MODELING & SIMULATION \

ROY AIRCRAFT AND AVIONIC SIMULATION INC. (RAAS)

PRESAGIS TOOLS HELP CREATE TURNKEY UAS TRAINING SOLUTION

The VENOM UAS flight control panel

AT A GLANCE

Customer // Roy Aircraft and Avionic Simulation Inc. (RAAS)

Country/Region // Québec, Canada

Domain // Lorem ipsum

Presagis Software // FlightSIM // HeliSIM

The VENOM UAS simulation suite, based on Presagis' open-architecture modeling and simulation tools, meets the demands of emerging civilian, and border security markets.

CUSTOMER BACKGROUND

Roy Aircraft and Avionic Simulation Inc. (RAAS) is an aircraft simulation and avionics consulting, services, and software provider founded in 2008 by Mr. Stéphane Roy. Mr. Roy is a Montreal-based electronics engineer with more than 20 years of experience in avionics and simulation. RAAS channels all of Mr. Roy's knowledge and expertise into the integration and development of custom, high-quality simulation solutions for customers that includes Boeing, Silkan, TechSat, AVIC, the DGA, Presagis and CAE. RAAS is also an official Presagis Partner and Reseller.

UAS SIMULATION SOLUTIONS: OPPORTUNITIES AND CHALLENGES

The Unmanned Aerial Systems (UAS) market continues to expand into new civilian applications, from photography, mining exploration, 3D cartography for terrain database and video game development, remote resupply missions, disaster response, utility inspection programs, forest fire surveillance, Law Enforcement, border surveillance and agriculture. This is in addition to an already well-established military market.
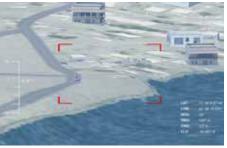
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This market expansion has increased the demand for simulation and scenario training applications that help lower the overall cost of a UAS program and increase the success rate of deploying an Unmanned Aerial Vehicle (UAV) safely and effectively in the field.

Simulation and training systems for UAVs can, however, be expensive and most often do not represent the specific unmanned aircraft in use. Setting up a custom or third-party solution for a UAV is further complicated by the fact that manufacturers are reluctant to share the aerodynamics and flight models that would allow for the aircraft to be accurately recreated in a simulation environment. In addition, the training component related to how the UAV would be employed, based on the customer's particular mission set has, in most cases, not been addressed adequately by the various training systems currently available.

To meet this expanding market's needs, RAAS formed a partnership with Legion Training and Simulation (LTS), a Texas-based company specializing in UAS training services and simulation-based products to develop a turnkey simulation and scenario training solution that would be able to support any UAV on the market, and SILKAN, a French company that designs and develops high performance computing and simulation solutions. The result is called VENOM, or the Virtual ENvironment Operations Module, and the first formal prototype was exhibited at the Association for Unmanned Vehicle Systems International (AUVSI) trade show in May, 2014. VENOM is now available to global customers that desire a high-fidelity, turnkey UAS training capability.

WHY RAAS CHOSE PRESAGIS

After considerable research, RAAS, SILKAN and LTS, as Presagis Partners, concluded that VENOM would benefit from Presagis' integrated suite of Modeling and Simulation tools:

- **FlightSIM for high-fidelity fixed-wing flight dynamics,**

- **HeliSIM for high-fidelity rotary-wing flight dynamics,**

- **Vega Prime for real-time 3D visualization, and**

- **STAGE as a component of the integrated simulation environment.**

"First, I had to be able to build accurate UAV flight models, and Presagis' FlightSIM and HeliSIM allowed me to achieve high-quality results," Roy explains. FlightSIM and HeliSIM integrates with the VENOM ground station – a virtual or real mission-control center that the UAV Pilot and Payload controller operate, and Presagis' Vega Prime has been integrated to simulate the camera that transmits the UAV's sensor system to the ground station.

"When you have a UAV in flight for training purposes, you need to have a 3D terrain database, you need entities, and you need to be able to control them," Roy continues. "Our integration of Presagis' STAGE plays a very large role in the visualization, control, and fidelity of our scenarios."

A major factor in Mr. Roy's choice of FlightSIM, Vega Prime, and STAGE was the open architecture of the software, the ease of integration with third party products, and their modularity and extensibility. FlightSIM's ability to build quality models from OEM or from platform performance data was critical to the VENOM project. STAGE is both flexible enough to interact with third-party components and powerful enough to generate and run complex training scenarios involving multiple entities. Vega Prime, with its open plug-in architecture, enables simultaneous visualization on multiple machines and displays.

VENOM also benefits by using a Common Database Format (CDB) that simplifies the architecture by providing a single data repository for the simulation and visualization tools and other components.

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A typical VENOM Simulation Suite. From left: the UAV Pilot Ground Control Station (with UAV camera view), Payload Operator station screen, Instructor Control Display, Tactical Display/Planning Map, and third-party rendering of the UAV while in flight.

THE VENOM SIMULATION SUITE

The VENOM UAS training suite is specifically designed for unmanned systems training, Operational Test and Evaluation, and Research and Development. VENOM simulates micro, small, medium, and large UAV platforms and includes several payload simulation models. The VENOM suite is ideal for training civil security forces, emergency and disaster response teams on how to integrate powerful UAS tools into their operations.

The first tool of its kind, VENOM is a turn-key hardware and software solution that is delivered to the customer's specification – LTS, SILKAN and RAAS assist their clients in developing mission specific training scenarios, and then train them on how to operate and evaluate them.

Each VENOM suite comes with one or more UAV models pre-installed, per customer specification – a significant challenge considering that UAV manufacturers do not normally share their aerodynamic models. Using FlightSIM and HeliSIM and the performance data that is available from UAV system user guides and manuals, Mr. Roy is able to recreate the performance behavior of a specific UAV, and does so with such accuracy that experienced pilots can easily recognize a vehicle by how it responds in the simulator.

"FlightSIM and HeliSIM have been designed to create professional simulators," says Roy. "You can build anything you want. You can start from scratch, or you can start with what you have and modify until you achieve your goal. This is indispensable to me."

Roy added different missions and autopilots through FlightSIM, and developed an API to connect to an actual or virtual ground control station. The UAV pilot and payload operator can control their parts with the same equipment used in a real-world mission, and view a high fidelity on-screen representation of their mission.

VENOM PROVIDES:

- **A low-cost Operational & Emergency Procedural Flight Crew Training Architecture for UAS Pilots**

- **Sensor Employment Training for Payload Operators**

- **Complex, Mission-specific Rehearsal Training**

- **Operational & Safety-Related Employment Planning**

- **Development of Crew Communications Procedures**

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"We are confident of VENOM's success in the global market place, in large part due to Presagis' suite of high quality applications."

- Stéphane Roy
Roy Avionic and Aeronautic Simulation (RAAS)

UNLIMITED POTENTIAL

The VENOM training suite is the culmination of more than two years' product development, and the sky's the limit! Introduced in May 2014 and available now, VENOM was designed primarily for training applications, but can also be used to develop an in-house auto-flight program. "All of the tools are modular," Roy points out, and that leads to endless possibilities for testing without having to launch a UAV.

"Because it is based on software tools that are designed for professionals, it can be used in an educational setting," Roy adds. Universities can not only use VENOM to train Pilots and Payload Operators, they can also take advantage of the R&D and Operational Test and Evaluation capabilities for platform design and development available through the VENOM SDK. Another advantage of VENOM is its capability to support the various FAA UAS Test Sites, whether for training or platform test and development.

In the near future, RAAS, SILKAN and LTS will launch a new UAS simulation suite for military applications, called NEMESIS: the NExt-generation Multiple Environment SImulation System.

"The fact that we designed the architecture to be flexible has opened all of these end uses," Roy says. "It is not a single-use product. We don't lose the capabilities of the Presagis tools when we integrate them into VENOM – they are all still there for the end user."

Presagis' comprehensive and integrated suite of software tools gave RAAS, SILKAN and LTS the open and scalable simulation toolkit that they needed to create a product that is unique in the market. VENOM, like the tools used inside it, is a versatile solution with tremendous possibilities.

VENOM sales are supported by a robust, worldwide distribution network: LTS is responsible for the U.S. market, the European market is handled by SILKAN, and RAAS covers Canada and the remainder of the world. Interest in VENOM is growing, as many inquiries have been received from several parties interested in acquiring the training suite.

"We are confident of VENOM's success in the global market place, in large part due to Presagis' suite of high quality applications," Roy concluded.

About Presagis

Presagis is a global provider of software for the development of modeling, simulation, visualization, and embedded display applications. Focused on building intimate relationships with its customers, the company provides integrated and comprehensive end-to-end solutions based on open standards, with a unique combination of commercial software tools, and professional development and advisory services.

Presagis makes the future safer by building software that helps its customers reduce development risk, improve time-to-market and lower costs in complex projects, in addition to developing DO-178 certifiable applications. With recognized expertise in the aerospace and defense markets, the company services more than 1,000 active customers worldwide, including many of the world's most respected organizations such as Boeing, Lockheed Martin, Airbus, BAE Systems and CAE.

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