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**SCOPE:**

Transducer and Systems Engineer / Analyst / Mechanical Designer / Project Manager / Lecturer / Author / Independent Researcher / Consultant to the Audio Industry / Authorized Asian Representative for Brush Wellman Electrofusion, KSC DIGMODA & D-Pro DSP, and KERONITE

**QUALIFICATIONS:**

- Fourteen years experience with both nonlinear and linear Finite Element Analysis and CAE.
- Fourteen years experience with transducer and system modeling.
- Fourteen years experience with Concurrent Project Management and Concurrent Engineering.
- Fourteen years experience with electrical, mechanical, and acoustic measurement techniques.
- Fourteen years experience troubleshooting transducer designs and manufacturing processes.
- Supervisor of BOSE, Hymnario, and P.Audio Transducer Groups' Technicians and Designers.
- Mentor of Junior Engineers with teaching experience at the University and in Industry.
- Strong communication and people skills, worked with many teams in various environments.
- A passion for audio, participation in more than 100 new product development projects.
- A proven track record of taking projects from concept to start of production.
- Working relationships with transducer related suppliers in North America, Europe and Asia.
- Large and small company engineering and project management experience in OEM/ODM, Competition Car Audio, PRO and Hi-Fi.
- New and innovative transducer design concepts from 13 mm to 600 mm including the *STEALLUS* transducer topology.

**TRAINING:**

Attended fourteen (14) training seminars in the USA pertaining to software tools, communication skills, project management, and technical skill enhancement, including EASE (listening room acoustics), Primavera (project planning), Acoustic Measurement System. AMS (Bose's LMS/MLSSA), WOOFF (Bose's LEAP), ABAQUS NONLINEAR FEA, SDRG IDEAS 3d, MSC ARIES, OPERA (electromagnetic FEA), Presentation Skills, Personalities, Boothroyd / Dewhurst DFM and DFA (URI), Frontline Leadership (management), Targeted Selection (interviewing techniques), and Design of Experiments (DOE) at Worcester Polytechnic by J. Leonard.

**EDUCATION:**

University of Rhode Island, Kingston, Rhode Island, USA

Graduate Degree: **MS, Electrical Engineering** (1995), G.P.A. 3.72/4.00

Project: 3-Way Loudspeaker System with Ribbon Tweeter and Compound TL Woofer

Elective Course: *Implementing Concurrent Project Management*

Advisor: Dr. Leland B. Jackson, IEEE Fellow, Taught DSP to Bose's Engineers

Degree: **BS, Summa Cum Laude, Electrical Engineering** (1993),

G.P.A. 3.71/4.00, Ranked 3rd in the Class of 1993 for ELE majors

Project: Ribbon Transducer; Honor Societies: Eta Kappa Nu, Tau Beta Pi

Community College of Rhode Island, USA; G.P.A. 4.00/4.00, (58 credits)

Bryant College, Smithfield, Rhode Island, USA; Degree: **BS, Business Administration** (1975)

## **WORK EXPERIENCE:**

S. M. Audio Engineering Consulting Co., Phuket, Thailand, <http://www.s-m-audio.com/>.

**PRESIDENT** (January 2002-Present) A family run independent Audio Engineering and Concurrent Product Development Consulting Company that specializes in transducer and system design/development, concurrent project planning/management, specifications, measurements, manufacturing procedures, appropriate supplier identification, and documentation. User of licensed engineering tools including Vector Fields PC OPERA with DC, AC, and Thermal Solvers and the KLIPPEL Distortion Analyzer, IJDATA LspCAD (Loudspeaker CAD), and LOUDSOFT FINECone. Developer and user of Soft-Part Lab, a proprietary Finite Element Modeling software that allows nonlinear simulation of suspension and diaphragm components including multi-laminate sandwich composites. The emphasis of consulting services is on implementing the highest performance audio transducer technologies, topologies, and materials using powerful software tools to solve audio transducer and system design and development problems. Essentially, the same tools as the Fortune 500 companies utilize to reduce both time and cost of product development. Boothroyd / Dewhurst (URI) techniques of designing for manufacturability (DFM) and designing for assembly (DFA) are also utilized in the design methodology. A full range of engineering services are offered on a project by project basis including staff training and seminars are also available. Loudspeaker measurements are available with KLIPPEL DA, while system and room measurements are made with ARTA, LIMP and STEPS installed on a Notebook Computer for portability. As a result the nonlinear loudspeaker parameters, impedance, distortion, impulse response, frequency response, and amplitude verses time and frequency or 3D waterfall plots are available. The objective is to reduce design and development costs by relocating R&D, Product Development, and/or manufacturing support to Asia. Open R&D projects include nonlinear FEA simulations, *KERONITE* surface treatment, DSP applications, Acrylic and Poron surrounds, Beryllium diaphragms, sandwich composites, and *STEALLUS* transducer topologies including headphone applications. The location of an office/lab is convenient for travel to where the concentration of manufacturing and branch office locations are increasing in China, Malaysia, Indonesia, Philippines, Thailand, Vietnam, Taiwan, Hong Kong, Singapore, Japan and India.

P. Audio Systems Co, LTD., Bangkok, Thailand

**DIRECTOR OF ENGINEERING** (January 2000-January 2002) P. Audio is member of the A-Ton Acoustics Group. Initially, tasks included formation of a new Research & Development Group. This included: hiring and training engineers, technicians, and a Project Manager from Thailand and Malaysia respectively; introduction of complete documentation packages consisting of operating procedures, bills of materials, product specifications, test specifications for manufacturing and R&D, assembly and subassembly drawings, and drawings for all parts and fixtures utilized in transducer manufacturing. Additional tasks included: designing and developing new professional audio transducers and systems while innovating and implementing new transducer technologies. Specifically, these projects included new lightweight Neo motor based low frequency and compression type transducers and systems; a subwoofer family for after market car audio; a family of multi-purpose High Frequency Direct Radiator Transducers; and a complete Home Theater Loudspeaker System. One of my rolls was to be the top acoustic consultant for the whole A-Ton Acoustics Group while initiating new designs utilizing Finite Element Analysis. The FEA tools used were OPERA with nonlinear DC Static, restart nonlinear AC Time Harmonic, and Thermal Solvers for motor designs. ABAQUS Standard was used for structural analysis and design of soft-parts and baskets. Interfaced extensively with all English speaking customers and did all technical writing for the company catalogs and brochures. A two-part interview on the topic of transducer design and development appeared in two issues of the Thai Popular Electronics Magazine. Many shows and exhibitions throughout the world were attended, including the NAMM in Los Angeles, USA, CES, PALA in Singapore, Musik Messe in Frankfurt, Germany, Hong Kong Electronics Fair, Bangkok Electronics Exhibition, and Beijing Electronics Show.

Acoustic Systems Inc., Rancho Dominguez, California, USA

**MANAGER OF DESIGN AND DEVELOPMENT** (March 1999-January 2000) Acoustic Systems is a member of the Eastech group, which included Hymnario. Hymnario, which was located in Kadah, Malaysia, was a major OEM manufacturer of transducers for Asia, Europe, and USA. Worked with Philips, Thomson, Polk, and several additional customers to develop new products. Responsible for the design and development of high quality audio transducers that contained new technologies. Specifically, new motor designs some including copper or aluminum gap sleeves and or shorting rings; new spider designs some of which include integral leads; surround and cone designs including aluminum cones; voice coil designs utilizing copper and aluminum wire; basket designs; and dust cap designs. Additional duties included project management, managing a mechanical designer, a technician, and an acoustic testing staff. Traveled throughout the world to meet with customers directly. Philips in Singapore; Thomson in Hong Kong and Indianapolis, Indiana, USA; Sunfire in Seattle, Washington, USA; Bose in Framingham, Massachusetts, USA; Atlantic Technologies in Norwood, Massachusetts, USA; Pioneer in San Diego, California, USA; Recoton in Germany; and Hymnario, China. Experience was gained with regard to the Asian manufacturing and Asian vendors. Vendor engineering was also performed. Worked on over 20 development projects, including project planning and budgeting, of which, most were completely new designs. Represented Hymnario for investment bankers and financial consultants. Developed new command files for PC OPERA and ABAQUS, FEA packages. Worked very closely with manufacturing in facilities in Malaysia and China to design within Hymnario's process capabilities.

TC Sounds, San Diego, California, USA

**CHIEF ENGINEER** (August 1998-February 1999) In an attempt to increase the scope of engineering tasks and decision making responsibilities, essentially encompassing to some degree most if not all aspects of transducer design, development, and manufacturing, a small OEM transducer design and manufacturing company was joined. Specifically, these tasks and responsibilities include: new product design which focuses on design for manufacturability (DFM) and design for assembly (DFA); implementing a structured documentation data base consisting of BOM's, test specifications, complete drawing packages, and documentation of the manufacturing processes; the ongoing development and implementation of a semi-automated assembly line; continuous improvement in the manufacturing processes; introduction of finite element analysis for magnetic design and soft part design; managing a junior engineer, a draftsman, and a technician. Additionally, project planning, product quality assurance and the training of and obtaining feedback from the assembly workers were performed. Designed Eclipse F10's Super Xmax family of subwoofers, this included a new very tall gap and very tall voice coil, 'well hung', motor assembly and suspension (spider and surround) designs. Although, the design is five years old, it is still highly regarded in after market car audio and competition systems at the present time.

BOSE Corporation, Framingham, Massachusetts, USA

**R&D TRANSDUCER ENGINEER III** (May 1995-August 1998) One of only four R&D Transducer Engineers in the transducer research group (TRES) that supported OEM, professional, systems and component audio. Design experience was obtained on over thirty transducer projects. Experience includes complete motor designs of shielded and non-shielded motors, some utilizing Faraday loops; both round and rectangular wire voice coil designs; cone designs; dust cap designs; spider and surround designs; basket designs; and lead out design. From May 1995 to May 1996, solely responsible for design of all new OEM transducers and the troubleshooting of existing OEM transducer designs within BOSE. From June 1996 to August 1998, responsible for the design of several high performance transducers, including the new AM5 nylon basket/enclosure baffle twiddler and a new family of neodymium motor, wide range transducers and a new low mass, high excursion woofers. All designs were first modeled, subsequently acoustic, mechanical, and electrical measurements were performed on working prototypes to validate the models. Other responsibilities include: complete control over design decisions;

creation of product / test / magnet specifications; and project planning and resource management. Selected to teach formal internal courses to other engineers, specifically, BOSE's lumped parameter circuit / loudspeaker modeling software (WOOF) and FEA magnetic modeling (OPERA). Chosen several times to perform research demonstrations for visitors and internal groups. Furthermore, a good understanding of the manufacturability issues, specifically an understanding of (DFM) and (DFA), were developed while working closely with manufacturing on many transducer projects. This included several trips to transducer manufacturing plants in Westborough, Massachusetts, USA, and San Luis and Tijuana, Mexico.

University of Rhode Island, Kingston, Rhode Island, USA

**TEACHING ASSISTANT** (September 1993-May 1995) Responsible for ELE 342, ELE 443, and ELE 444, which are Electronics I, II, and III laboratory courses. Tasks included: the presentation of subject material relating to analog and digital circuit design; the design of lab experiments and student design projects; the demonstration of the operation of electronic test equipment. Additionally, instructions were given on the utilization of PSPICE as a modeling tool.

**RESEARCH ASSISTANT** (May 1994-September 1994) Key member of a joint Industrial and Electrical Engineering Research Project for the Wardwell Braid Co. of Central Falls, Rhode Island, USA. The objective of this project was to evaluate the feasibility of active and passive noise control systems that would be capable of lowering the noise level of a high speed braiding machine by 15 dB at 1m to comply with OSHA and international noise standards. Specific tasks included extensive acoustic measurements and signal processing using a B&K 2034 Signal Analyzer and MATLAB software running on a Sun Engineering Workstation (SPARC 10).

#### **ACTIVITIES:**

Published fifty (50) articles on technical and business topics, interviews and trade event reports in Voice Coil, 2008 & 2009 Loudspeaker Industry Sourcebook, MultiMedia Manufacturer, and audioXpress magazines from July 2004 to present.

Conducted a seminar at the PALME Asia in Singapore in July 2007 on the topic of *SIMULATION METHODS FOR THE NONLINEAR LOUDSPEAKER PARAMETERS*.

Invited to present two papers at the IEAT Symposia in April 2007 in Shenzhen, China with translators, *SIMPLIFIED SIMULATION METHODS FOR THE NONLINEAR LOUDSPEAKER PARAMETERS* and *A LEAN - SMALL COMPANY NEW PRODUCT DEVELOPMENT MODEL*.

Invited to speak at the Seminar at the PALA in Bangkok in July 2006 on the topic of *A CONCURRENT APPROACH TO HIGH-PERFORMANCE ELECTRO-ACOUSTIC PRODUCT DEVELOPMENT*.

Invited to speak at the CALM in June 2005 in Beijing, China with translators on the topic of *DEVELOPMENTS IN ELECTRO-ACOUSTIC MATERIALS, ENGINEERING & MEASUREMENT*.

Invited to speak at the Conference at PALA in Singapore in July 2005 on the topic of *DEVELOPMENTS IN PROFESSIONAL LOUDSPEAKERS AND SOUND REINFORCEMENT SYSTEMS*.

Invited to speak at the AES Seminar at PALA with Dr. Kees A. S. Immink and Mr. Neville Thiele in Kuala Lumpur in July 2004 on the topic of *ELECTRODYNAMIC TRANSDUCER LARGE SIGNAL PARAMETER SIMULATION AND IDENTIFICATION*.

Conducted a first time 2-day transducer design-training workshop, *FUNDAMENTALS OF ELECTRODYNAMIC TRANSDUCER DESIGN* and presented a paper, *A CONCURRENT APPROACH TO TRANSDUCER AND SYSTEM DEVELOPMENT PROJECTS*, at the American

Loudspeaker Manufacturers and Acoustics (ALMA) International Winter Symposium in January 2004 in Las Vegas, USA.

Presented a technical paper, *TRANSDUCER DESIGN USING 2D FEA AND BEM*, at the Winter ALMA Symposium in January 2003 in Las Vegas, USA.

Conducted a seminar on transducer design and development at the Bangkok Convention Center with a translator to an audience of approximately 150 attendees in April 2001.

**REFERENCES:**

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