



Innovation Takes Flight at Athena Technologies in the Design Process of Aviation Flight Controls to Support Operation Iraqi Freedom

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Unmanned Aviation Vehicles (UAVs) for commercial and military use were simply a vision less than a decade ago. Today UAVs have become an integral part of military surveillance strategies in Iraq. In addition to this important role, UAVs are also being utilized in space exploration. Projections for the near future imply that UAVs may well be applied to some aspects of commercial aviation as well.

One such company seen as an innovator in the breakthrough enhancements of UVAs is Athena Technologies, out of Warrenton, VA. Founded in 1998 by Dr. David Vos, Athena Technologies has been in the forefront of developing and commercializing high-performance flight control technologies for UAVs – in making the US military's vision a current reality. The company supplies the U.S. Army's Shadow® (Tactical Unmanned Aircraft System - TUAS) with its GuideStar-211e flight controls to allow drones to conduct military surveillance in support of Operation Iraqi Freedom. The Shadow with its state of the art flight controls is well in use in Iraq, having already surpassed more than 100,000 flight hours and has an average of seven or eight Shadow aircrafts flying simultaneously every hour, day and night to gather critical intelligence data. Interestingly enough, in addition to Athena's development of the Shadow's flight controls systems, the company also develops prototype aircraft control systems for space exploration and has even floated the theory that UAVs could be used in the not so distant future for certain commercial applications.

Every great technology has humble beginnings. Dr. Vos, studied control theory at MIT. As part of his doctoral thesis he proved the underlying navigation and control system technology that would be the basis for Athena's advanced guidance systems – by creating a fully autonomous unicycle.

In 2000, Athena launched its first-generation of GuideStar™ control and navigation products, which are now installed in a

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myriad of intriguing UAV aircraft from the Army's Shadow to NASA's MarsFlyer, an experimental prototype with the capabilities of folding its wings and flying in an atmosphere similar to Mars. The company's customer list is the who's who in aviation – Raytheon, Lockheed, All, General Atomics – to name a few.

Lockheed Martin tapped Athena to provide the guidance systems for its Morphing UAV, which is part of the Defense Advanced Research Projects Agency's (DARPA) Morphing Aircraft Structures (MAS) program. Athena is integrating its GuideStar™ 111m, an advanced, miniaturized system – about the size of a cell phone - into the Morphing aircraft to integrate navigation, control and vehicle management. The MAS program is focusing on technologies to radically change the shape of an aircraft's wings in flight to rapidly accommodate alternative missions. A single aircraft, for example, can perform both loitering surveillance and reconnaissance missions and high-speed attack missions simply by expanding and contracting wing structures in flight.

Dr. Vos attributes the company's high growth rate to the efforts of the staff and the quality of the flight control and navigation systems. Leveraging the basic technologies of GuideStar, Athena has consistently refined systems capabilities for a multitude of applications – current and visionary.

General Atomics Aeronautical Systems' (GA-ASI's) Warrior™, which is a next-generation UAV that will provide surveillance, communications relay, and weapons delivery missions, is utilizing Athena's compact, integrated inertial navigation system, global positioning system (INS/GPS) and air data sensor suite, to provide dual back-up navigation capabilities for the Warrior.

It's no wonder that Athena, with a three-year growth rate of 409 percent, has gained recognition and awards from both its industry and business peers. In May, Dr. Vos, was named an Ernst & Young Entrepreneur of the Year® finalist for the Greater Washington region. Most recently, in September, the company was named to *Inc.* magazines' 500 list of the fastest growing private companies – a tribute that spotlights 'American business ingenuity and ambition'.



The very foundation of its success is the company's ability to deliver quality products that save both time and costs for their customers. According to Ali Dian, Athena's vice president of Development and Manufacturing, "...with the kind of work we do, we cannot afford to make mistakes – one error and the vehicle is jeopardized."

At the company's inception, it had a limited production program in external manufacturing facilities where it created centers of excellence. As the company recognized its growth potential, it focused on bringing manufacturing capabilities in-house where according to Dian, "we have built one of the best miniature manufacturing facilities" in the U.S.

In spite of superior training and professional expertise, the company experienced significant challenges in its ability to seamlessly manage product lifecycle issues. Dian noted that repeatability and accuracy of the documentation system – change control, communication with vendors – were issues that the company was not 100 percent confident about. "We had to make sure that all holes were closed, which meant there was a great deal of time invested with engineers with redundant and recurring reviews to alleviate the probability of any errors," he said. "We needed to be able to sleep at night."

Challenged by the seemingly limitless opportunity for growth and the need to position its manufacturing operations to meet that challenge, Athena set out to find a Product Lifecycle Management (PLM) solution that could stand up to its most demanding requirements.

The company approached the solution by involving teams from every area of the company – QA, engineering, manufacturing, purchasing. Each team had specific areas of interest and applicable criteria, which they organized into a table of preferences. "We had a wish list from every area of the company, narrowed it down to what was practical and used that template to measure the capabilities of the solutions providers we investigated," said Dian.

The company looked at several vendors before choosing a PLM solution from Omnify Software, Andover, MA, that touts its ability to deploy quickly and provide an easy to use solution that's built on an open technology platform with direct interfaces to engineering tools and manufacturing systems.

"It didn't take much study to narrow down our search to Omnify," said Dian. With a comprehensive table of criteria, Athena's project management team undertook a complete evaluation on all the products they investigated. "In all the categories, Omnify was either the best or close to the best in each circumstance."

Critical focus was placed on not only ease of use and cost of operation, but also how quickly and "how painlessly" the company could minimize the downtime of new product delivery while the PLM solution was being implemented. "This is critical to the company's mission," commented Dian. "The ease of implementation with the Omnify solution, allowed us to continue shipping new product concurrently."

Athena first integrated Omnify with its mechanical and electrical CAD systems. During the entire process, the company developed an entirely new part numbering system with new products first, including the documentation release process, engineering and change processes, each of which was tracked by a comprehensive flow chart.

The company was up and running with its PLM solution in a limited fashion in just three months. “As our commitment began, it required a significant number of infrastructure accommodations, product by product. Market launches received priority,” explained Dian. Today Dian estimates that about 85% of the company’s products are now managed by the PLM solution. Some older products have not yet received the necessary priority designation to be integrated.

How did Athena measure its success? Within the first 3 months, the solution was proactive in catching errors. “Within about four months, we were breaking open the champagne,” Dian quipped. The company hasn’t measured specific ROI on the solution as its focus is building a “robust” infrastructure to grow the company. The efficiency of being able to cut the product development cycle to meet market windows was a major element that the Omnify solution brought to Athena. “We concentrate on building the best products to meet customer requirements and demands and not fall behind,” Dian added.

In August, Athena announced the groundbreaking of its new 43,000 sq. ft. corporate office building in the Vint Hill Tech Park in Warrenton, VA, to accommodate its continuing growth.

Athena will also be growing the Omnify PLM solution, moving in the next nine to 16 months to fully integrate Omnify with its MRP system.

Response by employees to the challenges of rapid growth and a new technology infrastructure can sometimes be overwhelming. “Our culture at Athena is to work together as members of a team that recognize the contributions of each component. Like we approached finding a PLM solution, we also approach our growth challenges – basically we’ll all in this together,” said Dian. “That provides a foundation for our great success.”

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Omnify Software is a leading provider of business-ready Product Lifecycle Management (PLM) solutions for original equipment manufacturers in the electronics, mechanical, medical and defense industries. Omnify helps OEMs manage their product data from concept to obsolescence. Committed to customer success, the Omnify solution is easy to use, quick to implement and offers an open integration platform for direct interfaces to existing engineering and business environments. The Omnify product content and change management system speeds product development cycles, improves product innovation, and delivers significant cost-savings for customers.