SIMULATION

HELISIM

CREATE. SET. HOVER

\ **HeliSIM** is the industry-leading high-end COTS for creating high-fidelity, high-quality flight dynamics simulations for virtually any rotary-wing aircraft in the world – military, commercial, or unmanned.

PRESAGIS

\ MAKE IT REAL

At the core of HeliSIM's distinguished performance lies the real-time flexible blades and gearbox physics simulation. HeliSIM delivers these complex physics through highly optimized processing to simulate a large number of "blade elements" in real time to a produce high-fidelity simulation.

This optimized Blade Element Rotary Model (BERM) computation technique has allowed HeliSIM to become the market leading COTS rotary wing simulation software, leaving the competitions's "rigid disk" or other less advanced physics models, far behind when it comes to simulating the intricate physics of an helicopter, especially while in hovering mode.

BENEFITS

WIDE CHOICES OF ENGINES

Choose from turboshaft, piston, electrical, or other user-defined performance engines.

SYSTEMS AND SUB-SYSTEMS

Aerodynamics, Weight and Balance, Undercarriage, Hydraulic and Electrical systems, Navigation Systems, Flight Controls, Weather and more.

QUICK AIRCRAFT CUSTOMIZATION

Lets you easily change flight models or parameters or swap out aircraft.

RAPID INTEGRATION

Can connect to any flight simulation framework out-of-the-box through CIGI, HLA, DIS, local shared memory, or networked shared memory.

FLEXIBLE

Create high-fidelity models of virtually any rotary-wing aircraft with either rigid or flexible blades, single or multiple rotors, UAVs, combat or attack helicopters.

WHY **HELISIM?**

From developing flight training devices through building avionics test beds for existing or future rotary wing platforms, HeliSIM offers developers high-fidelity real-time simulation, easy customization, and rapid integration into a given simulation framework.

HeliSIM lets simulation developers easily conceive and quickly deploy a complete aerodynamic model for the real-time simulation of virtually any rotary-wing aircraft – military, civilian, and unmanned.

With a highly-flexible and customizable user interface, HeliSIM lets you use forms to define all the parameters of the flight model, engine model, blade tilt, atmospheric model, and defined flight paths.

You can also specify system and sub-system behaviors, such as Automatic Flight Control systems, as well as environmental conditions, and ground interactions.

Maximize HeliSIM by easily integrating virtual and/or real hardware devices and user-development simulation models. Also, out-of-the-box connection through CIGI, HLA, DIS, local shared memory, or networked shared memory to any flight simulation framework permits unparalleled interoperability and integration.

HOW HELISIM **HELPS**

- **Modular :** HeliSIM's architecture provides the ability to achieve the highest degree of fidelity for any components and subsystem of the aircraft.
  - Flexible : With HeliSIM, it is possible to:
  - Reuse existing model's components;
  - Build upon the existing model's components;
  - Replace the model's components by a new one;
  - Add any new model's components.
- **Extendable :** HeliSIM enables components to be developed with third-party COTS software or user customizable code.
- **Optimized Numerical Design Software:** Run simulations at a rate higher than 1000 Hz, without affecting CPU demand.
- **Fully documented API:** HeliSIM allows users to take the full control of the simulation, and prepare scenarios up-front or to change them in real time in the aircraft Environment, including NAVAIDS based on ARINC 424.
- **Open Connectivity :** With any CGF through DIS, HLA, nCom or API protocols.
- **Mature Architecture :** Allows users to achieve true level of fidelity and quality.
- **Engine Model:** HeliSIM is furnished with a high performance thermodynamic model.
- **Aerodynamic Model:**
  - BERM (Blade Elements Rotor Model) offers support for rigid and flexible models with downwash model and
  - Skid model base on finite elements.
- **Intuitive & Adaptable Interfaces:**
  - Build six DOF (Degree Of Freedom) aerodynamic equations.
  - Build Control Surfaces definitions and equations for the FC (Flight Control).
  - Build AFCS (Automatic Flight Control System) inner loop.
- **Complete Dynamic Tests Environment:**
  - Capacity to rehearse and replay actual or customized flight tests.
  - Users can maintain their development resources to evolve their simulations.
- **Tools for the Professional:** HeliSIM is fully backed with product maintenance, customer support and training.

HELISIM **FEATURES**

\ AERODYNAMICS MODELING CAPABILITIES

- Define each control surface on the aircraft through the graphical interface with or without programming, based on user preferences.
- Specify laws converting pilot inputs and/ or autopilot commands to control the pitch angle of the blades of both main and tail rotors
- Define aerodynamic coefficients for as many physical components as required to represent the helicopter
- Specify the installed engine(s)
- Specify external fuel load, landing gear, AFCS and electrical and hydraulic buses

\ SIMULATE A WIDE VARIETY OF HELICOPTERS

- With either rigid or flexible blades based on the blade element rotor model (BERM)
- Uses the Pitt-Peters model to calculate rotor downwash velocity
- Employs Bailey's tail rotor model or multiple rotors
- Driven by either turboshaft, advanced turboshaft or by a user-customized performance engine

Rotary-Wing Aircraft Options Include:

- Large transport helicopters
- Single, tandem, or multi-rotary (up to 8 rotors)
- Combat or attack helicopters
- Commercial rotor craft
- Remotely Piloted Vehicle / UAVs

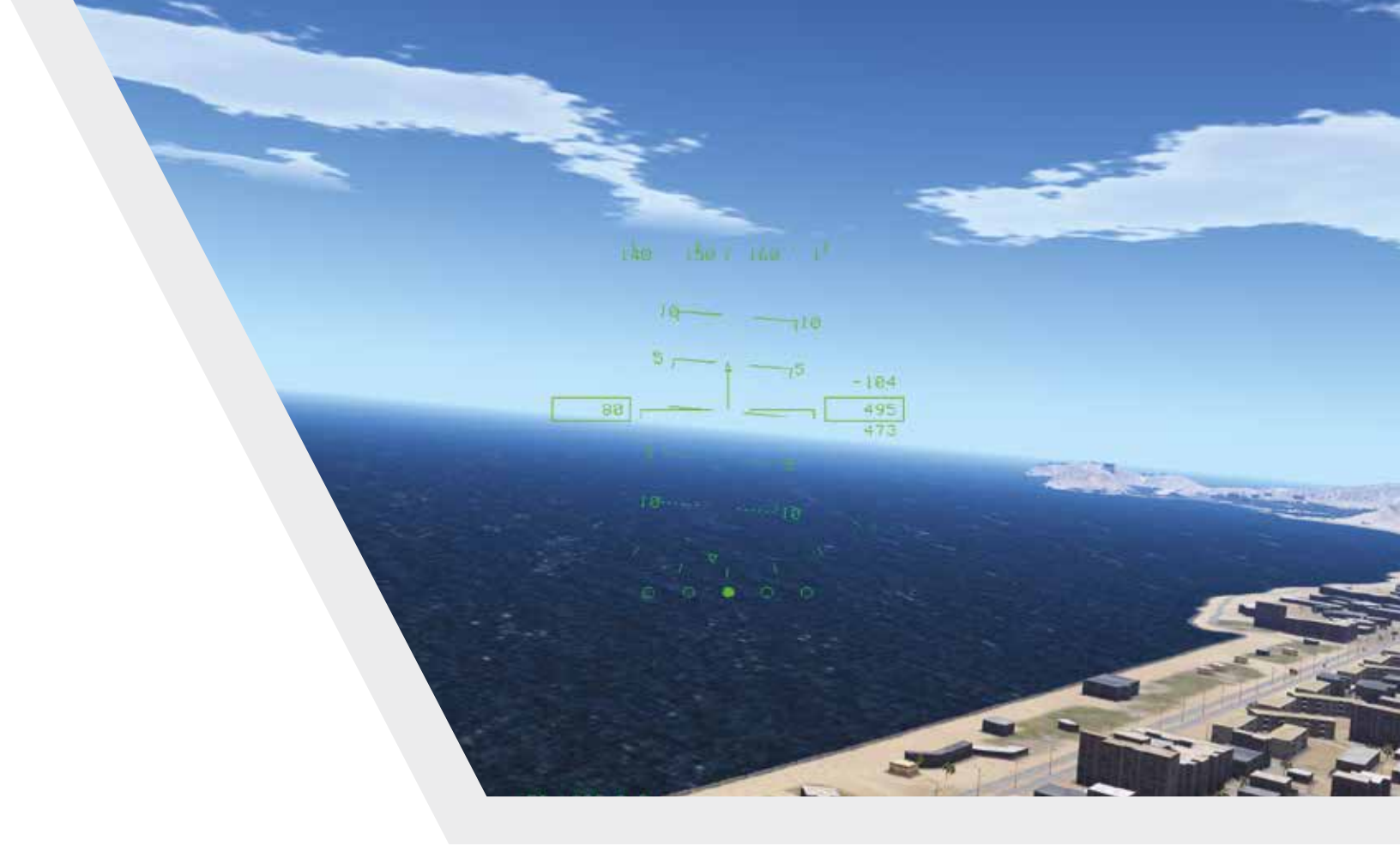
\ RESULTS-ORIENTED USER INTERFACE

HeliSIM provides significant time savings by offering a development workflow tailored to how users work. Define all the parameters of the flight model, engine model, blade tilt, atmospheric model, and defined flight paths directly through forms.

\ PRE-INTEGRATION & INTEROPERABILITY

Create a complete flight simulation and visualization solution using FlightSIM with other Presagis or 3rd party products. Pre-integrating with Presagis STAGE, VAPS XT, Vega Prime and Ondulus Radar help to speed application development.

HeliSIM can also connect to any flight simulation framework out-of-the-box through CIGI, HLA, DIS, local shared memory, or networked shared memory.



FULLY **CUSTOMIZABLE**

- Create models of numerous types of helicopters, including UAVs.
- Conceive and deploy a complete aerodynamic model for the real-time simulation of any rotary wing aircraft with or without OEM data and without writing a single line of code.
- Test both helicopter design and performance under controlled simulated conditions.
- Specify the behavior of systems and sub-systems: Automatic Flight Control Systems, including Mission Computer, Flight Management Systems, Auto Collective Systems, Flight Control Computer, etc
- Easily integrate virtual and/or real hardware devices and user created system and subsystem modules. Effortlessly enhance, modify, or substitute for user defined parameters. For example, a developer can add proprietary landing gear or hoist model to name a few.
- Quickly and easily tailor flight simulations by entering aerodynamics data in its native format via environmental parameters in windows and dialog boxes without having to write software conversion routines.

Visual Studio 2015 (VC 14) Support

API developers can use a more recent version of Microsoft Visual Studio tools.

ADDITIONAL HELISIM **COMPONENTS**

Tool to build navaids database according to the ARINC424 standard.

- Use of multiple receivers (DME, VOR, ADF, TACAN, and ILS) to interact with navaids stations specified with a database following the ARINC424 standard.
- Linearization tool to uncover the helicopter's natural oscillation frequencies to assist in designing its control system (state matrices A and B).
- Monitoring mechanism to validate the evolution in time of specific parameters.
- Testing instrument to support the AFCS tuning and to force specific conditions to validate the aircraft's flight model.
- Access to engine performance curves.
- Access to each Control Law.
- Malfunction scenarios accessible out-of- the-box. In addition to a user's ability to create their own malfunctions, there are than 100 situations already available including engine-out, engine flameout and hydraulic failures.
- Operator can begin in different conditions.
- Record and playback all pilot interactions during a flight. Snapshot and restore the helicopter to its exact state from any prior sequence in time.
- Multiple methods of pilot input ranging from mouse and keyboard to USB ports to a VAPS XT application. Moreover, an API is provided to build new sources allowing for immediate integration with high-end control loaders.
- API to control the simulation from an external application, or to link the simulation within your own process.

REAL WORLD **DETAILS**

ENVIRONMENTAL CONDITIONS

Multiple models are available, including ICAO standard atmospheric model, Von Karman wind model (JAA AWOG report 904a), Dryden turbulence model (FAA TSO report CII 7 Appendix 2), and microburst model (FAA TSO report CII 7 Appendix 1).

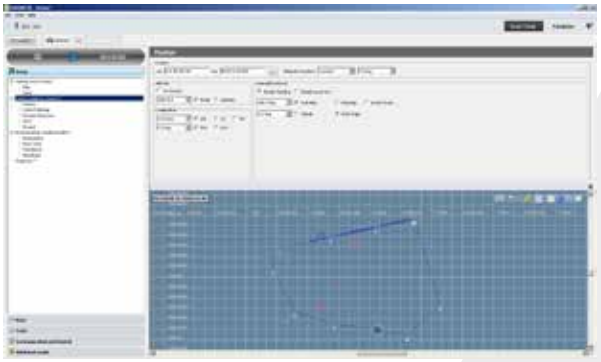
HeliSIM also considers Earth's rotation, variation of gravitational acceleration with latitude and altitude, and variation of its magnetic field based on the information specified in the ARINC424 navaids database.

WEIGHT & BALANCE SYSTEM

Considering factors such as impact of landing gear positions, fuel consumption, and additional loads (cargo, missiles, pilots, passengers, etc.). Furthermore, fuel tanks of different sizes can be defined and installed on the aircraft and additional loads can be modified at runtime.

GROUND INTERACTION

Ability to taxi, including landing and takeoff, on uneven terrain and moving platforms. Finite element method used to analyze the ground interaction with the undercarriage models (landing gear or skid).



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