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HELPING OHIO'S  
**Aerospace Community Soar**  
FOR TWO DECADES

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We  
have  
**LIFTOFF**



# You are cleaned for LIFTOFF



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Aerospace Community Soar  
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## PRESIDENT'S LETTER

The Ohio Aerospace Institute has been helping Ohio's aerospace community soar for two decades and 2009 was another successful year. We celebrated our 20th anniversary with a homecoming of OAI's alumni and stakeholders, including keynote speeches from former Ohio Governor Richard Celeste and former NASA Lewis Research Center Director and OAI founding father Dr. John Klineberg.

We expanded our business in 2009 with a 6 percent increase in grant and contract revenue (\$0.7 million) in a very challenging economic environment. We continued to grow Ohio's aerospace economy through research and technology development, education and training, and collaboration and information exchange.

However, the global economic recession imposed immense challenges on Ohio's aerospace economy and OAI in 2009. A state budgetary crisis forced severe reductions in state funding for numerous programs, including OAI. We developed and implemented an action plan to continue to serve our customers and stakeholders and grow our business base in this new budget environment.

OAI is committed to making our next 20 years better than the first, and we look forward to a bright future for aerospace in Ohio. Among our opportunities are:

- Capitalizing on aerospace exports, the top U.S. manufacturing export, with projected growth in 2010 and beyond. Ohio can position itself by making investments now that support supply chain enhancements, workforce development, and the expansion and attraction of aerospace companies to Ohio
- Repositioning some of Ohio's automotive industry assets to serve the growing aerospace industry
- Leveraging Ohio's aerospace capabilities to address our nation's energy issues and target new and promising markets in advanced energy
- Leading the way to the future of aerospace in quiet, clean and efficient aircraft; next generation access to space; and advanced space exploration systems

We're convinced that aerospace can and will be the economic sector that pulls Ohio out of the recession, and we are working to make it happen. We're meeting the challenge, and we thank you for your interest in and support of the Ohio Aerospace Institute.

Sincerely,

A handwritten signature in blue ink that reads "Michael L. Heil".

Dr. Michael L. Heil  
President and CEO

## COLLABORATION + INFORMATION EXCHANGE



Photo provided courtesy of NASA.

"I believe that the model of collaboration between education, government and industry, which is embodied in the Ohio Aerospace Institute, is a successful model for the future. I think that the two critical ingredients for future jobs in Ohio are rapid innovation and deep collaboration. Both of those characteristics are captured and practiced every day in the Ohio Aerospace Institute. There are 100,000 jobs in Ohio in the aerospace industry and more than 1,200 firms in the state of Ohio. All of these individuals and all of these firms and, frankly, all Ohioans are served by the Ohio Aerospace Institute."

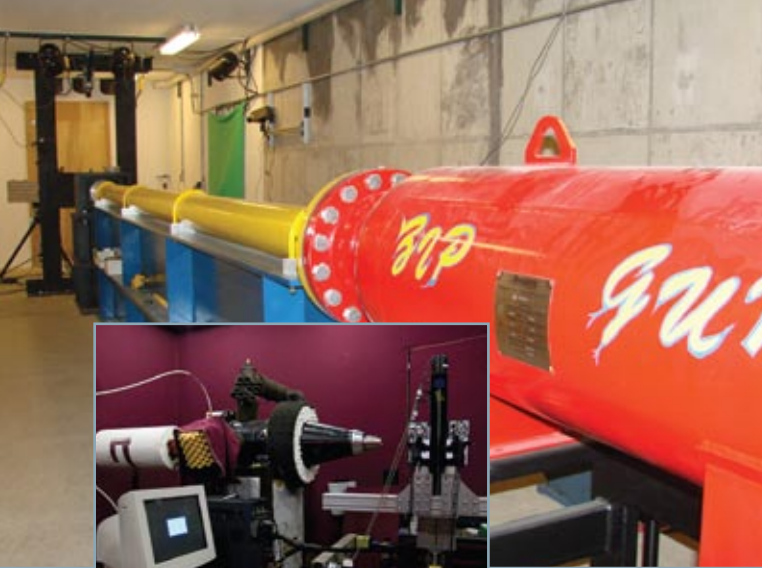
**Richard F. Celeste**  
*President, Colorado College*  
*Former Governor, State of Ohio*

OAI connects a broad set of participants in Ohio's aerospace economy through collaboration and information exchange events with companies, universities and government organizations to fill gaps in the workforce and develop stronger partnerships for research and technology development. Highlights include:

- Leading community support to celebrate NASA's 50th anniversary, culminating in an unforgettable reunion of 19 Ohio astronaut heroes and celebration of the achievements of NASA Glenn Research Center (GRC) at a gala recognition held in August 2008. Attendees included Honorary Chair Sen. John Glenn, Neil Armstrong, Jim Lovell, 16 additional Ohio-born/resident astronauts, Ohio Governor Ted Strickland, GRC's Center Director, and more than 500 members of the community
- Hosting a variety of roundtables for OAI industry members on various topics including federal stimulus, international sales, alternative energy, intellectual property strategy, and management and aerospace trends
- Conducting a site visit to the University of Akron, an OAI member university, where more than 30 industry and government guests toured the university and were briefed on its technical capabilities, including an opportunity to drive its electric research car
- Hosting a workshop presented by Valtronic Technologies, an OAI Small Business Network member, demonstrating how contract manufacturing and design services for advanced electronic applications can benefit aerospace and other industries in Ohio
- Visiting all members and staff of Ohio's congressional delegation in Washington, D.C., to discuss aerospace and defense R&D issues
- Promoting and hosting NASA GRC's GREEN Forums, which focused on new technologies and strategies to support advanced renewable energy
- Creating opportunities for Cleveland organizations with the Air Force Research Laboratory (AFRL) Human Effectiveness Directorate by facilitating visits to Brooks Air Force Base in San Antonio, Texas, and Mesa Site in Mesa, Ariz.
- Hosting an evening reception for Ohio State Representatives Mike Foley and Matt Patten, which included a panel discussion focusing on the advantages of the region, emphasizing aerospace as an important sector of the economy and growth area with companies and universities in Ohio
- Hosting events to celebrate OAI's 20 years in the aerospace industry. Events included a luncheon, a program review and an evening reception. This celebration was widely attended by many from industry, universities and the government, including a number of OAI's "founding fathers," including Dr. John Klineberg, former Director of (then) NASA Lewis Research Center
- Leading the Ohio Aerospace Working Group (OAWG)\* with two visits to Washington, D.C., to meet with Ohio congressional delegation staff to achieve unified, coordinated bipartisan support on three critical cross-regional aerospace challenges and opportunities in Ohio:
  - Leveraging Ohio's federal assets (NASA GRC and AFRL)
  - Statewide focused technology investment in alternative energy
  - Autos-to-aerospace manufacturing, workforce and industrial transition opportunities. The OAWG developed draft legislation to establish a pilot program to assess the available industrial capacity and workforce to create an automobile-to-aerospace transition in the United States

*\* OAWG is made up of eight economic development agencies across the state, the Ohio Department of Development and OAI*





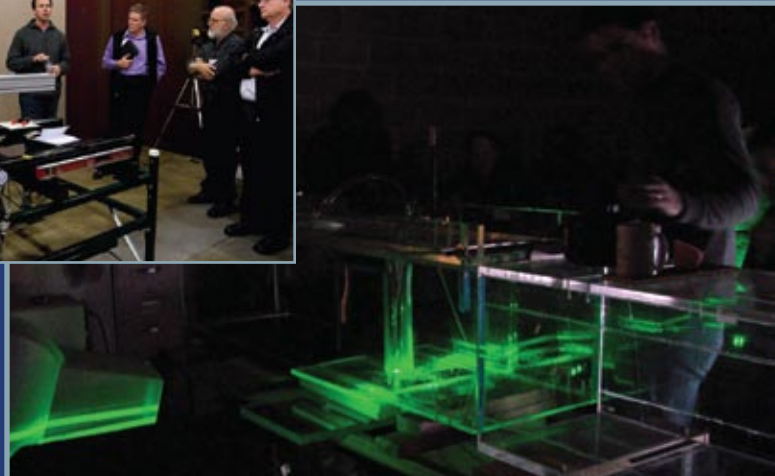
"Formed in 1989, OAI can be proud of its outstanding record of achievement, the growth it has promoted within Ohio's aerospace industry, and the enhancements it has added to our quality of life."

*George V. Voinovich  
United States Senator*



"Congratulations on getting and keeping the ball rolling. It's a good thing for Ohio aerospace companies—we in particular see the value in participating with others to make a united front in building the industry in Ohio. It's powerful to also show that Ohio's aerospace companies have not only the support of the state, but also have institutions like OAI that support the industry and the companies that make up the industry in Ohio."

*Priscilla Diem, P.E.  
Director of Business Development and Engineering  
COTSWORKS*



## Technology and Innovation Partnerships

OAI continued its quest to turn possibilities for innovation into reality through high-impact research and technology partnerships to accelerate the pace of technology development and commercialization. Accomplishments include:

- Partnering with GrafTech International, Ohio University and the AFRL Materials Directorate, to conduct research and develop a manufacturing capability in Ohio for advanced, high-conductivity graphitic foams. This new material is an enabling technology for current and future military systems that require better cooling and thermal management
- Continuing to support the Numerical Propulsion System Simulation Consortium in accessing, enhancing and commercializing engine cycle simulation software. OAI facilitated technology transition and finalized key licensing arrangements
- Entering into a strategic partnership with TechSolve to provide integrated services to the Ohio aerospace, aviation and defense industry cluster on a statewide basis. This effort is supported by the Edison Technology Center Program focused on "Aerospace and Aviation." The partnership between OAI and TechSolve provides Ohio companies greater access to the technical, networking and educational services of OAI and TechSolve
- Teaming with NASA GRC in leading a team of industry and university partners demonstrating a prototype of a commercial hydrogen fueling station that uses wind, solar power and water from Lake Erie for a mass transit bus powered by fuel cells. This project demonstrates the viability of clean energy systems for transportation and stationary power, boosting regional economic development
- Collaborating with two other Ohio nonprofit organizations, EMTEC and CIFT, to begin work on an AFRL contract to study the feasibility of converting Ohio-grown algae into alternative aviation fuel. OAI serves as project manager of this new effort
- Growing OAI's industry sponsor membership by 25 percent and OAI's small business network by 33 percent. Members are increasingly engaged in workshops and contracted services with OAI to solve specific industry needs
- Achieving 6:1 funding leverage for Boeing, GE Aviation, Honeywell, NASA GRC, Pratt & Whitney and Rolls-Royce through the Aeroacoustics Research Consortium (AARC) and starting three new research projects

## Sponsored Research

OAI's researchers are a significant reservoir of intellectual capital resident at the Institute and at OAI's customer sites. Our researchers are focused on advancing knowledge and contributing to our customers' missions. Highlights include:

- Growing industry/federal (non-NASA) sponsored research to more than \$1.2 million for the first time. OAI provided significant research support to the AFRL, Anteon, ASRC Aerospace, DARPA, GrafTech International, Gray Research, Materials Research International and United Technologies Research Center (UTRC)
- Winning an "R&D 100" Award for the work carried out by Dr. Nengli Zhang and his NASA GRC colleague, recognizing their Contact Angle Measurement Device as one of the 100 most important technology achievements of the year
- Receiving the President's Award from the American Ceramic Society, honoring the contributions of Dr. Mrityunjay Singh to ceramics research. The award has been given only a few times during the Society's 110-year history
- Receiving the Richard M. Fulrath Award from the American Ceramic Society, honoring the work of Dr. Andrew Gyekenyesi
- Receiving the Lee Hsun Award from the Chinese Academy of Science, recognizing Dr. Mrityunjay Singh's contributions to ceramic composites research
- Receiving numerous additional awards, honors and recognitions including:
  - 8 NASA Group Achievement, Space Act, Patent Application, Software Release, and Tech Brief Awards
  - 3 OAI researchers named governors, fellows, or associate fellows of major technical societies
  - 24 technical society awards, session/committee chairmanships, committee memberships and keynote addresses
  - Writing three book chapters; editing five special publications and winning five "Best Paper" awards
  - 4 patents
  - Authoring/co-authoring 103 articles/presentations in various NASA, conference and journal publications
  - Air Force Office of Scientific Research "Star Team" Award
  - 11 letters of commendation from customers

## Detonation Wave Simulation for Pulse Detonation Rocket-Based Combined-Cycle Engine



OAI Senior Scientist Dr. Shaye Yungster has completed performance maps for the Pulse Detonation Rocket-Based Combined-Cycle Engine (PDRBCC) in the Mach number range of  $0 < M < 3$ . Computational modeling results indicate that in this flight Mach number range the engine has the potential to increase specific impulse by more than 50 percent over conventional rocket engine systems.

The figure shows a detonation wave simulation for an H<sub>2</sub>-air mixture at a pressure of 0.5 bar. The figure shows maximum pressure contours.

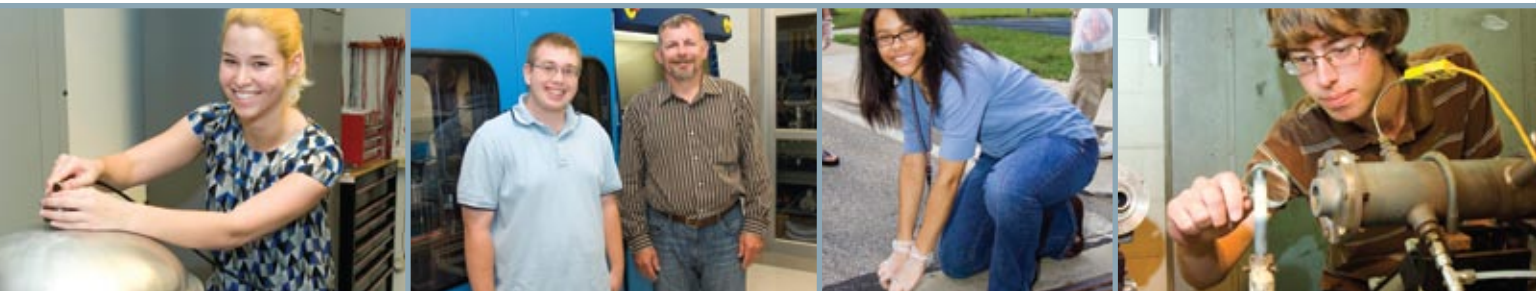


“I am extremely positive about institutes like the Ohio Aerospace Institute that can provide very effective mechanisms for combining the research programs of the federal, state and private sectors. We’re all proud of the Ohio Aerospace Institute and what it has become.”

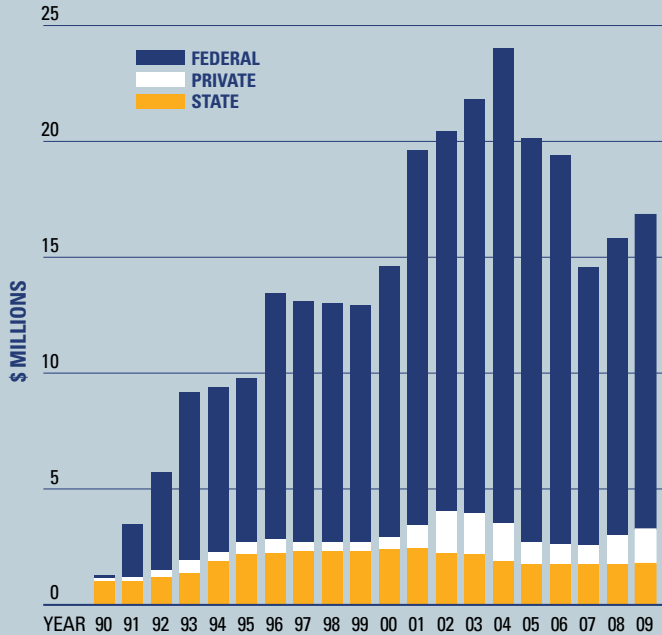
**Dr. John Klineberg**  
*Former Director  
 NASA Lewis Research Center*

OAI continued to deliver on its goal of building and sustaining a strong aerospace workforce in Ohio and across the nation. Highlights include:

- Hosting 130 college interns (60 from OAI member universities, 17 from other Ohio institutions) and 36 high school interns at NASA GRC through the LERCIP internship program
- Placing more than 50 students at 17 companies (including 24Plug, BAE Systems, COTS, First Fuel Cells, Goodrich Corporation, ISP Lima, Mentor Radio, MISCO, Numerica, Orbital Research, Powdermet, Parker Hannifin Corporation, Recognition Robotics, Sierra Lobo and Swagelok) through Ohio’s Third Frontier Internship Program
- Winning a new program to work with the AFRL to identify and support student “Senior Capstone” engineering projects at universities across the U.S. that will contribute to solutions and excite a new generation about working on Air Force technical challenges
- Collaborating with GRC to create a Multidisciplinary Analysis, Design and Optimization Institute that hosted two student research residencies and its first workshop for NASA participants
- Hosting 13 Summer Faculty Fellows (and one accompanying student) with NASA GRC (four faculty from OAI member universities) and nine students through the Glenn Academy
- Supporting students pursuing aerospace-related degrees, the Ohio Space Grant Consortium (OSGC) awarded 59 undergraduate scholarships and 10 graduate fellowships
- Awarding the OAI sponsored NTA Julian Earls Scholarship to Ariel Bouie of Richmond Heights High School in Cleveland
- Collaborating with GRC’s Partnerships and New Business Office, the AFRL, and the OSGC to offer a completely redesigned Historically Black Colleges and Universities and Other Minority Institutions Symposium, attended by more than 150 participants. Features included a student job recruitment fair involving GRC, AFRL, aerospace companies and universities from throughout Ohio, offering employment and graduate study opportunities
- Hosting and coordinating NASA GRC’s Pre-Service Teacher Institute. This new program provides opportunities for student teachers to develop professional skills that will help them attract and retain elementary or middle school students to STEM disciplines
- Contributing expertise to NASA’s SATERN training system in safety/mission assurance (SMA) via the NASA Safety Center EDUCATE contract (primed by Alphaport, Inc.), leading to NASA-wide kickoff of the SMA Technical Excellence Program across all centers
- Hosting six OAI Distinguished Lectures, including presentations by John W. Purvis (Retired Director of Air Safety Investigation, Boeing Company), Dr. Roger Launius (National Air and Space Museum, Smithsonian Institution), Dr. Bo Carlsson (Case Western Reserve University), and Dr. Tom Marimon (Lockheed Martin)
- Teaming with Hallgren Associates to offer a series of short courses covering the basics of aeronautics and jet engines to government and industry participants
- Continuing to offer training workshops, under the TechLift Northeast Ohio Program, on SBIR/STTR grant writing and networking events on federal funding, connections to NASA and AFRL, adequate accounting systems, grant writing assistance and sponsoring eight companies at the 2008 National SBIR Conference



REVENUE



As depicted above, OAI revenue increased for the third consecutive year. OAI's earned grant, industrial and registration income grew by a combined total of \$1.1 million or 8 percent. Since its inception in 1990, total OAI annual revenues have increased, on average, by more than 10 percent. In addition, OAI achieved surplus operations for the sixth consecutive year through selective project growth and managing related restricted and unrestricted expenses.

STATEMENT OF FINANCIAL POSITION (AUDITED)

ASSETS	
CURRENT ASSETS	
Cash and investments	\$ 2,133,560
Funds held for others	6,915
Net receivables and deposits	1,930,460
Total current assets	<u>4,070,935</u>
NET PROPERTY AND EQUIPMENT - AT COST	<u>7,368,308</u>
	<u>\$ 11,439,243</u>
LIABILITIES AND NET ASSETS	
CURRENT LIABILITIES	
Accounts payable and accrued expenses	\$ 1,546,124
Funds held for others	6,915
Deferred revenue	1,560,094
Other liabilities	11,639
Total current liabilities	<u>3,124,772</u>
NET ASSETS	
Unrestricted:	
Operating	\$ 946,163
Net investment in equipment/improvements	1,204,457
	<u>2,150,620</u>
Temporarily restricted - net building investment	<u>6,163,851</u>
Total Net Assets	<u>\$ 8,314,471</u>
	<u>\$ 11,439,243</u>

STATEMENT OF ACTIVITIES (AUDITED)

	Unrestricted	Temporarily Restricted	Total
SUPPORT AND REVENUE			
Support and revenue:			
Grants and contracts	\$ 13,571,462		\$ 13,571,462
State of Ohio - operating	1,584,458		1,584,458
State of Ohio - capital	200,000		200,000
Industry	1,156,253		1,156,253
Building rental and seminar fees	315,638		315,638
Interest and other	25,104		25,104
	<u>16,852,915</u>		<u>16,852,915</u>
Net assets released from restrictions:			
Annual building depreciation	185,379	\$ (185,379)	
Total support and revenue	<u>17,038,294</u>	<u>(185,379)</u>	<u>16,852,915</u>
EXPENSES			
Program services	\$ 14,640,195		\$ 14,640,195
Support services	2,157,892		2,157,892
Total expenses	<u>16,798,087</u>		<u>16,798,087</u>
CHANGE IN NET ASSETS	240,207	(185,379)	54,828
NET ASSETS - BEGINNING OF YEAR	<u>1,910,413</u>	<u>6,349,230</u>	<u>8,259,643</u>
NET ASSETS - END OF YEAR	<u>\$ 2,150,620</u>	<u>\$ 6,163,851</u>	<u>\$ 8,314,471</u>

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