

## REGISTRATION

Please see the course information and updates online at <http://www.seam.com> or contact Chad Musser by e-mail at [cmusser@ccinc.com](mailto:cmusser@ccinc.com), by phone at (617)-876-5777, or by fax at (617)-876-1816.

The course price is \$1250 for Basic Training (days 1 and 2); \$1250 for Advanced Training (days 2 and 3); or \$1750 for Basic and Advanced Training (all 3 days). The fee does not include hotel accommodations or meals. Please make your own arrangements. Classes will be held at the Hyatt Regency Dearborn, in Dearborn, Michigan.

Please register as early as possible since class size will be limited. To register, complete and mail the form below, or fax it to (617)-876-1816. A purchase order or payment by a check payable to Cambridge Collaborative, Inc. is due by September 3. Mail payment to Cambridge Collaborative, 689 Concord Avenue, Cambridge, MA 02138-1002.

All 3 days  Day 2 and 3  Days 1 and 2   
\$1750                      \$1250                      \$1250

Name: \_\_\_\_\_  
(Last)                      (First)                      (Initial)

Company: \_\_\_\_\_

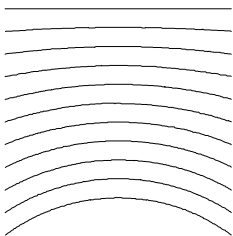
Address: \_\_\_\_\_

\_\_\_\_\_  
(State)                      (Zip)                      (Country)

Telephone: \_\_\_\_\_

Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_



689 Concord Avenue  
Cambridge  
Massachusetts  
02138-1002

**Cambridge Collaborative, Inc.**

# STATISTICAL ENERGY ANALYSIS

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A TRAINING COURSE PRESENTED BY

**Cambridge Collaborative, Inc.**

OCTOBER 4-6, 2004, DEARBORN, MICHIGAN

# STATISTICAL ENERGY ANALYSIS FOR VEHICLE NVH

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This seminar is designed for engineers, scientists and research managers in the automotive industry who desire training in the theory and applications of Statistical Energy Analysis (SEA). The course emphasis is on the practical application of the principles of SEA to vehicle NVH. Examples of vehicle applications are interspersed with theory and modeling procedures.

This seminar will teach engineers and managers how to take advantage of SEA's fast acoustic design capability, including:

- 1) evaluating design change effects on noise specifications;
- 2) identifying optimum sound treatment packages based on noise path analyses;
- 3) improving the accuracy of SEA models;
- 4) determining confidence intervals;
- 5) extending SEA into the mid-frequency region.

Cambridge Collaborative, Inc. is a research, development and consulting firm working in the field of vibroacoustics. For over twenty years Cambridge Collaborative has been a leader in advancing the field of SEA. The company's contributions include theoretical advancements, practical application solutions, software development, and training in SEA for both clients and the general engineering community.

Cambridge Collaborative has worked closely with vehicle manufacturers and automotive industry suppliers, advancing SEA techniques for specific automotive applications including chassis design, tire design, and sound package evaluation.

## Basic Training (Day 1)

### **Introduction and Overview**

Definition of SEA  
The Development of SEA  
Deterministic and Statistical Analysis Methods  
How SEA is used for Vehicle Design

### **SEA Capabilities**

Airborne Paths - Interior/Exterior Noise  
Structureborne Noise and Mid-Frequency Analysis  
Confidence Intervals  
Transient SEA

### **SEA Fundamentals I**

Power Balance Equations  
Modal Energy and Power  
Modal Density  
Coupling and Loss Factors

### **Applications I: Sound Package Design**

Sound Transmission Loss  
Absorption and Damping  
Barriers and Vibration Isolation  
Parameter Studies

### **Noise Management Programs**

Integrating Testing and Analysis  
Source Modeling and Characterization  
Establishing Noise and Cost Objectives  
Design Sensitivity Studies and Optimization  
Rapid Model Development

## Basic/Advanced Training (Day 2)

### **SEA Modeling Procedures I**

Substructuring  
Acoustic and Structural Elements  
Identification of Mode Groups and Coupling

### **SEA Fundamentals II**

Modal Response of Dynamic Systems  
Relating Energy to Response  
Statistical Models of Modes and Waves

### **Applications II: Structureborne Sound**

Engine Vibration  
Isolation Mounts  
Vehicle Suspension and Tires

### **Modeling Workshop**

SEAM<sup>®</sup> Analysis Code  
VisiSEAM<sup>™</sup> Graphical Interface  
SEAM-DSA<sup>™</sup> Design Sensitivity Analysis  
SEAM 3D<sup>™</sup> Graphical Interface

## Advanced Training (Day 3)

### **SEA Modeling Procedures II**

Subsystem Selection  
Geometry Data  
Subdivision of Acoustic Spaces  
Damping and Absorption

### **Measurement of SEA Parameters**

Experimental SEA  
Modeling of Acoustic Materials  
Modal Density Measurements  
Use of Decay Rate Measurements

### **Advanced Topics in SEA**

Mid-Frequency Analysis  
Transient Analysis  
Non-Resonant Transmission  
Variance Analysis

### **Applications III: Rapid Model Development**

Full Vehicle Models  
Use of Templates to Build Models