KC-46A Pegasus

Air Mobility Command issued an interim capability release for the KC-46A to support limited operational refueling taskings in 2021, but shortfalls in the Remote Vision System (RVS), refueling boom, and several systems that provide the aircrew threat situational awareness prevent the completion of IOT&E and a full-rate production decision until FY24. The Air Force Operational Test and Evaluation Center (AFOTEC) has completed 60 percent of effectiveness testing and 93 percent of suitability testing.

System Description

The KC-46A aerial refueling aircraft is a modified Boeing 767-200ER commercial airframe with military and technological upgrades required to perform aerial refueling of tactical and strategic aircraft, airlift and aeromedical evacuation, and to provide force protection against kinetic and chemical, biological, radiological, and nuclear threats. Notable upgrades include a fly-by-wire refueling boom, centerline and wing pod refueling drogues, a dual remote Air Refueling Operator's Station (AROS) enabled by an exterior RVS, additional fuel tanks in the body, a boom refueling receiver receptacle, a 787 digital cockpit update, Large Aircraft Infrared Countermeasures, a modified ALR-69A radar warning receiver (RWR), and Tactical Situational Awareness System (TSAS). The KC 46A cargo bay is designed to accommodate palletized cargo, aeromedical evacuation equipment, and roll-on command, control, and communications gateway payloads.

Program

The KC-46A Pegasus is an Acquisition Category IC program intended to be the first increment of 179 replacement tankers for the fleet of more than 400 KC-135 and KC-10 tankers. DOT&E approved the Milestone C Test and Evaluation Master Plan update in 2016 and the IOT&E test plan in April 2019. In a May 2020 memorandum, DOT&E communicated to the Assistant Secretary of the Air Force for Acquisition, Technology, and Logistics that DOT&E will not submit an IOT&E report on KC-46A until operational testing of a production-representative RVS is complete. The Air Force expects a corrected RVS version 2.0 to be ready for operational testing in mid-FY24. Air Mobility Command issued interim capability releases for KC-46A refueling taskings using its centerline drogue system in July 2021 and using the boom in August 2021.

Major Contractor

The Boeing Company, Commercial Aircraft, in conjunction with Defense, Space & Security – Seattle, Washington.

Test Adequacy

IOT&E has been ongoing since May 2019. In FY21, AFOTEC completed 60 percent of the effectiveness test points in accordance with the DOT&E-approved test plan; 16 percent are deferred, pending long-term updates to the boom, RVS, Wing Aerial Refueling Pod (WARP), RWR, and TSAS. Aeromedical and cargo operations testing is nearly complete.

During IOT&E, the Air Force collected and adjudicated suitability data during over 9,660 flight hours on four test aircraft, exceeding the minimum planned 1,250 flight hours for IOT&E. Testing and normal flight operations (21,419 flight hours on 46 aircraft) have accumulated ten times the required flight hours for an adequate suitability assessment, with 23 of 24 specific maintenance demonstrations completed. The Program Office commissioned a review of the entire Pegasus fleet's maintenance data to help guide future decisions on the program.

The KC-46A program completed continuous wave immersion electromagnetic pulse risk-reduction testing in November 2020 and some passive system testing in August 2021.

AFOTEC conducted cooperative cybersecurity testing in October 2020 but was unable to adhere to the test plan detailed in the Controlled Unclassified Information edition of this report. AFOTEC also conducted part of a cybersecurity Adversarial Assessment in July 2021, which experienced similar problems. Planning for a second phase of Adversarial Assessment scheduled for FY24 is underway.

Future assessments will be focused on solutions to fleetwide maintenance and supply issues, as well as already planned changes to the existing baseline (e.g., boom upgrades, WARP, and RVS upgrades).

Performance

Effectiveness

Testing to date identified shortfalls that require correction to mitigate the risk to achieving operational effectiveness in IOT&E:

- AFOTEC identified some shortfalls in the AROS functions that increase operator workload, which may degrade operational effectiveness in certain conditions. Refueling in lighting conditions that require the long-wave infrared sensor is prohibited until RVS 2.0 is complete. Boom refueling of certain platforms will resume after the boom actuator redesign. WARP capability will enter IOT&E in FY22, but an observation from developmental testing is that high receiver closure-to-contact speeds increase the likelihood of damage to drogue baskets.
- Aeromedical evacuation operations have progressed to the transport of actual patients, during which AFOTEC observed minor problems with loading patients and administering intravenous fluids.
- Cargo operations made progress, but KC-46A crews must reject a portion of standard cargo pallets due to KC-46A restrictions on pallet weight distribution. Aircrews also report excessive workload and delays in determining if proposed cargo is safe for transport in the aircraft and interfacing with cumbersome aircraft cargo management systems.

Suitability

The KC-46A is not yet meeting all operational suitability requirements, and therefore there is risk to achieving operational suitability in IOT&E:

- The program's reliability growth plan will likely meet suitability requirements by 50,000 fleet flight hours. The fleet suitability metrics, collected so far, are similar to those observed on IOT&E test aircraft.
- The following suitability metrics do not yet meet thresholds: operational availability; mission capability rate (MCR); maintenance man hours per flight hour; mean time between maintenance; and break rate. Factors most recently influencing operational availability and mission capability rates include insufficient cargo configuration guidance, restrictive fuel tank inerting procedures, and reliability problems with the auxiliary power unit drain mast and surge boot assembly.
- Operator surveys describe Type 1 training as inadequate to support the operation of multiple datalink systems to support mission readiness for net-ready taskings.

Survivability

The KC-46A needs to overcome several challenges to meet some of its survivability requirements. In accordance with the KC-46 Security Classification Guide, additional details are provided in the Controlled Unclassified Information edition of this report. The survivability of the KC-46A in a nuclear threat-induced environment cannot be determined without the active system test, scheduled to be completed in 3QFY22. Electromagnetic pulse testing to date indicates the shielding integrity of the aircraft is good, with no obvious shielding gaps. In addition, maintenance of the aircraft does not degrade electromagnetic pulse hardness.

Recommendations

The Air Force should:

1. Improve training and technical data to enable timely and repeatable configuration of aircraft data systems such as the military data network to support mission readiness for net-ready taskings.
2. Continue to redesign the RVS and the refueling boom to facilitate their readiness for operational testing, scheduled in FY24.
3. Address the recommendation highlighted in the Controlled Unclassified Information edition of this report to support survivability of the KC-46A.