www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Capabilities

High-Value Analysis-Driven and Test-Driven Engineering Design Solutions

Company

ATA Engineering, Inc., (ATA) is an employee-owned small business that has been helping our customers solve their complex engineering problems in the areas of product design, structural dynamics, thermal analysis, aeroelasticity, acoustics, software development, computational fluid dynamics (CFD), structural mechanics, training, and testing since 1977. During that time we have gained a reputation for excellence in the engineering community and have had the opportunity to work on a very wide range of highly engineered products, including military and commercial aircraft, satellites and interplanetary spacecraft, launch vehicles, missile systems, transportation vehicles, mining equipment, rides and equipment for themed entertainment, and a variety of electronic and consumer products.

ATA is headquartered in San Diego, with offices in Albuquerque, the Bay Area, Denver, Huntsville, Los Angeles, and Washington D.C. We help our clients find success through advanced engineering solutions. Please contact us to discuss how we can help you with your application.

ATA headquarters in San Diego

Winner of NASA's George M. Low award

Additional Information

Awards

- SBA Tibbetts Award
- NASA George M. Low Award
- NASA JPL Thomas H. May Legacy of Excellence
- SNC Small Business Excellence Award
- NRO Commander Commemoration
- *Wall Street Journal* Top 15 Small Workplaces
- NCEO Innovations in Employee Ownership

AS9100 Certification

- AS9100 Certificate #11002708

Staff Details

- Regular full-time staff of more than 180
- More than 150 degreed engineers on staff, averaging 14 years of experience each
- Majority of engineers possess advanced degrees

Recent Clients

- General Atomics
- Jet Propulsion Laboratory
- Lockheed Martin Space Systems
- NASA
- NAVAIR
- Northrop Grumman (Orbital ATK)
- Pratt & Whitney
- Sandia National Laboratories
- ThinKom
- US Air Force Research Laboratory
- World-Leading Themed Entertainment Companies

SBA Program Data

- Small Business Categories: SB
- NAICS Codes: 541330, 511210, 332312, 541715
- DCAA-approved accounting system

ATA ENGINEERING, INC.

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Key Service Offerings

Structural and Dynamic Analysis

- Loads determination
- Assessment of static and dynamic load effects
- Test-verified finite element model (FEM) development
- Detailed stress
- Durability
- Random, sine, and shock
- Aeroelasticity
- Coupled loads

Product Design

- Concept to production design development
- Requirements, specifications, and manufacturing drawings
- Third-party design reviews and design verification
- Design optimization
- Prototype development and testing
- Project management

Fluid Dynamics

- CFD simulation and visualization
- Fluid-structure and fluid-thermal-structural interaction
- Advanced modeling and methods development
- Chemically reacting flows and ablation analysis
- Aerodynamic design and wind tunnel test support

Mechanism/Nonlinear Dynamic Analysis

- Assembly, operation, and handling
- Deployable structures analysis
- Deployment and stage operation
- Nonlinear buckling and postbuckling failure analysis
- Impact and drop simulations
- Joint gapping and slipping
- Rigid and flexible body kinematic analysis

Robotics and Controls

- Control of dynamical systems
- Pointing and control of structure-borne optical systems
- Control-structure interaction
- Application to autonomous ground and air vehicles
- Implementation in traditional programmable logic controllers (PLCs) or advanced embedded controllers

Testing

- Modal and ground vibration
- On-site, real-time operational testing
- Vibration testing
- Strain, acceleration, thermal, displacement, and force measurements
- Drop, shock, and support for pyroshock measurements
- Rotating and reciprocating machinery
- Acoustic array testing
- Sound-level measurements
- Accelerated fatigue testing
- Data postprocessing and analysis
- Aircraft free-play and stiffness
- Flight testing support

Vibroacoustics

- Acoustic test design (including wind tunnel testing) for measurement of fluctuating pressures and vibration responses
- Data processing and interpretation of test data
- Definition of fluctuating pressure environments for launch vehicles and aircraft during liftoff, ascent, and flight
- Vibroacoustic analysis of coupled fluid-structure systems through finite element analysis, boundary element analysis, and statistical energy analysis
- Correlation of vibroacoustic models to test data
- Active and passive interior noise reduction
- Environment noise propagation analysis

Thermal Analysis

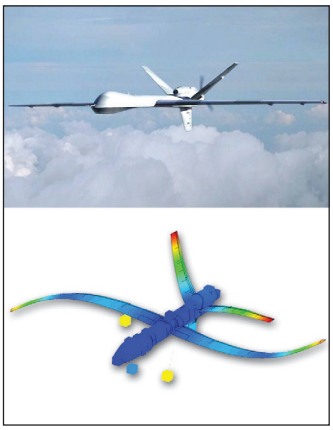
- System and component-level thermal analysis and design
- Board-level and chip-level thermal analysis
- Forced and free convection, using empirical correlations, one-dimensional duct flow, and three-dimensional fluid flow
- Orbital and ground-based radiation heating
- Ablation and TPS sizing
- Design of active and passive thermal control systems
- Thermal-elastic analysis

Software

- Value-added reseller (VAR) for Siemens Digital Industries Software
- Commercial (ATA Suite) and custom software development
- Support hotline and web portal for technical questions
- CAE and custom software training
- Visit www.ata-plmsoftware.com to learn more

ATA ENGINEERING, INC.

Dynamic Analysis and Test-Analysis Correlation



Customers include:
Aerojet Rocketdyne, BAE Systems, Boeing, General Atomics Aeronautical Systems, L-3 Coleman Aerospace, Lockheed Martin, NASA, Northrop Grumman, Orbital Sciences Corporation (now Northrop Grumman), Pratt & Whitney, Western Digital

Product experience includes:
Airframes, rocket engines, launch vehicles, missiles, satellites, spacecraft, reflectors, consumer military electronics, heavy machinery, roller coasters, manufacturing equipment

Codes utilized:
Abaqus® FEA, Attune™, Brüel & Kjær Test for I-deas, MATLAB®, MSC.Nastran™, NX Nastran, Siemens I-deas® NX, VA One, ZONA/ZAERO®

AS 9100 IAPMO R&T

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

Many structures must survive severe dynamic environments including transient, sinusoidal, random, and acoustic excitation. ATA has extensive experience in performing structural dynamics analysis to predict dynamic loads and responses. We have a variety of software tools including Siemens I-deas NX, Nastran, and MATLAB to analyze different environments. We are knowledgeable about the information contained in many dynamic-response specifications and requirements including the full range of military and NASA standards.

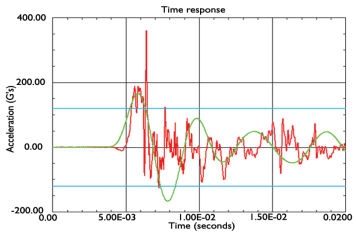
ATA recommends that when feasible, a test-verified finite element model be developed as this is the only way to guarantee that the model is accurate. The accuracy of the model can be critically important for use in coupled loads, transportation, control system, and other dynamic analysis. Modal testing provides a measurement of the actual dynamic characteristics of a structure. The finite element model is then adjusted to provide better agreement between the predicted (analysis) and actual (test) results. This process is usually called test-analysis correlation or model updating.

ATA has developed methods and software programs, including Attune, to efficiently perform model updating and the many correlation checks that are part of this process. The test-analysis model (TAM) mass matrix, produced during a pretest analysis, is valuable for performing many of these checks including orthogonality, cross-orthogonality, effective mass, and energy distribution. We have also developed automated procedures for optimally locating both exciters and sensors for a modal test. I-deas can also be used for computing orthogonality and modal assurance criterion (MAC) calculations.

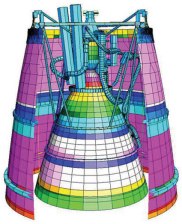
With a correlated finite element model, the quality of dynamic analysis results improves dramatically. In addition to the considerable experience in the area of flutter and divergence, ATA has evaluated the full gamut of shock and vibration loads including those due to the following:

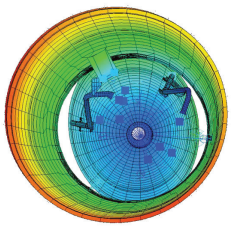
- Sea, air, rail, and road transportation
- Lift and drop
- Wind and wave
- Launch, engine ignition, and stage separation

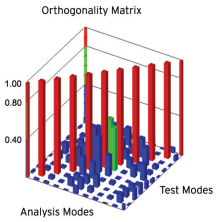
- Comparison of measured and predicted acceleration for drop event provides critical design information



- Correlation of test and analysis data provides high levels of confidence in analytical predictions for sophisticated aerospace products

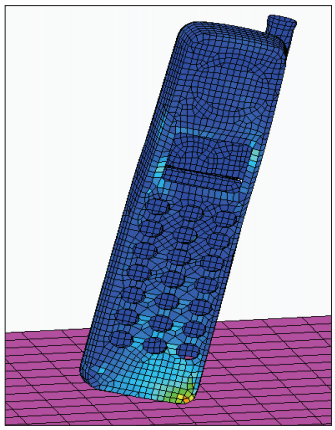






ATA ENGINEERING, INC.

Shock/Drop and Pyroshock



Customers include:
Aerojet Rocketdyne, ATK (now Northrop Grumman), BAE Systems, BMT Scientific Marine Services, Boeing Satellite Systems, InVision, Kistler, Lockheed Martin, Martinez & Turek, Pratt & Whitney

Product experience includes:
Launch vehicle and airframe structures, rocket engine components, reflectors and antennae, theme park rides, flight simulators, industrial machinery, tooling fixtures, pump and valve housings, consumer and military electronics

Codes utilized:
Abaqus® FEA, ANSYS®, BOSOR, Siemens I-deas® NX, Siemens Femap®, NASGRO, MATLAB®, MATHCAD®, MSC.Nastran™, NX Nastran

AS 9100 IAPMO R&T

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

ATA Shock Test Experience

ATA has over 20 years of experience measuring and analyzing shock-type events. For these tests, accelerometers, strain gages, and pressure transducers are used to assess structural component loads due to high-speed transient events. The test data are then used in developing design specifications and assessing structural performance characteristics.

Pyroshock

ATA has provided pyroshock measurements for several major aerospace companies. These are typically events dealing with separations of launch vehicles, which can subject structures to extreme structurally and acoustically borne acceleration inputs. Peak accelerations as well as shock response spectra allow assessment of these environments.

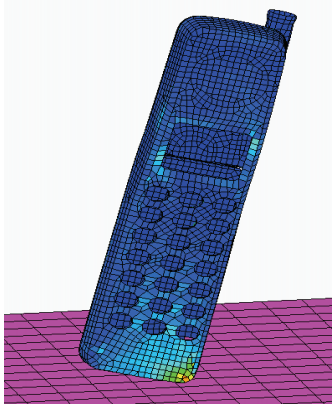
Drop and Impact Testing

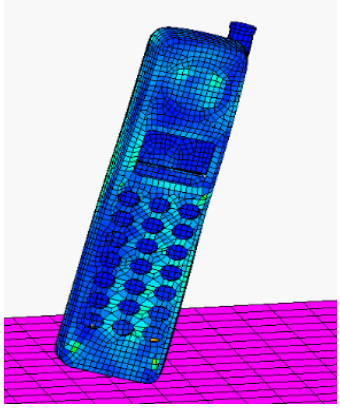
Environmental-type drop and impact testing has been performed for both aerospace and commercial customers. These tests are used to validate transportation equipment and packaging of sensitive electronics components. Peak accelerations are measured as well as structure displacements to evaluate loads transmitted and determine if an impact event will occur under specified conditions. Some structures tested by ATA include satellite transportation systems, military munitions, hand-held electronic devices, and sporting equipment.

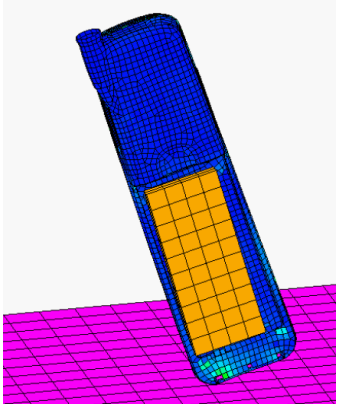
Test Capabilities

- Mobile test equipment allows for fast setup and testing at customers sites
- High-speed data acquisition rates to capture pyroshock events
- Shock accelerometers (4.2 grams and 50,000 g peak levels)
- Over 100 channels of strain conditioning
- Microphones and pressure transducers
- Electrodynamic shaker for performing mechanical shock

- Drop testing simulation helps validate packaging of sensitive electronics components in a wide range of products







Rotating and Reciprocating Machinery Testing

Customers include:
AK Steel, Alcoa, Allied Signal, Bosch, Caterpillar, Cooper Tire, Cummins Diesel, Dana, Delphi, General Motors, GKN, John Deere, FMI, FLSmidth, Ford Motor, Harley-Davidson, Hyundai, Mercury Marine, Metaldyne, Mitsubishi Polyester Films, MTS, NASA, Renault, Teldix and National Renewable Energy Lab, Solar Turbines, TWR, Visteon

Product experience includes:
Diesel and gas-powered engines, mining and mineral processing equipment, consumer and aerospace electronics, electric motors, medical equipment

Codes utilized:
Brüel & Kjær Pulse Reflex, MATLAB®, IMAT™, ROTATE, ROTATE PLUS

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

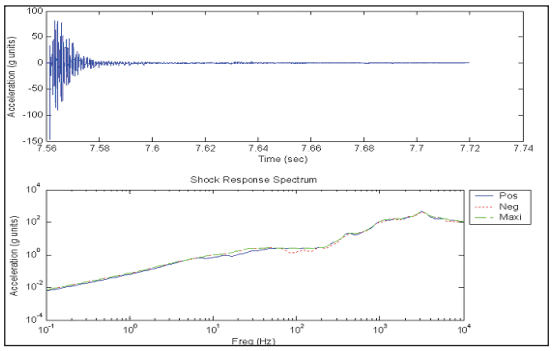
Using a broad range of software, ATA applies testing and analysis of rotating and reciprocating machinery to a wide range of industries from automotive to defense. ROTATE PLUS is in wide use for analyzing noise and vibration from time waveform and tachometer (or other machine speed) signals. ROTATE PLUS, in addition to ATA's other software suites, allows our test engineers to postprocess vibration and other types of data from many different data recorders.

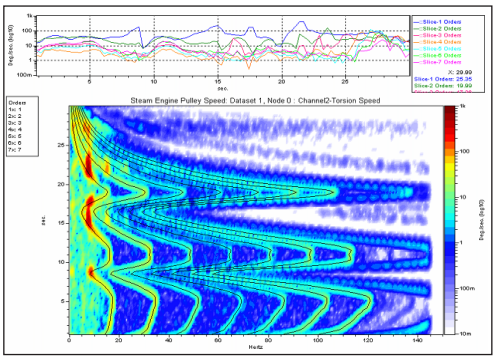
Continuing the work of Dr. Håvard Vold, a recognized leader in the sound and vibration analysis field, ATA applies the same upfront design-test-analysis expertise to rotating equipment solutions for clients as it does to other mechanical engineering challenges.

Applications include the following:

- Characterizing individual vibration frequencies in hertz, RPM, or orders
- Characterizing resonances
- Analyzing dynamic fatigue
- Analyzing torsional vibration with or without the use of slip rings, shaft-mounted transducers, or telemetry
- Identifying problems in variable-speed machinery, particularly when the speed changes rapidly or over a large range
- Troubleshooting intermittent problems that may require hours of data recording
- Identifying early-stage bearing and gearbox defects
- Creating a machine speed (RPM) history from vibration data alone (without a tachometer signal)
- Separating order-related vibrations from non-order-related vibrations
- Identifying problems in crowded, noisy signals from gearboxes and transmissions with closely spaced and crossing orders
- Diagnosing machinery when there is a noisy tachometer signal or no tachometer signal at all
- Performing advanced diagnosis using data from sensors away from the machinery-—accomplished by detailed evaluation of time waveform data with powerful analysis tools
- Creating impressive plots and tables of data to use in reports and presentations

- ROTATE PLUS allows sophisticated postprocessing of test data to provide greater insight into product performance





Strength, Durability, and Optimization Analysis

Customers include:
Aerojet Rocketdyne, BAE Systems, Boeing Satellite Systems, Martinez & Turek, Orbital ATK (now Northrop Grumman), Pratt & Whitney, World-Leading Themed Entertainment Companies

Product experience includes:
Launch vehicle and airframe structures, rocket engine components, reflectors and antennae, theme-park rides, animatronic figures, flight simulators, industrial machinery, tooling fixtures, pumps and valves, electronics, battery cell casings

Analysis Codes utilized:
Abaqus®, Adams, ANSYS®, Siemens NX, Siemens Femap®, Nasgro, MATLAB®, IMAT™, MSC.Nastran™, NX Nastran

Design Codes utilized:
ACI, AISC, ANSI, ASCE, ASTM, AWS, DIN, ISO, MIL (Military Standards), RCSC, SEI, and foreign an customer specific standards

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

ATA performs structural analysis using both advanced finite element analysis (FEA) and traditional handbook methods. We typically develop and display finite element models and results using Siemens NX, Siemens FEMAP, or Abaqus pre- and post-processing, and we analyze models with NX, Abaqus and Nastran Linear and Nonlinear solvers. We are also experts in using many additional FEA tools such as Adams and ANSYS®.

ATA performs structural-dynamic analysis using Abaqus/Standard, Abaqus/Explicit, NX Response Simulation, and NX Motion; these tools allow inclusion of highly non-linear effects such as creep, contact, large displacements, and multibody dynamics, and they can simulate manufacturing processes such as rolling and forming.

ATA is expert in the following areas:

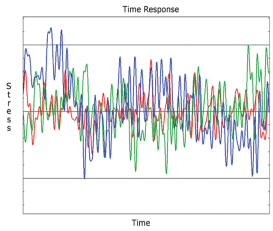
- Strength analysis of structures
- Fatigue analysis of structures
- Structural optimization

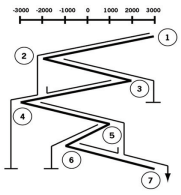
ATA performs detailed stress analysis of welds, fastener loads, pullout, bearing, and other factors using established design practices augmented by semi-automated procedures developed with Python, Visual Basic, MATLAB, IMAT™, and Microsoft Excel.

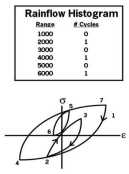
Cyclic stress magnitude and orientation are recovered from an FEA of the structure, and stress- or strain-based methods are used to assess durability of the structure. Fracture mechanics are also used to predict crack growth and stability and the maximum allowable initial crack size based on simplified crack models.

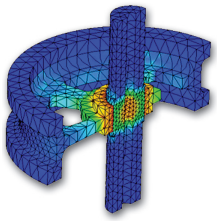
Optimized structures provide significant benefits including low material cost and maximum system performance. ATA performs structural optimization to minimize structural weight subject to frequency, displacement, and stress constraints using NX, Nastran, Abaqus, and MATLAB tools. ATA can also advise on design and manufacturing approaches to further optimize performance and manufacturability.

- Stress or strain time histories may be used to determine the damage to, and durability of, components under given duty cycles

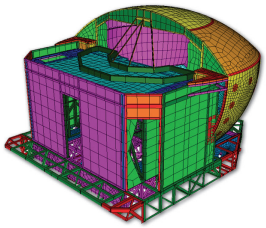


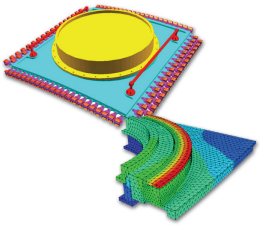


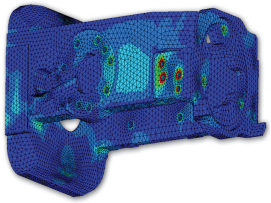


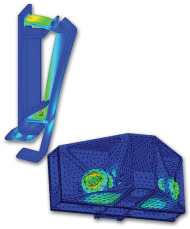


- ATA performs strength evaluation and optimization for products ranging from full-scale flight simulators to detailed subcomponents



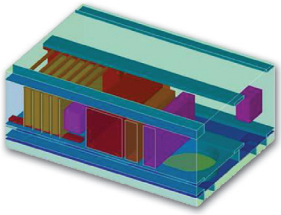


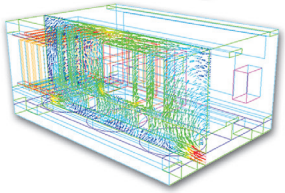




ATA ENGINEERING, INC.

Thermal and Fluid Analysis





Customers include:
Applied Aerospace Structures Corporation, Aerojet Rocketdyne, Bigelow Aerospace, Lockheed Martin, NanoRacks, Orbital ATK (now Northrop Grumman), Sierra Nevada Corporation, SolAero, Trex Enterprises, Vanguard Composites Group

Product experience includes:
Launch vehicles, satellites, rocket engines, reflectors, spacecraft, disk drives, laser systems, optical platforms, consumer and aerospace electronics, chemical reactors, electric motors, medical equipment

Codes utilized:
Siemens software: NX Flow, NX Thermal, Femap Flow, Femap Thermal, and I-deas™ NX Series TMG™ and ESC™, Other software: Abaqus®, ANSYS®, SINDA, Thermal Desktop, TRASYS

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

Mechanical problems often occur when a system becomes too hot or too cold or is continuously cycled through a large temperature range during its lifetime. Typical problems include equipment failure, mechanical distortion, and structural failure. ATA has extensive experience in performing thermal analysis of aerospace and electronic systems. Our primary analysis tools are Siemens Simcenter 3D Thermal and Flow, TMG Thermal/Flow, and Thermal Desktop®. These tools all have capabilities to model conduction, convection (including 1-D duct flow), and radiation problems. ATA has experience in defining the solar radiation environment and orbital mechanics for satellites and other orbiting systems. For ground-based systems, we analyze electronic systems with forced or natural convection cooling.

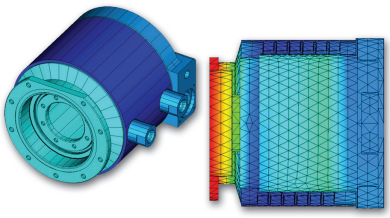
We also use other software packages such as SINDA, TRASYS, Abaqus, and ANSYS when necessary for specialty analysis and legacy compatibility, and we also can convert models from one format to another as necessary.

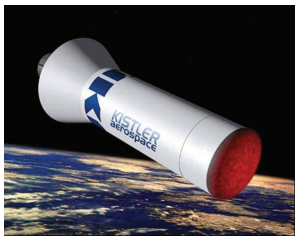
Additionally, we have commercial and in-house code that we use to map data, such as spatially varying heat flux on a surface, from other codes to our thermal models. We can also create user-subroutines to handle complex heating, such as chemical reactions, or to simulate active thermal-control systems. Finally, we can map temperatures from our models to structural models for use in thermal distortion or thermal stress analysis.

ATA provides thermal and coupled fluid-thermal analysis and design support at a variety of different levels depending on the application. This support includes the following:

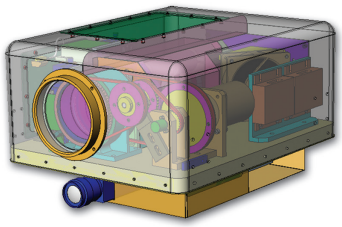
- Chip-level thermal analysis
- Board-level thermal analysis
- Component heat management
- System-level thermal analysis
- Orbital heating

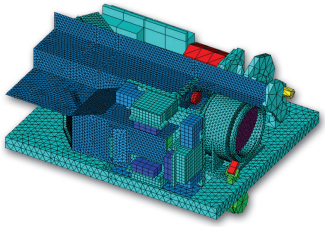
- ATA has provided thermal and fluid analysis services for products ranging from small motor casings to launch vehicles

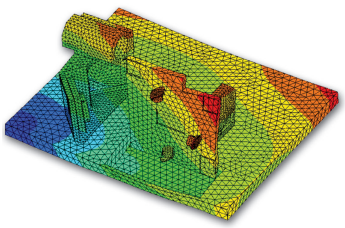




- Coupled fluid-thermal analysis of sensitive optical systems allows design of cooling systems to minimize distortion







Product Design and Prototyping

Customers include:
Gunderson, Kistler Aerospace, Data Physics Corporation (formerly Ling Electronics), Martinez & Turek, NASA, World-Leading Themed Entertainment Companies

Product experience includes:
Motion simulators and other amusement ride and show action equipment, launch-vehicle payload adapters and fuel tanks, precision industrial machinery, antenna and large optics support structures, precision manufacturing and assembly tooling

Design codes utilized:
Siemens NX®, Solidworks®, Solid Edge®

Analysis codes utilized:
Abaqus®, ANSYS, NX Nastran, MSC.ADAMS™, MSC.Nastran™, Siemens Femap®, Siemens Simcenter®, Simulink

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

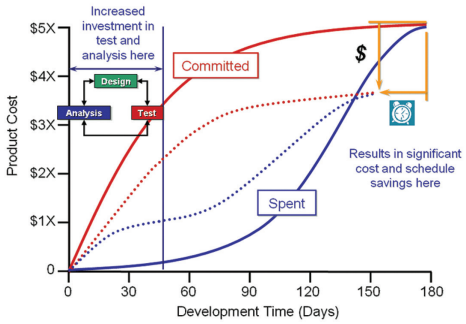
ATA provides design services to support clients with their product development processes. For the last forty years, our staff has worked with companies to help get their products to market faster. Our experience with the mechanics, materials (metal and composite), and manufacturing aspects of product design help our customers reduce the number of prototypes and mechanical tests necessary to arrive at a high-quality, reliable, and cost-effective product.

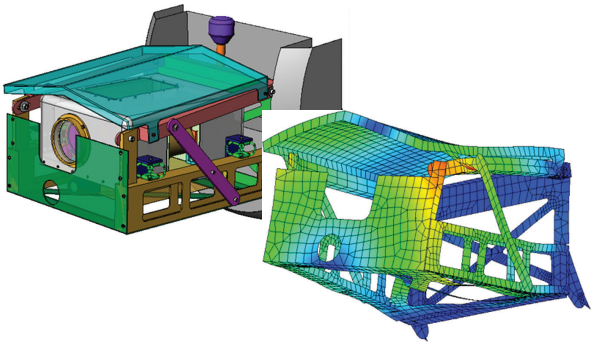
ATA is able to achieve significant savings in time and cost without negatively impacting quality through the early use of an analysis- and test-driven design process. Through early application of analytical techniques, a detailed understanding of the requirements can be developed. Through this analysis, the product specification can be turned into detailed design guidelines that help the designer get it right the first time. The early understanding gained from analysis allows design changes at a time when the commitment to the design is smaller and modifications are less costly in terms of time and expense.

The analysis can then continue as the design develops, guiding the design process and refinement. The application of analytical design-optimization techniques often refines the design and effectively and efficiently achieves the design objectives. By the time a detailed design has been developed and prototypes are built, the product performance is well understood.

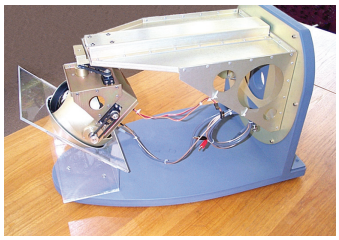
Companies often have the need to develop new product prototypes but do not have the time, facilities, or experience. We work closely with the client to engineer the product, produce prototype drawings, and deliver prototype hardware. ATA has strong relationships with several manufacturing companies that can produce precision prototypes for metallic, plastic, or composite products for a very wide range of dimensions. This often can be accomplished in less time than if done in-house due to the unique engineering environment and dedicated personnel at ATA. In the majority of cases, all product rights and patents remain with the client.

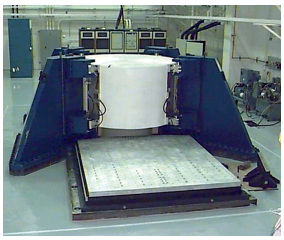
- ATA's analysis- and test-driven approach to product design reduces cost and schedule and helps get the product right the first time

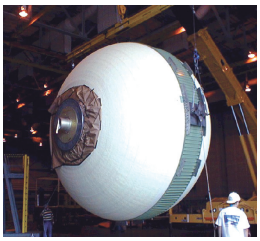




- Products designed range in size and use from compact optical systems packaging to satellite shakers to launch-vehicle fuel tanks







ATA ENGINEERING, INC.

Modal Testing

Customers include:
Ball Aerospace, Boeing, Embraer (Brazil), GA-ASI, KAI (Korea), L-3, Lockheed Martin, NASA, NAVAIR, Northrop Grumman, Orbital ATK, Pratt & Whitney, Solar Turbines, Raytheon, US Air Force, US Navy

Product experience includes:
Commercial and military airframes, rocket engines, launch vehicles, missiles, satellites, spacecraft, reflectors, consumer and military electronics, heavy machinery, roller coasters, precision equipment

Codes utilized:
B&K Pulse Reflex®, IMAT™, MATLAB, Siemens I-deas™ NX, Test for I-deas™ software

AS 9100 IAPMO R&T

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

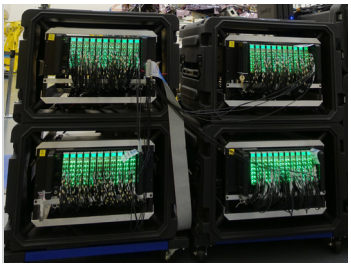
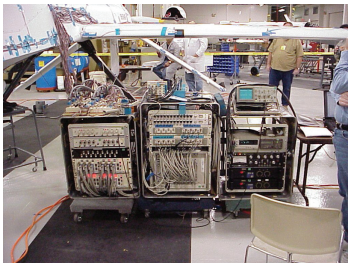
ATA is the leading independent company for performing modal survey tests. We have performed modal and dynamic testing for more than 40 years. We pioneered the use of random excitation for modal testing and extended the method to include multi-shaker random testing, patented multi-shaker Multi-Sine[1] testing, and alias-free polyreference modal parameter estimation. We have unsurpassed experience in modal testing of aerospace and industrial systems including large-scale tests for aerospace systems, using over 500 accelerometers and 12 shakers simultaneously. The aerospace structures we have tested include aircraft, space launch vehicles, rocket motors, and satellites. Other modal tests we have performed include surface-effect ships, robotic figures, propeller blades, generator sets, fixtures, and countless others. An ATA modal test program can include all of the following tasks:

- Pretest analysis using a finite element representation of the structure to generate a test-analysis model (TAM). The TAM is used to determine the ideal number and location of accelerometers and exciters and a mass matrix for orthogonality checking of test mode shapes.
- A detailed test plan is developed during the test planning task.
- During test execution, ATA will generally use a combination of multiple-input-random, multiple-input Multi-Sine, and impact excitation methods to define the modes of interest. “Quick look” reports summarizing results are typically presented the same day.
- A final correlation task to update the finite element model to achieve agreement with modal test results. An application such as ATA’s own Attune is used for this purpose.

All of the modal testing equipment is portable and is typically transported to the customer’s facility for on-site modal tests of large systems. ATA test equipment includes exciters, accelerometers, amplifiers, data-acquisition systems, and analysis computers. Many other pieces of equipment required to perform a modal survey, including force gages, shaker controllers, meters, signal generators, shaping filters, cables, and terminals, are also part of ATA’s extensive inventory.

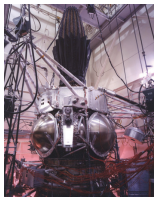
All ATA equipment is configured for remote testing and is commonly shipped via air or truck commercial carrier. In addition, ATA has a 1,800 ft^2 laboratory for in-house testing.

- ATA test equipment is configured to be highly mobile to allow testing at customer sites


- ATA is widely recognized as the leading independent aerospace modal testing company and supports customers all over the world






1 U.S. Pat. No. 8,281,659

ATA ENGINEERING, INC.

Operational Testing

Customers include:
Applied SuperConetics, Cummings Aerospace, Cymer, Fiber Materials, Inc, Perkin-Elmer, Pratt & Whitney, Solar Turbines

Product experience includes:
Amusement-park rides, power-generation equipment, commercial and military vehicles, industrial machinery, large rotating equipment, metal-processing mills, rocket engines, consumer electronics, precision laser equipment, magnetic resonance imaging equipment

Codes utilized:
IMAT™, MATLAB®, Siemens I-deas™ NX, Test for I-deas™ software

AS 9100 IAPMO R&T

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

Operational tests can be used to evaluate performance parameters and to troubleshoot problems, such as excessive vibration or premature fatigue failure of critical components. Identifying operating characteristics of equipment can confirm initial design objectives and ensure that problems will not be encountered in the future. Fatigue life estimates can also be investigated when the original design does not meet long-term operational integrity. Obtaining operating data is often the first step in a troubleshooting operation and can lend valuable insight when fixing problems. ATA has a wealth of experience not only in collecting operating data but also in interpreting the results and helping to solve real problems.

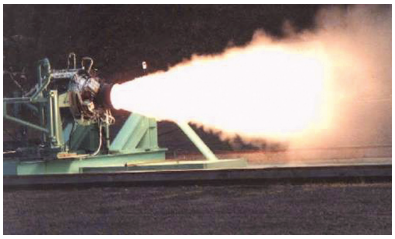
A key to understanding a structure's behavior as well as solving vibration problems is measurement of the operating environment. This kind of testing can determine both operating loads and responses such as strain, deflection, and acceleration. ATA has many years of experience in operational testing and is well qualified to both plan and execute these tests. Typical structures that we test include amusement park rides (supporting structures and running components), power generation equipment, vehicles (including large-scale people movers and monorail systems), large fans and mining equipment, metal-processing mills, motor-driven consumer electronics, and aircraft. ATA has all of the equipment required to install transducers, make measurements, and analyze the test data remotely or on site.

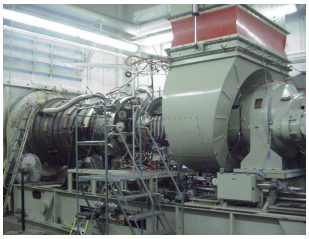
ATA routinely measures and interprets the following types of operational test data:

- Displacement
- Dynamic and/or static strain
- Acceleration
- Force and pressure
- Acoustic sound power levels
- Velocity
- GPS
- Temperature

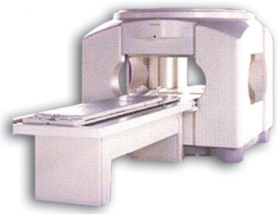
ATA's industry-leading high-channel-count acceleration and dynamic strain measurement capabilities allow us to provide a unique, high-value operational test solution by minimizing the number of individual test runs that must be performed to gather all required data. All equipment is fully portable and ruggedized for easy transport to a customer's site and performing data acquisition in tough environments. Smaller articles can be tested at ATA's in-house laboratory.

- ATA performs operational tests on a wide variety of large equipment including rocket engines and power generators

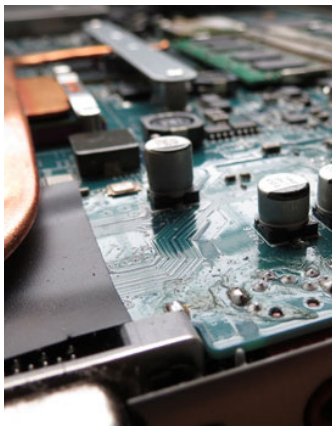




- ATA also performs operational testing of high-precision products such as laser lithography systems, MRIs, and disk drives



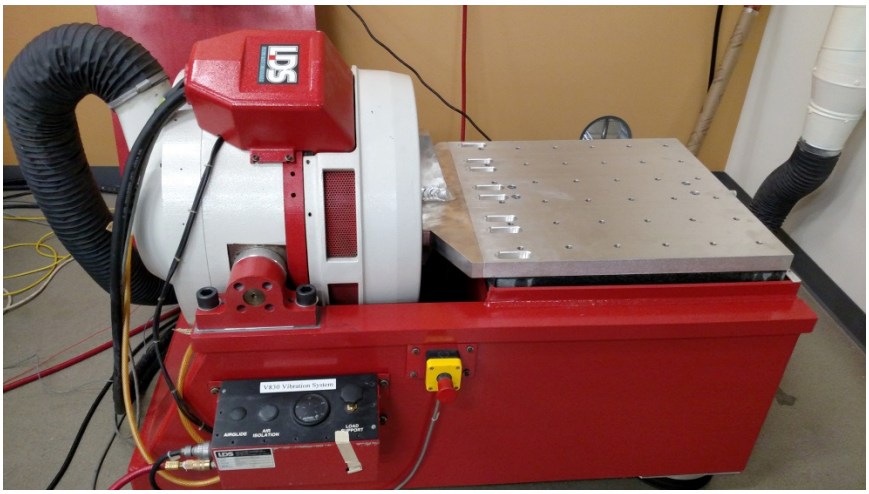
Environmental Testing



Overview

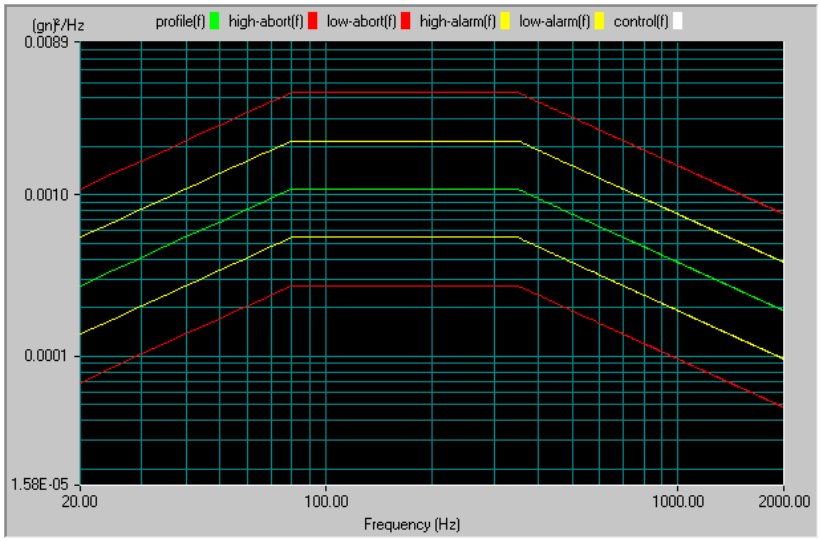
Environmental tests, which may be required in order to meet a standard or used to quickly assess the structural adequacy of a design, can be used to evaluate performance parameters and to troubleshoot problems such as excessive vibration or premature fatigue failure of critical components before the equipment is ever used in the field. ATA has years of experience in conducting environmental testing at other testing facilities and has recently added the capabilities to conduct testing in-house. ATA has a B&K LDS V830 shaker capable of random, sine, and shock testing for small and medium-sized components.

- ATA's in-house shaker capable of testing small and medium sized components



ATA provides additional value with a wide array of data acquisition systems and sensors. In addition to an four-channel vibration controller, ATA maintains more than a thousand channels of acquisition equipment capable of measuring acceleration, displacement, dynamic strain, temperature, force, and acoustic sound pressure levels. Finally, ATA's postprocessing tools using our own IMAT MATLAB toolkit, providing real-time information to make an informed engineering decision.

- Example vibration profile using a state-of-the-art vibration controller



Customers include:
BAE Systems, BMT Scientific Marine Services, Boeing, Sandia National Laboratory, Northrop Grumman, NTS (formerly Wyle), Pratt and Whitney

Product experience includes:
Qualification and environmental stress screening of electronic boxes, satellites

Key specifications:
B&K LDS V830-335-SPA16k
Sine force (peak): 2200 lbf
Slip table size: 24″x24″
Head expander size: 24″x24″

AS 9100 IAPMO R&T

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Fatigue, Durability, Performance, and Road Testing

Customers include:
Brunswick Aerospace, Cummings Aerospace, Ford Aerospace, IBM, Martinez & Turek, Qualcomm, Wenzlau Engineering

Product experience includes:
Commercial and military vehicles, amusement park rides, robotics, satellite transporters, mobile shelters, ground-based antennas

Codes utilized:
IMAT™, MATLAB®, Siemens I-deas™ NX Series, Test for I-deas™ software

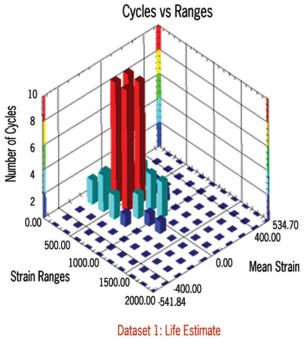
Overview

ATA's experience includes component and system testing utilizing strain gages, accelerometers, and many other available measurement devices. We can perform million-cycle tests or experimentally record the duty cycle and analytically predict the life of a structure. ATA's experience in this area extends to testing and evaluation of amusement park rides, automotive equipment, aerospace components, robotics, large-scale transportation vehicles, and other systems.

We typically use a variety of data acquisition systems and our own IMAT MATLAB toolkit for acquiring and analyzing strain gage data. ATA has one of the largest channel count strain conditioning systems in the industry and can acquire over two hundred channels of strain data concurrently. All data are collected with stand-alone digital data acquisition systems. This allows all channels to be measured simultaneously in rough environments without the need for a computer. The data can be reviewed immediately after each test run for quick-look verification. ATA's proprietary postprocessing tools greatly reduce the amount of time that a structure or vehicle has to be kept out of service for testing. Quick assessment of sensor functionality, repeatability, and overall measurement quality is completed within a few minutes after each test run.

Using ATA's proprietary MATLAB-based strain measurement toolkit, measured time histories can be converted to units of stress and subjected to rainflow cycle counting to provide 2-D histograms mapping stress ranges against mean stress values. Dynamic peak stress charts, a unique visualization of structural dynamic activity developed by ATA, can also be generated to precisely locate when and where high levels of stress occur during a typical operational test run. ATA is experienced in the evaluation of measured strain data according to most of the applicable fatigue codes, including DIN 1501.

- Test measurement of actual duty cycles allows accurate predictions of the fatigue life of structures



www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Vibroacoustics

Customers include:
ATK (now Northrop Grumman) Boeing, Harmon Kardon, ITT, Kistler, Lockheed Martin, Pratt & Whitney, Seagate, Space Systems Loral

Product experience includes:
Satellite systems, launch vehicles and fairings, rocket motors, jet and propeller aircraft, automobiles, ships, consumer electronics

Codes utilized:
AutoSEA2, I-deas, Vibroacoustics, NX Nastran, RAYON, SEAM, VA One, Wave6

Overview

ATA engineers are among the industry leaders in the field of vibroacoustics, the study of problems involving sound transmitted through or radiating from vibrating structures and vibration or stress induced by high intensity acoustic loading. The company maintains a comprehensive suite of the latest vibroacoustic engineering tools, which include the following:

- Field and laboratory test-measuring of sound pressure, sound intensity, vibration, and stress
- Statistical energy analysis (SEA) for wide bandwidth problems and system-level design
- Finite element and boundary element (BE) analysis for detailed structural-acoustic design

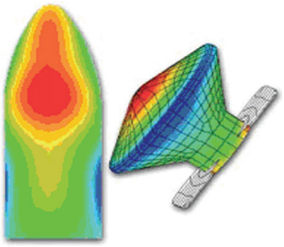
ATA's vibroacoustic engineering tools and experience allow the company to assist almost any program to predict product performance very early in the design stage. Our first task is often to define the loads for complex operating environments, including acoustic, aerodynamic, random vibration, and shock loads. We then use analysis tools, SEA, and finite element/BE analysis to provide valuable input to primary structure design. ATA also supports detailed design of add-on noise insulation or silencing treatments and vibration isolation or damping treatments—all optimized for minimum cost and lowest added mass.

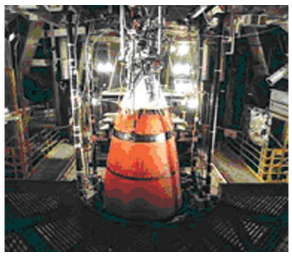
For noise reduction and sonic fatigue mitigation problems encountered in operating products and systems, ATA typically uses a cost-effective combination of test and SEA or BE analysis. This test/analysis approach ensures fast and reliable problem diagnosis and establishes a quantitative physics-based model for accurately evaluating the most effective design change options.

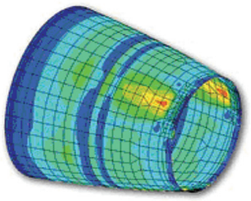
Common applications include the following:

- Defining random vibration and acoustic environments for equipment on satellites
- Launch vehicle and payload fairing design for liftoff acoustics, buffet and aeroelasticity, transonic aerodynamics, separation shocks, and reentry loads
- Aircraft/rotorcraft fuselage and interior trim design for control of cockpit and cabin noise levels, both subsonic and supersonic

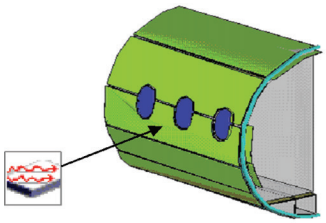
- ATA uses boundary element analysis for fairing interior acoustic and random vibration analyses of rocket motors

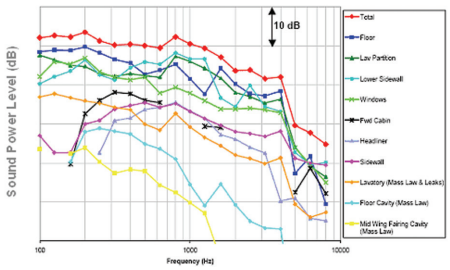






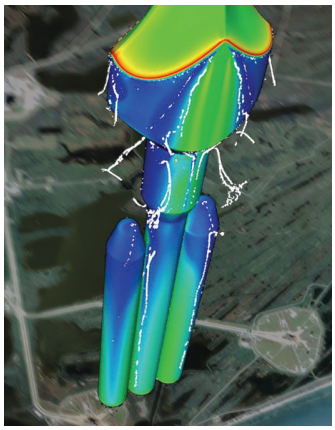
- ATA uses statistical energy analysis (SEA) for design of aircraft fuselage and interior trim to meet cabin noise control targets





www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Computational Fluid Dynamics (CFD) Analysis



Customers include:
Cessna, GA-ASI, NASA, Northrop Grumman, US Air Force Research Laboratory

Product experience includes:
Launch vehicles, payload fairings, airframes, fuel tanks, wind turbines, turbofan engines, heat exchangers, flow meters, and medical devices

Codes utilized:
Abaqus® CEL, FUN3D, Loci/CHEM, NX Thermal/Flow, Simcenter™ STAR-CCM+™

Overview

ATA's CFD and fluid-structure interaction (FSI) analysis services encompass prediction of the dynamic response of fluids, as well as thermal and/or mechanical fluid loading of structures (e.g., aircraft, launch vehicles, and propulsion systems). We have experience simulating many different types of fluids (e.g., gases, liquids, and multiphase fluids) across many regimes (laminar, turbulent, inviscid, viscous, etc.) using industry leading software tools on both in-house and external computing resources. Members of our staff have specialized expertise in different branches of fluid dynamics such as propulsion, reacting flows, FSI, rotorcraft, turbomachinery, and acoustics. We frequently develop unique tools and capabilities, including solver customization, in support of our customers. The CFD analysis support ATA provides includes the following:

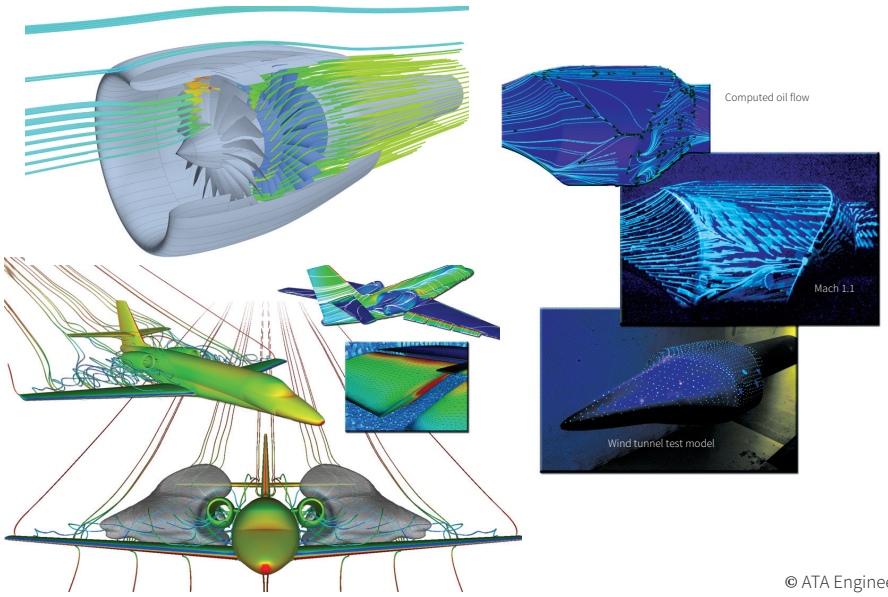
- Flow simulation and visualization
- Structural design optimization for fluid dynamic loading
- Fully coupled simulation of FSI
- Advanced methods development

For highly coupled systems or those that operate in extreme environments, multidisciplinary analyses that couple CFD results to a thermal, structural, or vibroacoustics model are often required. The ATA team is experienced in solving customer problems in these physical realms. For example, we offer engineering services that provide one-way and fully coupled fluid-structural-thermal analyses of engineering systems. Many of our advanced analysis methods and tools have been developed using independent research and development (IR&D) and Small Business Innovation Research (SBIR) funding, and we continue to push our capabilities in these areas to solve our customers' most challenging problems.

ATA is experienced with a variety of CFD analysis software, including Simcenter STAR-CCM+, Abaqus CEL, Siemens NX Thermal/Flow, Loci/CHEM, and FUN3D. ATA leverages both an in-house high-performance computing cluster and external supercomputing resources as required, and ATA's CFD analysts work closely with customers to create and interpret meaningful results and graphics from the large output data sets typically generated from CFD simulations. Our analysts are also familiar with numerous standalone pre- and post-processing tools and are able to convert data to and from these software packages to meet customer preferences.

Additionally, ATA is a value-added reseller of Simcenter STAR-CCM+.

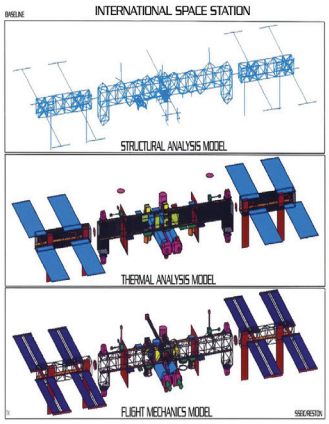
- ATA has provided CFD services for a variety of applications, frequently coupling the results to thermal, structural, and vibroacoustics analysis



www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

ATA ENGINEERING, INC.

Software Development, Process Improvement, and Integration



Customers include:
Boeing, Lockheed Martin, Micromotion, MTS, NASA, Sandia National Labs

Product experience includes:
Software specification development, CAE software translators, software integration, multidisciplinary process improvement, test data processing toolkits, temperature and pressure mapping programs, MATLAB-based software development, Open Architecture software, advanced CAE analysis software tools, graphical user interfaces

Overview

For many years, ATA has developed custom and commercial engineering software with a strong focus on the integration or interfacing of dependent but stand-alone software solutions. This focus is based on our experience supporting multidisciplinary engineering programs and identifying new methods and processes to improve the speed and quality of our customers' existing processes.

ATA typically develops customer-specific solutions based on our customer's tools and processes and which provide improvements in time, quality, and cost. Starting from our analysis of their particular requirements and processes, we develop use cases that can drive a precise software specification. The final software package is guided by this specification and user acceptance testing performed as the development progresses. An example of this is the I-deas Exodus Translator (IXT) for Sandia National Labs. Here, ATA developed an interface between Siemens I-deas® and the Sandia Exodus database that allowed virtually all of their in-house finite element codes to take advantage of the sophisticated finite element model generation and results display capabilities of I-deas.

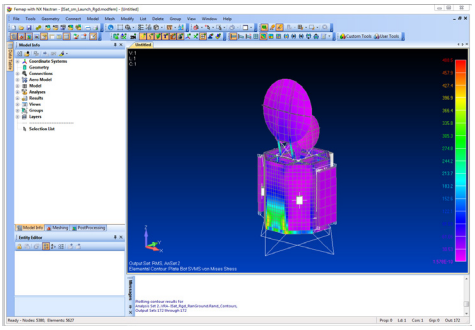
ATA staff also develop tools for multiorganizational programs. A key example of this is the I-deas² software product used for conceptual design of the International Space Station. This software product was developed for the NASA Centers and the Program Support Contractor for all preliminary analysis. It enabled more than 75 engineers from all engineering disciplines including structures, dynamics, orbital mechanics, thermal, and more to develop their models based on an automatic abstraction of the same geometry.

ATA also develops a number of commercially available products that support analysis- and test-driven design. These products were developed out of our need for these tools to make our consulting more efficient and capable, and our customers also benefit from these innovations. These products include the following:

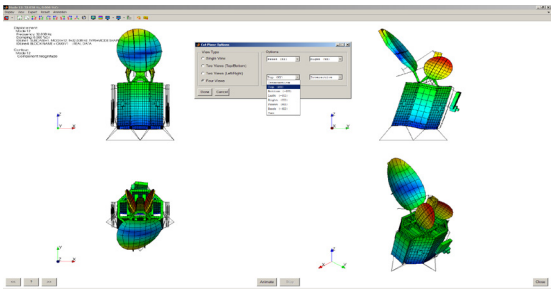
- Attune: Test and analysis model updating and correlation toolkit
- IMAT: I-deas Test to MATLAB® interface and toolkit
- TempMap and PressMap: Map temperatures and pressures from aeroheating and computational fluid dynamics (CFD) codes to I-deas NX
- Vibrata: Full-featured modal domain forced response solver integrated with MATLAB and Femap

ATA is also a value-added reseller (VAR) for the Siemens suite of computer-aided engineering (CAE) digital simulation tools, including Simcenter 3D (formerly NX CAE), NX CAD/CAM, NX Nastran, Femap, and Simcenter STAR-CCM+. We work hand in hand with Siemens to provide software sales, pre/post-sales technical support, training, and implementation services. For more information on these products, contact Dan Kuriger at 858.480.2069 or by email at daniel.kuriger@ata-e.com.

- With Vibrata, you can create Contour plots and animations help to visualize and comprehend results



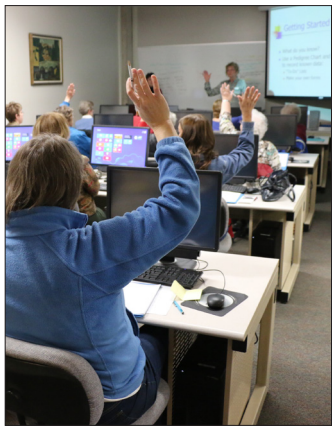
- Display and animate your mode shapes, change the mode shape view, and export your animations to an AVI or MPEG4 file, in IMAT



www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

ATA ENGINEERING, INC.

Training



Instructors are expert users
ATA provides software training only in software applications that ATA regularly uses. All instructors are expert users of the software that they teach

Class locations
Regularly scheduled classes are set for one of the ATA offices. See the Siemens Digital Industries Software Training website. Classes that are incremental to the pre-scheduled classes can be at a location of the customer's choosing, including on site at the customer's facility

Solution Partner
PLM
SIEMENS

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

Overview

ATA provides training for many of the software applications used daily for our project work, including Siemens Digital Industries Software and ATA software. With up-to-date, hands-on training from expert instructors, ATA's software training courses provide the skills you need. Courses use standardized training materials, or the training can be customized for your specific application.

Siemens Digital Industries Software Training

ATA is the developer of Siemens Digital Industries Software's NX Nastran courses and is the preferred provider of NX Nastran training in North America. Nastran courses developed and taught by ATA include the following, all taught with a choice of Femap or Simcenter as pre- and post-processors.

- Introduction to Finite Element Analysis
- Introduction to Dynamic Analysis
- Advanced Dynamic Analysis
- Introduction to DMAP
- Superelement Analysis
- DDAM Analysis
- Design Sensitivity and Optimization
- Coupled Structure/Acoustics Analysis

In addition to Nastran training, ATA develops and delivers training in the following Siemens Digital Industries Software tools:

- Response Dynamics
- Introduction to Femap Pre- and Post-Processing
- Advanced Femap Pre-and Post-Processing

To register for a scheduled class, sign up on the Siemens Digital Industries Software Training website. Customer-site classes can be arranged through your Siemens Digital Industries Software account manager.

ATA also offers these classes in special course sessions beyond those scheduled on the Siemens Digital Industries Software Training website. Special sessions can be arranged directly with ATA by contacting your ATA account manager or visiting http://www.ata-plmsoftware.com/events-training/training-classes/.

ATA Software Training

ATA has developed and maintains a suite of software applications, referred to as ATA|Suite™, targeted at facilitating ATA's project work. Customers also often find these applications helpful and elect to purchase them, so ATA offers training for these products as well. The most widely used ATA|Suite product is IMAT™, an interface to MATLAB that is used on every test project at ATA. IMAT and the other ATA|Suite products are described on the ATA website at http://www.ata-e.com/software/ata-software/. Training in any of these products can be arranged through your ATA account manager or by visiting http://www.ata-e.com/about-ata/contact/.

Custom Classes

In cases where the standard classes do not meet the need, ATA is able to create and deliver training according to the customer's specifications. Like the standard classes, these custom classes focus on software usage, but they may also include a significant element of methodology training. Custom training can be arranged by contacting your account manager or by submitting a request at http://www.ata-e.com/about-ata/contact/.

Class Experience

In all ATA classes, lectures are supplemented with extensive hands-on workshops based on practical examples so that attendees can leverage the training immediately upon returning to work, and training materials are routinely updated to include the latest software features and functionality. Students generally rate ATA classes as "excellent" for content, instructor knowledge, equipment, and overall course experience, and they consistently rate the classes as "much better than" other CAE classes they have attended.

ATA Engineering, Inc. – "A Valuable Asset"

Unique High-Value Technical Solutions

ATA Engineering solves design problems. Through our unique combination of test and analysis capabilities, knowledge of your products, and the expertise and dedication of our people, we have established a reputation for excellence over the last forty years and distinguished ourselves from other service providers.

We are able to provide unique, creative, and comprehensive solutions to your design concerns:

- We can provide integrated design, analysis, and test teams with all the skills needed to support a complete design project, or we can supplement your existing staff on a person-by-person as-needed basis.
- We have best-in-industry test and analysis tools that maximize our productivity and support your tight schedules and budgets.
- Our staff has an average of more than twelve years of relevant industry experience per person.
- We have experience in a broad cross-section of industries which allows us to leverage the best-of-the-best tools, processes, and methods on your design.

What Our Customers Say

"The ATA team is always accommodating, professional, and fairly priced."

Ted White
Program Management Specialist
Alliance Spacesystems

"ATA's performance was excellent. The delivery time was exceptional despite last-second changes in the project. ATA helps bring exceptional credibility to our projects. Thank you to the ATA team."

Mike Lewis
Chief Technology Officer
NanoRacks

"ATA staff went above and beyond in order to complete the instrumentation in time for the test. ATA is an excellent company to do business with. You are a team player and committed to making the customer's test a success."

Phil Mott
Staff Engineer
Lockheed Martin Space Operations

"As always, ATA performed excellently in a very technically challenging project with a very compressed schedule. ATA has become a valuable member of the Martinez and Turek, Inc. design team."

Dwight Leung
VP, Engineering
Martinez and Turek, Inc.

"During the project some unforeseen work developed which would have hindered a launch – ATA staff sacrificed much personal time to support analyses and develop a methodology which allowed for a better understanding of issues. The work by ATA was recognized and appreciated by Lockheed Martin and the Air Force customer."

Sandra Mossman
Titan IV Technical Lead
Lockheed Martin Corporation

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000

ATA ENGINEERING, INC.

Consortium Memberships

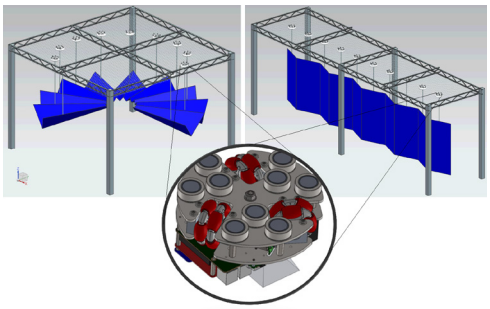
ATA Engineering Is a Non-Traditional Defense Contractor

To harness new technologies and methods, the US Department of Defense (DoD) often uses Other Transaction Authorities (OTAs) to collaborate with industry on rapid and agile research and prototyping efforts. OTAs provide flexible contracting practices that reflect commercial industry standards and best practices, and promote open collaboration among the Government, nonprofits, organizations of all sizes, and academic institutions. The Government–industry consortia that manage these OTAs have a common goal of quickly bringing innovative technologies to the warfighter through rapid contracting, relief from Federal Acquisition Regulations, and inclusion of non-traditional suppliers. As a small business, ATA Engineering is a non-traditional contractor and a proud member of the following consortia:

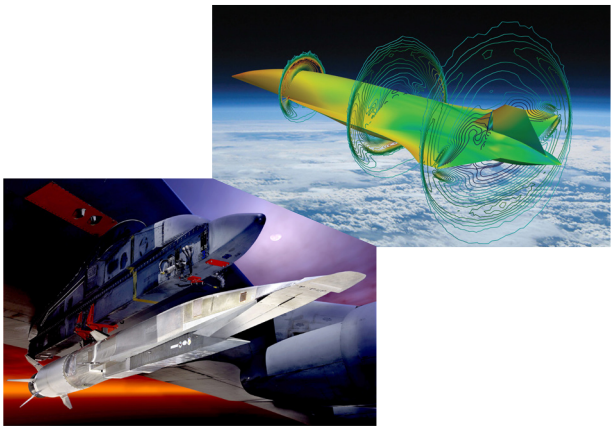
- National Armaments Consortium (NAC)
- Space Enterprise Consortium (SpEC)
- Aviation & Missile Technology Consortium (AMTC)
- Vertical Lift Consortium (VLC)
- Naval Surface Technology & Innovation Consortium (NSTIC)
- National Shipbuilding Research Program

Offering advanced methods and mechanical and aerospace engineering support in the areas of design, modeling and simulation, and testing, ATA seeks collaboration opportunities with prime contractors and other non-traditional organizations within the various consortia to best serve the DoD in its development of future systems and capabilities.

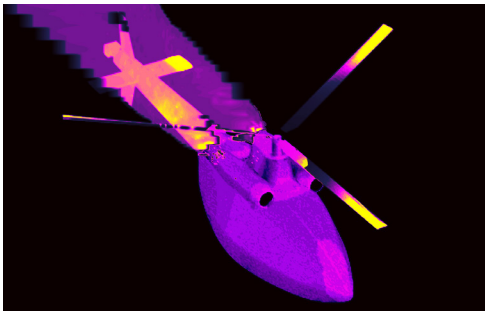
Relevant Defense Capabilities



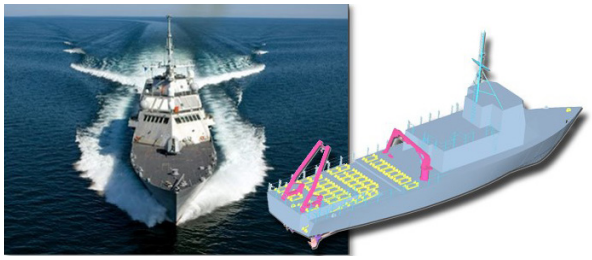
Space applications (new methods to predict large structures' behavior, new system designs such as reconfigurable gravity offloading systems for deployable structures)



Hypersonic applications (multiphysics simulations, composite material characterization, test facility improvements)



Rotorcraft applications (advanced signature prediction, airframe analysis, accelerated fatigue cycles)



Naval applications (new tools for accelerating processes to provide improved safety and simulation insights to our nation's shipyards)

www.ata-e.com
ata-engineering
@ataengineering
sales@ata-e.com
858.480.2000