

# Aviation focus: Oklahoma



**Oklahoma isn't always thought of as being one of the world's major aerospace-industry centres, but this southern US state has an impressive array of aerospace employers and is home to some uniquely large MRO and aviation-development assets. Chris Kjølgaard reports.**

Probably the first thing that enters most people's minds when they hear the name 'Oklahoma' is a famous Rodgers and Hammerstein musical. If asked what Oklahoma's main industries are, many might say agriculture and oil & gas. On the industrial question, both responses would be correct to some degree. But this sprawling southern US state of 68,667 square miles and 3.75 million residents, known within the country for its flat lands and big-sky vistas, is also a busy hive of aerospace activity, and aerospace is one of Oklahoma's four main industries.

Figures from the Oklahoma Department of Commerce and the Oklahoma Aeronautics Commission show that aerospace is responsible for about 150,000 direct and indirect jobs within the state and represents about 10 per cent of its entire employment base. Oklahoma's direct aerospace employment of more than 74,000 is about twice the number of workers in the state's oil & gas industry; and the average salary for Oklahoma's aerospace-industry workers is, at \$55,000, very nearly twice the state's overall average wage.

According to the two state bodies, aerospace was Oklahoma's biggest export earner in 2010, its \$331m export contribution representing 6.2 per cent of the state's total exports of \$5.4bn.

More than 500 aerospace companies are based in or have a presence in Oklahoma. These range from industry giants such as Boeing, Lockheed Martin and Northrop Grumman to mid-sized companies such as Tulsa-based aerospace manufacturer Nordam Group, which employs 1,700 people in the area; and BizJet, a Lufthansa Technik-owned completion centre which employs about 1,800 people at Tulsa. FlightSafety International is also a sizable Tulsa-area employer: the company builds all its full flight simulators there and is about to add more jobs as it moves its facility about three miles to a new, larger site where the company can work on constructing 19 simulators at a time rather than the 11 it can simultaneously work on now.

Oklahoma's aerospace complement ranges from large manufacturing or MRO firms such as Spirit AeroSystems, AAR and ARINC to specialists such as maintenance- and military-facility



architects Frankfurt Short Bruza; non-destructive inspection pioneer Veracity Technology Solutions (which is owned by AGC); aerobatic-aircraft manufacturer Zivko; software vendor Critical Technologies, whose AirVault division provides a browser-based, fully hosted service for the management of aircraft maintenance records; and precision CNC machining and fabrication company M&M Manufacturing.

However, the industry is dominated by three massive employers — Tinker Air Force Base at Oklahoma City, the US Air Force’s biggest maintenance base, where 18,000 civilians and 10,000 military personnel work; the American Airlines Maintenance and Engineering Center at Tulsa, which employs more than 7,000 people; and the Federal Aviation Administration’s Mike Monroney Aeronautical Center at Oklahoma City, where some 7,300 people work on a 110-acre site which acts as the heart of the FAA’s operations and development efforts as well as hosting the US civil-aircraft registry, the FAA’s fleet of navaid-calibration aircraft and the FAA’s (and US Department of Transportation’s) financial-management centre.

All these companies and institutions create a combined economic output of \$12.5bn a year, 10 per cent of Oklahoma’s entire economic output, says Victor Bird, director of the Oklahoma Aeronautics Commission (OAC). The OAC is a state body whose mission is to promote the aerospace and aviation industry within Oklahoma, in partnership with the Oklahoma Department of Commerce and other public- and private-sector entities. Its mandate also includes planning and development for the state’s public-airport system; and making as many of Oklahoma’s 49 general aviation airports jet-capable as possible within the current decade (41 are now jet-capable).

Bird sees Oklahoma’s aerospace industry as being fairly diverse, but he points out that it is dominated by one activity — MRO. “I tend to think of our industry in terms of what it does — we have some variety, but the major part is repairing aircraft and getting them back in the air,” he says. “We’re not manufacturing airframes today,” at least on a large scale. (Zivko builds the very successful EDGE 540 aerobatic aircraft, which has dominated recent Red Bull

Air Race World Championships.) “The diversity that exists here on a very grand scale is in public and private [partnerships].” These have been particularly successful in helping Oklahoma position itself as a leader in the fast growing unmanned aerial systems (UAS) field, he says.

One of the state government’s main development goals is to ensure that not only does the aerospace industry continue to be one of Oklahoma’s biggest employers, but that word gets out about Oklahoma’s unique aerospace assets and attributes — particularly the state’s ranking by aerospace management consulting firm AeroStrategy as one of the world’s seven major MRO-industry centres. Oklahoma is one of only two such MRO centres in the USA, the other being the Miami area, according to Bird.

**Aviation legacy**

Oklahoma’s aviation history is long and influential. Clyde Cessna began testing aircraft in the state in the 1910s. In the late 1920s, the state saw the founding of two airlines,



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**—Victor Bird, director, Oklahoma Aeronautics Commission**



Tulsa-Oklahoma City Airways (founded by Tom and Paul Braniff, who went on to establish Braniff Airways) and Southwest Air Fast Express (S.A.F.E.), founded by Erle Halliburton — the same man who founded the big oil-industry company that bears his name. Both Tulsa-Oklahoma City Airways and S.A.F.E. were bought by the then American Airways, beginning what became American Airlines’ long association with Oklahoma.

In the 1930s, Oklahoma was also home to two US aviation pioneers, Will Rogers (known worldwide as an entertainer) and Wiley Post. Post’s record-breaking round-the-world flight in 1933 in a Lockheed Vega named ‘Winnie Mae’ is still regarded as a landmark in US aviation history. He then went on to develop one of the first pressure suits, which allowed him to fly to an altitude of 50,000ft in 1934 and discover the existence of the jet stream. Post and Rogers died together in 1935 when the Lockheed Explorer floatplane they were flying crashed on take-off near Barrow, Alaska. Both



*(Above) American Airlines' Maintenance & Engineering Center at Tulsa, which claims to be the world's biggest commercial-aviation maintenance facility, is one of Oklahoma's 800-pound aerospace gorillas.*

*(Below) TulsaTech's Riverside Campus at Richard Lloyd Jones Jr. Riverside Airport is a key source of skilled employees for aerospace companies.*

men's passion for aviation has been immortalised by Oklahoma City in naming its main airport Will Rogers International Airport and its large business-aviation airport Wiley Post Airport.

Oklahoma's aviation heritage came of age in the Second World War, when two large Douglas plants were established near Oklahoma City and Tulsa (the state's two largest cities) to build bombers for the US Army Air Force. More than 40,000 workers, half of them women (the 'Rosie the Riveter' publicity campaign started in Oklahoma), worked in the two factories. After the war, the fortunes of the two facilities gradually diverged: the Oklahoma City-area plant became

the basis for Tinker Air Force Base, today the largest aircraft-maintenance complex and military-aviation logistics centre in the world, while the Tulsa factory declined over a period of many years. However, the scene was set for Oklahoma to develop its aerospace industry.

Together with Oklahoma's hard-working and highly skilled workforce, and various pioneering cash incentives and tax credits that the state provides for aerospace companies doing business in Oklahoma or with its subcontractors, Oklahoma's long aviation heritage is one of three key factors which have put it on the map as an aerospace-industry leader, says Bird. More than anything else, he believes, Oklahoma's workforce is the key to its aerospace-industry prominence.

### **A career-education system geared to aerospace**

"Oklahomans have a really great work ethic, since statehood [which Oklahoma achieved on November 16, 1907] and before," says Bird, noting that Oklahoma's terrible experience in the Great Depression in the 1930s (memorialised in John Steinbeck's *The Grapes of Wrath*) reinforced the desire among Oklahomans to work hard. "We have the same problems as everyone else in making the pipeline [of skilled labour] big enough, but we have something other states don't — we put our career technical education in a separate system."

In addition to Oklahoma's Spartan College of Aeronautics and Technology, which Bird says provides about five per cent of the state's requirement for skilled aerospace workers and engineers, Oklahoma has a large number of technical colleges. Of these colleges, 29 offer aerospace-education qualifications, with five different programmes available — among them courses for airframe & powerplant mechanics, avionics technicians, machinists and air traffic controllers. Prominent among these aviation-intensive "CareerTech" environments is TulsaTech's Riverside Campus at Richard Lloyd Jones Jr. Riverside Airport just outside Tulsa, the 35th-busiest tower-controlled airport in the USA (Jones Airport is busier than Orlando International for aircraft movements).

TulsaTech's 26,290m<sup>2</sup> (283,000ft<sup>2</sup>) campus at the airfield is such a key source of skilled employees for aerospace companies that American Airlines recently donated a just-retired MD-80 to the school so that students could practice their airframe maintenance skills on the aircraft by keeping it in mechanically sound status. The MD-80 is one of 30 non-flying aircraft which TulsaTech maintains, along with many aero engines that include big piston engines used to power aircraft such as the Lockheed Constellation and the Douglas DC-7, as well as a Packard Merlin.

Also central to Oklahoma's aerospace career-education efforts are the engineering degree programmes offered by its universities. In addition to Oklahoma State University (OSU, which is a world leader in unmanned aerial system (UAS) design and offered the first-ever degree course in the subject) and the University of Oklahoma, institutions such as Oklahoma City University, Tulsa University and the University of Central Oklahoma all offer American Board of Engineering & Technology-accredited programmes that train engineers for Oklahoma's aerospace employers.

A decade ago, says Bird, "we were losing our engineers — they were leaving the state in droves for the oil & gas industry". That has changed as Oklahoma has continued to invest in its CareerTech technical-college system and in its universities' aerospace programmes, as well as facilities such as OSU's University Multispectral Laboratories. "We're now keeping 50 per cent of our graduates — that [proportion] was only a third, a few years ago."

**Oklahoma's 800-pound aerospace gorillas**

Just how vital this is to Oklahoma is evident when one considers that not only is Tinker Air Force Base the world's largest military MRO facility, but American Airlines' Maintenance & Engineering Center at Tulsa claims to be the

world's biggest commercial-aviation maintenance facility. American carries out 65 per cent of its heavy maintenance work at Tulsa, including most of its engine work and its avionics maintenance at the 330-acre (3.3 million-square-foot) site. Bird says American has recently begun positioning the Tulsa centre to accept third-party MRO work to supplement American's own maintenance programmes. "They've been working hard on it and they're getting there," he says.

Tinker AFB, just outside Oklahoma City, dwarfs even American's huge facility at Tulsa. Not only is Tinker AFB where the USAF performs most of its bomber and tanker maintenance and most engine maintenance, but it is also the home of the Air Force Materiel Command's enormous Oklahoma City Air Logistics Center, the US Department of Defense's biggest spares depot. Tinker's facilities — which include a former General Motors plant that closed down in 2006 and which Oklahoma City bought in 2008 and leased to the USAF for \$1 a year — extend over more than nine square miles (23km<sup>2</sup>) and the city owns plenty of land round the base which it can make available for further growth.



*We want to remain one of the world leaders in the maintenance, repair and overhaul of aircraft. I don't think anybody has stepped out and said they want to be a composites centre of excellence. We want to do that.*  
 — Victor Bird, director, Oklahoma Aeronautics Commission



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Residents of 45 of Oklahoma's 77 counties work at the site, according to Bird.

Add the FAA Mike Monroney Aeronautical Center — where the FAA trains all its air traffic controllers-to-be and has its Civil Aerospace Medical Institute, in addition to everything else — into the mix and the need for engineering talent and highly skilled aerospace labour becomes even more apparent. However, Oklahoma's state government has been far-sighted in enacting legislation to attract aerospace companies and keep their workers happy. So happy, in fact, that Boeing has recently decided to transfer 500 jobs from its Long Beach plant in California to support its USAF Lockheed C-130 and Rockwell B-1 maintenance contracts, and is constructing a new office building right beside Tinker AFB to house the extra design and engineering staff it will need. "There's a grapevine out there — they've recognised we've got something," says Bird.

### Financial incentives for aerospace development

In addition to a low cost of living and a good quality of life, that "something" is the Oklahoma state government's willingness under governor Mary Fallin (a pilot herself), secretary of commerce Dave Lopez and Aeronautics Commission director Vic Bird to innovate more than other US states in providing economic incentives to encourage aero-

space business. More than 20 other US states have followed Oklahoma's lead in offering the 'Quality Jobs' cash-incentive programme to employers who create at least \$2.5m in payroll in new jobs, and investment tax credits on depreciable property to go along with it. However, only Oklahoma offers three new incentive programmes aimed at attracting investment from aerospace employers and bringing highly skilled aerospace workers to the state.

Boeing's decision to increase its workforce at Oklahoma City was partly due to its becoming in April the first awardee under Oklahoma's new PrimeWIN Prime-Contractor Incentive programme. PrimeWIN provides both a cash benefit and a certified sub-contractor base for prime contractors on US federal government contracts. To obtain the incentive — which offers a cash rebate of up to two per cent of the Oklahoma-workforce-loaded labour cost for a maximum of 10 years — contractors must sub-contract a portion of the work to an Oklahoma-based sub-contractor. All sub-contractors come from a large pool of companies that have been pre-certified by the Oklahoma Department of Commerce.

A second, new incentive is Oklahoma's 'Aerospace Industry Engineer Workforce Tax Credit'. From 2012, this will provide tax credits of \$5,000 a year to aerospace engineers hired to work in Oklahoma. Aerospace companies hiring engineers will also get a tax credit equal to five per cent of the engineer's pay for the first

five years; and 10 per cent if the engineer in question graduated from an Oklahoma educational institution. Employers can receive another tax credit of 50 per cent of the tuition costs they reimburse to engineer employees, for the first four years of employment. Bird's own organisation wrote the bill proposing the new incentive programme to the Oklahoma legislature.

The third new weapon in Oklahoma's arsenal of financial incentives for aerospace-industry employers is its '21st Century Quality Jobs' programme. This programme is squarely aimed at companies with highly skilled, knowledge-based workforces and offers cash incentives of 10 per cent of the company's entire payroll for any employer whose average wage is at least \$94,418.

"We need that skilled labour," says Bird. "Engineers are terribly important and you've got to have skilled workers to do the jobs that the engineers design." But while Oklahoma's incentive system is working well, and its focus on public-private partnerships in fast-growing areas of aerospace technology such as the UAS sector is also beginning to pay dividends, Bird says Oklahoma needs to do more for its companies to win business — particularly from its resident 800-pound gorillas.

**Future challenges**

"We still have a bit of a challenge: I would like to see more Oklahoma businesses doing business with Tinker Air Force Base and with American Airlines, frankly," says Bird. The OAC estimates that only about 10 per cent of the aerospace equipment and service contracts awarded by Tinker AFB go to companies in Oklahoma. So the Oklahoma legislature has created the Center for Aerospace Supplier Quality (CASQ), which offers free business intelligence and guidance to Oklahoma companies qualified to pursue US military contracts and connects them with contracting and sub-contracting opportunities. By May, CASQ had provided consulting services to 144 Oklahoma companies and as a result 26 of those companies had received a total of 289 contracts worth nearly \$25.9m.

A unique public-private partnership involving the Oklahoma government, the US Army and the FAA as well as OSU and several Oklahoma companies has seen the state establish the only UAS-testing airfield outside the US National Airspace System (NAS). Using restricted military airspace above the Army's Fort Sill reservation in southwest Oklahoma, the state can now offer organisations the ability to test UAS vehicles without having to obtain FAA authorisation to fly them.

While Oklahoma is striving to position itself as a world centre of UAS excellence, the state has other aerospace-industry development

ambitions. "We want to remain one of the world leaders in the maintenance, repair and overhaul of aircraft," says Bird. "I don't think anybody has stepped out and said they want to be a composites centre of excellence. We want to do that." Additionally, Oklahoma has a commercial-spaceport runway, a 13,000ft runway at Clinton in western Oklahoma. Although the spaceport currently has no occupants, Clinton is the only site in the United States NAS which offers a horizontal launch corridor, as a result of work done with the FAA in both Oklahoma and Texas. "I think at some point there's going to be some return on that," says Bird.

In its 2009 Strategic Plan for the Growth of the Oklahoma Aerospace Industry, the Department of Commerce intimated that the state would also seek to focus development activity in areas such as nanotechnology and other advanced materials; alternative fuels; aerospace simulation; the USA's NextGen air traffic management system; and sustainable, green aviation practices. To many, achieving all this might seem highly ambitious — but given the resourcefulness that Oklahoma has already shown in developing its aerospace industry, nobody should be sneering. ■



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