Boeing CV-22 Osprey

$60 million

Cost of each Osprey

400

Number of Ospreys in Existence

"

The U.S. Air Force wanted to ensure MRO training was available to its technicians from any location at any time.

MRO Training

Challenge

Aircraft need to be repaired just like all vehicles—and the stakes with military aircraft are extremely high. Technicians must be well-trained and experienced in maintenance operations to keep the fleet flightworthy and ready for deployment. Additionally, these MRO programs must mitigate the potential of accidental damage to the complex machinery or creation of safety hazards. When it comes to critical, ultra-expensive – and rare – aircraft such as the tilt-rotor, vertical-takeoff Osprey CV-22, gaining access to the craft for training purposes presents a serious hurdle for MRO officers.

There are only 400 Ospreys in existence, and the US Air Force 27th Special Operations Support Squadron at Cannon Air Force Base in New Mexico has only one of them. The single Osprey at Cannon AFB is rarely accessible for maintenance training and there are limited opportunities to practice on the machine itself. And yet, such training is essential to maintaining safe flight operations and readiness.

To address this problem, the Cannon Air Force Base Commander worked with the VR solutions team of Ocupath, XALTER and Boeing. The project was made possible with funding through a Small Business Innovation Research grant from AFWERX, the innovation arm of the US Air Force, through an open solicitation.

XALTER was tasked with building the VR training and assessment modules so that training would be available to technicians any time, from any location and provide exceptional course material retention and comprehension results.

Solution

The existing 65-step task order (TO) process was converted into a 20-minute VR training exercise to simulate "learning by doing" for improved comprehension and retention.

We developed a VR training solution that simulates the removal and maintenance of tires on a virtual Osprey CV-22: reading all necessary warnings, using appropriate PPE, dissembling the wheel assembly, examining the parts, and learning how they fit together. This provided training access and repetition to practice tasks that had not been possible until now.

Our engagement with the U.S. Air Force involved a multi-stage process that included the following tasks:

Planning
- Assigned a dedicated team led by our CTO
- Documented the Osprey CV-22 training goals and measures of success
- Initiated discovery calls with Ocupath team and AF customer
- Interviewed trainees, operators, etc. (user stakeholders)
- Engaged SMEs to understand proper processes and technical requirements

Design
- Reviewed the US Air Force's 65-step task order (TO) training process, including hours of video-based training materials
- Introduced intermediate steps to the 65-step TO because the it was not clear in some instances and even skipped some steps (verified by US Air Force SMEs)
- Built storyboards to document the entire process and user experience (UX), including a "scenario breakdown document" to define various training scenarios

Development
- Built the CV-22 Tire Module using the Unity engine with custom built 3D assets optimized for standalone, easily scalable headsets like the Oculus Quest 2. The 3D models can be reused in other scenarios which saves development time and lowers costs for the client.
- Designed and built the backend of the system to capture user data and support analytics

Deployment
- Using a head-mounted display such as the Oculus Quest 2 technicians can perform the step-by-step, Air Force-regulated task and gain confidence and experience without regard to the availability of the Osprey, risk of equipment damage, or physical injury.
- The training includes both a prompt driven "learning track" as well an assessment mode that can evaluate the trainees competency at the task.
- Importantly, the VR immersive learning solution includes a data feed that metrics activities inside the experience and exports reporting via a CSV file that integrates with an Air Force training dashboard. Tracking technicians' performance makes possible insights into common problem areas allowing the training simulations (or the process itself) to be improved upon.

The existing 65-step task order (TO) process was converted into a 20-minute VR training exercise.

MRO Training 2

VR Training Experiences
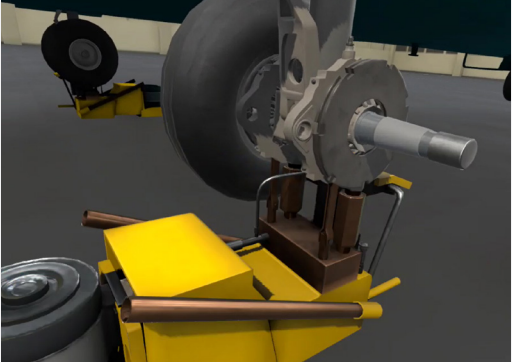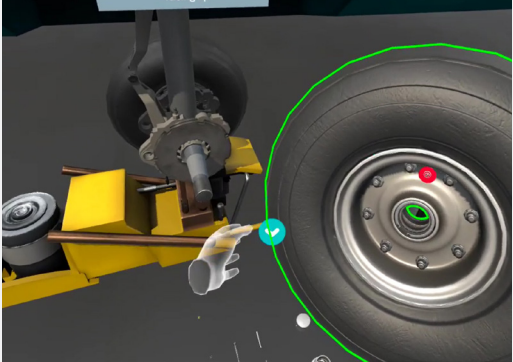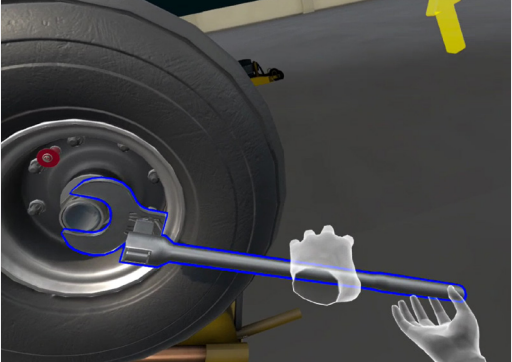
Results

Maintaining the Osprey requires dozens of specialized tasks and this initial VR project provided a proof of concept and experiential model to guide Cannon AFB's training roadmap. The CV-22 Tire Module showcased the efficacy of VR based training for future training TO's.

The US Air Force was able to validate that VR is a viable training methodology to overcome traditional training challenges such as: inaccessibility of equipment, cost of wear and damage on expensive airframes, and the risk of injury and death of inexperienced trainees.

XALTER develops virtual, augmented and mixed reality solutions that are delivered though the proprietary XALTER platform. The company has revolutionized the use of 3D modeling and simulation in training and operations support and offers measurable ROI, enhanced safety, content retention and environmental impact metrics.

Now customers can deploy multi-user and multi-platform programs anywhere in the world, gather data and derive valuable insights about their business. Scenario planning, user tracking and subsequent analytics facilitates data visualization on sophisticated dashboards that showcase business intelligence. The program benefits learners, trainers and the client company.

XALTER engineers and training professionals harness the latest research and training technology to provide clients highly individualized solutions. The platform engages learners in immersive VR/AR/MR custom training environments tailored to specific industry sectors and ensures effective knowledge acquisition and skills mastery.

XALTER

1820 S. Boulder Avenue,
Tulsa, Oklahoma 74119

www.xalter.com