

## OVERVIEW

We formed Vibro-Acoustic Consultants (VACC, Inc.) to provide vibration and acoustics solutions to a wide range of industries, institutions, and individuals. Building on our broad experience, we offer a full array of vibration and noise design consulting and measurement services. We consider our greatest strength to be our knowledge base and experience – we not only know the rules-of-thumb, but we understand their underlying physical principles. The "rules-of-thumb" might differ, but we strive to understand the deeper rules that govern dynamic systems. Our specialty is noise and vibration design and analysis in demanding settings:

- **Advanced Technology Facilities:** Vibration design for high-tech manufacturing, R&D, laboratories
- **Construction and Infrastructure:** Noise and vibration mitigation, design, and monitoring
- **Commercial, Residential, Mixed-Use:** Creating comfortable and productive human environments

## PROJECT-RELEVANT SERVICES: ACOUSTICS, NOISE, AND VIBRATION

We are a full-service consultancy capable of design as well as test/measurement. Our service offerings are tailored to the needs of owners, contractors, regulators, and stakeholders.

- **Test and Measurement:** Site selection, dynamics testing, performance verification, compliance
- **Environmental Monitoring:** Long-term monitoring of vibration, noise, and other parameters
- **Structural Dynamics Design:** Structural design, finite element analysis for vibration performance
- **Retrofits / Renovations:** Design for structural retrofits, rectification of poor mechanical systems
- **Acoustical and Noise Control Design:** Partitions, privacy/security, reverberation, diffusion
- **Mechanical Systems:** Layout, selection, isolation system specification for vibration / noise control
- **Advocacy:** Representation for creators or receivers of vibration and noise impact

## SAMPLE NOTABLE PROJECTS

- **PNNL: Physical Sciences Facility (Richland, WA)** – Noise, vibration design for nuclear research complex
- **University of Washington (Seattle)** – Light rail vibration impact (operations and construction)
- **NanYa / Inotera: Fabs 1, 2** – Semiconductor fab vibration design, local power plant vibration
- **IBM: Executive Briefing Center (San Jose, CA)** – Acoustical design and HVAC noise control
- **2829 California (San Francisco)** – Mixed use residential/commercial traffic noise & acoustical design
- **Shared Ownership Resort (Indio, CA)** – Luxury resort condo / hotel (453 units) acoustical testing
- **Verizon Cell Sites (Southern AZ)** – Neighborhood environmental noise from cell tower installations
- **Hitachi HGSP (Shenzhen, China)** – Factory expansion piledriving impact on existing operations
- **Crystal Springs Tunnel (San Mateo, CA)** – Construction (TBM, blasting) vibration and noise monitoring
- **Calaveras Replacement Dam (Santa Clara, CA)** – Construction (earthworks) noise monitoring
- **Solyndra: Page, Kato Fabs** – Factory noise control for new photovoltaic manufacturing facilities

## KEY PERSONNEL - AHMAD BAYAT, P.E.



Mr. Bayat is the founding principal of Vibro-Acoustic Consultants, with over 20 years of extensive design and management experience. Mr. Bayat has worked on the design of low-vibration facilities for many microelectronics clients, R&D facilities, universities, and specialty structural dynamics projects. The design includes finite element modeling and analysis (time history, frequency response function, modal analysis, etc.) of structures, dynamic soil-structure interaction analyses, design and specification of vibration isolation systems, and noise specification and design. As the principal structural dynamicist, he has been responsible for developing new concepts affording robust design and major cost savings. He has published many peer-reviewed articles.

**Project Positions Held:** Project Manager; Senior Consulting Engr., Lead Senior Engr., and Structural Engr.

**Work Experience:** 2000 - present – Vibro-Acoustic Consultants (San Francisco, CA)  
1993 - 2000 – Colin Gordon & Associates (San Mateo, CA)  
1986 - 1993 – ABB Impell Corporation (Lincolnshire, IL)  
1985 - 1986 – Sargent & Lundy (Chicago, IL)

**Education:** M.S., **Civil Engineering** with emphasis in finite element analysis and structural & soil dynamics, University of Houston (Houston, Texas)  
M.S. Thesis: "Dynamic Two-Parameter Soil Model for Soil-Structure Interaction"  
B.S., **Civil Engineering**, (w/honors), University of Houston (Houston, Texas)

**Honors / Societies:** Registered Professional Engineer in California  
Member, Structural Engineering Association of Northern California (SEAONC)  
Member, American Society of Civil Engineers  
Member, Chi Epsilon Delta Honors Society

**Recent Publications:** "Conversion of Old Fabs/Labs - The Vibration Design Perspective", (with J.B. Davis), presented at IEST ESTECH 2004 Conference, April 2004.  
"Vibration Control in Nanotechnology Research Environments", (with J.B. Davis), Cleanrooms Magazine (November 2003).  
"Dynamic Characteristics of Structures Extracted from In-situ Testing", (with H. Amick and M. Gendreau), Presented at International Society for Optical Engineering (SPIE) Conference on Current Developments in Vibration Control for Optomechanical Systems, Denver, CO (July 1999).

## KEY PERSONNEL - J. BYRON DAVIS



Mr. Davis is a founding associate and Vice President of Vibro-Acoustic Consultants. At VACC, Mr. Davis leads projects involving detailed noise and vibration measurement, theoretical environmental noise modeling, in-situ acoustical treatments, HVAC design for noise performance, long-term noise and vibration monitoring, impact modal testing of structures, and shaker-excitation dynamic testing of large structures. He has developed numerous methodologies for rapid and inexpensive noise and vibration tests. These include dynamic testing of pedestals for photolithographic tools, dynamic force extraction for stationary and mobile machinery, and field-measurement of acoustical performance of structures.

**Work Experience:** 2001 - present – Vibro-Acoustic Consultants (San Francisco, CA)  
2000 - 2001 – Applied Materials, Inc. (Santa Clara, CA)  
1998 - 2000 – Colin Gordon & Associates (San Mateo, CA)  
1997 - 1998 – Panasonic Technologies, Inc. (Cambridge, MA)

**Education:** B.S., Materials Science and Engineering, MIT (Cambridge, MA)

**Societies:** Associate Member, Acoustical Society of America (ASA)  
Associate Member, Institute of Noise Control Engineering (INCE)

**Recent Publications:** ["Environmental Vibrations"](#), a discussion of the importance of site selection for quiet vibration environments (June 2007).  
see [www.va-consult.com](http://www.va-consult.com)

["High-End Vibration Criteria"](#), a discussion of vibration criteria used in vibration-sensitive industrial and institutional settings (December 2008).

["What's in a Number?"](#), a discussion of the advantages and pitfalls of single-number ratings systems like NC, STC, NRC, and others (December 2008).

["Acoustical Considerations in the Concept Design of an Animal Research Facility"](#), Presented at ASA Miami, November 2008.

**Recent Notable Projects:** **IBM:** *Executive Briefing Center (San Jose)* – Noise isolation & acoustical design of high-end spaces for confidential product demonstrations.

**OpenWave (Redwood City, CA)** – Executive conference space acoustical retrofit: improvement of reverberation time and teleconference performance.

**University of Washington, Seattle, WA** – University-wide survey of vibration-sensitive research projects and experimental characterization of ground vibration propagation to help assess the impact of a planned light-rail system.

**PNNL: Physical Sciences Facility (Richland, WA)** – Acoustical, noise control, and vibration design of a 5-building nuclear research laboratory complex for Pacific Northwest National Labs.

## KEY PERSONNEL – ERIC PAI, P.E., S.E.



Mr. Pai has extensive experience in the supervision, management, and coordination of fast-track, high-tech facilities design and construction. His understanding of micro-vibration issues is complemented by his broad knowledge of structural, architectural, mechanical, plumbing, process piping, and electrical systems. During his career, he has been involved with all phases of delivering workplace and manufacturing solutions: site selection, master planning, planning, programming, architectural/engineering design, bidding and construction. His portfolio includes major facilities in Asia and North America.

**Work Experience:** 2005 - Present – Vibro-Acoustic Consultants  
 2003 - 2005 – Biggs Cardosa, Associate  
 2002 - 2003 – Bovis Lend-Lease Microelectronics, VP Taiwan  
 1999 - 2002 – Praxair Semiconductor Materials, Business Dev. Manager  
 1995 - 1999 – Rinne & Peterson, Vice President, Associate & Project Manager  
 1993 - 1995 – Rutherford & Chekene, Project Manager  
 1988 - 1993 – Rinne & Peterson, Project Engineer

**Education:** M.S., Structural Engineering, Stanford University  
 B.S., Civil Engineering, National Chiao Tung University, Taiwan

**Languages:** Mandarin, English

**Societies:** Registered Civil and Structural Engineer in California  
 Member of the Structural Engineers Association of N. California (SEAONC)  
 Ex-Member, Board of Directors - Chinese Institute of Engineers  
 Member of the Chinese American Semiconductor Professional Association

**Recent Publication:** "A Comprehensive Approach for Designing and Building the 300mm Fab", (with T. Joyce, J. Herron, et. al.), Future Fab International, Issue 5.

**Recent Notable Projects:** ASMC: *Shanghai, China* – 200mm Wafer Fab  
 UMC: *Tainan, Taiwan* – Tainan Site Master Planning  
 Cypress Semiconductor: *Laguna Lake, Philippines* – Cleanroom Expansion  
 Tissue Bank International: *San Rafael, California* – Facility Expansion  
 Alza: *M4 (Mountain View, California)* – Facility Conversion  
 Affymax: *Palo Alto, California* – Facility Retrofit and Upgrade  
 Inhale / Nektar: *San Carlos, California* – Facility Retrofit and Upgrade

## KEY PERSONNEL - TYLER RYNBERG, P.E.



Tyler Rynberg joined VACC in 2009, bringing significant background in residential, commercial, and mixed-use projects.

Tyler has extensive experience managing projects in room acoustics, sound and impact isolation, mechanical noise control, vibration isolation, environmental noise, and acoustic modeling of spaces (EASE). He has worked on a broad range of facility types, including recording/television studios, performance theatres, medical centers, multi-family residential housing, mixed-use, office spaces, movie theaters, and industrial/ manufacturing. In addition to his design work, Tyler also has conducted measurements of sound and impact noise transfer, vibration, environmental/transportation noise, noise exposure/dosimetry (OSHA), and room acoustics.

**Work Experience:** 2009 - Present – Vibro-Acoustic Consultants (San Francisco, CA)

1998 - 2008 - Thorburn Associates, Inc. (Castro Valley, CA)

**Education:** B.S., Engineering, Purdue University (West Lafayette, IN), 1997

**Honors/Societies:** Registered Professional Acoustical Engineer (PE) in Oregon

**Recent Notable Projects:** **SAS Executive Briefing Center:** *Cary, NC* – HVAC noise control, sound isolation, and room acoustics for a high-end briefing center.

**Westfield Centre:** *San Francisco, CA* – Isolation of rooftop mechanical equipment and a movie theater megaplex in Westfield's flagship shopping mall.

**Sutter Sacramento:** *Sacramento, CA* – HVAC noise control, vibration isolation, and sound isolation for a large medical campus, including MRI suites.

**Kaiser Permanente Medical Center:** *Santa Clara, CA* – HVAC noise control, vibration isolation, sound isolation, and environmental noise concerns for a large medical campus, including noise modeling of a helipad.

**Campbell University Chapel:** *Buies Creek, NC* – Developed a solution to improve the acoustical qualities of the space that integrated with the aesthetic goals, including an inexpensive "variable" acoustics treatment.

**Sky on the Strip:** *Las Vegas, NV* – Sound and impact isolation, mechanical noise control, and plumbing noise control design for a high-rise luxury condominium project.

**Stanford University Meyer Laboratory:** *Palo Alto, CA* – Mechanical noise control & vibration isolation for a new chemistry and biology research building.

**GSA Building:** *San Francisco, CA* – Mechanical noise control, vibration isolation, sound isolation, and room acoustics design for an award-winning and groundbreaking "green" high-rise office building.

## REPRESENTATIVE CLIENTS - UNIVERSITY, LABORATORY, BIOTECH, PHARMACEUTICAL

Duke University	Pacific Northwest National Lab (PNNL)
Ely Lilly & Company	University of California, Berkeley
Invitrogen / Molecular Probes	University of Pittsburgh
Los Alamos National Labs (LANL)	University of Washington, Seattle
NASA Ames Research Center	US Army Institute for Chem. Defense

## REPRESENTATIVE CLIENTS/PROJECTS - INFRASTRUCTURE

University of Washington (Sound Transit Light Rail)
MontCap Residential Group (Sound Transit Light Rail)
University of Maryland (MTA Purple Line Light Rail)
Shank/Balfour-Beatty (San Francisco Public Utilities Commission Tunnel Project)
URS (San Francisco Public Utilities Commission Dam Replacement Project)
Wedeco (Santa Clara County Water Treatment: Santa Teresa, Penitencia)

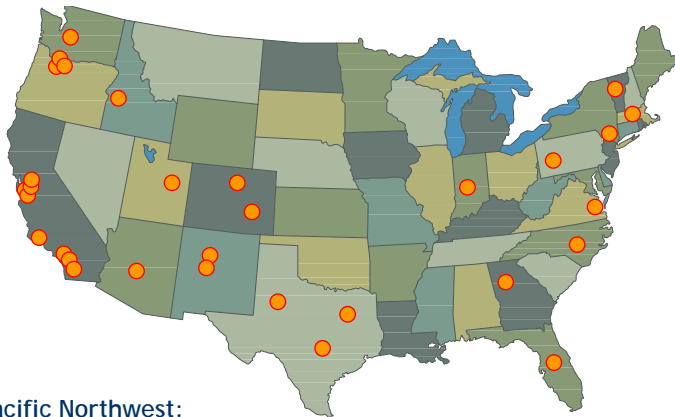
## REPRESENTATIVE CLIENTS/PROJECTS - COMMERCIAL, RESIDENTIAL, MIXED-USE

IBM Executive Briefing Center	Landmark Arboretum Apartments
City of Berkeley, CA	Clocktower Lofts, San Francisco
Verizon Wireless	2774 Monterey Highway, San Jose
Anchor Brewing, San Francisco	St. David's Medical Offices, Austin
San Francisco State (Westfield Mall)	TransAmerica Building, San Francisco

## REPRESENTATIVE CLIENTS - MICROELECTRONICS, FLAT PANEL, SOLAR

Agilent	IBM	STMicroelectronics
Applied Materials	Infineon Technologies	Samsung
BOE (TFT)	Micron Technology	Solyndra (Solar)
Hewlett Packard	Motorola / Freescale	Texas Instruments
Hitachi	Nan Ya / Inotera	Tianma (TFT)
Hynix	Powerchip / Rexchip	Toppoly (TFT)

## ADVANCED-TECHNOLOGY FACILITIES WITH MAJOR DESIGN INPUT \*



### Pacific Northwest:

Hyundai; WaferTech Camus; Fujitsu Gresham; 300mm fab for Confidential Client (OR) LSI Logic; IDT MASCA; Maxim; Seattle Ferry Terminal; University of Washington; HP Corvallis; Hynix Eugene; Invitrogen / Molecular Probes Eugene

### California:

Confidential Client, Fabs in Santa Clara; Stanford University; National Semiconductor; Linear Technology; AMAT Bldg.s 2, 3, 81, 85, 92, Arques Center, Scott Campus; IBM San Jose; IDT; LAM Research; Vishay/Siliconix; UC Campuses at Berkeley, Davis, and San Francisco; Lawrence Berkeley National Labs (LBNL); UC Irvine; Lawrence Livermore Nat'l Labs National Ignition Facility; Cal Poly San Luis Obispo; International Rectifier; ST Microelectronics; City of Berkeley; Anchor Brewery (San Francisco); ClockTower Lofts (San Francisco); Santa Clara County Water District; Novo Nordisk (Hayward); Western Digital (Fremont); Solyndra (Fremont)

### Texas:

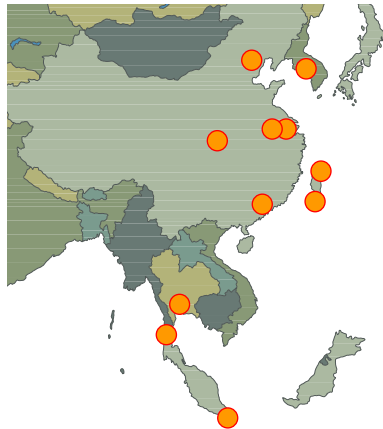
Motorola ULSI/MOS13; Samsung Austin and A<sup>2</sup>; TI DMOS 5 & 6, Kilby Center, NF-1; Atmel; AMD Fab 25; Methodist Heart Center (Lubbock)

### Eastern USA:

IBM (Burlington, E. Fishkill Fab 323A) Dominion Semiconductor Lucent (Orlando); Seagate (Pittsburgh) Nat'l Security Agency (Ft. Meade) USArmy Med. Research (Institute for Chem. Def.) Confidential Client Data Center (Massachusetts) Confidential Client Nanotech Labs (Pittsburg) Ely Lilly (Indianapolis)

### Western USA:

Atmel; Vitesse; Los Alamos Labs Center for Integrated Nanotech.; HP Fort Collins; Motorola COM1, MOS12, Flat Panel; Microchip (Phoenix); Micron Lehi, Boise, Mask Shop, NanoFab; Philips Fab 25; NCR; fabs for Confidential Client in AZ



### Taiwan, R.O.C.:

Powerchip Fabs 12A, 12C/12D; TSMC Fabs 3, 6, and 7; Quanta TFT; Winbond; Arima; UMC; Nan Ya Fab 1; NanYa / Inotera JV Fabs 1, 2, 3A; NanYa Fabs 2, 3; OPTO Fab; AMAT Taiwan; Eagle TFT Fab; Acer; Chunghwa Picture Tube; AMPI; Macronix; Runhorn/Ruentex; Toppoly TFT Fabs 1, 2, and 3

China: Motorola Tianjin MOS17, MOS17-X; ASMC Fabs 3EXT-S and 3EXT-N; Nanotech Changzhou Fab; BOE TFT Fab Chengdu. *Also, for Confidential Clients:* TFT Fab (Pudong); DRAM Fab (Wuxi); Disk Drive Assembly (Shenzhen)

AMAT Korea; ST Microelectronics AMK8 Fab Singapore; SMT Thailand; WTM/Silterra Malaysia Fab; *Confidential Client*, HDD Facility (Singapore)

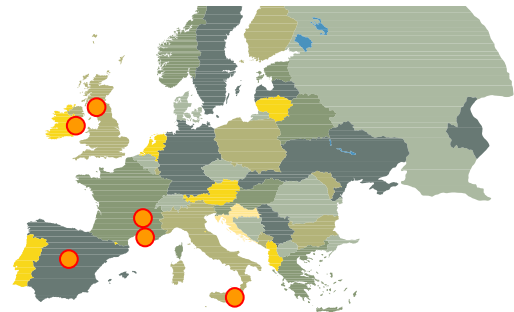
Scotland: Motorola East Killbride

Ireland: Fabs for Confidential Client

France: ST Microelectronics Rousset Fab; Kodak Lyon

Italy: ST Microelectronics Catania M6

Spain: Lucent Madrid Fab



\* Some projects completed under other design firms.

## CONTACT INFORMATION

**Physical Address:** VACC, Inc., dba Vibro-Acoustic Consultants  
490 Post Street, Suite 1427  
San Francisco, CA 94102 USA

**Telephone:** (+1) 415-693-0424

**Fax:** (+1) 415-693-1398

**WWW:** <http://www.va-consult.com>

**General Delivery E-mail:** [inquiries2009@va-consult.com](mailto:inquiries2009@va-consult.com)

