Orbital ATK's Cygnus Spacecraft Fly High with Flight Dynamics Powered by STK

Stratospheric Solutions. Down-to-Earth Costs.

THE CURRENT FLIGHT PLAN: Orbital ATK currently flies many different satellites and uses AGI's Systems Tool Kit (STK) in a number of instances. For their Cygnus automated cargo spacecraft—developed for NASA's Commercial Resupply Services (CRS) program—increased scrutiny required they develop a new flight-dynamics system with a complete "cradle-to-grave" flight profile. Orbital ATK's Flight Dynamics team strongly preferred an in-house solution designed to work as intended—rather than one that might not fully encompass the reality of a fast-paced Low Earth Orbit (LEO) ascent.

STK TAKES FLIGHT: For Orbital ATK to have an in-house solution, they would have to pay for custom development. They chose STK for the underlying engine to retain the flexibility of integrating an interface designed in-house with their current systems—while also utilizing AGI's proven software analytics. Orbital ATK used in-house programmers to develop a Graphical User Interface (GUI) for their Flight Dynamics System (FDS). The framework allowed function calls to access the Common Object Model (COM) while STK's design provided flexibility. As an example: While many tools calculate point-of-intersection on the Earth's surface, STK's flexibility allows users to calculate offsets—including those which only occur during sunlight—without post-processing existing data. While Orbital ATK's framework currently covers common functionality, STK's COM will also allow future development work to proceed.

"Designing the tool to specific requirements is straightforward. Using STK as our engine, we filled the gap in some non-traditional roles. Fixed-cost contracts mean there are no additional funds. And we have put numerous additions in place that would cost have more under the other systems available. The flexibility of STK lets us quickly do these things ourselves while we continue to fly missions."

— MIKE JAMROZ, ORBITAL ATK

Orbital ATK of Dulles, Virginia is a global leader in aerospace and defense technologies. The company designs, builds, and delivers space, defense, and aviation systems for customers around the world. Their product lines include launch vehicles; propulsion systems; satellites, components, and services; composite aerospace structures; missile systems; defense electronics; and advanced armament systems.

STRATOSPHERIC RESULTS: With the mechanics addressed—and a GUI provided by in-house programmers—Orbital ATK's Flight Dynamics group could develop functions that leverage STK to do exactly as they required. Using STK also allowed Orbital ATK to avoid such rudimentary steps as proving they had correctly targeted burns. Such streamlining has ultimately made the necessary software qualification easier. Industry-wide acceptance of STK meant that Orbital ATK did not have to test such time-consuming functions. As operators developed the tool themselves, they created an open-ended system able to handle anything that might arise during a mission.

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