Revolutionizing Marine Corps Maintenance with AR/VR Technology

[Courtesy Photo] Cpl. Tyler Havard, S3 Schools Non-Commissioned Officer (NCO), 2D Maintenance Battalion, prepares an Augmented Reality lens for use during tele-maintenance between artisans at Marine Depot Maintenance Command's Production Plant in Albany, Ga., and the maintenance team at Marine Wing Communications Squadron 28 (MWCS 28), Cherry

Point, N.C.

By Jennifer N. Napier

MARINE CORPS LOGISTICS BASE ALBANY, GA – Augmented Reality (AR) and Virtual Reality (VR) are set to play pivotal roles in transforming tele-maintenance operations, ensuring that maintainers are always available to support the Marine on any front at any time.

Bridging the Gap

Tele-maintenance, the remote diagnosis and repair of equipment, has traditionally relied on phone calls and manual instructions. However, the arrival of AR and VR technologies promises to take maintenance capabilities to an entirely new level. By overlaying digital information onto the real world (AR) or creating fully immersive virtual environments (VR), these technologies provide a more intuitive and effective way for technicians to perform maintenance tasks remotely.

AR can significantly enhance the diagnostic process by allowing remote experts to visualize the exact conditions that field technicians are encountering. For instance, a technician wearing AR glasses can receive step-by-step guidance directly in their line of sight, with holographic overlays highlighting parts and tools needed for a specific task. This real-time, hands-free assistance minimizes errors and speeds up the repair process.

The Pursuit

Marine Depot Maintenance Command has been experimenting with AR technologies as part of its effort to modernize its maintenance capabilities from industrial-era practices to technologies suitable and capable of meeting the demands of the Information Age. The implementation of the “Industry 5.0 Framework” includes increasing production planning, control, and execution of capabilities by optimizing and automating

business processes and optimization of facilities, business processes, and technology. As part of the effort, the command has actively engaged in experimentation and testing of AR capabilities since September 2022 and is gaining a better understanding of how it can be integrated into the command's current and future capabilities.

Real-World AR Application: A Case Study

In May 2024, Marine Wing Communications Squadron 28 (MWCS 28) at MCAS Cherry Point, NC, sought Marine Depot Maintenance Command (MDMC) Business Development's assistance to fix four non-operational electronic maintenance shelters experiencing various electrical problems. Normally, a forward maintenance team would be deployed from one of the command's two production plants in either Albany, Georgia, or Barstow, California, to support this request. Opportunely, the squadron had another option.

At the beginning of the year, the 2D Maintenance Battalion acquired and trained on the same AR equipment that MDMC had been experimenting with. Cpl. Tyler Havard, S3 Schools Non-Commissioned Officer (NCO), 2D Maintenance Battalion, became proficient in the use of the lens through training earlier this year and was able to link up with MWCS 28 to quickly orient the ground electronic maintenance team on how to use the AR equipment.

Using augmented reality, the MDMC team remotely guided Marines through the shelter maintenance and troubleshooting processes and identified and resolved various electrical problems, proving the effectiveness of AR-enabled tele-maintenance in real-time. Cpl. Vradley Cerna, a digital wideband systems maintainer, and Organics NCO, was one of three Marines working on the shelters who collaborated with the depot.

Cerna said that his team has been trained in electrical maintenance and could have attempted to troubleshoot the

issues themselves. However, having somebody already familiar with the electronic components and layout of specific shelter models who could guide them step-by-step was immensely helpful and sped up identifying the issues. It was Cerna's first-time using AR lenses. He remarked, "It was a little surprising the first time you put them on to see the features through the lens and hear the maintainers on the other end like they are right there next to you. It was a great experience and an option I would want to use in the future."

Key lessons from this operation highlight the effectiveness of AR for real-time collaboration, significant safety enhancements, and substantial cost savings. Previously, MDMC deployed contact teams on temporary additional duty (TAD), incurring travel costs and disrupting production.

Training and Skill Enhancement

The Marine Corps can also leverage AR and VR for training purposes. New and seasoned technicians alike can benefit from virtual simulations that replicate real-world scenarios. Training modules can include various maintenance tasks, from routine checks to emergency repairs, providing a safe and controlled environment to hone their skills.

By simulating real-world conditions, VR training can prepare Marines for the challenges they might face in the field. This immersive experience ensures that they are well-versed in the intricacies of their equipment and can perform under pressure, ultimately leading to higher efficiency and readiness levels.

Reducing Downtime and Costs

One of the most significant advantages of AR/VR tele-maintenance is the reduction in equipment downtime. Quick and accurate repairs mean that machinery is back in operation sooner, which is crucial in a military context where readiness is paramount. Additionally, by enabling remote experts to assist with repairs, the need to transport specialized

personnel to various locations is minimized, resulting in cost savings and faster response times.

Overcoming Challenges

While the potential benefits of AR and VR in tele-maintenance are substantial, there are challenges to be addressed. Ensuring secure and reliable communication channels is critical, as is the need for ruggedized AR/VR hardware that can withstand the harsh environments Marines often operate in. Moreover, integrating these technologies into existing systems and workflows will require careful planning and training.

Future Prospects

As AR and VR continue to evolve, their applications will expand, offering even more sophisticated tools and capabilities across the logistics enterprise. By investing in AR and VR for tele-maintenance, the Marine Corps is not only improving its current operational efficiency but also paving the way for future innovations in military logistics. This forward-thinking approach ensures that Marines remain equipped with the best tools available, ready to tackle any challenge that comes their way.

AR and VR technologies are set to revolutionize the Marine Corps, offering enhanced diagnostics, improved training, reduced downtime, and significant cost savings. As these technologies continue to develop, their integration into military logistics will undoubtedly play a crucial role in maintaining the Marine Corps operational readiness and effectiveness. The successful implementation of AR-enabled tele-maintenance demonstrates advancements in military maintenance operations, showcasing the potential for widespread adoption and efficiency and providing an optimistic outlook for this technology’s future financial and operational benefits.