COLLABORATION + INNOVATIVE SOLUTIONS

TECHNOLOGY + INNOVATION PARTNERSHIPS

SPONSORED RESEARCH

EDUCATION + TRAINING

TOWARD NEW HORIZONS

2011 Annual Report

OAI
Ohio Aerospace Institute

Sixty-six years ago, Dr. Theodore von Karman, chair of the U.S. Army Air Forces (USAAF) Scientific Advisory Group, issued a very important report to USAAF Commanding General Henry H. "Hap" Arnold. This report, entitled "**Toward New Horizons**," provided a remarkably prescient prescription for the research and development required to ensure American aerospace dominance in the decades to come.

The report's recommendations were largely followed by our nation in the years that followed, contributing immeasurably to our ascent to become the world's leading aerospace power. Trailing Germany as an aerospace power during much of World War II (Germany fielded operational jet fighters, pulsejet cruise missiles and intermediate range ballistic missiles during that war, while we did not), our nation made a commitment to never be second-rate in aerospace again. We can thank Dr. von Karman, General Arnold, and the authors of "Toward New Horizons" for their vision and leadership in driving the United States to become the world leader in aerospace.

But, we can't rest on our laurels; leadership in aerospace must be maintained through research and innovation. The Ohio Aerospace Institute (OAI) continued to be an aerospace research and innovation leader in 2011. We enjoyed a very successful year, increasing revenue by 10 percent while managing our expenses to close out the year in a favorable financial position. We added important new corporate members and supported Ohio's first ever display at the Paris Air Show, helping to secure new business for Ohio companies. We led Ohio's second Aerospace Day, bringing the aerospace community to Columbus to meet with state government officials and the legislature. We also greatly expanded our short course offerings for aerospace workforce professional development, and our researchers continued to receive both national and international accolades for their accomplishments.

As Dr. von Karman charted the future of aerospace with his "**Toward New Horizons**" report, OAI moves toward new horizons with a new focus and strategic plan as we enter 2012. Our focus is helping our partners succeed in their aerospace endeavors - to be their preferred partner for success. Our new vision is to be valued by the world's pre-eminent aerospace leaders for our innovative research and thought leadership, program management and execution, ability to act as a trusted agent and the opportunities we create for our partners. Through research and technology development, workforce development, and engagement with global networks for innovation and advocacy, we'll help our partners achieve success in aerospace. We look forward to working with our partners in industry, academia, and government to achieve the von Karman vision and move toward new horizons together.

Thank you for your interest in the Ohio Aerospace Institute.

Sincerely,

Dr. Michael L. Heil
President and CEO

BELOW AND COVER: OAI's award winning Cleveland facility was voted one of the 50 Best Buildings of the World in 1994.

COLLABORATION + INNOVATIVE SOLUTIONS

OAI continued to build partnerships in Ohio's aerospace economy through **collaboration** and **innovative solutions**. This included events with companies, universities and government organizations to develop stronger **partnerships** in research, technology and economic development.

HIGHLIGHTS INCLUDE:

- Participating in the Paris Air Show and recruiting Ohio companies to support the Ohio booth thus establishing relationships with a number of companies to build upon OAI's mission and grow Ohio's aerospace economy
- Supporting Ohio's third Airbus Supplier Summit, co-hosted by the Ohio Edison Technology Centers. Small and mid-sized aerospace suppliers had an opportunity to meet with Airbus and Tier I and 2 procurement executives to learn about the requirements and current needs of the industry
- Conducting site visits to OAI member universities, Case Western Reserve University and Cleveland State University, thus strengthening collaboration among OAI's industry and university members and federal labs
- Participating in the Ohio Advanced Energy Center for Excellence Roundtable at The Ohio State University and Advanced Transportation and Aerospace Centers of Excellence at the University of Dayton
- Hosting 11 industry roundtable meetings throughout the year, completing more than 40 company visits and holding more than 50 voice-of-the-customer meetings with industry members to identify trends and prospects for collaboration and innovation
- Hosting the Ohio Alternative Aviation Fuels Forum, which explored the future of aviation fuels made from farm-grown energy crops. Attendees included the USDA, Ohio Department of Development, Ohio Farm Bureau, Commercial Aviation Alternative Fuels Initiative, and Air Transport Association
- Planning and supporting Ohio Aerospace Day 2011, co-hosted by Ohio Aerospace Working Group. This event, held at the State House in Columbus, increased state legislative awareness of aerospace in Ohio, addressed identified industry challenges and positioned Ohio for future growth in the aerospace industry
- Hosting the annual OAI Industry Member Forum supporting OAI's large, mid-tier and small business members. This event highlighted member benefits in 2010, gave members the opportunity to network and collaborate on new opportunities, and provided an assessment of the supply chain from General Robert E. Mansfield, Jr.
- Co-leading the successful NASA International Space Station Research Forum. More than 130 individuals from area technology firms, universities and research organizations participated
- Continuing to provide recommendations to the Ohio Department of Development, the Ohio Legislature and Ohio Congressional representatives and staff on the advancement of the aerospace economy in Ohio
- Providing training sessions, as a member of the Jumpstart Entrepreneurial Network, on SBIR/STTRs, grant writing assistance/ red team reviews and access to supply chain partners or customers to support Northeast Ohio technology-driven small businesses
- Continuing to expand relationships with the Aerospace Industries Association (AIA), Aerospace States Association (ASA) and the American Institute of Aeronautics and Astronautics (AIAA) to advance the aerospace economy in Ohio
- Contributing to strategic planning and marketing recommendations for the Ohio Aerospace and Business Aviation Council
- Leading membership discussion with senior editors of Aviation Week & Space Technology and two follow-on articles on member activities

"Following OAI's initial introduction to Larrell Walters at IDCAST in late 2010, Lake Shore Cryotronics engaged IDCAST in a contract that has provided excellent access to their terahertz facilities and expertise. In July of 2011, Lake Shore was awarded a $1 million grant by the Ohio Third Frontier for development of a novel terahertz-based semiconductor material characterization system, with IDCAST as one of our key collaboration partners."

Rob Ellis | *Lake Shore Cryotronics*

TECHNOLOGY + INNOVATION PARTNERSHIPS

OAI continued to turn possibilities for innovation into reality through **high-impact** research and technology partnerships, **accelerating** the pace of technology development and commercialization.

HIGHLIGHTS INCLUDE:

- Continuing economic development partnership with TechSolve to provide various services to Ohio's aerospace, aviation and defense industry cluster. This partnership has allowed OAI to expand product and process innovation and commercialization business assistance services to meet the needs of Ohio's aerospace community and supported Ohio aerospace advocacy and marketing programs. For 2011, OAI projects achieved bottom-line impact of $7.9 million and investment leverage of $1.8 million
- Being selected as a subcontractor by NASTEC on the NASA Phase II SBIR Program. This two-year, $600,000 program develops "Aircraft Engine Life-Consumption Monitoring for Real-Time Reliability Determination"
- Continuing the Aeroacoustics Research Consortium for a 10th successful year, partnering Boeing, Honeywell, NASA Glenn Research Center (GRC), Pratt & Whitney, and Rolls Royce in sponsoring 44 research efforts and 11 workshops, nationally and internationally

SUCCESS STORY

NANOWORLD Laboratory at the University of Cincinnati (UC) was started in 2002 by Dr. Mark Schulz. He received a $73,000 grant from OAI to develop polymer nanocomposite materials based on carbon nanotubes in collaboration with Drs. Donglu Shi and Yijun Liu. The NANOWORLD Lab grew into a significant resource at UC. Through an SBIR partnership with the Air Force Research Laboratory, NANOWORLD's spin-off company, General Nano, is developing carbon nanotube thread to replace copper wire.

- Partnering with Valtronic Technologies (USA), Inc. to provide solutions in sensors and electronic miniaturization technologies for aerospace companies in Ohio and throughout the United States
- Continuing to support the Numerical Propulsion System Simulation Consortium in maintaining, developing, improving and commercializing engine cycle simulation software
- Facilitating the development of the Distributed Engine Control Working Group (DECWG) for the Air Force Research Laboratory (AFRL). The objective of this program is to provide a forum for the U.S. government and the aerospace industry to collaborate on the advancement of technologies required to implement distributed controls in aerospace propulsion systems with a focus on high temperature electronics
- Growing projects with the AFRL, for a 16th successful year, through delivery orders under OAI's VAATE (Versatile Affordable Advanced Turbine Engine) contract and growing collaboration with the Propulsion Instrumentation Working Group (PIWG)
- Receiving Navy funding through a NASA grant to expand PIWG collaboration opportunities, which will include hosting a forum to identify technical intersections between PIWG, DECWG and other instrumentation and controls organizations to better leverage available research dollars
- Continuing partnership with GrafTech, Ohio University and the AFRL Materials Directorate on the Graphitic Foam project. This highly successful project, now in its third year, researches the development and use of high conductivity graphitic carbon foams for use in heat exchangers and thermal energy storage devices for directed energy weapons systems and aerospace
- Continuing to serve as project manager on the AFRL Algae to Fuel project. Working with two of Ohio's Edison Technology Centers, Edison Material Technology Center and the Center for Innovative Food Technology, this project researches the feasibility of converting Ohio-grown algae into renewable hydrocarbon fuels for military applications
- Continuing to partner with NASA GRC in leading a team of community, industry and university partners to develop a prototype of a renewable powered electrolyzer and hydrogen fuel station to power fuel cell buses
- Growing OAI's Industry Sponsors and Small Business Network membership. Today, more than 70 companies are engaged in contracted services and workshops with OAI solving specific industry needs. Notable new members include Alcoa Forgings and Extrusions, EADS (EADS North America, Airbus Americas), RTI International Metals, Crane Aerospace & Electronics, PCC Airfoils and ATK (GASL)
- Establishing the Algae-to-Fuels Working Group comprised of stakeholders drawn from universities, government agencies, private industry and OAI members
- Creating an Advanced Biofuels Team providing innovation, leadership and project management capabilities in this rapidly expanding industry
- Establishing an in-house economic modeling and regulatory road-mapping capability and applying this with great success to algae-to-fuels projects
- Beginning new industry funded work to advance new innovative technologies with Parker Aerospace and Alcoa

SPONSORED RESEARCH

OAI's researchers represent a significant reservoir of **intellectual resources**, focusing on **advancing knowledge** and contributing to our customers' missions.

HIGHLIGHTS INCLUDE:

- Winning a $9.3 million five-year cooperative agreement with the Air Force Research Lab to perform computational aerodynamics research
- Completing major testing, ahead of schedule, on the DARPA Fast Access Spacecraft Technology Program. OAI supported the installation, operation and diagnoses of the system under simulated space conditions. The team consisted of Boeing, NASA GRC and OAI's Dr. James Gilland
- Helping to redefine how NASA tests radios to operate over its Space Communications and Navigation infrastructure (Mr. Tom Tanger)
- Developing a method to save hundreds of person-hours per year for the NASA Seal Team through streamlined pressure measurements (Mr. Nicholas Penney)
- Performing scanning electron microscopy work that appeared on the cover of the American Chemical Society's Applied Materials and Interfaces (Ms. Linda McCorkle)
- Developing computational models for predicting noise from subsonic rectangular jets (Dr. Stewart Leib)
- Making major contributions to critical investigations of icing phenomena leading to engine power loss (Dr. Paul Tsao)
- Presenting new developments in high temperature electronics packaging to GE Research (Dr. Liangyu Chen)
- Making major advances in the growth of defect-free SiC crystals (Mr. Andrew Trunek)
- Hosting ATK/GASL visit to discuss research collaborations in sensors/electronics, materials, combustion and other areas
- OAI's researchers continued to receive many awards and honors. Among the researchers honored during FY11 were:
  - Dr. Mrityunjay Singh - Selected to receive the American Ceramic Society's John Jeppson Award. Dr. Singh was also elected as a Fellow of the American Association for the Advancement of Science in recognition of pioneering, outstanding contributions and global leadership in applications of advanced ceramic and composite materials
  - Dr. Eugene Shin - Awarded the NASA Exceptional Public Service Medal for outstanding contributions in polymers research
  - Mr. Joseph Flatico - Recognized as a member of the GRC and NRL MISSE-7 Spaceflight Active Experiments team with a NASA HQ Group Achievement Award
  - Dr. Jun Kojima and Quang-Viet Nguyen (NASA GRC) - Received a 2011 R&D 100 Award for "Laser Pulse Stretcher"
  - Dr. Sreeramesh Kalluri - Received an award of appreciation from the ASTM International Committee for organizing and co-chairing the 9th International Symposium on Fatigue and Fracture Mechanics and co-editing "Fatigue and Fracture Mechanics: 37th Volume"
  - Dr. Andrew Gyekenyesi - Recognized by the ASM International and Indian Institute of Metals for contributions to the Visiting Lecturer Program
  - Dr. George Williams - Designated by NASA as an Exploration Systems Mission Directorate Senior Design Technical Expert for microgravity fluids and received a NASA Group Achievement Award for work in Lox-Methane propulsion. Dr. Williams also chairs the Northern Ohio Section of the AIAA
  - Dr. Yoshinori Yamada - Received the Keith Miller Young Investigator Award from ASTM International's Committee on Fatigue and Fracture
  - Dr. Philip Morgan and Dr. Michael White - Selected as members of an Air Force Office of Scientific Research "Star Team" – a designation only 10 percent of AFOSR-sponsored research efforts achieve
  - Dr. Michael White - Appointed to the Graduate Faculty at the University of Dayton
  - Dr. Rick Graves - Received a Congressional appointment to serve on a NATO/RTO Working Group focused on developing best practices for sensitivity analysis and uncertainty quantification, supporting the Air Force Research Laboratory
  - Mr. Darrell Gaydosh - Honored as a member of GRC's Shape Memory Alloy Team with NASA Aeronautics Research Mission Directorate Associate Administrator's Award, Strategic Partnership/Group category
- Receiving additional awards, honors and recognitions including:
  - 124 NASA, conference and journal publications and presentations (author/co-author)
  - 42 book chapters or editorships of proceedings, or guest editorships/journal editorships/roles as referee or reviewer
  - 6 technical society special awards or designations/nominations to Fellow or Associate Fellow
  - 31 international committees and technical society leadership roles or occasions serving as a conference/symposium/session chair or organizer
  - 10 Air Force or NASA Tech Brief, Group Achievement or other awards and letters of commendation from customers
  - 9 invited lectures
  - 3 patent applications filed, and 1 new patent awarded

EDUCATION + TRAINING

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

HIGHLIGHTS INCLUDE:

- Receiving a three-year renewal on Glenn Research Center's Lewis Educational and Research Collaborative Internship Program
- Co-sponsoring the 6th Annual Dayton Engineering Sciences Symposium and chairing the undergraduate projects session
- Supporting students pursuing aerospace-related degrees; the Ohio Space Grant Consortium (OSGC) awarded 112 scholarships and fellowships
- Hosting 112 college interns (50 from OAI member universities, 15 from other Ohio institutions) and 12 high school interns at NASA GRC through its internship program

- Contributing to Workforce and Education recommendations for the Ohio Aerospace and Business Aviation Council
- Hosting 25 Summer Faculty Fellows with NASA GRC, 11 Aerospace Academy students and nine Space Academy students through the Glenn Academy
- Hosting five OAI Distinguished Lectures, including presentations by William Harter (University of Arkansas), Graham Machin (National Physical Laboratory), Richard Priem (Consultant), Mark Bowles (American Public University), and Col. Timothy Lawrence (Air Force Institute of Technology)
- Receiving the NASA Group Achievement Award as a team member for the NASA One Stop Shopping Initiative
- Sponsoring, through OSGC, OhioSat CUBESAT Workshop at Air Force Institute of Technology (AFIT). The program gave college students hands-on spaceflight hardware experience invaluable for aerospace workforce development
- Continuing to support the Air Force Research Laboratory's "Senior Capstone" project by assisting college engineering students in working on projects with AFRL. Six new projects were added this year
- Teaming with Practical Aeronautics, TSTI, and Tec^Edge to offer a series of short courses relating to aeronautics, jet engines and space systems engineering to industry and government participants
- Continuing OAI's Business Management role in NASA's One Stop Shopping Initiative. OAI led the first NASA Education Stakeholders' Summit, attracting more than 300 participants from NASA, other federal agencies, academia, and industry. This three-day event included panel discussions on the attraction and retention of students to the STEM workforce, removal of barriers, and maximizing access to resources
- Continuing to support NASA GRC's Dropping in a Microgravity Environment Program. This program, for middle and high school students, focuses on designing, building and testing experiments in a NASA microgravity drop facility
- Participating in Ohio Experiential Learning discussions hosted by the Ohio Board of Regents
- Leading community support for the 10th Annual Buckeye Regional FIRST Robotics Competition, involving 59 high school teams from Ohio and other states
- Co-sponsoring with OSGC, NASA GRC, and supported by the AFRL, to host the Historically Black College/University and Other Minority Institutions Aerospace Collaboration Conference. This annual event represents an outstanding statewide collaboration that attracts faculty, students, and researchers to discuss technical needs, capabilities, and opportunities for collaboration
- Continuing to offer training workshops on SBIR/STTR grant writing and networking events on federal funding, acceptable accounting systems, and grant writing assistance

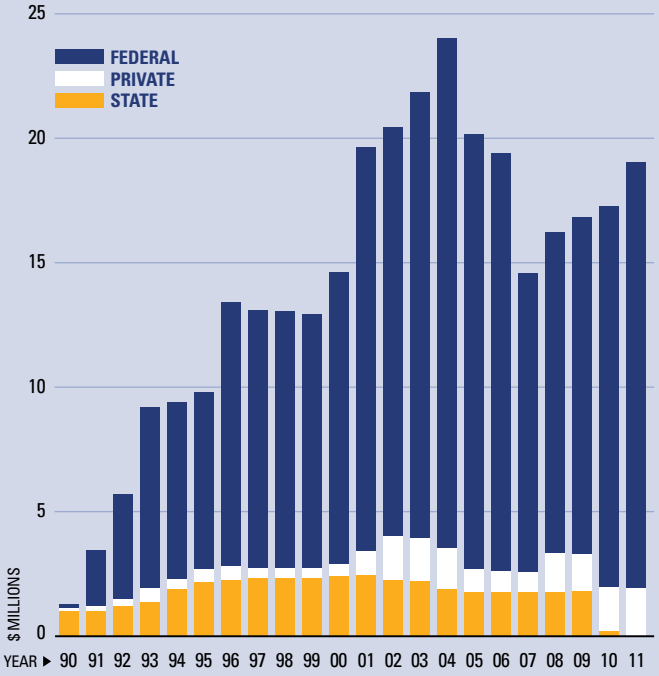
"Thank you for your commitment in the planning and implementation of the first One Stop Shopping Initiative, NASA Education Stakeholders' Summit and Higher Education Meeting: "An Innovative Solution to Support the STEM Workforce of Tomorrow." Your efforts proved to be an invaluable resource and were well-received. I appreciate your contributions in bringing this undertaking to a successful conclusion."

Dr. Mabel Jones Matthews | *Office of Education* | *NASA*

FY2011 FINANCIAL REPORT

YEAR ENDED JUNE 30, 2011

REVENUE

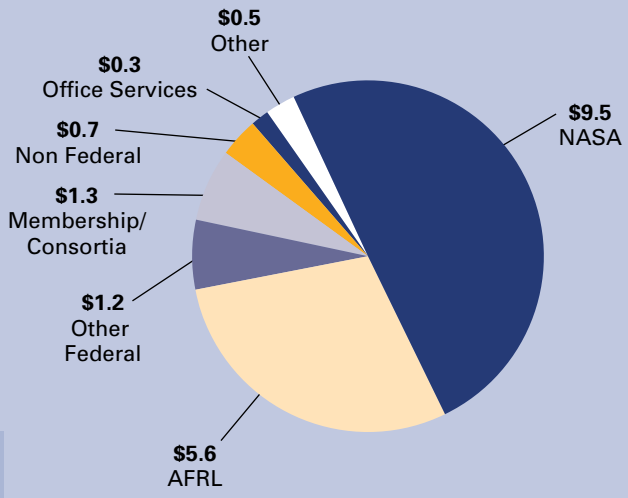


As illustrated above, total OAI revenue grew for the fourth year in a row. OAI's earned grant, industrial, and registration income increased by more than $1.9 million or nearly 12 percent during FY2011. Since its inception in 1990, OAI has sustained an annual total revenue growth rate, on average, of 10 percent. OAI also enjoyed surplus operations in FY2011 for the eighth consecutive year, largely due to on-going selective project growth and the continuing refinement of numerous expense austerity programs.

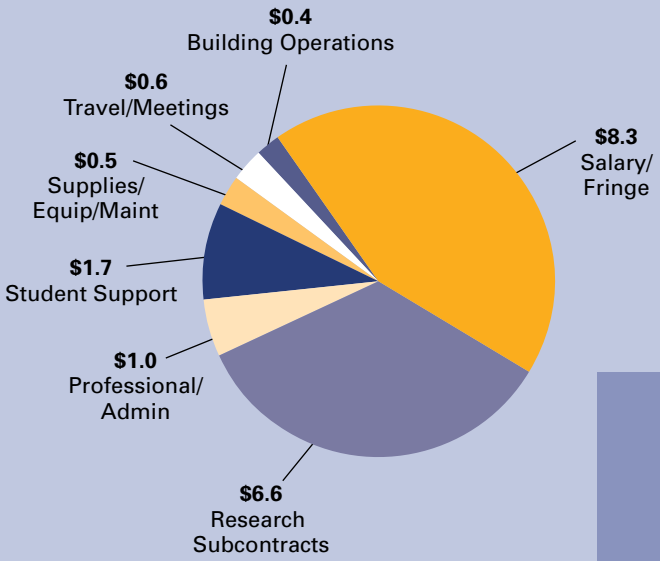
STATEMENT OF FINANCIAL POSITION (AUDITED)

ASSETS	
CURRENT ASSETS	
Cash and investments	$ 2,228,774
Funds held for others	23,812
Net receivables and deposits	3,430,226
Total current assets	5,682,812
NET PROPERTY AND EQUIPMENT - AT COST	6,830,150
	$ 12,512,962
LIABILITIES AND NET ASSETS	
CURRENT LIABILITIES	
Accounts payable and accrued expenses	$ 2,118,055
Funds held for others	23,812
Deferred revenue	2,226,334
Total current liabilities	4,368,201
NET ASSETS	
Unrestricted:	
Operating	$ 1,314,611
Net investment in equipment/improvements	1,037,057
	2,351,668
Temporarily restricted - net building investment	5,793,093
Total Net Assets	8,144,761
	$ 12,512,962

OPERATING REVENUES $19.209M (AUDITED)



OPERATING EXPENSES $19.206M (AUDITED)



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>
> Jay Foran | *Senior Vice President, Business Attraction* | *Team Northeast Ohio (NEO)*

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