

# COURSE CATALOG

**QirraSound Technologies Europe AB  
2013 - 2014**



**Your Road to Success**



## Introduction

The courses outlined in this document is a collaboration with Tech Fuzion and QirraSound in the USA. Dr. Thomas Lagö (QirraSound/Tech Fuzion) has been teaching and designing quality courses for industry and universities since end of 1970's. The material is based on his courses but we also have a number of other lecturers ready and able to help teach the material. Dr Alan Boyer (QirraSound/Tech Fuzion) is one of these lecturers and he has worked with Dr Lagö for more than 13 years.

Tech Fuzion is working with QirraSound Technologies, LLC in the USA, a revolutionary sound engineering company. A number of courses within the applications of these companies are also available and offered to that customer base.

Most of the courses belong to Dr Lagö but are licensed to MSW Elektronik & Teknik, TechFuzion and QirraSound Technologies. In Sweden, most of the courses are sold with QirraSound Technologies Europe AB or MSW Elektronik & Teknik AB as the source. In the USA, TechFuzion or QirraSound Technologies is the main source, depending on the courses presented. [alljudteknik.se](http://alljudteknik.se) is a collaboration platform (web portal) for multiple companies with complementary products and services. More information can be found at page 47 or the web address. **Most courses can also be given in Swedish since Thomas speak Swedish as well. The majority of the material is in English but can be translated if needed.** Some courses already exist in Swedish.

You are most welcome to contact us for your continued education and road to success.

Best regards,

MSW Elektronik & Teknik



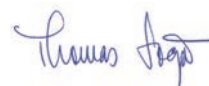
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Mathilda Ekström, CEO



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## . Partner: Bilda in Sweden

Bilda is a Swedish study association, one of ten Swedish adult educational associations. Though under our current name only since 2003, our history goes back to 1947, when Frikyrkliga Studieförbundet was founded by the Methodist, Baptist, and Mission Covenant youth organizations.

In the 1970's the Orthodox Churches in Sweden joined Bilda, and in 2010 the Catholic diocese of Stockholm became a member organization. Today, Bilda has 48 member organizations from three different church families.

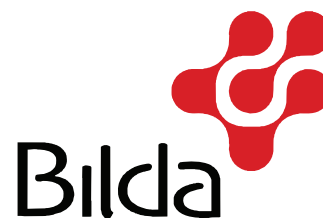
As an adult educational association, Bilda is part of the Swedish tradition of "folkbildning", liberal adult education, which grew out of the popular movements of the 19th century.

Through study circles, courses, and cultural programmes, the study associations have contributed to the development of democratic cultural practices in Sweden.

Though offering courses and study circles on a broad variety of subjects, Bilda specializes in culture, dialogue, and music. In 2010, almost 100,000 people participated in educational activities organized by Bilda, spending a total of almost 550,000 study hours.

The head office of Bilda is located in Älvsjö/Stockholm. Our main network is in Värnamo. Dr Lagö is a Bilda approved lecturer and has taught classes together with them since the 1970's.

<http://www.bilda.nu/sv/Startsidan/About-Bilda-in-english/>



## . Partner: STF in Sweden

STF Ingenjörsutbildning is a postgraduate education institute. They are specializing in concentrated short application oriented training programs and courses.



Depending on the customer needs they can perform open or on-site trainings. Their home market is Sweden however they are regularly performing on-site training programs in other countries in Northern Europe. The programs range from introductory level to highly specialized and technical specialist levels. STF has some 50 employees and organizes more than 2000 training activities, attended by some 15,000 participants on a yearly basis. The typical course length is 3 days.

Their lecturers are recruited from industry, education, regulatory and administration areas. Lecturers are not permanently employed by STF in order to secure that the programs offer objective and most recent knowledge achievements in respective competence area, this being an important part of the competence strategy. Since STF specializes in problem oriented courses, STF believe that the lecturers should share knowledge of the most recent experience of new technology accomplishments as well as new applications of old technology.

Almost all training programs can be run in English as on-site trainings even though the open occasions are in Swedish. Please don't hesitate to contact us if you would like to have a tailor made training program at your own premises!

Dr Lagö is an STF approved lecturer and has taught classes for them for many years.

## . QST - V400E Noise & Vibration Fundamentals

### Short description

This course is intended for those who are starting within the field of noise and vibration analysis, or who have been working in the field. Despite this, a deeper understanding of the theory and how it is connected to the real world is appreciated. The course gives an excellent understanding of how noise and vibration signals are measured and analyzed. Also, the course also covers how to correctly use an FFT analyzer. Numerous demonstrations of signal analysis concepts and vibration analysis procedures are presented in the course.

**Course duration:** 4 days

### Target group

- Those who have just started to use, or plan to start using, an FFT analyzer or computer software for time and frequency analysis.
- Those who have used an analyzer for a while but feel uncertain when to properly use “Autopower Spectrum”, versus Power Spectral density” or a “Hanning window” versus a “Flattop window” or “Force Window”.
- Those who work with vibration measurements and need a deeper understanding of how to use transducers and knowledge of their limitations.
- Those who work experimentally with sound and vibration problems and need a deeper insight into experimental techniques.
- Those who work with sound or vibration analysis of signals from rotation machinery.

### Course contents Part 1

**Dynamic Mechanical Systems:** Newton’s laws • The Single Degree of Freedom Systems (SDOF) • Resonance • Damping • Impulse response • Frequency Response • Receptance • Mobility • Accelerance • MDOF Systems.

**Transducers:** The piezoelectric effect • The charge amplifier • Transducers with built-in amplifiers • The accelerometer • Mounting of accelerometers • The piezoelectric force transducer • The impedance head • Calibration of accelerometers

**Data Acquisition:** AC/DC-coupling • AD-conversion, Quantisation noise, Dynamic range • Sampling, The sampling theorem, Aliasing, Anti-aliasing filter.

**Signal Analysis:** Classification of signals, periodic, random, transient • Fourier series • Time and frequency • Autopower spectrum • Linear spectrum • Fourier transform • Power Spectral Density (PSD) • Energy Spectral Density (ESD) • The Discrete Fourier Transform • Spectrum estimation with filters • Octave band spectra • Leakage • Time windows, Hanning, Flattop, Equivalent Noise Bandwidth • PSD vs Linear Spectrum • Trigger functions • Averaging • Overlap processing

**How to use an FFT analyzer:** Do's and Don'ts

## Course content Part 2

**Signal analysis:** Convolution • The Complex Fourier Series • DFT • Spectrum estimation with DFT • Time window compensation

**Statistics:** Noise theory, Amplitude Probability Density, Moments, Correlation • Spectrum of a random signal • Spectrum of a transient signal • Bias and random errors

Frequency Response Function measurements: Linear systems, H1, H2, • Coherence • Coherent output spectrum

**Excitation methods:** Hammer excitation, Force spectrum, Force window, Exponential window

**Shaker excitation:** Shaker excitation signals, typical shakers.

**Rotating machinery analysis:** Vibration sources in rotation machinery • Modulation • Tacho signal, Spectral Maps (Waterfall diagrams) • Order tracking • Smearing • Analysis with synchronous sampling.

### Previous knowledge:

Mathematics and Mechanics at low Technical University Level.

### Suitable continuation classes:

Experimental Structural Dynamics

Noise & Vibration Analysis using MATLAB®

Experimental Structural Dynamics using MATLAB®

Advanced Noise & Vibration Analysis

**Presenter:** Dr Thomas L. Lagö

# . QST - V420E Noise & Vibration Analysis Using MATLAB®

## Short description

This is an introductory course in noise and vibration analysis, describing how to use MATLAB® for efficient analysis of noise and vibration signals. During the presentation of this course, demonstrations of signal and vibration analysis concepts and procedures will be shown.

**Course duration:** 2 days

## Target group

- Those who wish to use MATLAB® for vibration analysis and need to find out how to proceed.
- Those who need a cost effective and efficient way to analyze vibration signals without paying the high price of other, dedicated commercial noise and vibration software.
- Those who already own some commercial software but feel limited by its capabilities.

## Course contents

- How to represent signals in MATLAB® • How to organize data • Data import • MATLAB® Signal Processing Toolbox • Normalized frequency analysis in MATLAB®
- Filters: A-filter, octave band filters, ISO 2631 filters, integration, differentiation • Time Spectral Maps
- Signal statistics: stationarity, data quality
- Rotating machinery analysis: RPM Spectral Maps, Order Track analysis
- Graphics: How to get the diagram look the way I want it to, Some useful plot functions • Graphical user interface: a simple toolbox

## Previous knowledge

Corresponding to QST-V400, Fundamentals of Noise and Vibration Analysis.

Experimental Structural Dynamics

Advanced Noise & Vibration Analysis

Experimental Fatigue Analysis using MATLAB®

Experimental Structural Dynamics using MATLAB®

**Presenter:** Dr Thomas L. Lagö



## . QST - V410E Advanced Noise & Vibration Analysis

### Short description

This course is the third course within noise and vibration analysis. In the course, we go through the advanced methods within statistics and signal analysis that are used in the area, such as MIMO modelling (Multiple-Input-Multiple-Output), principal response analysis, Noise Path Analysis, etc. This is a course for those who work as specialists within noise and vibration analysis, for example using measurement results for modelling vibrational behavior.

**Course duration:** 4 days

### Target group

- Those who use or have used software such as LMS, B&K or MATLAB®.
- Those who have worked a while with frequency analysis in acoustics or vibration and want to get a deeper insight into the capabilities of advanced, multi-channel signal analysis systems.
- Those who work with calculations or simulation in structural dynamics and want to learn how to use modern methods in signal processing and simulation.

### Course contents Part 1

**Time series analysis:** The sampling theorem • Interpolation techniques • z transform Digital filters • Integration and differentiation

**Statistics:** mean, variance, moments, skewness, kurtosis • Amplitude Probability Density

**Data quality:** Use of statistical measures • Stationarity test • Normality test •

**The Fourier transform:** DFT summary • Hilbert transform • Cepstrum

**Linear systems with one input signal:** Transfer function • Frequency Response Function • Basic matrix theory

**Single input/Single output (SISO) System Theory:**  $H_1$ ,  $H_2$ ,  $H_3$ ,  $H_c$ ,  $H_v$  • Coherence • Single Input/Multiple Output (SIMO) • Error formulas

### Course contents Part 2

Spectrum matrices Multiple Input/ Single Output (MISO) • Multiple coherence-function • Multiple Input/Multiple Output (MIMO):  $H_1$ ,  $H_v$  • Error formulas for Frequency Response Functions and coherence

Conditioned signals: MIMO for correlated inputs • Conditioned spectra • Partial coherence functions • Coherent output power

Orthogonalization: Eigenvalue analysis and singular value decomposition, SVD • Principal components • Virtual coherence • Source identification

Noise Path Analysis: To model the propagation paths • The inverse problem

Non-linear systems: Common non-linearities • Spectral density functions for non-linear systems • Different types: Without memory, with memory, A-system, B-system

Identification methods: Bi- and tri-spectra, Bendat methods

**Previous knowledge**

Corresponding to QST-V400, Fundamentals of noise and vibration analysis.

**Suitable continuation classes**

Using MATLAB® for Noise & Vibration Analysis

Experimental Structural Dynamics using MATLAB®

**Presenter:** Dr Thomas L. Lagö

## . QST - A500E Fundamentals of Acoustics

### Short description

This is a basic acoustics course with emphasis on the nature of sound and how to use a sound level meter for correct results. The attendees will also learn how sound fields are generated, indoors and outdoors and some basic knowledge about room acoustics. This course gives a fast track to proper techniques to make quality sound measurements, and explains why.

**Course duration:** 2 days

### Target group

- Those who use a sound level meter or basic analyzer i.e. for measurements of environmental noise, room acoustics or industry related noise
- Those who are working at an acoustics lab and are interested in taking the level 2 course
- Those who are designing noise radiating machines

### Course contents

- **Introduction:** What is sound? • The physiology of the ear • Hearing loss
- **Basic acoustic definitions:** dB, Sound pressure, Sound power • A- and C-weighting • Octave band filters • Sound propagation outdoors
- **Basic room acoustics:** Reverberation, Resonance
- **How to use a modern SLM:** Based on do's and don'ts and tips on "best usage"
- **Sound Sources:** Sound radiation from different sources • Sound Power • Sound Intensity
- **Anechoic and semi-anechoic rooms:** applications, Sound absorption, reduction, sound power
- **Psycho acoustics:** an introduction to sound quality.

### Previous knowledge

Mathematical skills corresponding to high school level.

### Suitable continuation classes

Fundamentals of Noise & Vibration Analysis

**Presenter:** Dr Thomas L. Lagö

# . QST - V330E Vibration Theory for the Design Engineer

## Short description

This is a course introducing basic concepts of dynamics for those who work with design and simulation of mechanical products. General vibration theory is covered from a perspective of understanding waves and modes etc. The course describes how vibrations occur, how they propagate, and how they can be reduced or eliminated using damping and vibration isolation.

**Course duration:** 2 days

## Target group

- Those who work with design in their work need to take vibrational aspects of structures and components into account
- Those who perform dynamic analysis and/or simulation on component level in design
- Those who want to acquire more knowledge in the vibrational properties of structures

## Course contents

- **Fundamental dynamics:** What starts vibration? Time and frequency – what does it mean in dynamics?
- **Spectrum:** Single degree of freedom systems, resonance, damping. Frequency response.
- **Different types of vibration:** periodic, white noise and shock. Vibration isolation: principles and areas of use.
- **Modal analysis in theory and practice:** Multiple degree of freedom systems. Continuous systems and structures. Modal analysis: free vibration, forced response. Experimental vs. analytical modal analysis.
- **Damage from vibration:** direct damage, fatigue. Environmental testing: specifications, choice of test methods.
- **Analysis methods for dynamics:** FEM -- Introduction to methods for dynamic analysis: motivation, principles, goals, different methods, The Finite Element Method (FEM) "without math"
- **Differences between statics and dynamics:** input, models, damping, solution methods, results;
- **Dynamic analysis methods:** system components in the analysis; FE-modelling; Simple results checks.

## Previous knowledge

Fundamental engineering mathematics and some experience from structural dynamics.

**Presenter:** Dr Thomas L. Lagö

## **QST - A510E ACOUSTICS Level 1**

### **Short description**

This is a basic acoustics course with emphasis of the nature of sound and how to use a sound level meter. The attendees will also learn how sound fields are generated, indoors and outdoors.

**Course duration:** 1 day

### **Target group**

- Those who use a sound level meter or basic analyzer i.e. for measurements of environmental noise, room acoustics or industry related noise
- Those who are working at an acoustics lab and are interested in taking the level 2 course
- Those who are designing noise radiating machines

### **Course contents**

What is sound? · The ear · dB · SPL measurements · A- and C-weighting

· Octave band filters · Sound propagation outdoors ·

Basic room acoustics · Reverberation · Resonance · Hearing loss

### **Previous knowledge**

Mathematical skills corresponding to high school level.

**Presenter:** Dr Thomas L. Lagö

## . QST - A520E ACOUSTICS Level 2

### Short description

This is an acoustics course for those who need to know more about sound power, sound intensity, etc. Special attention is given to the sound measurements that are needed for the EU directive on safety of machinery.

Comprehensive course material will be included, comprising of:

- A course binder with copies of overhead slides.
- Standalone software for Windows XP/Vista/Windows 7 with illustrating signal analysis examples for post course training.
- MATLAB® demonstration software - examples for noise and vibration analysis. These examples contain fully functional examples.

**Course duration:** 1 day

### Target group

- You are measuring sound levels according to the EU directives and needs to understand the system better
- You are working with room acoustic applications
- You are working in an acoustic lab
- You are working with acoustical absorbent material

### Course contents

Sound radiation from different sources · Sound power · Sound intensity · Room acoustics · Anechoic and semi-anechoic rooms: when to use and why? · Sound absorption · Measuring noise reduction · Psycho acoustics: an introduction to sound quality · Measuring sound power · Sound Intensity Fundamentals · Measuring room acoustics

### Previous knowledge

Mathematical skills corresponding to high school level.

**Presenter:** Dr Thomas L. Lagö

## . QST - M600E Properly Using Digital Measurement Systems

### Short description

A basic course covering electrical measurement techniques and how to properly plan a measurement series. The course also covers the practical use of modern digital instruments. The course concentrates on the analysis of dynamic signals.

**Course duration:** 1 day

### Target group

- Those who encounter digital oscilloscopes, a PC with data acquisition board and software or some other measurement system for data acquisition in their work.
- Those who are going to work with for instance vibration analysis and need a basic summary of measurement techniques.

### Course contents

- **Calibration:** The SI-system • The concept of traceability • Calibration of measurement instruments
- **Instrumentation:** Analog and digital instruments • The Voltmeter, counters and oscilloscopes
- **Analog to Digital Conversion:** A/D-conversion • The Sampling Theorem • ADC principles
- **RC-circuits:** time constants, step and impulse response • Amplitude and phase
- **Filters:** Analog filters • Digital filters • Frequency analysis
- **Measurements:** Treatment of measurement noise • Influence on the measurement object • Input and output impedance • Grounded and differential inputs • Error analysis
- **Data acquisition:** PC plug-in boards, measurement tape recorders, distributed data acquisition.

### Previous knowledge

No prior knowledge is required.

### Suitable continuation classes

Noise & Vibration Analysis Fundamentals or Fundamentals of Acoustics.

**Presenter:** Dr Thomas L. Lagö

## . QST - F70XE "Basics of Basics" — a series of courses

### Short description

This is a one day course presenting the basic information that every engineer and technician should know about sound and vibration. It is an excellent introduction to other, more elaborate courses on these topics. If you are new in the field of sound and/or vibration measurements, this is the introductory course for you. The course is divided into seven separate sections, about 45 minutes each, plus demonstrations.

**Course duration/course:** 1 day

### Target group

- Those who have just started to use, or plan to start using, an FFT analyzer or computer software for sound and vibration measurements.
- You have used an analyzer or sound level meter for some time but feel uncertain about the extended techniques available to accomplish quality measurements.
- You are a manager and would like to get on the “fast track” to understand what your engineering team is doing, and why.

### Courses available:

1. QST - F700E Basics of Sound and Vibration Measurement
2. QST - F710E Basics of Loudspeakers and Microphones
3. QST - F720E Basics of Electrical Measurements
4. QST - F730E Basics of Terminology for Sound & Vibration
5. QST - F731E Basics of Digital Signal Processing, DSP
6. QST - F732E Basics of Smart Sensors
7. QST - F733E Basics of Sound Level Meters and Real Time Analyzers
8. QST - F734E Basics of Experimental Modal Analysis and ODS
9. QST - F735E Basics of Microphones
10. QST - F736E Basics of Machinery Measurement Diagnostics
11. QST - F737E Basics of Sound Intensity
12. QST - F738E Basics of HVM (Human Vibration Measurements)
13. QST - F739E Basics of Holography
14. QST - F740E Basics of Environmental Noise
15. QST - F741E Basics of Calibration for Sound & Vibration
16. QST - F742E Basics of Building Acoustic
17. QST - F743E Basics of Sampling, Filtering and Reconstruction

### Previous knowledge

Mathematical skills corresponding to high school level.

**Presenter:** Dr Thomas L. Lagö



## . **QST - F700E Basics of Basics**

### **Short description**

This is a one day course presenting the basic information that every engineer and technician should know about sound and vibration. It is an excellent introduction to other, more elaborate courses on these topics. If you are new in the field of sound and/or vibration measurements, this is the introductory course for you. The course is divided into seven separate sections, about 45 minutes each, plus demonstrations.

**Course duration:** 1 day

### **Target group**

- Those who have just started to use, or plan to start using, an FFT analyzer or computer software for sound and vibration measurements.
- You have used an analyzer or sound level meter for some time but feel uncertain about the extended techniques available to accomplish quality measurements.
- You are a manager and would like to get on the “fast track” to understand what your engineering team is doing, and why.

### **Course contents**

Section #1 Sound & Vibration Terminology

Section #2 Sensor Technology Basics (microphones and accelerometers)

Section #3 Sound Level Meter and Analyzer Concepts

Section #4 Signal Processing Basics

Section #5 Environmental Noise Basics

Section #6 Basics of Sound Intensity — Sound Power and their applications

Section #7 Common Calibration Methods

Demonstrations.

### **Previous knowledge**

Mathematical skills corresponding to high school level.

**Presenter:** Dr Thomas L. Lagö

## . QST - F710E Basics of Loudspeakers and Microphones

### Short description

This is a course for the person that is interested in understanding the background and strategies to loudspeaker and microphone design. A historic outline will be presented and important changes in foundation and theory over time will be discussed. As an example, Thiele & Small made an important contribution when they introduced TS parameters for loudspeaker design. Are there similar approaches for microphones? Where is the technology today and is it possible to calibrate a room's loudspeaker system using a microphone? Many myths and opinions will be discussed and some erased.

**Course duration:** 1 day

### Target group

- Those who has an interested in understanding how loudspeakers are being constructed and why.
- Many loudspeaker systems for Pro-Audio sounded better 40 years ago. Why is that? Is it the "digital age" that has "destroyed the sound" or is an improvement? If you want more information and background to these topics, you should attend the course.
- You are planning on purchasing loudspeaker and microphone system and would like to know more, enabling you to become a better purchasing manager.

### Course content

- Background and history to microphone and loudspeaker design.
- Material use and key challenges and compromises that are common will be outlined and discussed.
- Different modeling strategies like Thiele-Small and other approaches will be outlined and discussed.
- Design differences in between Pro-Audio, Audiophile, and "home use" systems for loudspeakers.
- Sub-woofer design and placement. When can you hear the sub-woofer? The directional hearing will be presented and discussed.
- Examples of different design strategies will be presented and attendees can listen to the differences in approaches for real-life systems.
- The common "calibrate your "audiophile room" using a microphone will be discussed. Its ability and "error function" will be presented, giving a better understanding of what is possible and not.
- The difference in between Pro-Audio microphones, Professional Microphones and iPhone type microphones will be discussed.

### Previous knowledge

Mathematical skills corresponding to high school level.

**Presenter:** Dr Thomas L. Lagö

## . QST - F720E Basics of Electrical Measurements

### Short description

A basic course in electrical measurement techniques. How to plan a measurement. How to handle modern digital instruments. The course concentrates on analysis of dynamic signals.

**Course duration:** 1 day

### Target group

- Those who encounter digital oscilloscopes, a PC with data acquisition board and software or some other measurement system for data acquisition in their work.
- Those who are going to work with for instance vibration analysis and need a basic summary of measurement techniques.

### Course content

- **Calibration:** The SI-system • The concept of traceability • Calibration of measurement instruments
- **Instrumentation:** Analog and digital instruments • The Voltmeter, counters and oscilloscopes
- **Analog to Digital Conversion:** A/D-conversion • The Sampling Theorem • ADC principles
- **RC-circuits:** time constants, step and impulse response • Amplitude and phase
- **Filters:** Analog filters • Digital filters • Frequency analysis
- **Measurements:** Treatment of measurement noise • Influence on the measurement object • Input and output impedance • Grounded and differential inputs • Error analysis
- **Data acquisition:** PC plug-in boards, measurement tape recorders, distributed data acquisition.

### Previous knowledge

No prior knowledge is required.

**Presenter:** Dr Thomas L. Lagö

## . **QST - F730E Basics of Terminology for Sound & Vibration**

### **Short description**

A basic course handling the terminology used for sound and vibration measurements.

### **Course contents**

- Definitions
- Decibel
- Classification of signals
- Displacement, velocity and acceleration
- Sound fields
- Diffuse, free-field, near and far-field

**Course duration:** 1 day

**Combinable with:** QST-F733 Basic of SLM-RTA and other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . QST - F731E Basics of Digital Signal Processing, DSP

### Short description

A basic course describing the most important things to know and be aware of when handling sound and vibration measurements and analysis.

### Course contents

- Definitions
- History of DFT and FFT
- Classification of signals
- Common errors when using FFT
- ADC principles
- Sampling methods
- Reconstruction
- Digital filters versus analog filters
- Common misconceptions
- Windows and FFT
- Picket Fence
- Proper amplitude scaling
- Automatic amplitude scaling
- Do's and Don'ts
- Summary

**Course duration:** 1 day

**Combinable with:** QST-F733 Basic of SLM-RTA or other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . QST - F732E Basics of Smart Sensors

### Short description

A basic course outlining the concepts of smart sensor and their usage for sound and vibration measurements. IEEE standards and directions for smart sensors is covered.

### Course contents

- How Smart Is Smart?
- Industry-Wide Initiatives
- Product Developments in Smart and Embedded technologies
- Applications

**Course duration:** 1 day

### Combinable with:

QST-F742 Basics of Calibration

QST-F735 Basics of Microphones

and other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . QST - F733E Basics of Sound Level Meters and Real Time Analyzers

### Short description

A basic course handling the concepts of Sound Level Meters and Real Time Analyzers used for sound and vibration measurements. Their applicable standards are described as well as the main measurement functions and principles.

### Course contents

- Modern SLM concepts
- Standards for SLM and Type 0, 1, 2 and 3
- Detectors
- RMS, fast, slow and peak
- Leq
- Frequency weighting and octave band analysis
- Constant bandwidth versus percentage bandwidth
- Tips for quality measurements

**Course duration:** 1 day

**Combinable with:** QST-F730 Basic of SLM-RTA and other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . QST - F734E Basics of Experimental Modal Analysis and ODS

### Short description

A basic course describing the foundation for Experimental Modal Analysis and ODS measurements and analysis. The course outlines the need for LTI systems (Linear and Time Invariant) for proper analysis. Different curve fitting techniques, their history and proper use is discussed. Excitation techniques are essential, especially if the systems are not completely LTI. This is discussed and main tips and advice for quality analysis is outlined. Operational Deflection Shapes (ODS) is also discussed and its relation to Experimental Modal Analysis (EMA).

### Course contents

- Domains
- Modal Analysis, what is it?
- Orthogonal base functions
- Modal analysis example
- Frequency Response Function, FRF
- Linear and time-invariant systems, LTI
- Curve fitting concepts
- Excitation techniques
- Operational Deflection Shapes, ODS
- Summary

**Course duration:** 1 day

**Presenter:** Dr Thomas L. Lagö

.



## . **QST - F735E Basics of Microphones**

### **Short description**

A basic course handling the terminology and principles used for microphones when used for sound measurements. Main microphone types are described and their key features. Main design criteria and principles are outlined as well as calibration methods typically used.

### **Course contents**

- Microphone types
- Directional characteristics
- Basic rules for sound measurements
- Free-field corrections
- Microphone sensitivity and frequency range
- Selecting a microphone
- Effects of polarization voltage, temperature, humidity and barometric pressure
- Calibration considerations
- ICP and Phantom Power principles

**Course duration:** 1 day

### **Combinable with:**

QST-F737 Basics of Intensity

QST-F739 Basics of Holography

QST-F741 Basics of Calibration

and other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . **QST - F736E Basics of Machinery Measurement Diagnostics**

### **Short description**

A basic course handling the terminology and principles used for sound and vibration measurements with a focus on machinery diagnostics.

### **Course contents**

- How defects manifest themselves in spectrum analysis:
  - Engines
  - Gears
  - Imbalance
  - Misalignment
  - Turbines
- Sensor selection and mounting
- Amplitude accuracy and scaling
- Tips for quality measurements

**Course duration:** 1 day

**Presenter:** Dr Thomas L. Lagö

## . **QST - F737E Basics of Sound Intensity**

### **Short description**

A basic course handling the terminology and principles used for sound intensity and sound power measurements. The history of the technique is discussed but also the directions of new sensors and measurements principles. A full coverage of main errors and why they exist plus key factors to consider for quality measurements is included.

### **Course contents**

- Sound intensity and sound power
- History and theory
- Errors
- Approximation errors
- Spacer size
- PI-index
- Residual intensity
- Sound power

**Course duration:** 1 day

### **Combinable with:**

QST-F735 Basics of Microphones.

QST-F739 Basics of Holography.

and other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . **QST - F738E Basics of HVM (Human Vibration Measurements)**

### **Short description**

A basic course handling the terminology and principles used for vibration measurements with a focus on the human body. This is typically divided into Hand-Arm and Whole-Body and these areas are discussed. Applicable standards are discussed and tips and suggestions for quality measurements is included.

### **Course contents**

- Background
- Frequency Sensitivity
- Whole-Body Vibration
- Standards
- Natural frequencies of the human body
- Measurement techniques and sensors

**Course duration:** 1 day

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**Presenter:** Dr Thomas L. Lagö

## . QST - F739E Basics of Holography

### Short description

A basic course handling the terminology and principles used for holography measurements. Tips for quality measurements and analysis is included.

### Course contents

- Short history and background
- What is it?
- Instrumentation and computer requirements
- Practical applications

**Course duration:** 1 day

### Combinable with:

QST-F735 Basics of Microphone.

QST-F737 Basics of Intensity

and other "Basics of Basics"

**Presenter:** Dr Thomas L. Lagö

## . QST - F740E Basics of Environmental Noise

### Short description

A basic course handling the terminology and principles used for environmental measurements. The course covers all the main parameters and how they are calculated and why. Tips for quality measurements and analysis is included.

### Course contents

- Noise parameters
- Leq, SEL and statistics
- Industrial noise
- Sound Dose and dose parameters
- Hearing conservation programs
- Occupational noise
- Permanent noise monitoring systems
- Pass-by systems

**Course duration:** 1 day

**Presenter:** Dr Thomas L. Lagö

## . QST - F741E Basics of Calibration for Sound & Vibration

### Short description

A basic course handling the terminology and principles used for calibration systems used in sound and vibration applications. Tips for quality principles, measurements and analysis is included.

### Course contents

- Calibration overview
- Calibration methods
- Inversion, drop, reciprocity, laser interferometry, gravimetric,
- Uncertainties
- Microphone Calibration
- Free-field reciprocity
- Microphone comparison

**Course duration:** 1 day

### Combinable with:

QST-F735 Basics of Microphones and other "Basics of Basics" courses.

**Presenter:** Dr Thomas L. Lagö

## . QST - F742E Basics of Building Acoustics

### Short description

A basic course handling the terminology and principles used for building acoustics measurements and analysis. Different definitions and why they exist and how to verify them is discussed. Tips for quality measurements and analysis is included.

### Course contents

- Sound Propagation
- Sound Field
- Reverberation Time
- Acoustical Properties of Materials
- Sound Absorption
- Sound Insulation
- Dumping
- Measurements Setup
- Standards

**Course duration:** 1 day

**Presenter:** Dr Thomas L. Lagö



## . QST - F743E Basics of Sampling, Filtering and Reconstruction

### Short description

A basic course handling the terminology and principles used when converting a signal from analog time domain to digital time domain. The course gives a thorough background to Nyquist and Shannon and will, in laymen's terms describe what is happening. Sound examples will be used to illustrate aliasing and other "phenomena." The course will also discuss the concept of "sparse sampling" and how that can impact time domain analysis but is a must for FFT and similar approaches. Up-sampling and down-sampling will be outlined and a full explanation on how to recreate your analog signal is also included. Common misconceptions will be brought up and explained and how to avoid them becoming a challenge. This is very useful course if you would like to understand how sampling and reconstruction should be handled and its practical and theoretical foundation.

### Course contents

- Main principle on converting a signal from analog to digital.
- Sampling principles including both Nyquist and Shannon.
- Consequences of sampling – sound examples and visualizations.
- Filtering in time using analog and/or digital filters. Main advantages and disadvantages will be discussed.
- Different analog to digital converters and their main principle and advantages (plus disadvantages).
- Spares sampling and why that is the most common foundation for data acquisition systems.
- Reconstruction and proper filtering both using analog and digital filters.
- Common challenges for ADC systems, filters and data acquisition systems. This is complemented with tips on easy testing of the system, making sure it does what is claims!
- Do's and don't's when it comes to sampling and reconstruction. Common misconceptions will be brought up and explained and how to avoid them becoming a challenge.

**Course duration:** 1 day

**Presenter:** Dr Thomas L. Lagö

## . QST - F743E Sound, Vibrations and Acoustics in Buildings

### Short description

This course is put together in order to help the manufacturer or installer of heating or ventilation systems, or other units that often creates noise and vibration challenges. If you belong to one the following categories, this course is a must for you:

- House producer or deliverer (e.g. Myresjöhus, Trivselhus, Willa Nordic, Sävsjö Trähus, .....
- Manufacturer and/or installer of e.g. heating systems for homes and industry (e.g. IVT, Thermia, Mitsubishi, Panasonic, .....
- Manufacturer and/or installer of kitchen fans, heating systems, compressors, .....
- Unhappy customer that is interested in knowing what the above groups did not do right

The course is based on real life problems and challenges from construction of new offices and/or homes. High noise and vibration levels can lead to increased blood pressure and many other problems. The installations used as examples had too high levels but the vendors were unable to fix it on their own!

### Course contents

- How to radically decrease the sound levels radiated from e.g. a heat pump. A real life example will be presented where the sound levels decreased with about 25 dB using low cost and easy to install methods.
- How to properly handle ventilation system installations to decrease sound and vibration levels.
- Basic room acoustics and how to make a room feeling more silent and “better.”
- How to properly install e.g. a heat pump in such a way that sound and vibration levels are reduced in the building.
- Standards and norms that should be used will be discussed.
- Common mistake made, making the house or installation noisy and discussion how these challenges could have been avoided using low cost and easy approaches. This part is based on real life examples and showing results before and after.

This course is a must if you are working as a house developer/builder, manufacturing and/or installing heat pumps or systems, ventilation systems or other equipment can impact the important “silence” that many people expect, but do not exist after these installations have been made. Examples, covering common mistakes will be presented and discussed making sure that easy and often low cost solutions are being used more frequently.

The course has excellent course material with pictures and examples and the attendees can discuss and ask questions during the course.

**Course duration:** 2 days

### Day 1

Outline of different applications and why there are sound and vibration challenges arising from the installation.

- Ventilation systems
- Heating systems (heat pumps, furnace or other equipment that can "sound" or "vibrate")
- Kitchen fans
- The most common "weakest links" one must be aware of?
- How can a room be made more quite – what is myth and what is reality?
- Basic physics and theory that is often used – pros and cons with this.
- Standards and norms.
- Discussions.

## **Day 2**

- How should sound and vibration be measure in a correct manner – standards and principles.
- How can one modify bad installations making them better?
- How can one make it right the first time?
- Examples in regards to common mistakes will be presented and discussed.
- Discussions.

### **Target group:**

Sound engineers or persons with an interest for sound equipment

### **Previous knowledge:**

No degree needed but practical experience is a plus.

### **Presenter:**

Dr. Thomas Lagö has a vast practical experience. Lagö teaches sound and vibration courses and their mitigation on an international basis and has given courses for NASA, Rolls Royce, ABB, Volvo, SAAB, Scania, Boeing, Atlas Copco, TATA, Indian Navy and many international universities and expert groups. His practical experience is vast and he has worked as a carpenter, upholsterer and Radio & TV Technician and is very practically oriented despite his thorough theoretical education and experience. His solutions and courses have helped many teams better their environment and solve challenging problems without spending huge money.

**This course can also be given in Swedish if needed.**

## . **QST - S800E Sound Quality**

### **Short description**

The interest for sound quality has increased during the last years. Sound quality deals with human perception, why certain sounds are pleasant and others are not. In this course we review sound analysis methods and how to change a product to make it sound better. A great number of signal analysis tools are described and demonstrated.

**Course duration:** 1 day

### **Target group**

- Those who are working in an acoustics lab
  
- Those who are working with sound reduction measures, especially for consumer products

### **Course contents**

The hearing system • Psycho acoustics: the perception of sound • Music and signal analysis: what are the common points? • Sound recording: microphones, recording heads, calibration • Sound reproduction • Subjective listening tests • Sound quality metrics • Tools for sound decomposition: rotating machinery, background noise • Filtering • Linking sound quality to structural dynamics

### **Previous knowledge**

Skills corresponding to QST-V400 "Noise and Vibration Analysis Fundamentals".

**Presenter:** Dr Thomas L. Lagö

**This course can also be given in Swedish if needed.**

## . QST - S810E Condition Monitoring System Approaches

### Short description

In many CBM applications, the basic assumptions for the analysis used is forgotten or “ignored.” This can lead to large amplitude errors and hence misleading the analysis. This will most likely be devastating for prognosis since the amplitude errors are likely to be substantial. This course describes some of these errors and how this can lead to wrong conclusions and or results. By understanding these errors and why they exist, it is possible to mitigate and/or minimize their impact on the end results. The challenge related to that signals analyzed do not obey the proper properties and hence large amplitude errors could become the result can be handled automatically. The background to the challenges is discussed and proper solutions and strategies to avoid such errors are presented. The automatic method will automatically tell which of the frequency lines can be trusted from an amplitude accuracy point of view and they can be scaled properly. MATLAB® examples will be presented.

**Course duration:** 1 day

### Target group

- Those who are working with Condition Monitoring or similar applications
- Those who are interested in signal processing of sound and vibration signals

### Course contents

Background • Analog to Digital Conversion Basics • Sampling Rate • Anti-aliasing filtering approaches and their impact on signals • Digital signal reconstruction • History of the FFT • Basic FFT principles • Common amplitude errors • Validation methods • Automatic tools for rotating machinery • Digital and analog filtering of data • Examples and lab exercises

### Previous knowledge

Skills corresponding to QST-V400 “Noise and Vibration Analysis Fundamentals”.

**Presenter:** Dr Thomas L. Lagö

**This course can also be given in Swedish if needed.**

## . QST - F900E VOX Sound Courses Overview

.  
**Do you want to create a better sound in your church or ensuring your success as a sound engineer?**

Then, one or more of the courses described below should be of interest for you. We have been teaching courses for 35+ years and the comments has always been that the sound quality improved after attending these courses. It is common to only focus on the technical aspects of the equipment itself, but good sound quality comes when all involved has a good collaboration and understanding on what it takes to create a better sound. The courses gives a good background to important factors, often playing a major role for the end result. A frequent comment after attending these courses is: "how could we possibly forget that these factors are that vital for the success?" If you are interested in a good sound quality and high intelligibility, you should attend one or more of these courses.

### . QST-F901E PRIMO VOX

This course gives an overview on the main factors creating a good sound quality. The course encourages a structured collaboration that is needed if the goal should be reached. This collaboration in between the sound engineers and the performers is more crucial than normally understood. Examples from churches and stage performances will be presented and the attendees will probably "smile and recognize themselves" many times. Some examples in regards to psycho acoustics and differences in the sound handling will be presented. These demos usually creates discussion and awe but also demonstrates the need for an understanding of the main factors involved in creating a better sound quality.

**Target Group:** Sound engineers, acousticians, builders, constructors decoration, persons with a sound interest, pastors, priests, quire masters, singers, performers, musicians etc.

**Pre-knowledge:** An interest in good sound and what is needed to make it happen.

**Presenter:** Dr Thomas Lagö, with a vast experience from sound in churches and stages, design of loudspeakers, mixer consoles and other equipment for sound systems.

**Course outline and structure:** Usually 1+1 night + 1 day (the course would start e.g. 17.00 (5pm) with an end at abt 21.30 (9.30pm)) (we can custom design a schedule that fits the interested group) Day-time is also possible.

**Presenter:** Dr Thomas L. Lagö

**This course can also be given in Swedish if needed.**

## . QST-F902E DUO VOX

### Short description

This course gives an overview on the main factors creating a good sound quality. The course encourages a structured collaboration that is needed if the goal should be reached. This collaboration in between the sound engineers and the performers is more crucial than normally understood. The first part of this course is essentially PRIMO VOX but also includes how to handle loudspeakers, mixer consoles and other equipment properly. Examples from churches and stage performances will be presented and the attendees will probably "smile and recognize themselves" many times. Some examples in regards to psycho acoustics and differences in the sound handling will be presented. These demos usually creates discussion and awe but also demonstrates the need for an understanding of the main factors involved in creating a better sound quality.

**Target Group:** Sound engineers, acousticians, builders, constructors decoration, persons with a sound interest, pastors, priests, quire masters, singers, performers, musicians etc.

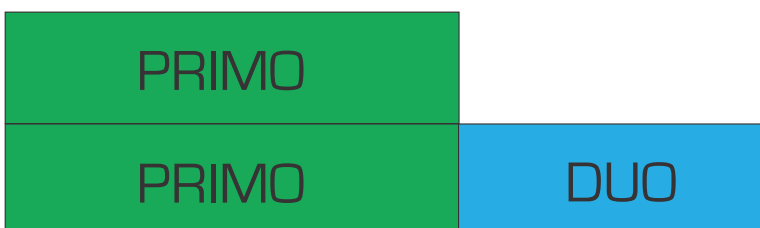
**Pre-knowledge:** An interest in good sound and what is needed to make it happen.

**Presenter:** Dr Thomas Lagö, with a vast experience from sound in churches and stages, design of loudspeakers, mixer consoles and other equipment for sound systems.

**Course outline and structure:** Usually 1+1 night + 1 day (the course would start e.g. 17.00 (5pm) with an end at abt 21.30 (9.30pm)) (we can custom design a schedule that fits the interested group) Day-time is also possible.

### VOX Sound Courses Outline

Below, a picture is depicting how the different modules are outlined for VOX courses. The courses are intended to train all involved in what is need to create a better sound. DUO VOX is an add-on course and is intended for the sound engineers and persons interested in more knowledge and understanding in regards to sound quality. PRIMO VOX is a must for all involved. DUO VOX is an extension that covers some deeper aspects of what "good sound" is.



**Presenter:** Dr Thomas L. Lagö

**This course can also be given in Swedish if needed.**

## . QST - F903E TRIO - VOX

### Short description

This course is giving an overview in regards to the most important factors creating a good sound. The course has a strong focus on the cooperation aspect and what is needed in regards to the joint work on stage and behind the mixer console. This course is a combination of the QST PRIMO VOX and QST DUO VOX. The course includes the key rooms acoustic factors and how these often are quantified and improved. If the group of attendees is mixed, the first parts could include all and the final part could be for the more technically interested.

**Target Group:** Sound engineers, acousticians, builders, constructors decoration, persons with a sound interest, pastors, priests, quire masters, singers, performers, musicians etc.

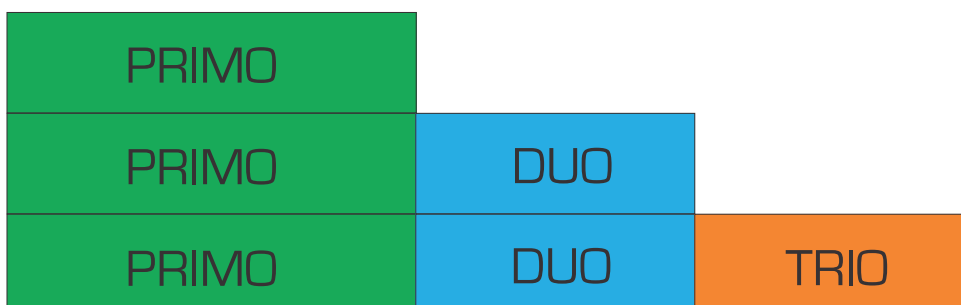
**Pre-knowledge:** An interest in good sound and what is needed to make it happen.

**Presenter:** Dr Thomas Lagö, with vast experience from sound in churches and stages, design of loudspeakers, mixer consoles and other equipment for sound systems.

**Course outline and structure:** Usually 1+1 night + 1 day (the course would start e.g. 17.00 (5pm) with an end at abt 21.30 (9.30pm)) (we can custom design a schedule that fits the interested group) Day-time is also possible.

### VOX Sound Courses Outline

Below, a picture is depicting how the different modules are outlined for VOX courses. The courses are intended to train all involved in what is need to create a better sound. TRIO VOX is the most complete course and is intended for the sound engineers. PRIMO VOX is a must for all involved.



The course modules will be adapted to the available day and nights for the attendees. It could e.g. be a Friday night and a Saturday. The attendees will receive a certificate after the course completion.

**Presenter:** Dr Thomas L. Lagö

**This course can also be given in Swedish if needed.**



## . QST - F904E MIXER - VOX

### Short description

This course is an advanced course for those who have participated in the course TRIO VOX. A focus is given on digital mixing consoles because they have many opportunities but can also create new challenges. The course goes deeper into how the psychoacoustic effects such as masking and "completion," impacts the sound and how this should be handled at the mixing console. Many examples are given on how to help people with a hearing damage or hearing loss hearing better. They will be affected more rapidly and will thus not be able to hear and/or cannot remember the contents of the worship which they participated in. This is well documented in research and practical tests. By understanding what needs to be done as a sound engineer and how this work using the mixer console can improve the sound quality considerably. The course has many practical elements so much of the time is spent in front of the console (video camera makes everyone see what happens). The course also covers different types of filters which are common, and their advantages and disadvantages, both analog and digital versions. Unexpected side effects of filters is discussed and how to deal with this. Microphone selection, including recommendations on how to work both indoors and outdoors, will be discussed. Also, how to measure sound properly will be covered. The course helps most sound engineers behind the mixing console to better understand what to do to create the best sound possible with the sound system at hand. In addition to this, hearing loop systems and how to install them to avoid trouble and get a good sound will also be discussed. Sound engineers attending this course have relayed a major improvement in their ability to create a better sound, independent of their background and knowledge base.

**Target Group:** Sound engineers, and persons with a sound interest.

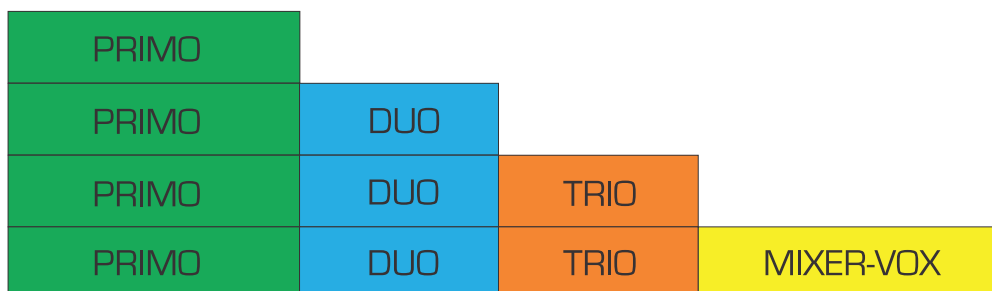
**Pre-knowledge:** TRIO VOX.

**Presenter:** Dr Thomas Lagö, with vast experience from sound in churches and stages, design of loudspeakers, mixer consoles and other equipment for sound systems.

**Course outline and structure:** Usually 1+1 night + 1 day (the course would start e.g. 17.00 (5pm) with an end at abt 21.30 (9.30pm)) (we can custom design a schedule that fits the interested group) Day-time is also possible.

### VOX Sound Courses Outline

Below, a picture is depicting how the different modules are outlined for VOX courses. The courses are intended to train all involved in what is needed to create a better sound. TRIO VOX is the most complete course and is intended for the sound engineers. PRIMO VOX is a must for all involved. DUO VOX is an extension that covers some deeper aspects of what "good sound" really is.



The course modules will be adapted to the available day and nights for the attendees. It could e.g. be a Friday night and a Saturday. The attendees will receive a certificate after the course completion. **This course can also be given in Swedish if needed.**

# . QST - F910E Sound Engineering Level 1

## Short description

This course is a suitable continuation of the Sound Engineering Course TRIO or if similar competence exists. This course will focus in depth in regards to different technical solutions and components in a sound system and the pros and cons. The course gives and good insight into what the different components will do to the sound and how to best utilize them.

## Course contents

- Different loudspeaker systems and their primary usage for the respective category
- Different microphone types and their primary usage for the respective category
- Different wireless systems and their primary usage for the respective category
- The mixer console's most important functions and proper usage
- Different frequency controls and how to best use them to create a good sound
- Power amplifiers and filters for speakers – how to think and act?
- Third and one octave filters and their correct usage
- Delay units, what are they for and how should they be properly set
- Compressors, how they function and their most important application areas
- The limiter, how it is working and its most important applications
- The compressor, how it is working and its most important application areas
- Sound Processors, how it is working and its most important application areas
- Reverberation and echo units
- How to handle feedback – what is the truth, really?
- Monitor systems
- Etc

**Course duration:** 1 day

## Target group:

Sound engineers or persons with an interest for sound equipment

## Previous knowledge

Experience from sound engineering and/or being at stage as a performer

**Pre-requisite:** TRIO VOX or similar knowledge.

**Presenter:**

Dr Thomas Lagö, with vast experience from sound in churches and stages, design of loudspeakers, mixer consoles and other equipment for sound systems.

**Course structure:**

Usually 1+1 night (course start e.g. 17.00 (5pm) and will end 21.30 (9.30pm))

**We can custom design courses to fit the need of a group of sound engineers or performers. We can also deliver on-site courses. This course can also be given in Swedish if needed.**

## . QST - F920 Sound Engineering Level 2

**Short description**

The interest for sound quality has increased during the last years. Sound quality deals with human perception, why certain sounds are pleasant and others are not. In this course we review sound analysis methods and how to change a product to make it sound better. A great number of signal analysis tools are described and demonstrated.

**Course contents**

- Sound Propagation
- Sound Field
- Reverberation Time
- Acoustical Properties of Materials
- Sound Absorption
- Sound Insulation
- Dumping
- Measurements Setup
- Standards

**Course duration:** 1 day

**Previous knowledge**

Experience from sound engineering and/or being at stage as a performer.

**Presenter:** Dr Thomas L. Lagö

## . QST - SF990E The Magician's Show on Sound and Vibration

### Short description

This is a one hour seminar or presentation on sound and vibration applications, presented in a more humorous way. About every 10 minute, the presenter uses the Magician's hat and a wand. When the "wand is being used," something strange will happen. Some examples are: sound disappear, the selected person will start stuttering, sound is not changing its pace but it sounds like it etc. This presentation does not explain "why" in technical terms but present important industrial applications for the "effect" that has been demonstrated.

### Presentation contents:

- Background to sound and vibration and its industrial applications.
- Psycho acoustics and its applications.
- Sound illusions similar to picture illusions – what you hear is not what has been produced?!
- How can the "stuttering" be induced by the magician and where does this become important in industry?
- Sound sources "disappear" despite being there – what is happening and how can this be used?
- Sound and vibration can be canceled – important principles and applications
- Summary plus Q&A.

### Target group:

Any person interested in sound and vibration and its applications.

### Pre-knowledge:

None. This is a presentation for all ages and backgrounds.

### Presenter:

Dr Thomas Lagö, with a vast experience from international sales and marketing. He has completed international courses on the topics in the USA and Sweden and have had sales and marketing responsibilities internationally in both small and large organizations.

### Course outline:

About 1 hour. The course can be expanded up to 3 hours if needed (more topics covered). The presentation can also be given at site for a team (5-25 attendees is a good group). **This presentation can also be given in Swedish if needed.**

## . QST - MF90E Basic Sales and Marketing Techniques

### Short description

This course is suitable if there is an interest to understand the basic principles of sales and marketing. The presenter has more than 30 years experience from international sales and marketing and will present interesting examples in regards to good and bad approaches. This basic understanding is crucial and if understood and handled, creates a great platform to better understand and read other books on sales and marketing. This course has been presented at universities but also for a vast range of companies. Despite being a very short course, attendees have always praised the course and claimed that their performance has greatly increased after attending. Many teams have said that there is a "before and after the course." More advanced continuation courses are available and custom designed courses can be delivered.

### Course contents:

- Basic sales techniques – important principles
- Basic negotiation techniques – important principles
- Argumentation techniques – important principles
- Marketing techniques – important principles
- Time and energy thieves and how to get rid of them
- Sales planning and forecasting
- Customer contacts and handling

### Target group:

Sales persons, marketing managers, politicians, teachers and others with an interest in understanding how to better "selling their own ideas or products."

### Pre-knowledge:

None, but some experience from sales and marketing is an advantage. The course "Basic Presentation Techniques" is however, a good background.

### Presenter:

Dr Thomas Lagö, with a vast experience from international sales and marketing. He has completed international courses on the topics in the USA and Sweden and have had sales and marketing responsibilities internationally in both small and large organizations.

### Course outline:

3 hours plus 1 hours discussion. The course can be given in the afternoon or night. The course can also be given at site for a team (5-25 attendees is a good group). **This course can also be given in Swedish if needed.**

## . QST - MF100E Basic Presentation Techniques

### Short description

This course is suitable if there is an interest to understand the basic principles in handling a presentation for a group. The presenter has more than 30 years experience from international sales and marketing and will present interesting examples in regards to good and bad approaches. This basic understanding is crucial and if understood and handled, creates a great platform to better understand how to make an impact with the presentation. This course has been presented at universities but also for a vast range of companies. Despite being a very short course, attendees have always praised the course and claimed that their presentation skill and performance has greatly increased after attending.

### Course contents:

- Basic presentation techniques – important principles
- Using proper tools for the presentation – important principles
- Short and longer presentations – important principles
- Colors and outline – important principles
- Handling different audiences
- Do's and don'ts
- Summary

### Target group:

Sales persons, marketing managers, politicians, teachers and others with an interest in understanding how to better "making an impact with their presentation."

### Pre-knowledge:

None, but some experience from previous presentations is an advantage.

### Presenter:

Dr Thomas Lagö, with a vast experience from international sales and marketing. He has completed international courses on the topics in the USA and Sweden and have had sales and marketing responsibilities internationally in both small and large organizations.

### Course outline:

3 hours plus 1 hours discussion. The course can be given in the afternoon or night. The course can also be given at site for a team (5-25 attendees is a good group). **This course can also be given in Swedish if needed.**

## . **QST - MF110E Time and Energy Thieves – how to avoid them!**

### **Short description**

This course is suitable if there is an interest to understand the basic principles in handling your time and energy in an efficient manner. The presenter has more than 30 years experience from international sales and marketing and will present interesting examples in regards to good and bad approaches and why some people seems to accomplish more than the average despite only 24 hours. This basic understanding is crucial and if understood and handled, creates a great platform to better understand how to make more out of the time available. This course has been presented at universities but also for a vast range of companies. Despite being a very short course, attendees have always praised the course and claimed that their time usage and effectiveness has greatly increased after attending this course.

### **Course contents:**

- Typical time and energy thieves
- Time management
- Focusing on the right matters -- solve the right problem!
- Follow-up and re-focus
- Relax and reward yourself
- Celebrate
- Summary and discussion

### **Target group:**

Sales persons, marketing managers, politicians, teachers and others with an interest in understanding how to better "making an impact with their presentation."

### **Pre-knowledge:**

None, but some experience from previous presentations is an advantage.

### **Presenter:**

Dr Thomas Lagö, with a vast experience from international sales and marketing. He has completed international courses on the topic in the USA, India and Sweden and have had sales and marketing responsibilities internationally in both small and large organizations.

### **Course outline:**

3 hours plus 1 hours discussion. The course can be given in the afternoon or night. The course can also be given at site for a team (5-25 attendees is a good group). **This course can also be given in Swedish if needed.**

## . QST - MF120E Home Based Businesses – Friend or Foe?

### Short description

Starting a home businesses can be very rewarding but also, extremely dangerous. It is not as easy as one is led to believe. This course will guide you through the merits and demerits of starting a home based business and give you the good, bad, and ugly news of what you can expect. Our goal is not to talk you into starting a home based business but to give you the truth and then let you decide if it's the right thing for you to do. The course will include a questionnaire to determine if you need to be in a home based business, if you want to be in a home based business and if you've got what it takes to be in a home based business. Additionally, we'll teach you the following skills so that if you jump in and become an entrepreneur, you'll know what to expect and how to set yourself apart from other people fighting for success.

### Course contents:

- **Telling Not Selling:** This program is exceptionally useful and will teach you how to introduce your product or services to prospects in such a way that you won't be using manipulative selling techniques that frankly, make good people feel dirty! You'll learn how to tell stories to illustrate your points. You'll learn how to teach the unknown from the known. You'll learn that Overcoming Objections is not necessary. You'll learn that it's OK to leave money on the table. You'll learn how to quickly filter out the time wasters but never leave them stranded. After all, a "no" today might be a "yes" tomorrow! In short, you will learn skills that you can use immediately with great effect.

### The program is taught in two parts.

**1 – Prospecting:** The prospect will qualify or disqualify him or her self during a brief exchange that is designed to determine if an appointment should be held in order to move forward after establishing conditions of mutually beneficial satisfaction. This strategy is especially useful when attempting to move through lists of prospects due to its efficiency and effectiveness in time and results.

**2 – Consultative Needs Based Selling:** Using and following a simple to use process that unravels a prospects needs and wants, this program ensures that the prospect, if s/he becomes a customer, will do so because the need payoff of using your product provides a solution to a problem that the prospect is experiencing.

**Telling not Selling is a perfect way to start a new business or accelerate the growth of an existing one.**

- **Know yourself, know your customers:** This is an eye opening class that will first of all enable you to identify your behavioral characteristics and then those of your customers. Knowing these various behavioral characteristics will enable you to increase your success by using the most effective strategies for achieving success with everyone you encounter. These newly found skill sets can be used immediately with great success and you'll find that you're less frustrated when someone doesn't move at the same speed as you do or, that they become impatient when you take a long time going over every detail that you feel is necessary for them to make a decision!



- **Manage your time or it will manage you:** “If it wasn’t for the last minute, nothing would ever get done”. If you are one of those people, then this course is definitely for you. In a very easy to use way, a time management decision making plan will enable you to make the right choices for your project list. You will learn to make good decisions relative to what’s important and urgent, not important and not urgent and get the things done without absolute panic throughout every minute of every day. You will feel so good once you begin to control your time and even look forward to getting up in the morning without having that stomach churning feeling that you didn’t get much done yesterday and the whole world is caving in on you. Additionally, if you’re working a full time job as well as operating a home based business, you’ll still have time to relax and have fun. In short, you’ll wonder where the extra hours came from and marvel at how relaxed you are. Your family will notice too!

**Target group:**

Persons with an interest in understanding how to better handle a home based business and why some are destructive and others good.

**Pre-knowledge:**

None, but some experience from previous home based businesses is an advantage.

**Presenter:**

Dr Alan Boyer, with a vast experience from international sales and marketing and multiple home based and direct selling companies.

**Course outline:**

4 hours plus 1 hours discussion. The course can be given in the afternoon or night. The course can also be given at site for a team (5-25 attendees is a good group).

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## . QST - MF130E Introduction to Using A Computer – Step 1

### Short description

This course is designed for people, that haven't used a computer before but want an easy to follow, hands on course that will enable them to access the internet, view and send pictures to with friends and family and generally bring loved ones closer by being able to see them, hear them and talk to them whenever they want.

If you have never used a computer before, this is the course for you? You may have worked a little with a computer but feel uncomfortable and find it difficult to manage it. We organize courses for beginner's level in basic computer use where you'll learn everything from scratch. Everyone can attend, even if you have never used a computer before. You do not have to own a personal computer in order to attend the course. You can borrow a computer at the course (included in the course fee). Course set-up might look like the outline below, but we can also tailor courses to your specific needs.

### Example course contents:

Week 1: Computer basics and getting started.

Week 2: Word Processing, the basics of Microsoft Word.

Week 3: The Internet and various search engines and e-mail.

Week 4: Continuation Internet, social media and more.

Week 5: Getting started with video and photo management.

Week 6: My own preference in regards to application areas.

**Duration:** The course duration is spread over for 6 weeks, 2 hours / week. A total of 12 hours. (The distribution of hours can also be customized if desired.)

**Pre-knowledge:** None.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . QST - MF140E Intermediate Course in Computer Usage – Step 2

### Short description

This course is intended for those who have already passed the beginner course in basic computer or PRIME to work with a computer but want to learn more. This course allows you to immerse yourself and learn more. The course is tailored to the student's needs and desires. You do not have to have a personal computer in order to attend the course. You can borrow a computer at the course (included in the course fee). Course set-up might look like the following, but we can also customize according to your specific requirements.

### Example course contents:

Week 1: Continuation and repetition of the basics. Exercises

Week 2: Continuation of word processing and individual work with exercises.

Week 3: Continuation of the Internet and various search engines and e-mail with exercises.

Week 4: Continuation of the Internet and your own personal preferences. Exercises.

Week 5: Continuation of image and photo management.

Week 6: My own preference in regards to application areas.

**Duration:** The course duration is spread over 6 weeks, 2 hours / week. A total of 12 hours. (The distribution of hours can also be customized if desired.)

**Pre-knowledge:** Beginner's Course in Computer Usage – Step 1.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . QST - MF150E Beginner's Course Adobe Photoshop

### Short description

This course is intended for those people that want to learn the basics of the image editing program Adobe Photoshop.

If you have ever wanted to learn how to change or create images from photographs or other artwork, then this is the course for you. You will learn the basics of working with Adobe Photoshop and you'll be surprised at how much you can accomplish in such a short time. You do not have to have a personal computer in order to attend the course. You can borrow a computer at the course. The classes are designed for you, enabling you to be able to get personal help for techniques that you wish to work with. There are typically 6-7 participants /course. You can also engage us for smaller groups and individual training if desired. The course set-up might look like the outline below, but we can also customize according to your specific requirements.

### Example course contents:

Week 1: Fundamentals of the various tools in the software program.

Week 2: The Basics. Layers and text in picture.

Week 3: Introduction to editing colors in your image.

Week 4: Basics to cut and paste your image.

Week 5: The Basics of filters and special tools.

Week 6: My own preference in regards to application areas.

**Duration:** The course duration is spread over 6 weeks, 2 hours / week, a total of 12 hours. (The distribution of hours can also be customized if desired.)

**Pre-knowledge:** Beginner's Course in Computer Usage – Step 1.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . QST - MF160E Beginner's Course Adobe InDesign

### Short description

This course is intended for those who want to learn the basics of Adobe InDesign. In this course, you will learn the absolute basics to start working with Adobe InDesign. You do not have to have a personal computer in order to attend the course. You can borrow a computer at the course. The classes are designed for you, enabling you to be able to get personal help for techniques that you wish to work with. There are typically 6-7 participants / course. You can also engage us for smaller groups and individual training, if desired. The course set-up might look like the outline below, but we can also customize according to your specific requirements.

### Example course contents:

Week 1: Basics of documents.

Week 2: Foundations of tables and bullet lists and more.

Week 3: Create different types of documents. (CV, bio, presentations, etc.).

Week 4: Images in your documents.

Week 5: Pages and contents.

Week 6: My own preference in regards to application areas.

**Duration:** The course duration is spread over 6 weeks, 2 hours / week, a total of 12 hours. (The distribution of hours can also be customized if desired.)

**Pre-knowledge:** Beginner's Course in Computer Usage – Step 1.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . QST - MF170E Beginner's Course Microsoft Word

### Short description

This course is intended for those who want to learn the basics of Microsoft Word. If you have never or barely used Microsoft Word, then this is the course for you. Here you will learn the absolute basics to start working with Word. You do not have to have a personal computer in order to attend the course. You can borrow a computer at the course (included in the course fee). The classes are designed for you, enabling you to be able to get personal help for techniques that you wish to work with. There are typically 6-7 participants / course. You can also engage us for smaller groups and individual training, if desired. The course set-up might look like the outline below, but we can also customize according to your specific requirements.

### Example course contents:

Week 1: Basics of documents.

Week 2: Foundations of tables and bulleted lists and more.

Week 3: Create different types of documents. (Bio, presentations, etc.).

Week 4: Images in your documents.

Week 5: Pages and contents.

Week 6: My own preference in regards to application areas.

**Duration:** The course duration is spread over 6 weeks, 2 hours / week. Total of 12 hours. (The distribution of hours can also be customized if desired.)

**Pre-knowledge:** Beginner's Course in Computer Usage – Step 1.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . QST - MF180E Beginner's Course Microsoft Excel

### Short description

This course is intended for those who want to learn the basics of Microsoft Excel. If you have never or barely used Microsoft Excel, then this is the course for you. Here you will learn the absolute basics to start working with Excel. You do not have to have a personal computer in order to attend the course. You can borrow a computer at the course (included in the course fee). The classes are designed for you, enabling you to be able to get personal help for techniques that you wish to work with. There are typically 6-7 participants / course. You can also engage us for smaller groups and individual training, if desired. The course set-up might look like the outline below, but we can also customize according to your specific requirements.

### Example course contents:

Week 1: Basics of the Excel principles.

Week 2: Foundations of tables and layouts.

Week 3: Create different types of documents (calculations etc).

Week 4: Creating different diagrams and using SmartArt.

Week 5: Multiple exercises using different documents as the foundation.

Week 6: My own preference in regards to application areas.

**Duration:** The course duration is spread over 6 weeks, 2 hours / week. Total of 12 hours. (The distribution of hours can also be customized if desired.)

**Pre-knowledge:** Beginner's Course in Computer Usage – Step 1.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . **QST - MF190E Basic course in how to start working with your iPad / Android tablets**

### **Short description**

Have you never used an iPad / Android tablets or want to learn more about how you can effectively use your iPad / android tablets? Then, this is the right course for you!

You will learn the basics in order to effectively work with your iPad / Android tablets

- Start up your iPad / Android tablets.
- Settings of your iPad / Android tablets.
- Manage contacts.
- Mail and Calendar on your iPad / Android tablets.
- Apple-ID, Google Account, and Windows account. (Depends on which platform you use)
- Apps and Apps Stores.
  - Appstore & iTunes. (Depending on which platform you use).
  - Play store & Goggle play. (Depending on which platform you use).
  - Sore & Windows Phone Store. (Depending on which platform you use).
  - Download apps. How do I buy apps.
  - Advises on great apps for different functions to your iPad / Android tablets Update apps.
- Browse and search on Internet.
- Camera, photo and film.
- MMS and SMS (texting in the USA).
- And much more .....

**The lecture is for:** All interested.

The seminar can be arranged in the form of study group if desired. We cooperate with Bilda.

**Welcome to contact us and we will arrange a unique lecture!**

**Duration:** TBD

**Pre-knowledge:** None.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>



## . **QST - MF200E Basic course in how to start working with your smart-phone**

### **Short description**

Have you never used a Smartphone or want to learn more about how you can effectively use your iPad / android tablets? Then, this is the right course for you!

You will learn the basics in order to effectively work with your iPad / Android tablets

- Start up your Smartphone.
- Settings of your Smartphone.
- Manage contacts.
- Mail and Calendar on your Smartphone.
- Apple-ID, Google Account, and Windows account. (Depends on which platform you use)
- Apps and Apps Stores.
  - App Store & iTunes. (Depending on which platform you use).
  - Play store & Goggle play. (Depending on which platform you use).
  - Sore & Windows Phone Store. (Depending on which platform you use).
  - Download apps. How do I buy apps.
  - Advises on great apps for different functions to your Smartphone Update apps.
- Browse and search on Internet.
- Camera, photo and film.
- MMS and SMS (texting in the USA).
- And much more .....

**The lecture is for:** All interested.

The seminar can be arranged in the form of study group if desired. We cooperate with Bilda.

**Welcome to contact us and we will arrange a unique lecture!**

**Duration:** TBD

**Pre-knowledge:** None.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

## . QST - MF210E Seminar on Positive Thinking

### Short description

How do I cope with the ups and downs of every day life? How do I choose to deal with life? How is it that we are so quick to focus on the bad things that happen to us? We tend to look at the negative things and shortcomings instead of seeing the good things and what we can truly accomplish with a change of attitude. We are often also quick to point out negative things about both ourselves and others.

This course deals with how we can choose to focus on positive things and highlight what is good, even if the situation is not exactly what we want it to be. Do not be so hard on yourself, it is not dangerous to fail! Failure is just the road to success. Failure is an experience and how you deal with it. The question is, how do you manage your failures and what do you learn from them? Do you want to become a more positive person? If so, then this course is a first step to acquiring the tools to begin changing your mindset. Positive thinking is something that you can use in order to facilitate your everyday life and your professional life.

**The lecture is for:** Associations, companies, individuals, clinics and more.

The seminar can be arranged in the form of study group if desired. We cooperate with Bilda.

**Welcome to contact us and we will arrange a unique lecture!**

**Duration:** TBD

**Pre-knowledge:** None.

**Presenter:** Mathilda Ekztröm, EMZ<sup>2</sup>

We offer courses for individuals, churches, associations and companies. The courses are arranged in cooperation with Bilda.

## . Short Bio – Dr Thomas L. Lagö, Adjunct Professor

Dr. Lagö has more than 35 years of industrial experience and has worked for companies including Hewlett-Packard (today Agilent Technologies) and Leuven Measurement & Systems, LMS. Dr Lagö is a creative, enthusiastic, high-achieving executive with outstanding performance based on a solid education. He has post-doc degrees in Electrical Engineering (EE), Civil Engineering (CE), Mechanical Engineering (ME), Physics plus MBA type education (selected courses plus Hewlett Packard's Sales and Marketing school, (Sweden and the USA). Formerly, President and Chief Scientist of a \$9 million leading USA sales company in the Sound & Vibration business. Prior responsibility reflects outstanding career growth and progress through various high-tech businesses, including European Product Line Manager for Hewlett Packard's Dynamic Signal Analyzer Products and International Business Development Manager for a \$60M company group in the sound and vibration industry, as well as multi functional responsibilities including sales and marketing, strategic planning, engineering, but also finance and human resource leadership.

Dr. Lagö has a vast practical experience. Lagö teaches sound and vibration courses and applicable mitigation methods on an international basis and has given courses for NASA, Rolls Royce, ABB, Volvo, SAAB, Scania, Boeing, Atlas Copco, TATA, Indian Navy and many international universities and expert groups. His practical experience is vast and he has worked as a carpenter, upholsterer and Radio & TV Technician and is very practically oriented despite his thorough theoretical education and experience. His solutions and courses have helped many teams better their environment and solve challenging problems without spending huge money. Dr Lagö has become a BINDT Fellow, (British Institute for Non-Destructive Testing) and he is the Industrial Chair for ISCM - The International Society for Condition Monitoring.

Lagö is also involved in a number of scientific organizations like the British Institute for Non Destructive Testing, the Condition Monitoring Branch (CM20XX - European Conference on CBM), MFPT (The Applied Systems Health Management Conference held in the USA) and the conference in South Africa (18th World Conference for Non-Destructive Testing). Lagö has been the Director for IIAV, International Institute for Acoustics and Vibration and is also serving as a Board of Directors member for the following Scientific Boards (current and past): SEM-IMAC (Society for Experimental Acoustics), SAE (Society for Automotive Engineering, NVC), ICSV (International Institute for Sound and Vibration), SVIB (Scandinavian Vibration Society). He is also an AES member and participates in multiple standardization groups for sound in rooms, movie theatres and speaker systems. Lagö is author of more than 290 scientific papers, written multiple chapters in international text books and holds more than 25 patent/ patent applications and has received multiple awards. He has 1500+ international contacts on LinkedIn and 9300+ contacts in his ACT! CRM database (categorized).

Dr Lagö has also participated and written chapters for the following books:

- The VISIR Open Lab Platform accepted for publication in Internet Accessible Remote Laboratories: Scalable E-learning Tools for Engineering and Science Disciplines, M. E. Auer, V. J. Harward and A. K. M. Azad (ed.), IGI Global, 2011.
- Chapter 10, "Digital Processing of Vibration Signals", in "Engineering Principles of Mechanical Vibration," by Douglas D. Reynolds, published by Trafford, eBook ISBN 9781426907982, Print ISBN 9781426907968, 2009.
- Chapter 9, "VIBRATION MEASUREMENTS", in "Engineering Principles of Mechanical Vibration," by Douglas D. Reynolds, published by Trafford, eBook ISBN 9781426907982, Print ISBN 9781426907968, 2009.
- "COLLABORATE, The Art of WE, combining capabilities to create new opportunities for success," by Dan Sanker, Jossey-Bass, An Imprint of John Wiley & Sons, ISBN 978-1-118-11472-8, 2012.

## . **Short Bio – Dr Alan Boyer, MBA**

Dr. Alan Boyer was born in England and graduated from Sheffield University, England, studying education, psychology and music. Boyer has more than 25 years of experience in the sound and vibration industry and has worked at all levels of the organization.

In 1998, after heading the development of the Larson Davis, Inc. European Office, Boyer moved to the USA to become manager of the corporate marketing department and was subsequently appointed to the position of Senior Vice-President and COO. One of his most important projects was the formation of a strategic alliance between leading international companies in the area of sound and vibration. This successful alliance drew great international attention and began to change the way that collaborative relationships were formed and nurtured in the industry.

Other projects successfully led by Dr. Boyer include sound detection systems for the airports of London Heathrow, Gatwick and Stansted. He has also delivered test and measurement systems to Land Rover, Honda, Toyota, Rolls Royce, Jaguar Cars, Lotus Cars, Ford Motor Company, Vauxhall (GM), and others. Boyer has also carried out projects regarding ISO 9002 (for the European office) and ISO 9001 certification for the corporate office in the USA. Dr. Boyer implemented and oversaw projects in relation to product catalog, data sheet, instruction manual design drawing on his background in education, instructional psychology and sales/marketing.

Dr. Boyer is much sought after as a consultant on all areas of business and enjoys working with start-up companies and home based business owners. His teaching, presenting, seminar, and public speaking abilities are extremely effective and his combination of presenting thorough material combined with his English sense of humor, enables him to teach in a very effective manner.

Boyer's consulting activities have been to various USA and European based businesses (established and start-up) in diverse industries such as Neutraceutical, Nano Science, Cosmetics, Acoustics/Vibration, and others.

Boyer is an accomplished musician and conducts medium to large music ensembles. He is a Licentiate of Trinity College of Music and an Associate of the London College of Music. As a teenager, he was an accomplished virtuoso trumpeter. He began to conduct at the age of fifteen and has directed many ensembles in Europe and the USA. In 2006, Dr. Boyer was presented with the National Arts and Humanities Award by Provo Arts Council for services to the arts in Utah and throughout the USA. Dr. Boyer sits on a number of for profit and not for profit boards in the areas of business and music/arts.

As CEO of QirraSound Technologies LLC, Tech Fuzion, and Embla Global, LLC, Dr. Boyer brings important leadership skills and high levels of success and expertise to the organization both in the USA and European teams.

## . **Short Bio – Mårten Westman**

Mårten is born and raised in Gullringen outside Vimmerby in Sweden. He had a Wood Technology education at high school but changed to Electronics & Telecommunications technical training after 1 year. In parallel to the school, he worked as a Radio & TV technician at the company Expert LT Sound and Vision, which then became his profession for several years. In conjunction with an education at Banverket school, he trained in hot work; welding, gas cutting and soldering where he had more experience than the teacher, which meant that he trained him in soldering whilst studying. He

then started at a company, Tools in Vimmerby, where he spent a couple of years as the project manager for the exchange of business (data) and responsible for the store, handling ball bearings and repairs of welds for Lincoln Electric. He took the opportunity to educate himself in Hydraulics and Pneumatics and received further training in Welding Technology. After a few years he became store manager at Holmströms car (Mercedes / Nissan) in Vimmerby. He went on for almost a year to the manufacturing company, Ultra Tan AB, where he started as a service manager in Sweden. After a year in sales for the north of Sweden, work expanded to the whole world. Then, staying at the office and performing after marketing for the company became more important. He took part in marketing, development, production and sales. He was also involved in the development of all sound systems, circuit boards and other parts of the electrical work. In parallel with his employment at Ultra Tan, he started a private firm in 2005, where among other things he sold their system to various locations around the north of Sweden. During his last Year at Ultra Tan, he was Project Manager for "innovation and development of the enterprise group" whose parent company was Intercedo. In 2009, he started MSW Electronics AB and also got the chance to build a new business within Intercedo group which made the MSW somewhat dormant until the following year. Together with Fredrik Thorstensson, they started an online store fall 2012 where they are looking to bring in a third party for operation and maintenance. He has, over a couple of years together with a colleague, been working on a project that spring / summer 2013 are registered as entities. Over time, he has also attended courses in Multi-Room, Control and Pneumatics Engineering, Acoustics and Hearing Modeling Techniques.

## . **Short Bio – Fredrik Thorstensson**

Fredrik was born in Vetlanda but raised in Linköping, Sweden. Being the son of an engineer, entrepreneur and visionary, he was pretty much "born in a recording studio" with sound and music around him. He studied Electronics and Telecommunications Engineering. He started working with sound system installations in early years. His first formal job was at Nokia Data in Linköping as troubleshooter and repair of circuit boards for computers. During that time, he had received training in regards to Telecommunication. After this, he continued as a sales person for Electrolux Cleaning System and then worked for 10 years in a construction/hardware store. He served 8 years as store salesmen and 3 years as a department manager for K-rauta (built up the department store). He then started his own company, *Music Centre Import in Linköping AB*, and was the CEO for 7 years. Then, he worked as salesman at Xerox Sweden and received further training in system sales. During the last 5 years, he has incorporated a Sole Proprietorship in Audio Installations and piano service in Linköping. He has always had a long-term mind set in regards to customer relations. He is active in the local church helping with music and technology advancements. His interests include Music, Golf and Community. 2012, he developed a new partnership with MSW Electronics & Technology AB (Mårten Westman). For this venture, everything possible to broaden the knowledge base and level of service is included. In 2013, major installations and commissioning developed important relationships with strong trade marks in sound, lighting and control systems. One valued partner is Sennheiser Nordic AB and other trademarks are ElectroVoice, Ametronic, Soundcraft and Qirra Sound Technologies LLC. Some important customers are Swedish churches, municipalities and private companies. A guiding principle is to meet customer needs and resolve problems for the best results in their respective business. Then, develop a long term relationship with them!

## . **Short Bio – Mathilda Ekztröm**

Mathilda Ekztröm was born and raised in Stockaryd, Sweden. At college, she studied commerce, economics, and computer science. Mathilda has a background in carpentry with many years of experience programming CNC machines. She held the position of Marketing Communications specialist in the Acticut International AB group from October 2009 to April 2011. Since 2007, Mathilda has worked closely with Dr. Thomas L Lagö and Dr. Alan Boyer on different projects and has had the advantage of receiving a unique education in sound and vibration techniques. Additionally, Mathilda has worked closely with Dr's, Lago and Boyer on marketing and business development strategies. In 2011, Mathilda formed her own company, EMZ2, offering marketing strategy consulting, graphic design, corporate branding strategies, educational programs, and seminars. Mathilda offers educational courses in, for example, fundamentals of operating computers, basic sales techniques, time planning and positive thinking.

## . **Short info – [alljudteknik.se](http://alljudteknik.se)**

[alljudteknik.se](http://alljudteknik.se) is a collaboration portal for groups of technology companies. [alljudteknik.se](http://alljudteknik.se) is the web portal where we, as a team, work together with the aim to provide assistance and support to you by providing the best products and services for your needs and wants. This is accomplished by using one, easy to navigate utility or contact person. This includes anything from piano tuning, sound in your living room, to complete system installations for large areas or concert halls. Nothing is too small or too large!

We have a vast amount of knowledge and expertise and acknowledge the importance of sound, light, visual, acoustic and vibration working together in a great harmony. We will analyze your needs, provide cost effective solutions and bring together what is needed to assist you in reaching your goal. Examples of areas where we can assist you include:

Certification	Sales of products
Installation Services	Consulting in many areas
Marketing Strategies	Measurements and systems
Piano Tuning	Educational programs for all levels and many areas
Equipment Rental	Acoustics – Mitigation, Planning, Enhancements or Design
Work Environment Issues	Movie, picture or visual systems
Noise and Vibration handling	Event Handling
Hearing Aids and Technology	Instrument
Sound Systems (all sizes)	Multi Rooms
Smart Homes	Control Systems (from simple to advanced)
Vibration Measurements and Mitigation	Sound or Vibration, Good or Bad, Man or Machine

## **Other presenters that can be engaged when needed:**

- . [Dr Pete Johnson, Professor, University of Washington](#)  
USA (half Swedish). International specialist on Ergonomics and Whole Body Vibration.
- . [Dr Douglas Reynolds, Professor, University of Nevada Las Vegas \(UNLV\)](#)  
USA. International specialist on Ventilation Systems and Whole Body Vibration.