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EDUCATION

Ph.D. Mechanical Engineering, Texas A&M University, 1995
M.S. Mechanical Engineering, Texas A&M University, 1991
B.S. Aerospace Engineering, Texas A&M University, 1988

WORK EXPERIENCE

President, AbM Engineering, LLC, 2003 – present
Engineering Design, Analysis, training and consulting
(http://www.theAbMsolution.com)

Contributing Author, July 2007 – Present
Engine Air Magazine, dedicated to the jet engine users and operators market, NY
Authorship of a technical quarterly article titled "Ask the Engineer"

Chair of the Technical Advisory Board, Jan 2007 – Present
Turbine truck Engines, Inc., Deland, Florida
Dedicated to the development of an innovative, flex-fuel, pulse detonation engine for drive-shaft applications including: mobile power generation, general aviation, and heavy-duty trucks

Associate Professor, Aug 2006 – present
Department of Aerospace Engineering
Embry Riddle Aeronautical University, Daytona Beach, Florida

- Engaged in research and education in the field of gas turbine engines.
  - Taught graduate and senior level courses in the fields of Lean Engineering, Aerodynamics and Thermodynamics of Gas Turbine Engines, and Detailed Design and Operation of Gas Turbine Engine Components, as well as special topics in axial compressor and turbine aero and thermodynamics.
  - Supervisor of the Gas Turbine Laboratory including a CF6-6 (shown), Garrett TPF351-20 TS, and GE CF34, with several research associates and graduate research assistants, as well as a comprehensive suite of NASA, USAF, in-house, and commercial design codes.
  - Research areas focus on design, and Lean Engineering, all aspects of the gas turbine engine including component aerodynamics and Thermodynamics, certification, operation, current issues, as well as design systems.
  - Associate Director of the Honors Program for Aerospace Engineering

WORK EXPERIENCE (Continued)

Assistant Professor, Jan 2004 – May 2006
Department of Aerospace Engineering
Embry Riddle Aeronautical University, Daytona Beach, Florida

Consultant, Oct 2003 – present
ABM Engineering, LLC, Ormond Beach, Florida

- Intellectual Property Investigation Assisted the customer by investigating the extent of the IP purchased from Socata (a division of EADS). Visited Socata's facilities in Tarbes, France and assessed the completeness of the IP while working with Socata representatives.

- Redesign of a Pulsed Detonation Engine Redesigned major portions of a pulse detonation engine to improve power output, performance, and reliability. Redesign focus included cycle analysis, combustion chamber, turbine design, tolerances, and materials. Using our in-house CATIA and a suite of industry standard codes. CFD and testing phases to begin shortly.

- LEAN Enterprise Lecturer and Trainer. Certified Instructor in "LEAN Enterprise Value" principles by the "LEAN Aerospace Consortium"; a consortium of all major Aerospace companies and MIT (Massachusetts Institute of Technology). Trained employees at the Rolls-Royce Corporation, Indianapolis, Indiana, in Lean Enterprise Value.

- Consulting in the field of Alternative Power. Consulted with Turbine Truck Engines, Inc., Deland, Florida, in the continued development of a pulsed detonation gas turbine engine (US patent # 6,000,214) for automotive, power, aviation, and general drive shaft applications.

- Consulting in the field of Innovative Technologies. Consulted with foreign and domestic inventors to bring innovative technologies to the propulsion and Turbomachinery industry. Innovative technologies include counter-rotation drives, missile propulsion, and coal combustion for power generation.

Consultant, May 2004 – October 2004
CDI Corporation, Orlando, Florida

- Consulting in the field of Gas Turbine Engines. Consulted with the Siemens Westinghouse Power Corporation, through CDI Corp., Orlando, Florida, in the areas of compressor diaphragms mechanical integrity (unusual wear patterns), and compressor performance at part load operation (excessive bleeding to lower CO emissions).

Senior Design Engineer, Mar 1998 – Nov 2003
Siemens Power Generation, Orlando, Florida

- ATS Compressor "depressed-inlet-pressure" Test Data Analysis. The ATS compressor was tested (DOE funded project) at the Philadelphia Naval Shipyard at a depressed inlet pressure. Conducted a performance prediction calculation of the ATS compressor at that inlet pressure using the "Viscous Method (mentioned below)". The prediction was within the measurement accuracy.

- W501FD Empire Test Data Analysis. Analyzed the Empire test data of the W501FD compressor, and compared with prediction.

WORK EXPERIENCE (Continued)

- Lead Aerodynamic consultant for the upgrade of the W501D5 compressor. Duties involved consulting and cooperating with the Modifications and Upgrades group to design a cost-effective upgrade for the W501D5 by redesigning only the front stages and maintaining retrofittability. Furthermore, the customer ability to use "wet compression" was not to be hindered.

- Conceptual development of the next generation family of compressors. This set of studies involved researching a new airfoil shape, investigation of a design of a low stage count highly loaded compressor, investigation of modularly upgradeable compressor designs, as well as investigating cantilever diaphragm designs.

- Compressor Design Methods. From within the design systems group, given the global responsibility of ensuring that the in-house developed compressor design codes are performing properly. Duties included algorithms development, validation, creating of test cases, user manuals, compiling training materials, and performing global training (at US and German sites).

Senior Design Engineer, Nov 1995 – Mar 1998
Westinghouse Electric Corporation, Orlando, Florida

- Aerodynamic Blading Designer for the W501G and ATS Compressors. Duties included section design for optimal design point performance as well as off-design performance, stacking, and 3D CFD.

- Aerodynamic Blading Designer for the ATS Turbine. Designed the 4th stage blade and vane. Duties included section design for optimal design point performance as well as off-design performance, stacking, and 3D CFD.

- Co-developed a multi-discipline method for fast tuning of compressor (and turbine) airfoils using Strain Energy and Kinetic Energy contours. The combination of SE and KE contours plots lead to a better understanding of the modal behavior of the airfoil for each mode, independently, providing for the ability to manipulate the airfoil to affect a particular mode without impacting neighboring modes. As a result, tuning complex shrouded airfoils became much more efficient.

- Meanline and S1-S2 compressor analysis calculations. Duties included the modeling and understanding of all of the Westinghouse compressors (AA, B series, D4, D5, D5A, FA, FC, G, and ATS). Each compressor was analyzed using a combination of 2D Blade-to-Blade code and a streamline curvature code. The impact of each aerodynamic feature was studied using "sensitivity studies". Features studied included: Hade angles, airfoil count, re-stagger, radial distribution of total pressure, IGV design, OGV design and its impact on diffuser performance, diffuser shapes, bleeds, and ID and OD contour shapes.

- Developed the "Viscous Analysis Method": a method to predict the performance of axial compressors. This method involves the combination of 3D CFD with a throughflow code. The method was validated against W501FC and W501D5 shop test data, as well as ATS "depressed-inlet-pressure" shop test data. In each case, the performance prediction was within the measurement uncertainty (see publications).

WORK EXPERIENCE (Continued)

- Developed the "Viscous Design Method": a method to design axial compressors. This method involves the combination of 3D CFD with a throughflow code to systematically design 3D airfoils, and is an extension of the previously mentioned work.

- Lead aerodynamicist for the upgrade of the W501F compressor, later known as the W501FD. My task was to maintain retrofittability but still increase mass flow and efficiency. Employing the "Viscous Design Method", 3D airfoil shapes were used to achieve the target.

Research Associate, Jan 1989 – May 1995
Turbomachinery Laboratory, Texas A&M University, College Station, Texas

- Development of axial compressor and turbine models: this was a research project funded by NASA-Lewis (now NASA-Glenn) (contract NAG-1144) to create a complete engine performance code. GETRAN is a modular code for the simulation of design and off-design performance of Gas Turbine Engines (see publications). Duties were primarily the writing of the Compressor and Turbine modules, which were also spun-off as individual stand-alone simulation codes. In addition, given responsibility for overall integration of the other modules, calibration and validation of the overall code. Conducted cycle studies, shutdown and start-up studies, loss-of-load studies, trip studies, as well as numerical integration, compiling, literature surveys, and code debugging.

PATENTS

Patent No. **6,079,197**, June 27, 2000
Title: High Temperature Compression and Reheat Gas Turbine Cycle and Related Method.

RESEARCH GRANTS & AWARDS

- *"Conceptual Design for an Innovative Thrust Reverser System"* ($60,000) phase I of this research includes brainstorming for a totally new method of reversing the thrust of large commercial aircraft. 2008 (ongoing).

- Jet Set International, Ltd. ($371,000) "*Feasibility Study for the re-Engine of the MS760 Paris Jet*", conduct engine selection and preliminary design to replace an aging turbojet with a modern turbofan and gain FAA approval as well as build the certification plan for the STC, 2006-2008.

- Turbine Truck Engines, Inc. ($367,000) "*Modeling and Redesign of a Pulsed Detonation Engine for Drive Shaft Applications*", and "*Feasibility Study of a 540-HP Pulsed Detonation Engine*", conduct a preliminary analysis regarding the assembly, rig test, and field (road) test of a pulsed detonation engine for drive shaft applications (US patent # 6,000,214), 2006 (ongoing).

- National Science Foundation ($770,000) proposal entitled "*A Large Beowulf Computer Cluster for Across-Discipline Research and Education at Embry-Riddle Aeronautical University*", with M. Hickey, and C. Herbster. Purchased and installed a 265-processor, 2.2 GHz, 64-bit application capable supercomputer, 2004, the cluster became operational in July of 2006.

- Recipient of the 1997 George Westinghouse Signature Award of Excellence

GRADUATE THESES SUPERVISION

- Chang Meang (Flow Control over the Suction surface of Compressor Stators), December 2007.
- Laurent Lachmann (Investigation of the HS Vortex in Turbine Stator Vanes), December 2007.
- K. Joe Klatsi, (Elimination of the Horse Shoe Vortex in Turbine Cascades), October 2006.
- Troy Ramnath, (Highly Loaded Fan Stage Design for Military Application), May 2006.
- Hanho Hwang, (Multi-Stage Highly Loaded Axial Turbine Design), August 2005.
- Amit Garg, (Highly Loaded Axial Turbine Stage Design), April 2005.

PUBLICATIONS

Attia, M., "A Graduate Course in Lean Engineering at Embry-Riddle University, Sample Case Study: VLJ Re-Engine Project", Invited Talk at the Lean Aerospace Initiative Education Network (LAI EdNet) Summer workshop, Massachusetts Institute of Technology (MIT), Hosted by the Boeing Company, The Boeing Company Headquarters, July 31 – Aug 2, 2007, Chicago, Illinois.

Eastlake, C., and Attia, M., "Employing Lean Engineering Principles as a Student Exercise to Modify the Content of Traditional Aircraft and Propulsion Design Courses", AC 2007-268, presented at the 2007 ASEE Annual Conference and Exposition, June 24-27, 2007, Honolulu, Hawaii.

Attia, M., "Upgrade of A 16-Stage Industrial Compressor, Part I: Development Of An Innovative Performance Analysis Method", ASME GT2006-91186, presented at the ASME IGTI Turbo Expo, May 8-11, 2006, Barcelona, Spain.

Attia, M., "Upgrade of A 16-Stage Industrial Compressor, Part II: Extension of the Analysis Method to the Design Function and Results", ASME GT2006-91199, presented at the ASME IGTI Turbo Expo, May 8-11, 2006, Barcelona, Spain.

Attia, M., Hemerly, C. "Modular Multi-Stage Axial Compressor Design: A Conceptual Study with an Example", ASME GT 2006-91053, presented at the ASME IGTI Turbo Expo, May 8-11, 2006, Barcelona, Spain.

Hemerly, C., Attia, M., "Modular Multi-Stage Axial Compressor Design: A LEAN Approach", presented at the LEAN Enterprise Value Plenary Conference, April 17-19, 2006, San Antonio, Texas. The paper won the best paper award at the conference.

Attia, M., Nakhla, H., Clark, A., Sikorski, J., and Vega, V., "Analysis and Design Modifications of Jet-Powered Dragster, Part I: Modeling, Structural, and Propulsion Assessment", AIAA 2006-0773, presented at the 44th AIAA Aerospace Sciences Meeting and Exhibit, Reno, Nevada, Jan 9-13, 2006

Nakhla, H., Attia, M., Clark, A., Sikorski, J., and Vega, V., "Analysis and Design Modifications of Jet-Powered Dragster, Part II: Aerodynamics, CFD, and Proposed Modifications", AIAA 2006-0774, presented at the 44th AIAA Aerospace Sciences Meeting and Exhibit, Reno, Nevada, Jan 9-13, 2006

Attia, M., "Semiviscous Method for Compressor Performance Prediction", *AIAA-Journal of Propulsion and Power*, 2005, Vol. 21, No. 5, pp 792-796

Attia, M., "A Semi-Viscous Method for Designing Axial Compressors", AIAA 2005-4540, presented at the 41st AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Tucson, Arizona, July 10-13, 2005

Attia, M., "A Semi-Viscous Method for Compressor Performance Prediction", AIAA 2004-3412, presented at the 40th AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Ft. Lauderdale, Florida, July 11-14, 2004

PUBLICATIONS (Continued)

Schobeiri, M.T, and Attia, M., "Active Aerodynamic Control of Multi-stage Axial Compressor Instability and Surge by Dynamically Adjusting the Stator Blades", *AIAA-Journal of Propulsion and Power*, 2003, Vol. 19, No. 2, pp 312-317

Schobeiri, M. T., and Attia, M., "Advances in Nonlinear Dynamic Engine Simulation Technology," ASME 96-GT-392, presented at the International Gas Turbine and Aero-Engine Congress and Exposition, Birmingham, UK, June 10- 13, 1996.

Schobeiri, M. T., and Attia, M., "Zur Entwicklung von Berechnungsverfahren zur Simulation Dynamischen Verhaltens von Strahltriebwerken und Stationären Gasturbinenanlagen", (*A Computational Method for Dynamic Simulation of Aero- and Stationary Gas Turbine Engines*), Zeitschrift für Flugwissenschaften und Wetraumforschung (*Journal of Flight Sciences and Space Research*), Berlin, 20, (1996), pp. 227-238.

Attia, M., and Schobeiri, M. T. "A New Method for the Prediction of Compressor Performance Maps Using One-Dimensional Row-by-Row Analysis", ASME paper 95-GT-434, presented at the IGTI-ASME Turbo Expo, Houston, Texas, June 5-8, 1995.

Schobeiri, M. T., Attia, M., and Lippke, C., "Nonlinear Dynamic Simulation of Single and Multi-Spool Core Engines, Part (I): Computational Method", *AIAA Journal of Propulsion and Power*, November 1994, Vol. 10, No. 6, pp. 855-862.

Schobeiri, M. T., Attia, M., and Lippke, C., "Nonlinear Dynamic Simulation of Single and Multi-Spool Core Engines, Part (II): Simulation, Code Validation", *AIAA Journal of Propulsion and Power*, November 1994, Vol. 10, No. 6, pp. 863-867.

Schobeiri, M., Attia, M., and Lippke, C., "GETRAN: A Generic, Modularly Structured Computer Code for Simulation of Aero- and Power Generation Gas Turbine Engines", *ASME Journal of Engineering for Gas Turbines and Power*, July 1994, Vol. 116, pp. 483-494.

Schobeiri, T., and Attia, M., "Row-by-Row Performance Calculation Method for Turbines", *AIAA Journal of Propulsion and Power*, 1992 Vol.8, pp. 823-828.

PROFESSIONAL AFFILIATIONS

Lean Aerospace Initiative (LAI) Academy of Instructors
ΣΓΤ (Sigma Gamma Tau) - National Aerospace Engineering Honor Society
American Institute of Aeronautics and Astronautics (AIAA)
American Society of Mechanical Engineers (ASME)