

CASE STUDY

A New High-Efficiency Hangar Design for the KC-46A Tanker

Burns & McDonnell successfully designs a first-of-its-kind hangar with integrated multifunction maintenance capabilities.



Challenge

Entering service in 2019 as the U.S. Air Force's next-generation tanker, the Boeing KC-46A Pegasus plays a critical role in enabling enhanced air mobility. This large, advanced aircraft's maintenance requirements are supported by a maintenance depot at Tinker Air Force Base (AFB) in Oklahoma.

The Air Force decided on an innovative approach for this project: Design a hangar capable of supporting corrosion control, fueling and general-purpose maintenance under one roof. This approach would allow for a single hangar to be utilized for all maintenance workflows as initial aircraft enter service, aligning facility costs closely to current needs. As additional aircraft come online and maintenance workflows increase, additional hangars would be constructed and the original multifunction hangar would be converted for long-term use as a specialized corrosion control hangar.

Condensing three different maintenance functions into a single hangar required a unique control system design to allow maintenance personnel to rapidly switch between different functional modes. Each of these modes needed automatic adjustments to support systems such as heating, ventilation and air conditioning; electrical; and industrial waste/fuel spill control.

Project Stats

Client

U.S. Army Corps of Engineers
(USACE), Tulsa District

Location

Tinker Air Force Base, Oklahoma

\$142M

PROJECT COST

125K+

SQUARE FEET

LEED

SILVER CERTIFIED

Solution

Planning began with an initial weeklong charrette led by Burns & McDonnell and continued over the next several years with multiple planning meetings. This preliminary work included a variety of interested parties, including the Air Force — and its Air Force Logistics Command, Air Force Materiel Command, Air Force Civil Engineer Center (AFCEC), and the 72nd Air Base Wing at Tinker AFB — the USACE Tulsa District and the Burns & McDonnell design team. Biweekly teleconferences with Air Force representatives were conducted throughout the design process to coordinate and review action items. These teleconferences were critical to developing the design to mitigate potential risks for this mission-critical program.

Based on this highly detailed, committed approach to the planning process, USACE Tulsa District selected Burns & McDonnell to provide comprehensive architectural/engineering design services for this \$142 million hangar. The overall scope of work included design of the two-bay depot maintenance hangar, a mechanical systems building, major utilities and airfield pavement. This project required proactive risk management to plan for extensive phasing with the multiple contractors on-site. Workflows were carefully synchronized to allow for minimal disruptions for continuous operations.

Shortly before the Issued for Construction (IFC) drawings were due to be submitted, AFCEC requested that Burns & McDonnell redesign a significant portion of the fire protection system to satisfy new requirements. Having supported initial development of these Air Force requirements, the Burns & McDonnell team had the knowledge needed to promptly execute a redesign. Burns & McDonnell worked with the USACE Tulsa District to overcome a challenging construction market and achieve a successful award, with value engineering work on this project identifying approximately \$4 million in savings.

“Burns & McDonnell delighted the USAF customer by meeting the requirements of this task order within a severely compressed schedule. Requirements were completed on time every time for all reviews. The Burns & McDonnell team additionally went out of their way to address cost issues that arose during design development including additional communication across all parties in the design working group and routinely held coordination calls outside of the typical design reviews to address issues.”

BRYAN THOMPSON
Engineering Branch Chief, USACE Tulsa District



Figure 1: The innovative hangar provides the U.S. Air Force with support needed for aircraft maintenance requirements.

Results

The project was successfully awarded, construction was completed and the hangar is currently operational. The completed hangar stands approximately 44 feet high over the wings of the aircraft and approximately 78 feet high over the tail and fuselage section. The hangar includes 12 telescoping platforms designed to reach all areas of the KC-46A aircraft; also included are eight work platform lifts, as well as new bridge cranes and fall protection devices. It features a pair of horizontal sliding hangar doors with a clear-height opening of 65 feet and a clear-width opening of 177 feet.

The hangar was designed pursuant to UFC 1-200-02 and achieved LEED Silver certification, with over 60% of construction waste successfully diverted from the landfill, 24% of building products manufactured with recovered materials and whole-building energy modeling projected at 45.8% energy efficiency compared to the ASHRAE 90.1 baseline. Our team worked with the local base civil engineer and user groups to design a hangar that recirculates 80% of the airflow in paint mode, greatly reducing first cost and energy usage to achieve LEED Silver certification.

About Burns & McDonnell



Burns & McDonnell is a family of companies bringing together an unmatched team of engineers, construction and craft professionals, architects, and more to design and build our critical infrastructure. With an integrated construction and design mindset, we offer full-service capabilities. Founded in 1898 and working from dozens of offices globally, Burns & McDonnell is 100% employee-owned. For more information, visit burnsmcd.com.