

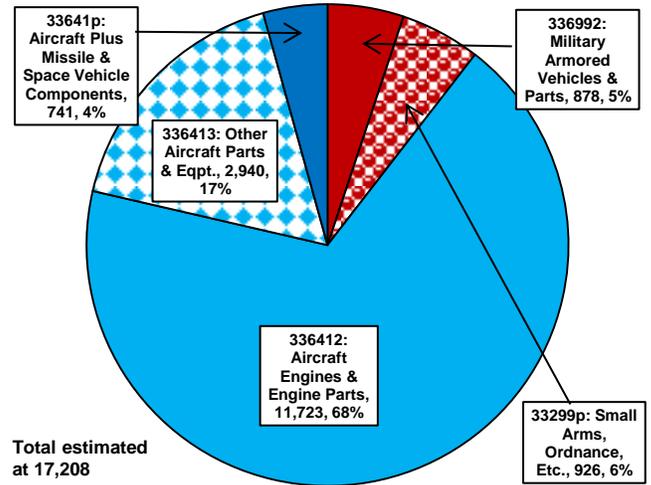
# Aerospace and Defense: Manufacturing Employment\*



## The Distribution of Industry Employment in Ohio

- 17,200 people were employed at 98 establishments manufacturing aerospace and defense (A&D) goods during 2013, according to the U.S. Census Bureau (USCB) and the Ohio Development Services Agency (ODSA).
- 15,400, or 89.4 percent, were making aerospace goods (NAICS 3364) at 70 establishments. At least 11,700 of these people made aircraft engines and engine parts (336412) – 68.1 percent of total A&D employment; about 2,900 – 17.1 percent – made other aircraft part (336413); around 600 assembled aircraft (336411); less than 200 made missile and spacecraft components (336415-9).
- 1,800, or 10.6 percent, made arms, ordnance, armored military vehicles, and related parts and accessories. Of these, employment was nearly equally divided between those making military armored vehicles and their parts (336992) and those making ammunition, small arms, ordnance, etc. (332992-4).

## 2013 Employment



Source: USCB, 2015; ODSA

## The Concentration of Industry Employment in Ohio

- Summary A&D manufacturing employment in Ohio is nearly proportional with overall private sector employment: 3.8 percent vs. 3.9 percent of the corresponding national totals.
- The table at right reveals the high concentration of two specific industries in Ohio: aircraft engine and parts production with 16.3 percent of the U.S. total, and military armored vehicles and parts production at 9.8 percent.

## Industry Concentration, 2013

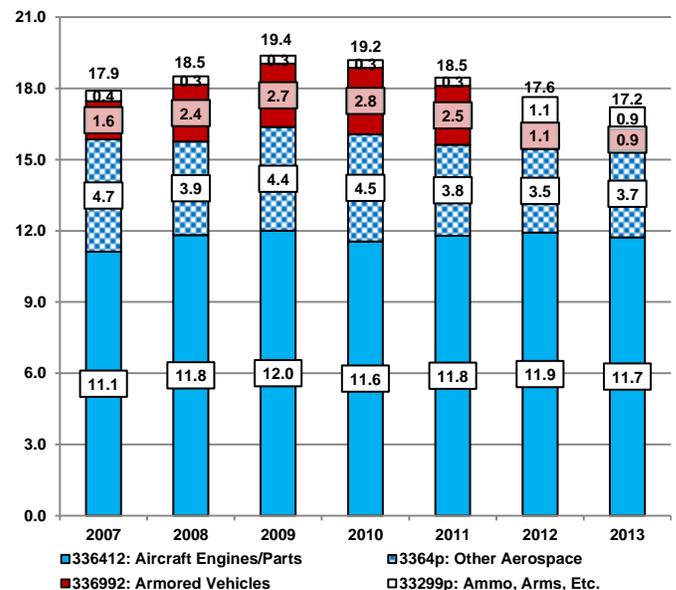
Industry	Ohio Employment as Percent of U.S.
Private Sector (Except Farm and Railroad)	3.9%
A&D Manufacturing	3.8%
Arms, Ordnance, Armored Vehicles, Etc.	3.7%
Ammunition, Small Arms, Ordnance, Etc.	2.4%
Military Armored Vehicles & Parts	9.8%
Aerospace Products & Parts	3.8%
Aircraft Assembly	0.4%
Aircraft Engines & Parts	16.3%
Other Aircraft Parts & Eqpt.	2.6%
Missile & Spacecraft Components	0.8%

Source: USCB, 2015; ODSA

## Employment Trends in Ohio

- Summary A&D manufacturing employment rose from 17,900 in 2007 to 19,400 in 2009 before falling to 17,200 in 2013.
- Most of this variation resulted from changes in two industries: the rise and fall of employment in military armored vehicles from 1,600 (2007) to 2,800 (2010) to 900 (2013), and the decline in all other aerospace employment from 4,700 to 3,700 (this *excludes* 336412, aircraft engines and engine parts). The latter cluster mostly reflects the net decline in other aircraft parts and equipment (336413) from 4,600 in 2007 to 2,900 in 2013.
- Employment gains in small arms manufacturing (332992) in 2012 and 2013 have partially offset the net decreases in the two industry segments.
- Employment in the aircraft engines and engine parts industry (336412) has been comparatively stable, fluctuating between 11,100 and 12,000 with no discernable trend.
- Except for 2013, summary A&D employment in Ohio has ranged between 4.0 and 4.4 percent of the U.S. total.

## Ohio Employment Trends (in thousands)



Source: USCB, 2009-2015; ODSA

Note: \* - All employment figures are estimates.

# Aerospace and Defense: Aerospace Value-Added, Defense Contracts, and Major Projects



## Value-Added in Aerospace Manufacturing in Ohio

- Valued-added by aerospace manufacturing (3364) has changed little since 2009; the reduced percentage of the U.S. total reflects industry growth elsewhere in the U.S.
- 85.5 percent of the aerospace value-added in Ohio was contributed by the aircraft engine and engine parts industry (336412) during 2012; Ohio's value-added in the latter also comprised 20.2 percent of the corresponding U.S. total, ranking Ohio second in that specific industry.

## Top Counties for Dept. of Defense Procurement

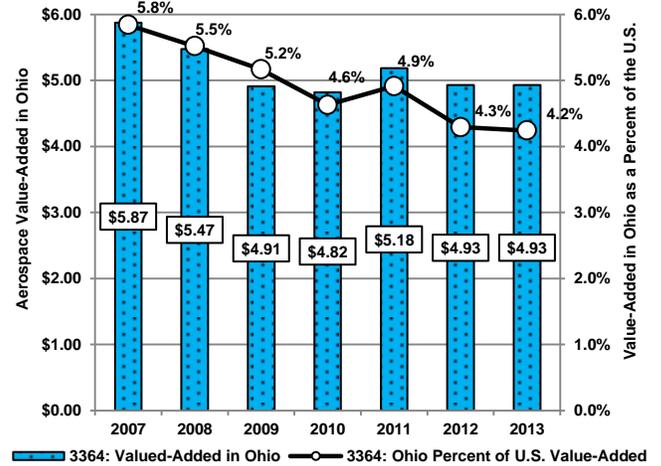
- 89.4% of \$4.5 billion in Dept. of Defense procurement contracts made with firms in Ohio went into eight counties during fiscal year 2014. (Ohio ranked 18<sup>th</sup> in the nation with 1.73 percent of the total.)
- Hamilton, notably with GE-Aviation, led all counties with contract awards of \$1.18 billion – 26.2 percent of the state total. Franklin, home to Battelle and Defense Supply Center contractors, ranked second with \$1.05 billion in contracts – 23.3 percent of the state total.
- Greene and Montgomery, with many companies around Wright-Patterson Air Force base, combined to receive close to \$1.12 billion – 24.9 percent of the state total.
- Four more counties – Clermont, Cuyahoga, Licking and Summit – combined to provide 15.0 percent of the goods and services for Defense. L3 in Clermont, NASA-Glenn, Eaton's TECT and United Technologies (UT) in Cuyahoga, Boeing and UT in Licking, and Lockheed-Martin and Meggitt in Summit are some of the notable aerospace and defense operations.

## Major Projects in Ohio

- 16 companies announced 20 major projects in Ohio's aerospace and defense manufacturing industry during the 2011-2014 period. They planned to invest a total of \$108.9 million and anticipated 860 new jobs upon completion. 2014 saw the greatest investment amount, while the largest number of projects – 7 – and anticipated new jobs were seen in 2011.<sup>^</sup>
- Heroux-Devtek's HDI Landing Gear planned the largest investments – a total of \$38.8 million, while L-3 anticipated the greatest number of new jobs – 290.
- Outside of manufacturing, GE Aviation announced four projects in 2014. GE planned to invest a total of \$161.5 million for research, development, testing and management services, and anticipated a total of 1,450 new jobs.

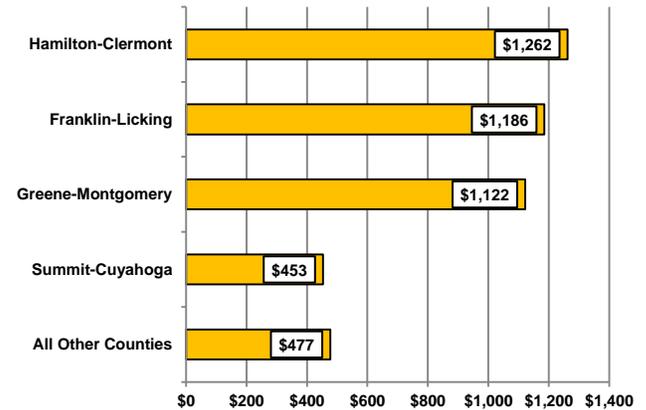
<sup>^</sup> - A major investment involves at least \$1 million, 50 new jobs, or an addition of 20,000 square feet. Projects often are phased-in over several years with jobs added at the end; they are not comparable with annual capital expenditures.

## Value Added in Ohio by Aerospace Manufacturing (in billions)



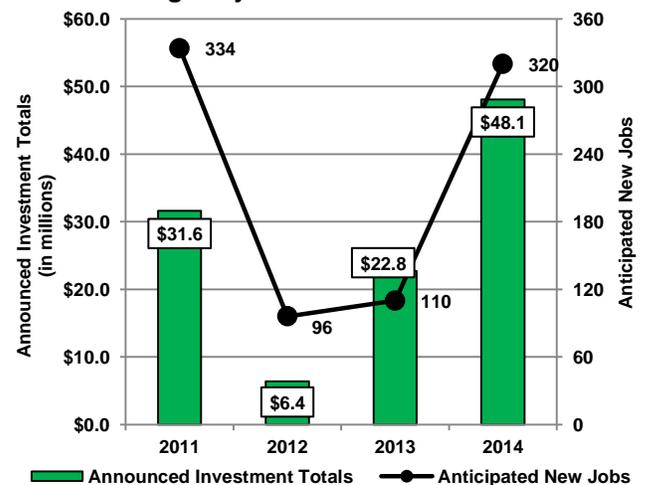
Source: USCB, 2008-2015

## Dept. of Defense Procurement Contracts: Top Counties in Ohio (in millions)



Source: Federal Procurement Data Center, 2015

## Manufacturing Project Announcements



Source: Office of Research, ODSA



# Aerospace and Defense: Organization Highlights

## Wright-Patterson Air Force Base

- Wright-Patterson AFB, located just east of Dayton is large, diverse and organizationally complex. Activities go beyond flight operations to include research and development, training and advanced education, acquisition and logistics management, and intelligence work.
- The conception, testing, acquisition, integration and/or modernization of the nation's aeronautical weapons are directed at the base. Cyberspace systems and work on unmanned aerial vehicles are the most recent additions.
- The base employs over 7,600 military personnel and well over 11,500 DoD civilian workers. An additional 7,000-plus non-DoD civilians work there. The Air Force estimated that the direct and indirect economic impact of the base amounted to \$4.04 billion in 2013.

## NASA Glenn

- NASA Glenn is located adjacent to Cleveland Hopkins International Airport. Its primary mission has always been developing science and technology for use in aeronautics and space. Research focuses on micro-gravity, propulsion systems, material and structural durability, electrical power, communications and health, and is often done in conjunction with private companies.
- The center employs well over 1,600 civil servants (about 76 percent of which are scientists, engineers and technicians); another 1,600-plus contractors worker at or near the complex. The most recent study concluded the center's total economic impact on Ohio amounted to \$1.19 billion in fiscal 2013.
- The Plum Brook Station subdivision near Sandusky specializes in large-scale mission-environment tests, often conducted in the world's largest vacuum chamber.

## Defense Supply Center, Columbus

- DSCC principally provides logistical support to land and maritime units. The facility employs about 6,200 DoD civilian workers and 500 military personnel; an additional 935 contractors work there.

## Ohio Aerospace Institute

- The OAI is a joint initiative of the NASA Glenn Research Center, Wright-Patterson's Air Force Research Laboratory, the State of Ohio, ten universities in Ohio granting doctoral degrees in aerospace-related engineering disciplines, and many companies engaged in aerospace activities.
- A non-profit organization founded in 1989, OAI's mission is building Ohio's aerospace economy by serving as a network and information exchange for education, training, research on a wide variety of subjects, and related technology development. OAI has about 80 employees and \$16 million in annual revenue.

## The Ohio Center for Advanced Propulsion and Power (OCAPP)

- Led by the Ohio State University and funded as a Wright Center of Innovation, OCAPP is an inter-disciplinary research center bringing together the state's aerospace resources: a strong industrial base, two federal laboratories, and five existing university research programs.
- OCAPP research is providing the knowledge to create faster, quieter and more fuel efficient jet engines – with reduced environmental impact, helping to meet the requirements of next-generation aero propulsion systems.

## Private Sector Companies

- General Electric's (GE's) Aviation division, headquartered in Evendale just north of Cincinnati, produces various large jet engines for commercial and military aircraft. CFM International, a joint venture with France's SNECMA, also operates in the Cincinnati area. GE's engine testing facility is in Peebles, and its Unison subdivision is near Dayton. GE Aviation also provides support and repair services. Total employment in southwestern Ohio exceeds 8,600.
- General Dynamics' Land Systems division produces the latest M1 tanks – and upgrades earlier models – for armies at the Defense Department's Joint Systems Manufacturing Center (JSMC) in Lima. It also makes other military vehicles and goods for other services. Minimal production is anticipated for the near future. The company employs about 500 people at the JSMC, and has smaller operations in Beavercreek and Springboro, and at Wright-Patterson AFB.
- The Central Ohio Aerospace and Technology Center houses a number of industry operations east of Columbus in Heath. The Boeing Guidance Repair Center services military electronics and inertial guidance and navigation systems, and does small-scale assembly, integration and testing. Boeing employs over 400 people at this location. (As judged by company expenditures, Ohio supplies more parts to Boeing than any other state.) Other operations include United Technologies' (UTC's) maintenance and repair of inertial navigation systems, and joint Air Force-industry precision metrology and calibration efforts.
- GE, General Dynamics and Boeing are on Fortune's list of the 1,000 largest U.S. companies. Additional list-companies with aerospace or defense operations of varying sizes in Ohio include Carlisle's Friction Products division, Honeywell and its Grimes Aerospace division, L-3's Fuzzing and Ordnance division, Lockheed-Martin, Parker-Hannifin, the Triumph Group's Thermal Systems division, and UTC and its Goodrich division. Other large employers in Ohio include the Eaton-TECT complex, Meggitt's Aircraft Braking Systems division, and Meyer Tool, which manufactures turbine blades.

