IoT and Augmented Reality in Federal Aerospace & Defense: Business Challenges and Key Questions

Below you’ll find some of the most compelling use cases in the aerospace and defense sector, as well as questions to consider as you start the journey to create, operationalize, and embed. The future is happening now.

Manufacturing environments, military depots, and shipyards

Don’t focus on the aircraft, ground vehicle, or ship itself. Instead, focus on the industrial equipment that will either manufacture it or keep it operating: the torque screws, laser cutters, painters, stampers, boilers, HVACs, and water pumps. It’s relatively easy to up-sensor at that level and get quick wins with real impact. There will also be thousands of highly configured additive manufacturing machines in the Defense Industrial Base (DIB) coming online in the next few years. This could be a platform for innovation.

- In what ways will shop floor workers using augmented reality have full confidence that what they print reflects the finalized design, its proper version, orientation, and inspection history?
- How can we expedite training and maintenance of new machines using Internet of Things and augmented reality technology?
- For any piece of machinery on the factory floor, could we set the algorithms to automatically learn normal operating conditions, correlate those to peak efficiency, then alert us before a breakdown happens?

Operating and maintaining forward-deployed equipment

Tribal knowledge type insights unique to the maintainer of one aircraft, ground vehicle, or ship could be verified with empirical data, and then shared through AR with other maintainers in remote locations. You won’t connect a piece of support equipment to uptime directly. Instead, monetize the time savings on the periphery and simply buy more uptime. You can quantify that. Going a step further, soon a set of sparing scenarios for optimized availability of military equipment assemblies will be based on actual usage data, not estimates. The inputs for those strategies will be IoT—the outputs will be AR.

- To create a more technically enabled workforce, how can we allow an experienced trainer/maintainer back home to have a real-time virtual session with forward deployed personnel such that either party can electronically mark up and annotate a product visual while running through work instructions?
- For the especially difficult maintenance tasks such as helicopter tail rotor balancing, could we expedite training times by having work instructions presented through a gamified, hands-
For the especially difficult maintenance tasks such as helicopter tail rotor balancing, could we expedite training times by having work instructions presented through a gamified, hands-free AR experience?

**Free AR experience?**
- Would accelerating training and maintenance diagnostic times with IoT or AR have a positive impact on readiness for platforms like F/A-18?
- Will the pre-flight check of the future utilize AR with work instructions?

**AR-enabled MBE for acquisition management**

In June of 2018, the Office of the US Secretary of Defense issued a policy regarding digital engineering strategy. It will require the use of digital models to inform program decision-making as well as a single authoritative source of truth to sync documents and engineering artifacts to digital models for improved collaboration across government and industry. Product lifecycle management will be the centerpiece of this strategy and will have a profound impact on the way systems data is organized.

- As our program proceeds through tech development, could we use an AR-enabled system for MBE to fly through prototype models coming from industry?
- We can visually reflect the impact of changing warfighter requirements on product designs right now, but could we push that to an AR experience in a virtual design review?
- During the same virtual design review, could we create an operational dashboard of program metrics, then push that to an AR experience along with electronically marked-up product visuals?

**Marketing, public relations, and proposal development**

AR could be a means to proactively demonstrate a commitment to lowering lifecycle costs in the A&D sector. The visuals are powerful and intuitive for non-technical users.

- As we engage in FMS, should we develop an AR demo that highlights different country-specific language use cases for maintenance training on the same equipment platform?
- Could we show that demo directly to a customer, the media, at conferences, or to Congressional offices?
- Will it be possible to electronically embed an AR demo capability directly into a proposal response for an upcoming acquisition?

PTC contributed to an October 2017 NDIA whitepaper addressing challenges, opportunities, and recommendations related to cybersecurity for manufacturing networks. A substantial focus is using technologies like the IoT and AR for workforce training, maintenance, and operational dashboarding to smooth the integration of IT and OT environments.