



CEAT Center of Excellence for Airport Technology

The University of Illinois at Urbana-Champaign leads the Center of Excellence (COE) for Airport Technology (CEAT). This Center was competitively selected by the FAA Administrator in 1995, through a strong working partnership with the FAA, initially focused on airport pavement issues.

In 1999, the Center broadened its research to include airport safety components: wildlife hazard mitigation, anti-icing, and airport lighting and visual guidance. The COE research team was expanded to include Rensselaer Polytechnic Institute (RPI), and North Carolina A&T University (NCA&T).

In 2004, the COE developed a strong partnership with the O'Hare Modernization Program (OMP). The Center established a research initiative targeting technical issues related to the construction of new and extended runways.

The joint project emphasizes active research and novel approaches to the creation of durable pavements providing for improvement and cost-effectiveness in this vital area.

The COE/OMP research team lends expertise in the areas of concrete pavement studies, airport wildlife safety management and subgrade support and stabilization at the Chicago O'Hare International Airport.

In 2004, the FAA also invited the Lighting Research Center (LRC) at Rensselaer Polytechnic Institute to conduct research on new LED and tungsten halogen technologies for airport visual guidance. The COE has been serving as an umbrella organization encompassing this work.

The COE has sponsored summer internship programs between NCA&T and UIUC over the past decade. This outreach effort has successfully encouraged

students from underrepresented groups to pursue graduate studies in airport engineering.

The FAA's National Airport Pavement Test Facility (NAPTF) located at the FAA William J. Hughes Technical Center, provides COE researchers the opportunity to analyze multiple-wheel interaction effects on runway surfaces. Knowledge being gained from these studies supports the FAA's development of new pavement design software in preparation for the next generation of commercial aircraft including the Boeing B-777 and Airbus A-380.

Over the past decade, CEAT has produced 50 Ph.D. theses, 500+ technical reports, articles and papers, has involved over 150 students. Since its inception, the FAA investment in CEAT research has been matched by more than \$18M of cost sharing contributions by the University of Illinois and CEAT industrial partners.

Technology Areas:

Pavement Research: Nondestructive Evaluation of Pavements, Structural Behavior and Modeling, Design Concepts and Procedures.

Safety Management: Avian Radars, Foreign Object Debris (FOD) Detection, LED Lighting Technology, Wildlife Hazard Mitigation.

Sponsor:

Airport Technology R&D Team

Web:

<http://ceat.illinois.edu/>



Center Projects Include:

Airport Safety:

- Wildlife Hazard Abatement Systems (WHAS)
- Deployment and Evaluation of Avian Radars
- Deployment and Operation of FOD Detection Systems at Airports
- Metrics and Measurement Procedures for LED Lighting Systems
- Field Evaluation of Runway Guard Lights

Airport Pavement:

- Non-Destructive Testing and Evaluation (NDTE) Technologies for Airport Pavement
- Advanced Finite Element Modeling of Asphalt Overlays
- Alternative Fatigue Cracking Modes on Airfield Rigid Pavements
- Hot-Mix Asphalt (HMA) Fatigue Characteristics for Airport Pavements
- Development and Validation of Residual Stress Test for Concrete Pavement

University Partners:

University of Illinois at Urbana-Champaign (lead)

North Carolina A&T University
Rensselaer Polytechnic Institute

Public Partners:

O'Hare Modernization Program
O'Hare International Airport
Chicago Department of Aviation
Port of Seattle
Seattle-Tacoma International Airport
John F. Kennedy International Airport
Providence International Airport
Rhode Island Airport Corporation

Industry Affiliates:

XSiGHT Systems
Geo-Marine Inc.
Accipiter Systems
Trex Enterprises Corp.
QinetiQ Group PLC
Stratech Systems, Ltd.

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- Operations Research - 1996
Web: <http://www.nextor.org>
- Airworthiness Assurance - 1997
Web: <http://www.coe.faa.gov/aace>
- General Aviation - 2001
Web: <http://www.cgar.org>
- Aircraft Noise and Aviation Emissions Mitigation - 2003 (with NASA and Transport Canada)
Web: <http://www.partner.aero>
- Advanced Materials - 2004
Web: <http://www.niar.twsu.edu/coe/cecama.asp>
Web: <http://depts.washington.edu/amtas>
- Airliner Cabin Environment Research - 2004
Web: <http://acer.eng.auburn.edu>





NEXTOR

National Center of Excellence for Aviation Operations Research

Established in 1996, the Center of Excellence (COE) for Aviation Operations Research (NEXTOR) seeks to lead the aviation community by exploring new ideas and paradigms for aviation operations, educating and training aviation professionals, and promoting knowledge exchange among industry, government and academic leaders.

In collaboration with the FAA and its industry partners, this Center looks to develop an understanding of how the National Airspace System (NAS) service providers and users will respond to alternative system architectures, operational concepts, investment strategies, and finance mechanisms. The knowledge and capabilities gained from this research provides critical information to executives and senior government officials on a host of issues

ranging from near-term investment choices to long-term strategies.

Through its conference and seminar series, this COE gains a wealth of information that is presented and discussed with the academic and industrial community. The series offers two to three conferences and seminars per year on such subjects as NAS Infrastructure Management, Performance Metrics, and Economic and Social Value of Air Transportation.

In addition, the partnership seeks to increase the breadth of aviation operations research knowledge through short courses and degree programs at each of its universities. More than 200 graduate students have participated in the COE's research programs since the organizations formation in 1996. Short courses are taught by facul-

ty members and are open to any FAA, federal government, or industry affiliate employee interested in air transportation systems analysis. COE members and industry affiliates have provided more than 15M in matching contributions.

Core Members:

University of California, Berkeley
Massachusetts Institute of Technology
George Mason University
University of Maryland, College Park
Virginia Polytechnic Institute and State University

Industry Affiliates:

The Boeing Company
California Department of Transportation
CSSI, Inc
Draper Laboratory

Established: 1996

Technology Areas:

- Air Traffic Management and Control
- Safety Data Analysis
- Communications, Data Collection, and Distribution
- Human Factors
- System Performance and Assessment Measures
- Aviation Economics
- Knowledge Transfer and Education

Sponsor: Office of Technology Development and Operations Planning

Web: <http://www.nextor.org>



Federal Express
 Honeywell
 Leigh Fisher Associates
 Logistics Management Institute
 Los Angeles World Airports
 Maryland Aviation Administration
 Massachusetts Port Authority
 Metron Aviation Inc.
 Northrop Grumman
 Sabre
 San Francisco International Airport
 Seagull Technology
 Southern California Association of Governments
 Virginia Department of Transportation

University Management Team:

Co-Directors:

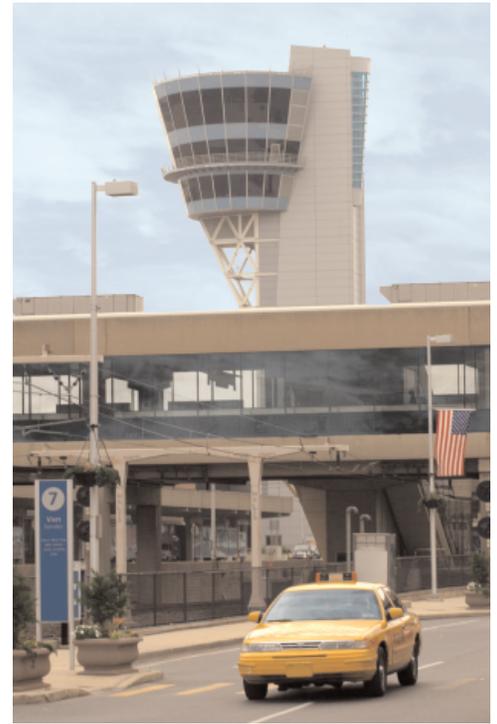
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- General Aviation - 2001
 Web: <http://www.cgar.org>
- Aircraft Noise and Aviation Emissions Mitigation - 2003 (with NASA and Transport Canada)
 Web: <http://www.partner.aero>
- Advanced Materials - 2004
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 Web: <http://depts.washington.edu/amtas>
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PARTNER

Center of Excellence for Aircraft Noise and Aviation Emissions Mitigation

Partnership for AiR Transportation Noise and Emissions Reduction

The Center of Excellence (COE) for Aircraft Noise and Aviation Emissions Mitigation (PARTNER) collaborates with its sponsors, FAA, NASA, DOD, and Transport Canada, and a broad range of stakeholders to enhance the understanding of aviation environmental issues, and foster a quieter and cleaner environment. In addition to its core sponsors, Center activities are supported by the Department of Transportation Volpe National Transportation Systems Center, the Department of Defense, and the Environmental Protection Agency.

The Center of Excellence is a long-term

partnership of academia, industry, and government to foster technological, operational, policy, and workforce advances for the betterment of mobility, the economy, and the environment. The group conducts research and engineering development to increase understanding of aviation's environmental impacts, and to develop and assess options for mitigating these impacts.

The knowledge and capability gained from this research provides government, industry, communities, and policy-makers with new scientific understanding and analysis to employ when addressing aviation's environmental impacts. COE members and

industry affiliates have provided more than \$27M in matching contributions.

Examples of current research:

- Emissions Characteristics of Alternative Fuels
- Emissions Atmospheric Impacts
- Health Impacts of Aviation-Related Air Pollutants
- Noise Exposure Response
- Health Effects of Aircraft Noise
- Sonic Boom Mitigation
- Sound Structural Transmission
- Open Rotor Noise Impact On Airport Communities
- Continuous Descent Arrival

Established: September 2003

Research Areas:

- Noise and Emissions Measurements
- Aviation Effects on Air Quality and Climate
- Noise and Emissions Impacts on Human Health and Well-Being
- Compatible Land Use Management
- Aircraft Operational Procedures for Reduced Noise and Emissions
- Design and Analysis of Current and Future Aircraft Technology
- Aviation Alternative Fuel Opportunities, Challenges, Emissions Characteristics
- Interdependencies Among Technology, Policy, Operations, Economics, Environment
- Tools and Analysis to Inform Decision-making
- Communication and Continuing Education

Sponsors: FAA Office of Environment and Energy, NASA Aeronautics, and Transport Canada

Web: <http://www.partner.aero>



- Airport Surface Movement Optimization
- Environmental Cost-benefit Analysis of Ultra Low Sulfur Jet Fuels
- Life-cycle Analysis of Alternative Jet Fuels
- Metrics for an Aviation CO2 Standard
- Economic and Environmental Effects of a Cap-And-Trade Policy in Aviation
- Tools to Assess Technology, Operations and Policy Options for Mitigation

University Partners:

- Massachusetts Institute of Technology - Team Lead
- Georgia Institute of Technology
- Harvard University
- Pennsylvania State University
- Purdue University
- Stanford University
- Missouri University of Science and Technology
- University of North Carolina
- York University

Other University Participants:

Cambridge University, University of California at San Diego, University of Houston, University of Illinois, Urbana-Champaign, University of Reading, University of Sheffield.

Industry, Professional and Community Affiliates:

One of PARTNER's great strengths is its advisory board. Members include aerospace manufacturers, airlines, airports, national, state and local government, professional and trade associations, non-governmental organizations and community groups. They are united in the desire to foster collaboration and consensus to jointly advance environmental performance, efficiency, safety and security. A complete list of members is available at <http://web.mit.edu/aeroastro/partner/about/board.html>

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CGAR

Center of Excellence for General Aviation Research

Federal Aviation Administration Administrator, Jane Garvey, selected a team of universities that forms the Air Transportation Center of Excellence for General Aviation Research (CGAR) in March, 2001. The Embry-Riddle Aeronautical University (ERAU) serves as lead for the core team that includes Wichita State University, the University of North Dakota, and the University of Alaska. Affiliate universities include Florida A&M University and Middle Tennessee State University. In August 2001, the universities entered into cooperative agreements with the FAA that allow them to share as equal technical partners in support of GA safety-related research and development.

Centers of Excellence (COEs) are designated following rigorous competition and a

formal evaluation based on selection criteria mandated in Public Law 101-508, the FAA Research Engineering and Development Authorization Act of 1990.

Funding for the center is provided through cost-share contract awards and grants subject to dollar-for-dollar matching requirements mandated by Congress. The COE represents a long-term FAA commitment over a period of 10 years, and the Center is striving to become a self-supporting national resource during its final phase.

Through the Air Transportation Centers of Excellence program, the FAA enhances internal research efforts with access to academic research, and hastens the application of this work to benefit the aviation community and the flying public.

By establishing major research centers

throughout the country to advance aviation-related technologies, the FAA proactively works toward creating a pool of professionals trained in aviation-related research areas; helps finance graduate education; fosters cooperative FAA-university-industry research and development; and ultimately improves the national airspace system.

FAA Centers of Excellence form a cumulative repository of aviation related knowledge, and encompass the entire spectrum or research and development from basic research to engineering development and prototyping.

The FAA has funded more than 100 projects, reports, theses, and doctoral dissertations through this Center of Excellence partnership. More than 250 graduate and

Established: 2001

Technology Areas:

- NextGen ADS-B
- Weather Technology in the Cockpit
- General Aviation Safety Management Systems
- Remote Airport Lighting Systems
- FAA Industry Training Standards
- Unmanned Aircraft Systems

Sponsor:

Airport and Aircraft Safety
Research & Development
Division

Web: <http://www.cgar.org/>



undergraduate students have participated in research activities associated with this COE. The COE members and industry affiliates have provided more than \$15M in matching contributions.

CGAR Center projects include:

- Effect of ADS-B on Near Mid-Air Collision Rates of General Aviation Aircraft
- Remote Airport Lighting Systems (RALS)
- Establish a North American Bird Strike Advisory System (NABSAS)/ US Civilian Airport Wildlife Advisory System
- Weather Technology in the Cockpit (WTIC)
- Safety Management Systems (SMS)
- Statistical Analysis for General Aviation Accidents
- Aviation-Grade Ethanol Development
- Joint Training Standards Development - FAA Industry Standards Program
- UAS Systems Research
- Human Factors in General Aviation
- ASI Course Development

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University Partners:

- Embry Riddle Aeronautical University
- University of North Dakota
- University of Alaska-Anchorage
- University of Alaska-Fairbanks
- Wichita State University

Affiliate Members:

- Florida A&M University
- Middle Tennessee State University



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JAMS

The Joint Center of Excellence for Advanced Materials

The Joint Center of Excellence (COE) for Advanced Materials (JAMS) was established in January 2004 to assist in ensuring the safe and reliable application of composites and advanced materials to commercial aircraft. The Center is a joint effort of the Center for Composite and Advanced Materials (CECAM) led by Wichita State University and Advanced Materials for Transport Aircraft Structures (AMTAS) led by the University of Washington. The COE is a leader in international coordination of research, development, and standardization for structures constructed from these new materials.

The common goal of this Joint Center, as with the other COEs, is to create a cost-sharing academic, industrial, and governmental partnership. The members are forging a union between the public sector, the private sector, and academic institutions to create a world-class capability to identify solutions for existing and

potential advanced materials and structures issues.

The main focus of this partnership is the research, engineering, and development of information used to assure safety and standardize certification of existing and emerging structural applications of composites and advanced materials. Specifically, projects include the evaluation of past applications, performance of applied research, and the development of standard engineering practices.

This Joint Center of Excellence, working with industry and government, also plays an important role in technology transfer, training, and continuing education for the aircraft industry and regulators. The group strives for international standardization; develops consensus for developed protocols; identifies standardized criteria for material and process control; and promotes shared material databases worldwide.

COE members and industry affiliates have provided more than \$15M in matching contributions.

JAMS Projects include:

- Aging of Composite Aircraft Structures: Beechcraft Starship Teardown and Decommissioned Boeing 737 Tail
- Certification of Discontinuous Composite Material Forms for Aircraft Structures
- Combined Global/Local Variability and Uncertainty in Integrated Aeroservoelasticity of Composite Aircraft
- Crashworthiness of Composites: Material Dynamic Properties
- Damage Tolerance and Durability of Adhesively Bonded Composite Structures and GLARE Laminates for Aircraft Structures
- Development and Evaluation of Fracture Mechanics Test Methods for Sandwich Composites

Established: 2004

Technology Areas:

- Material Standardization and Shared Databases
- Bonded Structures
- Structural Substantiation
- Damage Tolerance and Durability Maintenance Practices
- Advanced Material Forms and Processes
- Unique Advanced Materials Cabin Safety Issues
- Life Management of Materials for Improved Aircraft Maintenance Practices
- Nanotechnology for Composite Structures

Sponsor: Office of Airport and Aircraft Safety R&D Division

Web: <http://www.jams-coe.org/>



- Development of Reliability Based Damage Tolerant Structural Design Methodology
- Environmental Factor Influence on Composite Design and Certification
- Evaluation of Friction Stir Weld Process and Properties for Aerospace Application
- Failure of Notched Laminates Under Out-of-Plane Bending
- Fluid Ingression Damage Mechanism in Composite Sandwich Structures
- Identification and Validation of Analytical Chemistry Methods for Detecting Composite Surface Contamination and Moisture
- Impact Damage Formation on Composite Aircraft Structures
- Improving Adhesive Bonding of Composites Through Surface Characterization
- Inverse/Optimal Thermal Repair of Composites
- Methods for the Evaluation of the Fitness of Fiber Reinforced Composite Surfaces for Subsequent Adhesive Bonding
- Production Control Effect on Composite Material Quality and Stability

- Standardization of Analytical and Experimental Methods for Crashworthiness Energy Absorption of Composite Materials
- Statistical Analysis Program for Generating Material Allowables
- Structure Health Monitoring for Life Management of Aircraft
- Training Strategy Development - Composite Materials Education for Aircraft Practitioners
- Technology Assessment of the Airworthiness of Unmanned Aerial Systems

CECAM Director/University Lead:

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CECAM Members:

Northwestern University
Purdue University
University of Delaware
University of California at Los Angeles
Tuskegee University



Composite sandwich panel with a circular repair patch being inspected using mechanical impedance equipment.

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Oregon State University
Florida International University
University of Utah
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RITE

Center of Excellence for Research in the
Intermodal Transport Environment
(formerly Airliner Cabin Environment Research-ACER)

The Federal Aviation Administration (FAA) Administrator announced the establishment of the Center of Excellence (COE) for Airliner Cabin Environment Research (ACER) on August 30, 2004. Recently re-named the COE for Research in the Intermodal Transport Environment (RITE), the Center, in collaboration with the FAA, expanded its scope and now engages in research and development to ensure the safety and health of all human occupants of aircraft as well as other vehicles used in public transportation (e.g., trains, buses, etc.). This partnership seeks to develop tools to understand and mitigate occupant safety and health risks that arise from environmental issues.

The COE conducts research that includes the entire spectrum from applied research through engineering development, prototyping, and testing within the scope of the airliner cabin environment. The scope of this research includes, but is not limited to: development of cabin air quality sensors

“We’ve brought together some of the brightest minds science has to offer to focus on cabin air quality and chemical and biological threats to protect passengers and crew members. This research will be of great benefit to the flying public.”

FAA Administrator Marion C. Blakey

and sensor systems to detect potential environmental contaminants; evaluation and definition of the distribution of chemical contaminants and infectious disease in airliner cabins; investigation of the health effects of potential contaminants and other aspects of airliner cabin environments.

The Center performs field and laboratory analysis of potential cabin contaminants, assessments of potential methods to mitigate, control and eliminate the effect and/or spread of contaminants and disease, and develops databases with supporting architecture for documentation of contaminants and contaminant incidents on commercial airliners. The future scope of activ-

ities may be expanded to other aviation cargo and cabin environmental quality efforts such as large-scale application of sampling/analysis techniques in commercial aviation. COE members and industry affiliates have provided more than \$15.5M in matching contributions.

University Partners:

Auburn University - Executive Lead
Harvard University - Technical Co-lead
Purdue University - Technical Co-lead
Boise State University
Kansas State University
University of Medicine and Dentistry
of New Jersey

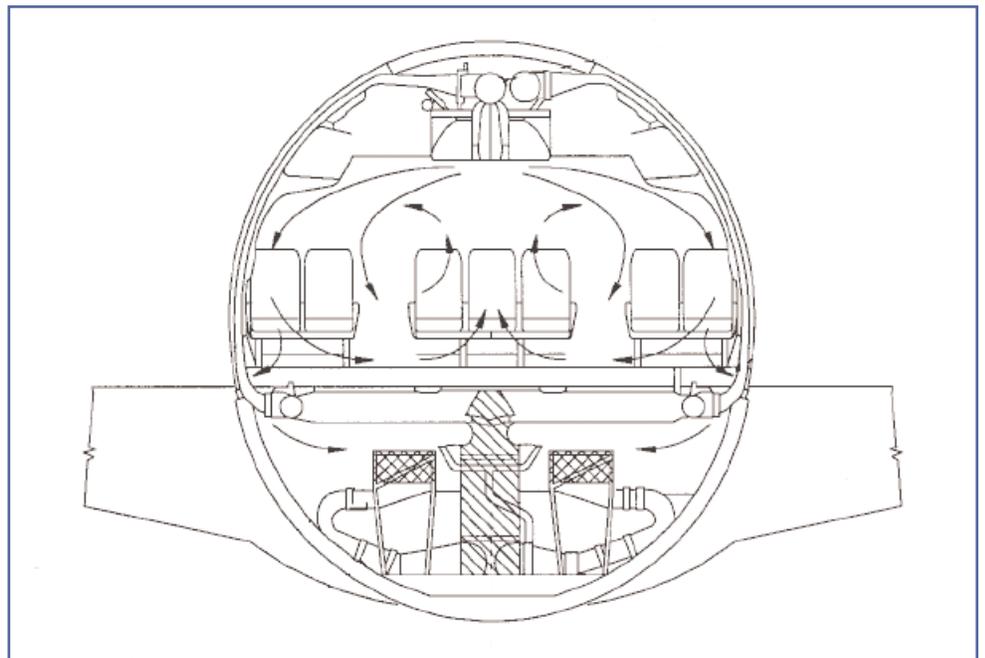
Established: August, 2004

Technology Areas:

- Cabin Air Quality Sensor System Development
- Contamination Mitigation Technology Development
- Air Quality Incident Analysis
- Safety and Health Risk Assessments
- Disease Transmission and Mitigation

Sponsor: FAA Aviation Safety
Office of Aerospace Medicine

Web: <http://acer.eng.auburn.edu>



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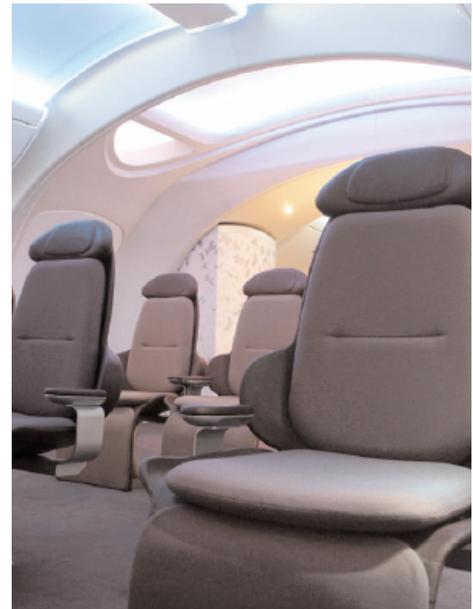
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Industry Affiliates:

Air Transport Association
ANSYS Inc.
AeroClave LLC.
Airline Pilots Association
AirOcare Inc.
Altera Inc.
Boeing Company
Delta Air Lines
Donaldson Company Inc.
Goodrich Sensor Systems
Honeywell
Intergraph Corporation
InvisiMED Company
Keddeg Company
Pall Aeropower Corporation
Steris Corporation
Technical University of Denmark
TSI Inc.
United Technologies Research Center



Advisory Board Members:

Air Transport Association, ARA,
Boeing, Honeywell (Chair), Pall Aeropower
Corp., Steris, CDC, and EPA.



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Web: <http://www.nextor.org>
- Airworthiness Assurance - 1997
Web: <http://www.coe.faa.gov/aace>
- General Aviation - 2001
Web: <http://www.cgar.org>
- Aircraft Noise and Aviation Emissions Mitigation - 2003 (with NASA and Transport Canada)
Web: <http://www.partner.aero>
- Advanced Materials - 2004
Web: <http://www.niar.twsu.edu/coe/cecam.asp>
Web: <http://depts.washington.edu/amtas>
- Airliner Cabin Environment Research - 2004
Web: <http://acer.eng.auburn.edu>





CST

The Center of Excellence for Commercial Space Transportation

Genesis of the Center of Excellence for Commercial Space Transportation

On August 18, 2009, FAA Administrator, Randy Babbitt, in concurrence with a request by Dr. George Nield, Associate Administrator for the FAA Office of Commercial Space Transportation (AST), agreed to the creation of a new FAA Center of Excellence for Commercial Space Transportation (COE CST).

Dr. Nield intends to utilize the collaborative COE model to help fulfill the role of AST to "encourage, facilitate, and promote" commercial space transportation. The new FAA Center will focus on strategic research, education and training to support AST initiatives over the next decade.

Since its creation in 1984, the FAA Office of Commercial Space Transportation has successfully conducted its two-fold regulatory responsibility: 1) to judiciously regulate the industry to ensure public safety,

and 2) to encourage, facilitate, and promote a safe and successful commercial space transportation industry. As of March 2010, there have been over 200 successful launches that were licensed or permitted launches by the FAA Office of Commercial Space Transportation.

The Emerging Commercial Space Transportation Industry

On October 4, 2004 Burt Rutan won the \$10 million Ansari X PRIZE with SpaceShipOne, his suborbital reusable launch vehicle to an altitude of 100km (328,000 feet). This feat was immediately recognized as a milestone in flight by the Smithsonian's National Air & Space Museum, and it led to the creation and announcement of Virgin Galactic, the first commercial company designed to provide frequent and safe flights to take private individuals to the edge of space and back.

Armadillo Aerospace and Masten Space

Systems, after claiming all two million dollars in the Lunar Lander Challenge by October 2009, announced plans to begin flight testing of rocketpowered vehicles with the stated goal of commercial operations for frequent suborbital flight and recovery of scientific payloads to altitudes near, to, and above 100 kilometers.

Meanwhile, the intentions and accomplishments of other companies, e.g., Orbital Sciences, Space Exploration Technologies (aka SpaceX), and XCOR Aerospace, provide strong examples of the emerging commercial space transportation sectors that differentiate themselves from the more established sectors of expendable launch vehicles.

Currently, as of April 2010, the next chapter of the SpaceShipOne story has already begun to unfold. SpaceShipTwo (christened VSS Enterprise), a vehicle six times larger than its predecessor, underwent its inaugural captive carry test. It was carried

To be Established: 2010

Technology Areas:

- Space Traffic Mgt & Operations
- Launch Vehicle Systems
- Human Space Flight
- Space Commerce

Sponsor:

- Office of Commercial Space Transportation



VSS Enterprise First Flight: Photo by Mark Greenberg

by WhiteKnightTwo (christened VMS Eve) and successfully accomplished all flight test goals. Further flight testing is expected through 2010 and into 2011.

COE CST Description

Like the eight FAA Center teams previously selected by FAA Administrators, this COE will encourage and facilitate the collaboration of world class scientists and the leveraging of shared resources and capabilities to maximize the synergy amongst government entities, academic partners, and industry affiliates. Members will coordinate efforts to define and conduct research, disseminate results and engage in technology transfer for public purpose while they educate, train, and prepare the next generation of commercial space transportation professionals.

Administrator Babbitt has made a 10- year commitment to fund the COE for CST at an annual level of one million dollars. COE members are required to match federal grant funds 1:1 from industry and other non-federal sources.

The four major research areas and their component technical domains to be addressed by the COE CST include:

Space Launch Operations and Traffic Management:

- On-Orbit Operations
- Emergency Response
- Ground Safety
- Spaceports
- Space Traffic Control
- Training
- Space Environment

Launch Vehicle Systems, Payloads, Technologies, and Operations:

- Safety Management & Engineering
- Flight Safety Analyses & Computation
- Avionics
- Flight Safety Systems
- Materials
- Propulsion Systems
- Sensors
- Software Safety
- Testing
- Vehicle Design, and Payloads

Commercial Human Space Flight:

- Aerospace Physiology and Medicine

- ECLSS and Habitability
- Human Factors
- Human Rating of Commercial Spacecraft
- Personnel Training

Space Commerce:

- Space Business and Economics
- Space Law
- Space Insurance
- Space Policy
- Space Regulation

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The FAA has established the following Centers of Excellence:

- The Joint Center of Excellence for Computational Modeling of Aircraft Structures - 1992 to 1996
Designated by Congress in 1990
- Airport Technology - 1995
Web: <http://cee.uiuc.edu/research/CEAT>
- Operations Research - 1996
Web: <http://www.nextor.org>
- Airworthiness Assurance - 1997
Web: <http://www.coe.faa.gov/aace>
- General Aviation - 2001
Web: <http://www.cgar.org>
- Aircraft Noise and Aviation Emissions Mitigation - 2003 (with NASA and Transport Canada)
Web: <http://www.partner.aero>
- Advanced Materials - 2004
Web: <http://www.niar.twsu.edu/coe/cecama.asp>
Web: <http://depts.washington.edu/amtas>
- Airliner Cabin Environment Research - 2004
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