



VIRGINIA ADVANTAGES

Aerospace



**VIRGINIA ECONOMIC
DEVELOPMENT PARTNERSHIP**

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Virginia's Aerospace Industry

- Employs 28,200 people at 287 firms, primarily in Aerospace Technology and Aerospace Equipment
- Key aerospace manufacturers include Alcoa Howmet, Goodyear, Moog, Orbital ATK, and Rolls-Royce
- Leading aerospace technology operations include NASA, Boeing, and The Aerospace Corporation
- Benefits from R&D assets such as DARPA and the National Institute of Aerospace
- Home to NASA's Langley Research Center and Wallops Flight Facility
- Bolstered by key military bases in Hampton Roads and Northern Virginia
- Thousands of people exit the U.S. military from Virginia bases each year
- Over the past ten years, 67 Aerospace Industry projects have announced 3,810 new jobs and investments of \$1.4 billion
- Has a direct economic output of \$7.2 billion
- Virginia ranks first in the nation for U.S. Department of Defense Prime Contracts (\$40.3 billion in FY 2015)
- Central location on the Atlantic Coast provides interstate and rail access to the Northeast, Southeast, and Midwest
- Access to international markets provided by the Port of Hampton Roads and Washington-Dulles International Airport
- Home to the Mid-Atlantic Regional Spaceport

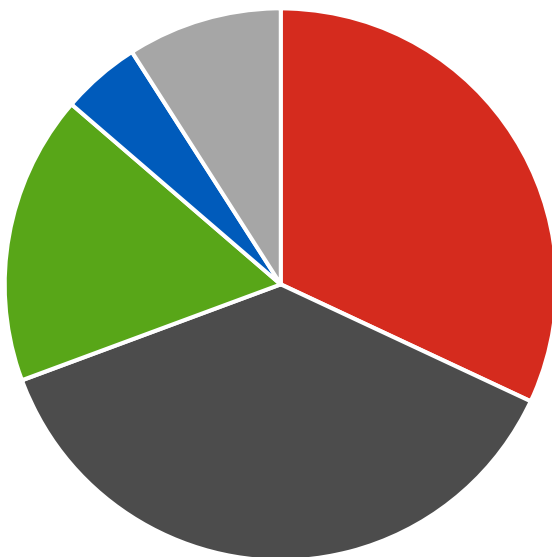


Photo Credit: NASA Wallops Flight Facility

Aerospace Industry in Virginia

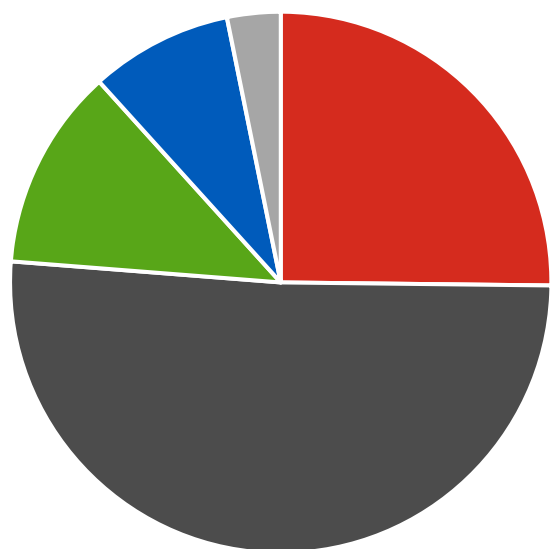
Virginia's Aerospace industry employs over 28,200 people. The top two Aerospace sectors by employment are Aerospace Technology (10,600) and Aerospace Equipment (9,000). These two sectors comprise 69% of Aerospace employment in Virginia. Virginia's Aerospace industry includes the production of aerospace equipment as well as aerospace research and development at private, academic, and government facilities. Virginia's Aerospace industry is supported by 355 machine shops employing 5,000 people. The direct economic output of Virginia's Aerospace Industry is \$7.2 billion. Aerospace also supports \$4.9 billion in additional economic activity in Virginia. Regionally, Aerospace employment occurs across Virginia, but is concentrated in Northern Virginia (51%) and Hampton Roads (25%).

Employment by Sector



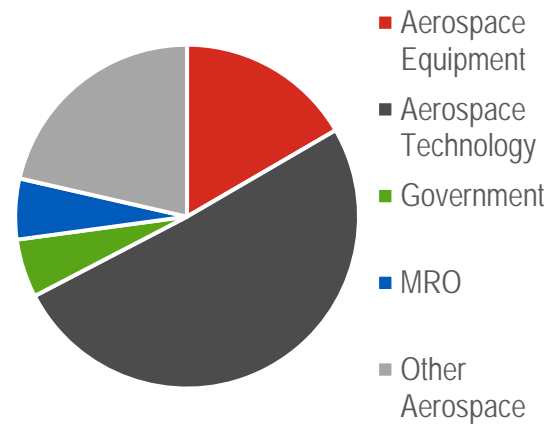
- Aerospace Equipment
- Aerospace Technology
- Government
- MRO
- Other Aerospace

Employment by Region



- Hampton Roads
- Northern Virginia
- Southern & Central Virginia
- Southwestern Virginia
- Valley Region

Virginia is home to 287 Aerospace firms with 473 locations. The Aerospace Technology (106) and Other Aerospace (79) sectors account for 64% of all aerospace firms. Virginia's Aerospace companies cover equipment production, headquarters operations, technology and research, and government agencies. Companies with corporate or regional headquarters in Virginia include Airbus, General Dynamics, Northrop Grumman, Orbital ATK, and Rolls-Royce North America.



Major Aerospace Companies in Virginia

Aerojet	Dynamic Aviation Group	Moog
Airbus	Euro Composites	Northrop Grumman
Analytic Services	General Dynamics	Orbital ATK
Arconic	Goodyear Tire & Rubber	Raytheon
Aurora Flight Sciences	Kollmorgen	Rockwell Collins
BAE Systems	L-3	Rolls-Royce
Boeing	Lockheed Martin	The Aerospace Corporation

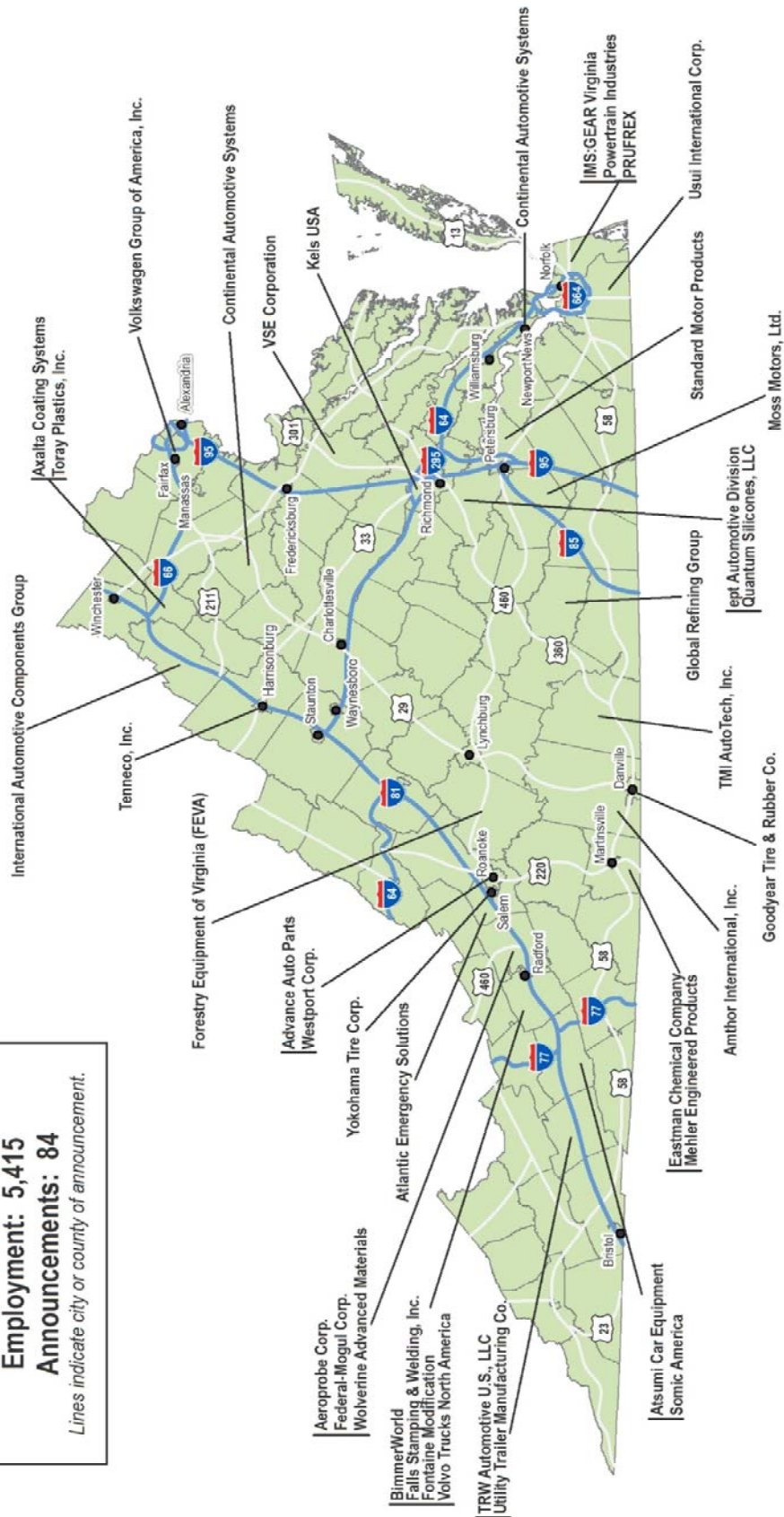
New and Expanding Aerospace Companies in Virginia

In the past ten years, 67 Aerospace Industry projects have announced 3,810 new jobs and investments of \$1.4 billion. Recent announcements include:

Aerojet	Hardide Coatings
Ball Aerospace	L-3 Unmanned Systems
Carson Helicopters	Raytheon IIS
Eagle Enterprises	Satair USA
Fulcrum Concepts	Zodiac Executive Aircraft Inserts

AUTOMOTIVE INDUSTRY ANNOUNCEMENTS 2006 - 2015

Investment: \$1.29 billion
Employment: 5,415
Announcements: 84
Lines indicate city or county of announcement.



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Sources: ESRI 2016, VEDP 2016

Virginia's Key Aerospace Sectors

Engines and Components

With a bold industry champion and innovative, collaborative research opportunities, the future of aerospace is being developed in Virginia.

- Rolls-Royce produces aircraft engine components at its Crosspointe campus in Prince George County
- The Commonwealth Center for Advanced Manufacturing conducts applied research in its facility on the Rolls-Royce Crosspointe campus
- Virginia's southern counties are strategically located between the Rolls-Royce Crosspointe campus and the North Carolina facilities of GE Aviation and Honda Aircraft
- Other key employers include:
 - Arconic Power and Propulsion
 - Aerojet
 - Entwistle Company
 - Triumph Aerospace
- John Tyler Community College near Richmond offers machining training for aerospace products
- Virginia Tech is one of the nation's top universities for producing skilled aerospace employees
- Commonwealth Center for Aerospace Propulsion Systems – a collaborative research effort Rolls-Royce, Virginia Tech, and UVA

Unmanned Aerial Systems

Virginia is on the cutting edge of UAS research, testing, and production, thanks to its unique combination of government contractors, academic institutions, and industry supporters.

- Almost 2,000 people work at 41 UAS-related companies
- Aurora Flight Sciences develops and builds UAS in Manassas
- UAV Pro conducts UAS training and research in Blackstone at the Fort Pickett Army National Guard Maneuver Training Center
- Dominion Virginia Power uses UAS to inspect its power lines
- Virginia Tech and the Mid-Atlantic Aviation Partnership were named as one of the FAA's six UAS test sites
- Liberty University in Lynchburg, Virginia offers classes in UAS at its School of Aeronautics

Composites

Virginia's composite sector benefits from advanced research and strategic federal government allies.

- 4,700 people employed at 32 composites firms in Virginia
- Key employers include:
 - American GFM
 - BGF Industries
 - EURO-COMPOSITES
 - General Dynamics
 - Honeywell
 - Mitsubishi
- NASA Langley's Integrated Structural Assembly of Advanced Composites system produces carbon fiber aerospace structures and parts
- The National Institute of Aerospace in Hampton manages NASA's Advanced Composites Consortium, which improves composite materials research and certification
- Benefits from the presence of the U.S. Navy and Air Force in Virginia's Hampton Roads region
- Virginia Tech conducts composites research in Blacksburg

MRO

Given its skilled workforce and strategic location, Virginia offers the ideal landing place for MRO companies.

- 47 FAA Certificated Repair Stations operate in all regions of Virginia and employ over 1,300 people
- Key employers include
 - Dowty Propellers Americas
 - Dynamic Aviation
 - Freedom Aviation
 - L-3 Flight International
 - Landmark Aviation
 - Summit Helicopters
- 9 commercial airports, including Washington Dulles International Airport and Regan National Airport
- Workforce benefits from thousands people exiting the military annually from bases in Virginia
- Blue Ridge Community College offers an Associate of Applied Science in Aviation Maintenance Technology
- Averett University offers a degree in Aerospace Management and Liberty University offers a degree in Aviation Maintenance Management
- The furniture industry cluster in southern Virginia offers skilled workers for producing and installing aircraft interiors

R&D

Virginia's top-notch R&D ecosystem involves collaboration among numerous public, private, and academic institutions, including:

- Commonwealth Center for Advanced Manufacturing
- Commonwealth Center for Aerospace Propulsion Systems
- Defense Advanced Research Projects Agency
- Mid-Atlantic Aviation Partnership
- Mid-Atlantic Regional Spaceport
- NASA Langley Research Center
- NASA Wallops Flight Facility
- National Center for Hypersonic Combined Cycle Propulsion
- National Institute of Aerospace
- Naval Surface Warfare Center Dahlgren
- Old Dominion University Department of Mechanical and Aerospace Engineering
- University of Virginia
 - Aerospace Research Laboratory
 - Rotating Machinery and Controls Laboratory
- Virginia Modeling, Analysis, and Simulation Center
- Virginia Space Grant Consortium
- Virginia Tech's Department of Aerospace and Ocean Engineering
 - Center for Space Science and Engineering Research
 - Aerospace Structures and Materials Laboratory
 - Operates 7 different wind tunnels

Virginia's Skilled Workforce

Selected Aerospace Occupations	Virginia Employment	Virginia Average Salary
Aerospace Engineers	2,350	\$131,470
Mechanical Engineers	7,470	\$97,390
Electrical Engineers	6,560	\$100,080
Electrical and Electronics Engineering Technicians	5,420	\$65,480
Engineering Technicians, Except Drafters, All Other	3,080	\$71,930
Industrial Engineering Technicians	890	\$57,090
Software Developers, Applications	35,060	\$105,830
Software Developers, Systems Software	26,550	\$114,000
Machinists	6,850	\$43,040
Computer-Controlled Machine Tool Operators, Metal and Plastic	1,140	\$38,780
Welders, Cutters, Solderers, and Brazers	7,060	\$43,980
Team Assemblers	15,200	\$28,550
Sheet Metal Workers	3,670	\$44,290
Aircraft Mechanics and Service Technicians	2,260	\$63,870
Industrial Machinery Mechanics	8,310	\$48,550

Source: U.S. Bureau of Labor Statistics, 2015

Virginia's Educational and Training Opportunities

The National Institute of Aerospace is a research and graduate education institute created to conduct leading-edge aerospace and atmospheric research, develop new technologies, and help prepare the next generation of scientists and engineers. Research at NIA is sponsored by aerospace companies and government agencies. NIA is a strategic partner of NASA Langley Research Center and works through a consortium of research universities including Virginia Tech, University of Virginia, Old Dominion University, and The College of William and Mary. Aerospace engineering programs are offered at Virginia Tech, University of Virginia, and Old Dominion University at the undergraduate and graduate levels.

The Virginia Community College System provides education and training programs for Virginians and Virginia businesses. In the Richmond area, a partnership between John Tyler Community College and Rolls-Royce allows students in the Precision Machining Technology program to train on a machining center at the college which is similar to the ones used at the company's Crosspointe location. Degree programs include

- Aviation Maintenance Technology
- CAD/CAM
- Engineering Technology
- Industrial Electronics
- Industrial Production
- Industrial Technology
- Mechanical Engineering Technologies
- Precision Machining Technology
- Welding

In Hampton Roads, The City of Newport News offers an aviation magnet school program to its high school students. The Aviation Academy is a specialized four-year program to prepare highly motivated and successful high school students for careers in engineering technology with an emphasis on aviation and computers. Aviation classes cover pre-engineering subjects: physics, electricity, materials, fluids, pneumatics, and aircraft design. Students earn college credit for some of their classes.

Virginia's Government and Military Assets

- Thousands of people exit the U.S. military from bases in Virginia each year
- The Pentagon
- Army Training and Doctrine Command
- Central Intelligence Agency
- Department of Homeland Security
- Defense Technical Information Center
- Fort Belvoir
- Fort Lee
- Joint Base Langley-Eustis
- Marine Corps Base Quantico
- Missile Defense Agency
- National Geospatial-Intelligence Agency
- National Ground Intelligence Center
- National Reconnaissance Office
- Naval Air Station, Oceana
- Naval Surface Warfare Center, Dahlgren
- Navy Commander Operational Test and Evaluation Force
- Norfolk Naval Base
- Office of Naval Research
- Space and Naval Warfare Systems Command