U.S. Navy demos use flight data analysis and other tools to improve aviation safety.

Post-flight 'replays' improve maintenance, operations, safety and training.

Background

The U.S. Navy's Military Flight Operations Quality Assurance (MFOQA) program is part of a larger initiative to improve operational flight safety throughout the U.S. military.

Specifically, the U.S. Department of Defense has required the four service branches to reduce Class-A mishap rates by 75 percent by September 2008. Class-A mishaps are defined as loss of aircraft or human life or repairs exceeding $1 million. Each branch of the military has approached the requirement in a way that will ensure success while meeting the needs of its specific aviation community.

Mission

The U.S. Navy adopted a "bottom-up" team approach to its MFOQA effort, involving Naval aviators at the squadron level, as well as relevant government and industry participants. Aviation data analysis and visualization expert SimAuthor, Inc., a wholly owned subsidiary of Westar Aerospace & Defense, Inc., was part of this collaborative team. The company's FlightAnalyst™ and FlightViz™ software tools were key to the group's mission: develop a knowledge management process to improve operational readiness and reduce inherent risks in Navy and Marine Corps aviation squadrons. The project included human factors assessments and subsequent demonstrations using prototype tools to define and develop the MFOQA user requirements and Concepts of Operations (CONOPS), in essence the service's operational philosophy.

Solution

The team worked with fixed- and rotary-wing units, including those flying SH-60s, T-45s and F/A-18s within the Navy and Marines to demonstrate and evaluate the analysis and visualization tools, including FlightAnalyst and FlightViz, and a separate software system developed by the Navy. The demonstrations assisted users at the operational level while developing procedures, fine-tuning the technology, and answering questions such as:

- Is it necessary to revise existing policies and procedures?
- How much data is required? What data is most useful?
- What reports are required?
- How should the information be distributed and secured?

The software tools enabled the collection, download, analysis, and visualization of flight performance and aircraft systems data to provide squadrons with quantitative

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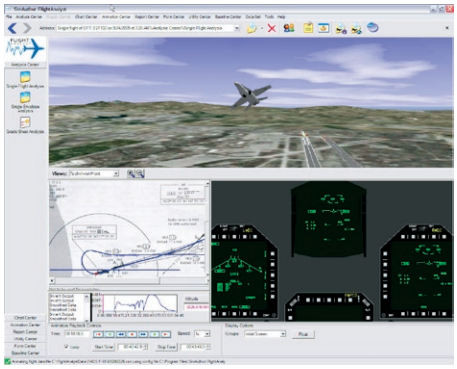
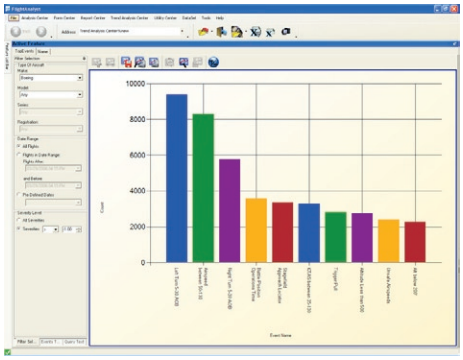


FlightViz literally allows crews to see, evaluate, and learn from events that occur during actual missions.

"The tools provided significant improvements during our tactical and maintenance debrief sessions and were convincing enough for us to request their use during our deployment to Operation Iraqi Freedom," said Maj. "Drowzy" Reed, Director of Safety and Standardization for VMFA (AW)-242.



FlightAnalyst collects and presents flight data in a way that makes it easy to assess performance and identify trends that may impact safety.

and actionable information. This information, in turn, helped to assess aircrew performance, troubleshoot maintenance discrepancies, and identify and address unfavorable trends, such a recurring maintenance problem, for example. More specifically, the demonstrations allowed crew members to test and evaluate:

- **IMDHUMS In Flight Reporting System (HIRS)**, with real-time display of aircraft positions, overlaid on terrain imagery plus systems status during flight. HUMS is a health usage monitoring system for aircraft.
- **Post Flight Animated Debrief (PFAD)**, with three-dimensional animations of aircraft, modeling of flight controls and cockpit instruments, and user-selectable display of available parameters in a synchronized, strip chart format.
- **Multi-Aircraft Playback Capability** allows representation of geo-spatial relationships between multiple aircraft and manipulation of associated aircraft views, accompanied with specific flight parameters and display of flight instruments with historical flight data.

FlightAnalyst and FlightViz positively contributed to increasing efficiencies in four primary MFOQA areas: maintenance, operations, safety and training. For example, in one demonstration, the ability to play back an unexpected power loss event not only saved time in resolving the problem, but the computer-generated animation was then used in subsequent training. On the operational side, analysis of flight data concentrating on certain flight maneuvers revealed that a squadron was excessively utilizing the aircraft's service life and a modification to procedures was implemented. By modifying the procedure, it may be possible to extend the life of the aircraft. In another case, maintainers noticed that a tail rotor drive system gearbox was out of tolerance, and detection would not have been possible using traditional test equipment. Additionally, the authoring capability and open architecture philosophy of the software enables users to define specific events or request data points in certain conditions. The users generated the requirements at the operational level in an effort to ensure the needs of the war fighters would be met.

Results

The lead fixed-wing squadron for the MFOQA demonstration found the prototype tools so useful and effective that they asked permission to use them during combat operations in Iraq. The "Bats" of Marine All-Weather Fighter-Attack Squadron 242, VMFA (AW)-242 have now deployed with the tools they evaluated during air-to-air and air-to-ground training. The squadron's director of safety and standardization said squadron members described the tools as "force multipliers," meaning they could do more with the assets they had. The "Bats" are using the tools on a daily basis in Iraq. Typical applications include aircrew debriefs of missions with the capability to depict spatial relationships of multiple aircraft during simultaneous flights. As they did during demonstrations, the tools will also help validate discrepancies during daily maintenance operations and possibly eliminate troubleshooting steps or maintenance actions. The bottom line for Naval Aviation is increased operational efficiency and readiness, time savings, and, most importantly, mishap avoidance.

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