

CUSTOMER SUCCESS STORY

SPACEQUEST USES ALTIUM TO DEVELOP GAME CHANGER SATELLITE PAYLOAD



SpaceQuest is a recognized leader for development and rapid turnaround of advanced micro satellites and space systems and a pioneer in the satellite AIS market. Altium Designer™ enabled SpaceQuest to develop an experimental AIS collection payload from concept to flight hardware in just six weeks.

“ We had a preliminary design of a payload to collect AIS signals, but that design was a prototype and our development processes were still evolving. ”

Mark Kanawati, Vice President, SpaceQuest

The Automatic Identification System, (“AIS”) is a navigation communications system for maritime collision avoidance. International treaty requires most large cargo and passenger vessels to be equipped with AIS transponders. Today nearly 100,000 vessels are tracked by competent maritime authorities using coastal stations but their range is limited to the horizon since AIS operates in the VHF band.

The Challenge

In 2009, SpaceQuest was developing microsattellites AprizeSat-3 and AprizeSat-4 for asset tracking and management services from low E-earth orbit. Recognizing the limitations of coastal AIS tracking networks, SpaceQuest was also exploring how to collect AIS signals from space. In 2007 SpaceQuest was the first to demonstrate collection of AIS signals from space using an experimental receiver hosted on a customer satellite. Over the next two years, SpaceQuest analyzed the payload data and worked on AIS signal processing software.

Mark Kanawati, Vice President of SpaceQuest recalls, “We had a preliminary design of a payload to collect AIS signals, but that design was a prototype and our development processes were still evolving.”

SpaceQuest was in the late stage delivery of AprizeSat-3 and AprizeSat-4 when the decision was made to integrate an updated prototype AIS collection payload on AprizeSat-3. Integrating a brand new payload relatively late in a satellite development project is unheard of in the space industry. SpaceQuest has a reputation for delivering space systems on tight schedules nevertheless only six weeks remained before AprizeSat-3 was scheduled to ship to Kazakhstan for launch.

“Delivering a completely new electronic board, on such a compressed schedule using our previous myriad of tools and processes would have been daunting,” recalls Kanawati. “Altium Designer has helped us accelerate our time to market not only from the design perspective, but also the management and creation of the design and library data and associated documentation.” SpaceQuest employs a distributed design team based at multiple locations. Previously electronic board design relied on a variety of tools to address the PCB layout, electrical and mechanical checks. In addition, much of the work was outsourced.



AprizeSat-3 Launch Preparation

Crunch Time

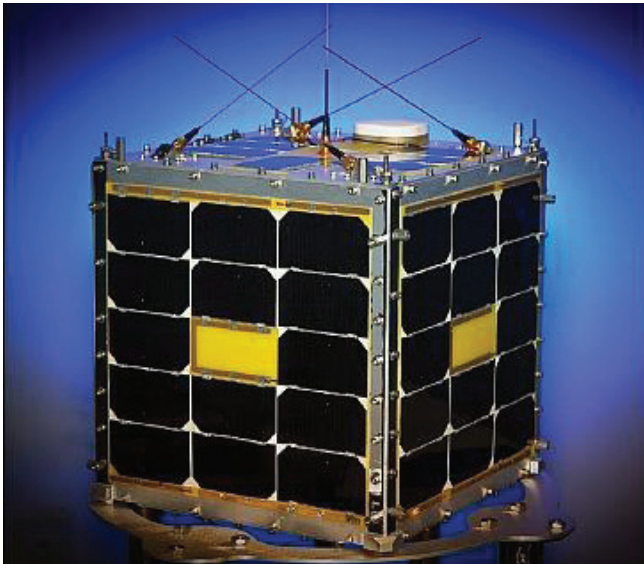
One of the SpaceQuest engineers suggested trying Altium Designer™ as a possible way to get ahead of the schedule. The intuitive workflow of Altium Designer™ enabled SpaceQuest to consolidate all the board schematics into one environment, conduct electrical integrity, routing and mechanical fit checks and spin a flight prototype board in just over one week. The time saved was crucial as it allowed focus on populating the board with electronic components,

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testing of the AIS decoder software and final thermal and vacuum chamber testing. Missing the AprizeSat-3 integration deadline would mean waiting two years for another launch opportunity.

Go for Launch

SpaceQuest was able to complete testing of the flight prototype AIS collection board and integrate the payload enclosure into AprizeSat -3 in time for delivery to Kazakhstan. On July 29, 2009, AprizeSat-3 and AprizeSat-4 were successfully launched into a low-earth orbit on a Russian Dnepr rocket from Baikonur Cosmodrome. The experimental AIS collection payload performed flawlessly.



AprizeSat-3 with AIS Payload

Remarks Kanawati, "The capabilities offered by Altium Designer was one of the factors that enabled us to integrate an experimental payload at a late stage in the launch campaign and validate our technology on-orbit for a promising new service." The AIS flight experiment was a game changer for SpaceQuest, which established itself as an early pioneer in AIS data services that which ultimately became its primary business.

Following the AprizeSat-3 project SpaceQuest has fully adopted Altium Designer™ in its electronic board development pipeline from design, to layout, to assembly. PCB directives are maintained automatically from design to layout stage saving time and eliminating errors. Differential Pair Routing and Integrated Pin Swapping in Altium Designer have enabled productivity gains for SpaceQuest engineers.

Leveraging the 3D PCB visualization capability allows engineers to achieve reduced tolerances for smaller and lighter payload enclosures, which translate, to less mass and volume- critical drivers in the space industry. That same capability allows a high degree of confidence for mechanical compatibility prior to committing to board fabrication.

SpaceQuest used to generate PCB board assembly drawings using a separate CAD tool but now generates drawings directly from Altium Designer™. The company also has seen efficiency benefits for its product documentation and inventory control by leveraging Designer's Report Manager to set up a Bill of Materials (BOM) report.

SpaceQuest continues to expand its constellation of AIS satellites with development of AprizeSat-7 and AprizeSat-8 microsatellites planned for launch in second quarter of 2013. Altium Designer™ is utilized by SpaceQuest in-house and by its vendors throughout the development process for microsatellites and other space systems.

About SpaceQuest

SpaceQuest, Ltd. ("SpaceQuest") is a U.S. satellite technology company headquartered in Fairfax, Virginia and is a developer of advanced satellite technology for government, university and commercial use for over eighteen years. SpaceQuest operates a constellation of six AIS collection microsatellites in low-earth orbit. SpaceQuest has delivered twelve microsatellites and been involved in over 47 space development projects, including avionics for the world's first private space station, Genesis I and Genesis II, for Bigelow Aerospace.

ABOUT ALTIUM

Altium Limited (ASX:ALU) creates electronics design software. Altium's unified electronics design environment links all aspects of electronics product design in a single application that is priced as affordable as possible. This enables electronics designers to innovate, harness the latest devices and technologies, manage their projects across broad design 'ecosystems', and create connected, intelligent designs.

Founded in 1985, Altium has offices in San Diego, Sydney, Karlsruhe, Shanghai, Tokyo, Kiev, with value added resellers worldwide. For more information, visit www.altium.com. You can also follow and engage with Altium via Facebook, Twitter and YouTube.