Bernhard
113.	C.G. Mollo	MSME 1987	A Numerical Method for Analyzing the Optimal Performance of Active Noise Controllers	R.J. Bernhard
114.	T. Borchers	MSME 1987	Investigation of Noise Mechanisms in Dishwasher Appliances	R.J. Bernhard
115.	C.U. Bruer	MSME 1987	Measurements and Predictions of the Effect of Damping Layers on the Dynamic Response of Beams	J.S. Bolton
116.	H.A. Chung	MSME 1987	Linear and Nonlinear Mathematical Modeling of the Steady State Vibration of Sealed Refrigeration Compressors	J.F. Hamilton
117.	J.L. Dohner	PhD 1987	The Three-Dimensional Active Attenuation of Sound	R. Shoureshi
118.	P. Graf	PhD 1987	Semi-Active and Active Control of Frame Vibration in Automotive Vehicles	R. Shoureshi
119.	G.J. Kohrman	MSME 1987	An Investigation of a Sound Power Measurement Fixture for Internal Combustion Engines	R.J. Bernhard
120.	J.V. Warner	MSME 1987	Active Control of Sound Fields in Three-Dimensional Enclosures	R.J. Bernhard
121.	J. Kim	PhD 1988	Simulation of a High Speed Hermetic Compressor with Special Attention to Gas Pulsations in Three Dimensional Continuous Cavities	W. Soedel

	Name	Degree	Thesis Title*	Major Professor
122.	M. Krueger	MSME 1988	Theoretical Simulation and Experimental Evaluation of a Hermetic Rolling Piston Rotary Compressor	J.F. Hamilton
123.	H.Y. Lin	PhD 1988	A Time Domain Approach for Noise Source Identification in Periodic Systems	J.F. Hamilton
124.	U.D. Dietschi	MSME 1988	Identification, Assessment, and Control of Noise Sources in a Domestic Vacuum Cleaner	J.S. Bolton
125.	D. Waters	MSME 1988	An Investigation of Adaptive Digital Signal Processing Techniques Applied to Active Noise Control	R.J. Bernhard
126.	J.C. Wohlever	MSME 1988	Vibrational Power Flow Analysis of Rods and Beams	R.J. Bernhard
127.	D.C. Smith	MSME 1988	Noise Control Design of Vibrating Structures Using the Direct Boundary Element Method	R.J. Bernhard
128.	M.F. Albright	MSME 1988	Identification and Measurement of Forces Which Produce Noise in the Internal Combustion Engine	J.S. Bolton
129.	D.S. Mandic	MSME 1989	Adaptive Active Control of Enclosed Sound Fields in Elastic Cylinders Via Vibrational Inputs	J.D. Jones
130.	D.A. Ufford	MSE 1989	Development of a Digital Signal Processing Technique to Determine the Number of Incoherent Sources in a System with Application to an Automotive Powertrain	R.J. Bernhard
131.	J.N. Dubrouillet	MSME 1990	Noise Control on a Pulse Furnace	V.W. Goldschmidt
132.	R. Andrews	MSME 1990	Noise Source Identification in Twin-Screw Compressors	J.D. Jones
133.	D. Brown	MSME 1990	Noise Source Identification of a Multi-Cylinder Reciprocating Automotive Air Conditioning Compressor	P. Sherman
134.	K.L. Koai	PhD 1990	Mathematical Modeling of Twin Screw Compressors with Special Attention to Gas Pulsations in Three-Dimensional Gas Paths	W. Soedel

	Name	Degree		Thesis Title*	Major Professor
135.	P. Konieczny	MSME 1990		Development of a Noise Prediction Scheme for Low-Noise Centrifugal Blowers	J.S. Bolton
136.	G.R. Batta	PhD 1990		Real-Time Adaptive Active Control of Sound Fields	R. Shoureshi
137.	B. Boyd	MSE 1990		A Special Analysis Approach to Obtaining Transient Response of Plates	J.S. Bolton
138.	D.S. Stutts	PhD 1990		A Study of Horizontal and Vertical Forces Generated by Rolling Tires	W. Soedel
139.	N.M. Shaiu	PhD 1991		Multi-Dimensional Wave Propagation in Elastic Porous Materials with Applications to Sound Absorption, Transmission and Impedance Measurement	J.S. Bolton
140.	P. Chang	MSME 1991	N-T	Research Study on Active Control of Rotorcraft Interior Noise	J.D. Jones
141.	J. Frabotta	MSME 1991		Investigation of Noise Generation Mechanisms and Transmission Paths of Fractional Horsepower Reciprocation Piston and Rolling Piston Compressors	J.D. Jones
142.	C. Scheper	MSME 1991		An Investigation of the Behavior of Adaptive Recursive Algorithms Applied to the Control of Modal Systems	R.J. Bernhard
143.	T.J. Wahl	MSME 1991		The Prediction and Analysis of Transient Structural Responses	J.S. Bolton
144.	M. Zen Ruffinen	MSME 1991		Noise Source Identification on a Pulse Furnace with Potential Methods of Noise Control	V.W. Goldschmidt/ J.D. Jones
145.	K. Van Wyk	MSE 1991		Models for the Characterization of the Acoustical Properties of Asphalt Surfaces	J.S. Bolton
146.	J.D. Stell	PhD 1991		Active Noise Control in Finite Length Waveguides	R.J. Bernhard
147.	W.B. Ferren	MSME 1991		An Investigation of the Active Control of Structure-Borne Road Noise in Automobile Cabins	R.J. Bernhard
148.	S.D. Ochsner	MSME 1991		Structure-Borne Noise Modeling of Automotive Suspension and Vehicle Systems	R.J. Bernhard

	Name	Degree		Thesis Title*	Major Professor
149.	W. Holliday	MSME 1992		Noise Control on a Pulse Furnace	V.W. Goldschmidt/ J.D. Jones
150.	P.C. Laux	MS 1992		The Identification of Signal Parameters that Influence the Perception of Sound Quality	P. Davies
151.	J. Wiederhold	MSME 1992		Indirect Measurement of Forces Exciting Engine-Like Structures	R.J. Bernhard
152.	Z. Hu	PhD 1992		Measurement and Prediction of Sound Propagation Over an Absorbing Plane	J.S. Bolton
153.	M. Kompella	PhD 1992		Improved Multiple-Input/Multiple Output Modeling Procedures with Consideration of Statistical Information	R.J. Bernhard
154.	T. Roggenkamp	PhD 1992		An Investigation of the Indirect Measurement of Broadband Force Spectra	R.J. Bernhard
155.	O. Bouthier	PhD 1992		Energetics of Vibrating Systems	R.J. Bernhard
156.	W. Tsoi	MSME 1992		Acoustical Modeling of Polymide Foams	J.S. Bolton
157.	H.J. Kim	PhD 1992		Computer Simulation of Gas Pulsation Generated Sound in Compressors	W. Soedel
158.	D.L. Hallman	MSME 1992		Generalized Techniques for the Application of Nearfield Acoustical Holography in Industrial Measurement Environments	J.S. Bolton
159.	T.A. Beauvilain	MSME 1993		Multipole Sources for the Active Control of Radiated Sound Fields	J.S. Bolton
160.	C.M. Heatwole	MSME 1993		Parametric Studies of the Active Control of Structure-Borne Road Noise	R.J. Bernhard
161.	P. E. Cho	PhD 1993		Energy Flow Analysis of Coupled Structures	R.J. Bernhard
162.	G.P. Adams	PhD 1993		Modelling and Computer Simulation of Rotor Chatter and Oscillating Bearing Forces in Twin Screw Compressors	W. Soedel
163.	D. Cuhat	MSE 1993	N-T	Development of a Multi-Point Measurement System for Flexible Structures	P. Davies

	Name	Degree		Thesis Title*	Major Professor
164.	V.R. Sonti	PhD 1994		Analysis of Flat and Curved Piezo-Actuators for Vibration Control of Cylindrical Shells	J.D. Jones
165.	K.R. Abram	MSME 1994		Indirect Measurement of Internal Engine Forces	R.J. Bernhard
166.	L.A. DeVries	MSME 1994		Acoustical Holography in Spherical Coordinates for Noise Source Identification	J.S. Bolton
167.	M.W. Ryan	MSME 1994		Adaptive Passive Vibration Control	M.A. Franchek
168.	Y.J. Kang	PhD 1994		Studies of Sound Absorption by and Transmission Through Layers of Elastic Noise Control Foams: Finite Element Modeling and Effects of Anisotrophy	J.S. Bolton
169.	E.R. Green	PhD 1995		An Examination of "Smart" Foams for Active Noise Control	J.S. Bolton
170.	B.K. Gardner	PhD 1995		External System Modeling with Application to Vibro-Acoustic Optimization	J.S. Bolton
171.	P.F. Wang	PhD 1995		Development of Experimental Model Building Techniques	P. Davies
172.	D.V. Brown	MSME 1995		The Design, Construction, and Validation of a Small, Low-Speed, Quiet Wind Tunnel with Application to Noise from the Flow Over a Cavity	L. Mongeau
173.	J. Oh	MSME 1995	N-T	Finite Element Models for Sound Transmission	J.S. Bolton
174.	D.M. Yim	MSME 1995		Influence of Surface Variables on Motor Vehicle Passby Noise Measurements	J.S. Bolton
175.	F. Pan	PhD 1995		A Study of Piezoelectric Transducers in Application to Active Control of Reciprocating Compressor Noise	J.D. Jones
176.	Y.K. Kim	MSME 1995		The Analysis and Simulation of Gas Pulsations in a Valve-Muffler System of a Rolling Piston Compressor	W. Soedel
177.	J.M. de Bedout	MSME 1996		Adaptive-Passive Noise Control with Self-Tuning Helmholtz Resonators	M.A. Franchek

	Name	Degree	Thesis Title*	Major Professor
178.	D.L. Hallman	PhD 1996	Nearfield Acoustical Holography for Interior Spaces	J.S. Bolton
179.	C.A. Buhr	MSME 1996	Noncollocated Adaptive-Passive Vibration Control Using Self-Tuning Vibration Absorbers	M.A. Franchek
180.	B.L. Minner	MSME 1996	Design Optimization for Thermoacoustic Cooling Systems	J.E. Braun
181.	K.A. Temple	PhD 1996	Thermal and Internal Acoustic Model of a Helmholtz Type Pulse Combustion Furnace	V.W. Goldschmidt
182.	P.C.C. Lai	PhD 1996	A General Procedure for the Analysis of Gas Pulsations in Thin Compressor or Engine Manifolds and Thin Shell Type Mufflers	W. Soedel
183.	F. Bitsie	PhD 1996	The Structural-Acoustic Energy Finite Element Method and Energy Boundary Element Method	R.J. Bernhard
184.	S.W. Kurth	MSME 1996	The Effect of Nonlinearities on Active Noise Control Systems	R.J. Bernhard
185.	R.J. Danforth III	MSME 1996	Sound Transmission Through Road Vehicle Primary Bulb Seal Assemblies	L. Mongeau
186.	J.E. Huff Jr.	PhD 1997	Analysis of Structural Systems in the Mid Frequency Range	R.J. Bernhard
187.	C.M. Heatwole	PhD 1997	Robust Feedback Control of Flow Induced Structural Radiation of Sound	R.J. Bernhard/ M.A. Franchek
188.	J.D. Bezemek	MSE 1997	Aeroacoustic Source Characterization Method with Applications to Flow-Excited Cavity Pressure Fluctuations and Computer Cooling Fan Noise	L. Mongeau
189.	T.J. Hartwig	MSME 1997	Measurements of the Acoustical Properties of Asphalt Surfaces in the Presence of Wind and Temperature Gradients	J.S. Bolton
190.	J.M. D'Souza	MSME 1997	A Full-Vehicle Force-Based Steady-State Cornering Model	J.M. Starkey
191.	C. Wyatt	MSME 1997	Acoustical Measurements of High Speed Spindle	C.M. Krousgrill

	Name	Degree	Thesis Title*	Major Professor
192.	D.A. Haid	MSME 1997	Sound Source Identification Method for Turbomachinery	L. Mongeau
193.	P. Potter	MSME 1997	The Effects of Suspension Turning on he Limit Handling Behavior of High Performance Vehicles	J. Starkey
194.	H.J. Song	MSME 9/97	Investigation of Liquid Hammer By Modal Analysis	W. Soedel
195.	G. B. Moebs	MSME 9/97	De-Dopplerization and Visualization of Sound Fields Emitted by Moving Noise Sources	J.S. Bolton/ P. Davies
196.	A. Weston	MSME 1997	Measurements and Predicting of the Fluctuating Thrust of a Vane Axial Waterjet Pump	L. Mongeau
197.	J.S. Johnson	MSME 1997	An Experimental Study of Flow-Excited Cavity Resonance Suppression Techniques	L. Mongeau
198.	H. Kook	PhD 1997	Prediction and Control of the Interior Pressure Fluctuations in a Flow-Excited Helmoholtz Resonator	L. Mongeau
199.	H.-Y. Lai	PhD 1997	Modeling of Acoustical Properties of Limp Fibrous Materials	J.S. Bolton
200.	G. S. Alves	PhD 1997	Feedback Control of Non-Minimum Phase Systems with Applications to Piezo-Driven Active Noise Control	R. Shoureshi
201.	D.M. Gilmer	MSME 1998	Signature Recovery Techniques with Applications to Engine Valve Trains	R.J. Bernhard
202.	R.S. Groom	MSME 1998	A Model Quality Improvement Process applied to Statistical Energy Analysis	R. Bernhard
203.	S. Katagradda	MSME 1998	A Model for Sound Absorption by and Sound Transmission Through Limp Fibrous Layer	J.S. Bolton
204.	T.M. Kostek	MSME 1998	Hybrid Noise Control in Ducts	M. Franchek
205.	P.C. Laux	PhD 1998	Using Artificial Neural Networks to Model the Human Annoyance to Sound	P. Davies

	Name	Degree		Thesis Title*	Major Professor
206.	S.A. McCabe	PhD 1998		Nonlinear Digital System Identification Application Vibrating Structures	P. Davies
207.	S.W. White	MSME 1998		Dynamic Modeling and Measurement of Occupied Car Seats and Seating Foams	P. Davies/ A. Bajaj
208.	R.J. Yun	MSME 1998		Development of a New Sound Transmission and Numerical Optimization of Sound Absorption and Transmission	J. S. Bolton
209.	D. Albert	MSME 1999		Active Control of Transmission Loss in Lightly Damped Panels	M. Franchek/ R. Bernhard/ C. Krousgrill
210.	D. Cuhat	PhD 1999		Multi-Point Vibration Measurement Using PVDF Piezoelectric Film with Application to Direct Sensing of Modes in a Structure	P. Davies
211.	F. Han	PhD 1999		Prediction of Flow-Induced Sound and Vibration Using the Energy Flow Analysis Method	R. Bernhard/ L. Mongeau
212.	D.B. Hasselbring	MSME 1999		A Substructuring Technique to Predict Axle Vibration Due to Housing and Drive Train Component Interaction	J. Starkey
213.	P.G. May	MSME 1999		Assessment of Refrigerator Sound Quality	P. Davies/ J.S. Bolton
214.	S. Ramamurthy	MSME 1999		Noise and Vibration in Rolling Bearing Systems Lubricated with Grease	F. Sadeghi/ C. Krousgrill
215.	D. Memering	MSME 1999		The Application of Adaptive Control Algorithms to the Low Idle Governor of a Heavy Duty Engine	P. Meckl
216.	L. Hagenmeyer	MSME 2000	N-T	Occupied Car Seat Dynamics	A. Bajaj
217.	Y.K. Kim	PhD 2000		Forced Response of Tires with Mass Nonuniformities Using Ring Models	W. Soedel
218.	B.K. Servis	PhD 2000		The Onset of Squeal Vibrations Resulting from a Coupled Mode Instability	C. Krousgrill/ A. Bajaj
219.	R. Singh	MSME 2000		Dynamic Modeling of Polyurethane Foam and Development of System Identification Methodologies	P. Davies/ A. Bajaj

	Name	Degree		Thesis Title*	Major Professor
220.	R.J. Unglenieks	PhD 2000		Estimation of Flexural Wave Energy Parameters Using Wavenumber Transform Techniques	R.J. Bernhard
221.	S. Wang	PhD 2000		High Frequency Energy Flow Analysis Methods: Numerical Implementation, Applications, and Verification	R. Bernhard
222.	W. Zhao	PhD 2000		A Numerical Investigation of Sound Radiated from Subsonic Jets with Application to Human Phonation	L. Mongeau/ S. Frankel
223.	A. Alexander	MSME 2001		Performance of Straight-Fin and Microchannel Heat Exchangers in Steady and Periodic Flows	L. Mongeau/ J.E. Braun
224.	M. Anderson	MSME 2001	N-T	Sound Quality Inside Earth Moving Equipment Cabs	P. Davies
225.	E. Chang	MSME 2001		Vibrations of Angular Contact Bearings Lubricated with Grease	C.M. Krousgrill/ F. Sadeghi
226.	J. Feist	MS 2001		Noise Control and Speech Intelligibility Improvement of a Toll Plaza	R.J. Bernhard/ L. Mongeau
227.	R. Grinnip	MSME 2001		Numerical Investigation of High Amplitude One-Dimensional Acoustic Standing Waves	L. Mongeau
228.	J. Klos	MSME 2001		Modeling Cylindrical Shell Dynamics Using Energy Flow Methods: An Analytical and Experimental Validation	R.J. Bernhard
229.	B. Song	PhD 2001		Measurement and Enhancement of Acoustical Properties of Porous Materials	J.S. Bolton
230.	K.A. Williams	PhD 2001		An Investigation of the Design and Control of Shape Memory Alloy Adaptive Tuned Vibration Absorbers	G. Chiu/ R.J. Bernhard
231.	Y.T. Cho	MSME 2002		Spherical Acoustical Holography	J.S. Bolton
232.	J. Dawson	MSME 2002		An Investigation of the Feasibility of Fluidic for Active Noise Control	R.J. Bernhard
233.	T. Doughty	PhD 2002		System Identification of Modes in Nonlinear Structures	P. Davies
234.	T. Johnson	MSME 2002		Analysis of Dynamic Transmissibility as a Feature of Structural Damage Detection	D.E. Adams

	Name	Degree		Thesis Title*	Major Professor
235.	G. McGee	MSME 2002		Characterization of Nonlinearity in a Tire-Vehicle Suspension System	D.E. Adams
236.	J. Park	PhD 2002		Effects of Mechanical Properties of Sealing Systems on Aerodynamic Noise Generation Inside Vehicles	L. Mongeau
237.	S. Thorpe	MSME 2002	N-T	Waveguide Models of Vibration of Toroids/Waveguide Models of the Vibration of Cylinders	R.J. Bernhard
238.	Z. Zhang	PhD 2002		Experimental Study of Sound Generation by Confined Jets with Application to Human Phonation	L. Mongeau/ S. Frankel
239.	R. Ippili	MSE 2003		System Identification of Quasi-Static Foam Behavior and Its Application in the Prediction of Static Equilibrium Position of a Cart Seat Occupant	P. Davies/A. Bajaj
240.	T. Yoo	MSME 2003		The Performance of Sound Barriers with Jagged Edges	L. Mongeau
241.	S. Sanghoon	PhD 2003		Comparison of the Performance of Absorbing and Rigid-Edged Barriers by Using Experimental and Numerical	L. Mongeau/ J.S. Bolton
242.	Y.J. Kim	PhD 2003		Visualization of Tire Vibration and Sound Radiation and Modeling of Tire Vibration with an Emphasis on Wave Propagation	J.S. Bolton
243.	M. Haroon	MSME 2003		Nonlinear System Identification of a Tire-Vehicle Suspension System Using Response Transmissibility	D.E. Adams
244.	J. Song	PhD 2003		Nonfibrous Sound Absorbing Materials	J.S. Bolton
245.	R. Mennem	PhD 2003		Parametrically Excited Vibrations in Spiral Bevel Geared Systems	C.M. Krousgrill
246.	V. Kankatala	MSME 2003	NT	Friction Induced Vibrations of Road Vehicle Weather Seals	L. Mongeau/ C. Krousgrill
247.	T. Freeman	MSME 2004		Reduction of Vehicle Chassis Vibrations Using the Powertrain System as a Multi-Degree-of-Freedom Dynamic Absorber	D.E. Adams

	Name	Degree		Thesis Title*	Major Professor
248.	R.J. Hundhausen	MSME 2004		Mechanical Loads Identification and Diagnosis for a Standoff Metallic Thermal Protection System Panel in a Semi Realistic Thermo-Acoustic Operating Environment	D.E. Adams
249.	Y. Li	PhD 2004		Active and Adaptive Passive Control of Acoustic Impedance Matching and Thermoacoustic Cooling Applications	G.T.C. Chiu
250.	S. Thomson	PhD 2004		Fluid Structure Interactions within the Human Larnyx	L. Mongeau/ S. Frankel
251.	R. Deng	PhD 2004		Modeling and Characterization of Flexible Polyurethane Foam	P. Davies/ A. Bajaj
252.	C. Yang	PhD 2004		Experimental Embedded Sensitivity Functions for Use in Mechanical System Identification	D.E. Adams
253.	A. Hastings	PhD 2004		Sound Quality of Diesel Engines	P. Davies
254.	L. He	MSME 2004	NT	Acoustic Arrays	J.S. Bolton
255.	R. J. Hundhausen	MSME 2004		Mechanical Loads Identification and Diagnosis for a Standoff Metallic Thermal Protection System Panel in a Semi-Realistic Thermo-Acoustic Operating Environment	D.E. Adams
256.	Y. Li	PhD 2004		Active and Adaptive-Passive Control of Acoustic Impedance Matching with Thermoacoustic Cooling Applications	G.T.-C. Chiu
257.	J. Mynderse	MSME 2004		Design and Control of a Steering Wheel Vibration Simulator for Human Perception Testing	G.T.-C. Chiu
258.	S. Thomson	PhD 2004		Fluid Structure Interactions within the Human Larynx	L. Mongeau/ S. Frankel
259.	W. Thornton	MSME 2004	NT	Tire/Pavement Interaction Noise	R. Bernhard
260.	D. Cook	MSME 2005		Computational Models of Fluid Flow, Structural Vibration and Fluid Structure Interactions of Human Phonation	L. Mongeau

	Name	Degree		Thesis Title*	Major Professor
261.	D.P. Gallant	MSME 2005		An Experimental Study of the Perceptual Attributes of Tonal Sounds and Annoyance with Application to Automotive Component Noise	P. Davies
262.	J.W. Kim	PhD 2005		Sound Transmission Through Lined, composite Panel Structures: Transversely Isotropic Poro-Elastic Model	J.S. Bolton
263.	I. Paek	PhD 2005		Performance Characterization of Thermoacoustic Cooler Components and Systems	L. Mongeau/ J.E. Braun
264.	R.D. Widdle, Jr.	PhD 2005		Measurement and Modeling of the Mechanical Properties of Polyurethane Foams	P. Davies
265.	T. Yu	MSME 2005	NT	Acoustics	J.S. Bolton
266.	K. Yum	PhD 2005		Control of Structural-Acoustic Radiation from Tires by Structural Modification	J.S. Bolton
267.	U. Kim	PhD 2006		Friction-Induced Vibrations and Squeal of Glass-Run Window Sealing Systems	L. Mongeau/ C. Krousgrill
268.	J. White	MSME 2006		Impact and Thermal Damage Identification in Metallic Honeycomb Thermal Protection System Panels Using Active Distributed Sensing with the Method of Virtual Forces	D.E. Adams
269.	M. Zanartu Salas	MSE 2006		Influence of Acoustic Loading on the Flow Induced Oscillations of Single Mass Models of the Human Larynx	L. Mongeau/ P. Wodicka
270.	Y.T. Cho	PhD 2006		Holographic Projection of Sound Fields Based on Spatially-Limited Data Sets	J.S. Bolton
271.	J.B. Park	PhD 2006		Instantaneous Orifice Discharge Coefficients of Driven Physical Models of the Human Larynx	L. Mongeau
272.	J. Jaques	MSME 2006		Headrest Rattle: Nonlinear Model Identification and Analysis	D.E. Adams
273.	J. Lim	Ph.D. 2006		Statistical Energy Analysis for a Compact Refrigeration Compressor and Model Improvement	J.S. Bolton/ Bernhard, R.J./ Krousgrill, C.M.

	Name	Degree		Thesis Title*	Major Professor
274.	Lee, Kyoung Hoon	Ph.D. 2006		Perception of Tones in Machinery Noise and Its Influence on Annoyance	P. Davies
275.	Blanc, Arthur	Ph.D. 2007		Validation of Vibro-Acoustic Numerical Models	R.J. Bernhard
276.	Robinson, Daniel	MSME 2007		Effect of Low Frequency Sound on Resonant Sound Insulation and Rattle Systems	R.J. Bernhard
277.	Spencer, Mychal	MSME 2007		Indirect Determination of the Strain and Stress in Physical Models of the Vocal Folds Using Digital Image Correlation	L. Mongeau
278.	Marshall, Andrew	MSME 2007		A Preliminary Investigation into the Perceptual Characteristics of Low Level Sonic Booms Heard Outdoors	P. Davies
279.	Yoo, Taewook	Ph.D. 2008		The Modeling of Sound Absorption by Flexible Micro-Perforated Panels	J.S. Bolton
280.	Peters, Jeffrey	MSME 2008	N-T	Noise Control in Hydraulic Systems	L. Mongeau/M. Ivantysnova
281.	Jiang, Hao	Ph.D. 2008		Material Damage Modeling and Detection in a Thin Metallic Sheet and Sandwich Panel Using Passive Acoustic Transmission	D.E. Adams
282.	Cook, Doug	Ph.D. 2009		Systematic Structural Analysis of Human Vocal Fold Models	L. Mongeau/E. Nauman
283.	Chang, Hoyt	MSME 2009	N-T	Environmental Acoustics	K.M. Li
284.	Hong, Kwan Woo	Ph.D. 2009		Acoustical Estimation of Macroscopic Properties of Poroelastic Materials	J.S. Bolton
285.	Jessop, Andrew	MSME 2009		A Study of the Effects of Panel Stiffness on Transmission of Low-Frequency Sound	K.M. Li
286.	Swift, S. Hales	MSME 2009	N-T	Potential Health Effects of Aircraft Noise	P. Davies
287.	Wulf, Tanya	MSME 2009		A Study of the Effect of Innovatively Textured Portland Cement Concrete Roadway Surfaces on Tire-Pavement Noise	R. Bernhard

	Name	Degree		Thesis Title*	Major Professor
288.	Chen, Li-Jen	Ph.D. 2009		Investigations of Mechanical Stresses Within Human Vocal Folds During Phonation	L. Mongeau
289.	Joshi, Gauri	MSME 2010		Planar Whole-Body Vibratory Response of a Nonlinear Multi-Body Model of a Seat-Occupant System with Polyurethane Foam	P. Davies
290.	Shin, Yoon-Shik	Ph.D. 2010		Numerical and Experimental Investigation of Noise from Small Scale Axial Fans Focusing on Inflow Condition and Acoustic Source Type	J.S. Bolton
291.	Zwink, Brandon	MSME 2010		Nondestructive Evaluation of Composite Material Damage Using Vibration Reciprocity Measurements	D.E. Adams
292.	Deshmukh, Yash	MSME 2010		Measurement of Foam Properties and Modeling of Layered Foam Systems	P. Davies/A. Bajaj
293.	Kumar, Vijay	MSME 2010	N-T	Vibration Attenuation and Amplification	J. Rhoads
294.	Zanartu Salas, Matias	Ph.D. 2010		Acoustic Coupling in Phonation and Its Effect on Inverse Filtering of Oral Airflow and Neck Surface Acceleration	Wodicka, G./Mongeau, L.
295.	Tong, Bao N.	MSME 2010		Sound Field of a High Speed Airborne Source in a Horizontally Stratified Fluid Medium Above an Impedance Plane	K.M. Li
296.	More, Shashikant (Shashi)	Ph.D. 2010		Aircraft Noise Characteristics and Metrics	P. Davies
297.	Huang, Andrew	MSME 2011	N-T	Environmental Acoustics	K.M. Li
298.	Eberhardt, Frank	MSME 2011		Study of the Feasibility f Estimating Combustion Noise Radiation in Reverberant Environments	J.S. Bolton/P. Davies
299.	Choi, Won Hong	MSME 2011		Influence of the Cavity Mode on Tire Surface Vibration	J.S. Bolton
300.	Shin, Hyun Jun	MSME 2011		The Use of Microperforated Materials as Duct Liners	J.S. Bolton
301.	Liu, Sheng	Ph.D. 2011		The Propagation of Sound from a Monopole and Directional Source Near a Layered Ground	K.M. Li

	Name	Degree	Thesis Title*	Major Professor
302.	Kim, Nicholas	MSME 2011	Numerical Modeling of Microperforated Acoustical Materials	J.S. Bolton
303.	Liu, Yangfan	MSME 2011	Sound Field Reconstruction and Its Application in Loudspeaker Sound Radiation Prediction	J.S. Bolton/P. Davies
304.	Marshall, Andrew	Ph.D. 2012	Development of a Model of Startle Resulting from Exposure to Sonic Booms	P. Davies
305.	McGuire, Sarah	Ph.D. 2012	Modeling Aircraft Noise Induced Sleep Disturbance	P. Davies
306.	Lee, Hsu Chew	MSME 2012	A Study of Low Speed Flow Noise and Its Reduction by Numerical Simulations	K.M. Li
307.	Schultz, Ryan A.	MSME 2012	Effect of Solid Phase Properties on the Acoustical Performance of Poroelastic Materials	J.S. Bolton
308.	Dare, Tyler	Ph.D. 2012	Generation Mechanisms of Tire-Pavement Noise	R.J. Bernhard
309.	Giacomoni, Clothilde	MSME 2012	Sound Quality of Supersonic Aircraft Noise as Heard Indoors and Its Impact on Annoyance	P. Davies
310.	Underwood, Sara	Ph.D. 2012	Subsurface Damage Detection in Sandwich Composite Using Three-Dimensional Laser Vibrometry Measurements with Nonlinear Vibration Response Characteristics	D.E. Adams
311.	Foertsch, Kevin	MSME 2013	The Number-of-Events as a Predictor Variable in Aircraft Noise Annoyance Models	P. Davies
312.	Hayward, Michael	MSME 2013	Identification and Modification of Dominant Noise Sources in Diesel Engines	P. Davies/J.S. Bolton
313.	Berdy, David	Ph.D. 2013	Kinetic Energy Harvesting from Low Frequency Sources	J. Rhoads
314.	Salunke, Akhil	MSME 2013	Control of Impacting Dynamical Systems	J. Rhoads
315.	Paripovic, Jelena	MSME 2013	Characterization and Modeling of Materials Used in Improvised Explosive Devices	P. Davies

	Name	Degree		Thesis Title*	Major Professor
316.	Tao, Hongdan	Ph.D. 2013		Propagation of Sound in the Vicinity of Rigid Porous Interfaces	K.M. Li
317.	Jessop, Andrew	Ph.D. 2013		Near-Field Pressure Distributions to Enhance Sound Transmission Through Multi-Layer Materials	J.S. Bolton
318.	Viswanathan, Arun	MSME 2013	N-T	Study of the Effect of Grazing Flow on the Performance of Microperforated and Perforated Panels	J.S. Bolton
319.	Varanasi, Srinivas	Ph.D. 2014		Sound Attenuation Characteristics of Cellular Metamaterials	J.S. Bolton
320.	Sakamoto, Nicholas	MSME 2014		The Prediction of Airborne and Structure-Borne Noise Potential for a Tire	J.S. Bolton
321.	McMullen, Andrew	MSME 2014		Assessment of Noise Metrics for Application to Rotorcraft	P. Davies
322.	Sobecki, Brandon	MSME 2014		Development of Sound Quality Metrics for Gear Rattle in Diesel Engines	P. Davies/J.S. Bolton
323.	Sundaram, Vaidyanadan	MSME 2014		Measurement of the Responses of Polyurethane and Confor Foams and the Development of a System Identification Technique to Estimate Polyurethane Foam Parameters from Experimental Impulse Responses	P. Davies/J.S. Bolton
324.	Peng, Yuan	MSME 2014		Propogation of Wind Turbine Noise Through Wakes and Turbulent Atmosphere	K.M. Li
325.	Miller, Jacob	MSME 2014	N-T	The Thermomechanical Responses of Composite Energetic Materials to Acoustic and Ultrasonic Excitation	J. Rhoads
326.	Woods, Daniel	MSME 2014	N-T	The Thermomechanical, Near-Resonant Response of Energetic Materials	J. Rhoads
327.	Cao, Rui	MSME 2014		Investigation of a Fully Coupled Spinning Tire-Wheel Model	J.S. Bolton
328.	Bhattiprolu, Udbhau	Ph.D. 2015		Modelling and measurement of the Response of a Beam Interacting with a Polyurethane Foam Foundation	Davies, P./Bajaj, A.

	Name	Degree		Thesis Title*	Major Professor
329.	Tong, Bao	Ph.D. 2015		Prediction and Reduction of Aircraft Noise in Outdoor Environments	Li, K.M.
330.	Wagner, Caleb	MSME 2015	N-T	Sound Quality of Rotorcraft	Davies, P.
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