

## STK Aviator is a fourth generation aircraft modeling tool that supports real-world flight, especially at hypersonic velocities and altitudes.

**STK Aviator** performs complex, highly accurate, time-based mission analysis for aircraft operations. It is built on the concept of an aircraft's mission, as opposed to a mere point-to-point route. An aircraft using STK Aviator as its propagator can carry out operations that are more complex than a transit between two points (e.g., holding in a pattern).

### Aircraft models

An aircraft model defines the physical characteristics of the aircraft and the modes of flight that define how the aircraft flies in any given situation.

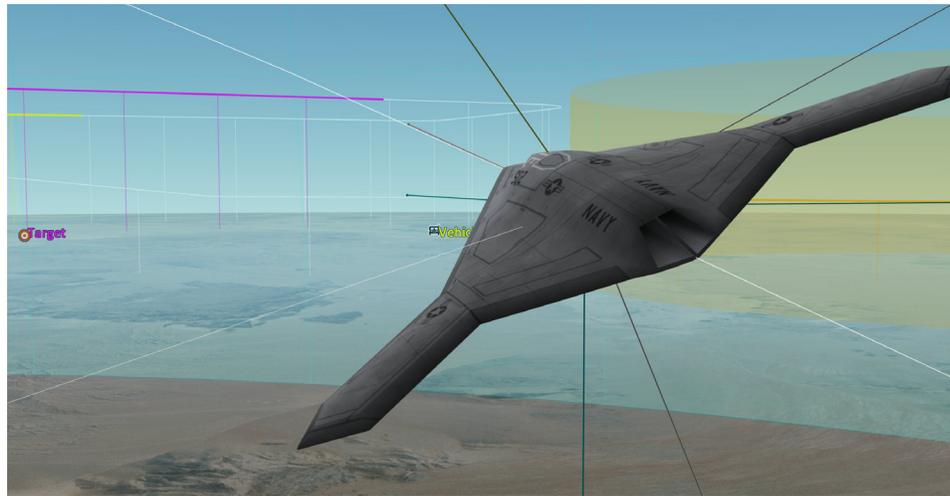
### Configuration

- **Basic.** Used to define empty parameters of the aircraft, and displays the total values, based on the stations and fuel tanks defined for it.
- **Stations.** Used to define internal fuel tanks, stations, and external fuel tanks that are attached to the stations.
- **Fuel.** Displays all fuel tanks defined for the aircraft, in their consumption order.

### Performance models

Over 15 performance models are used to define the behavior of the aircraft in flight. By specifying performance models to use with each phase of the mission, you can vary the manner in which the aircraft performs based on the priorities of the mission. Performance models include:

- Basic and advanced acceleration
- Basic, advanced, and sequenced climb
- Basic and advanced cruise
- Basic, advanced, and sequenced descent
- Basic and advanced landing
- Terrain follow
- Vertical take off and landing (VTOL)



### Phases

Phases are the basic logical unit of a mission, and serve as containers for the procedures that define the aircraft's actions. You can select a specific set of performance models to use with each phase, allowing you to perform one mission with multiple performance characteristics.

### Sites

Each procedure is associated with a site. The site defines the location and the nature of the position at which the procedure takes place – e.g., a runway, a waypoint, another aircraft – and also determines what procedure types are available for selection. There are over 15 types of sites, including:

- Airport, Navaid, runway, VTOL point, and waypoint from the Aviator catalog
- STK objects, including area target, waypoint, static object, and vehicle
- Relative to previous procedure, relative to stationary STK object
- Reference state
- Super procedure

### Flight procedures

At a specified waypoint, you can specify a flight procedure from a set of over 25 flexible, pre-defined options, such as:

- Arc enroute, arc point to point
- Area target search
- Basic maneuver, basic point to point
- Holding: circular, Holding: figure-8, Holding: racetrack
- Hover, hover translate
- Landing, takeoff
- Parallel flight line, terrain following
- Transition to forward flight, transition to hover
- Vertical landing, vertical takeoff

### Basic maneuvers

A basic maneuver procedure is a single action undertaken by the aircraft, in contrast to most procedures in STK Aviator, which represent a series of actions that together comprise a common flying procedure. There are over 15 types of basic maneuvers, such as:

- Aileron roll, barrel roll
- Autopilot: horizontal plane, Autopilot: vertical plane, Glide: Vertical Plane

- Loop, pull, rolling pull
- Simple turn, smooth turn
- Smooth accel
- Straight ahead, weave
- Cruise profile
- Profile Segment: Bezier or push/pull

### 3D route editing

You can build routes and add, move, and alter waypoints within the 3D environment. The entire mission, including waypoints and procedures, can be clicked out in a matter of seconds. Holding pattern parameters such as length and width can be edited by simply clicking and dragging the 3D control points.

### Catalogs

STK Aviator provides a catalog for the loading and saving of aircraft, airports, navaids, runways, VTOL points, and waypoints. Each of these elements of a mission has an associated catalog in STK. You can add, modify, and delete items from the catalogs to make it easier to use the same elements for multiple missions and procedures. In addition, you can import catalogs of compatible data, such as DAFIF and ARINC424 data, and access them for use in defining these elements.

### Mission profile

The mission profile can display a variety of data describing the mission. The default profile displays the aircraft's altitude relative to its downrange distance, but the graph can be customized to display any Flight Profile data provider with respect to time or downrange distance.

### Wind and Atmosphere Model tool

The Wind and Atmosphere Model tool enables you to simulate wind and atmospheric conditions for the scenario, a mission, a specific procedure, or a group of multi-selected procedures.

- Wind models in STK Aviator can change the ground speed, flight path angle, and altitude rate of an aircraft and can produce a difference between the heading and course of an aircraft (also known as a crab angle).
- Atmosphere models in STK Aviator define air density, which affects the behavior of all performance models.

### Refuel/Dump tool

The Refuel/Dump tool simulates adding or removing fuel in flight during the associated procedure.

### Advanced Fixed Wing tool

The Advanced Fixed Wing tool is used to define a highly precise set of physical properties for the aircraft that you are modeling. These physical properties can then serve as the basis for a set of advanced performance models. Properties include:

- Aircraft Geometry
- Aerodynamics
- Powerplant
- Structural and Human Factors Limits

### Hypersonic/thermodynamic propulsion models

These high-end, complex, propulsion models incorporate an extensible fuel model system that handles the thermodynamic properties of air and fuel mixtures. All of the models incorporate variable, specific, heat thermodynamics. The fuel models are all plugins, so you can employ your own models by providing additional plugins.

- **Dual Spool Turbojet.** You can specify various maximum values for temperatures and pressure ratios along with component efficiencies to model the effect of those parameters on thrust and fuel burn.
- **Dual Spool Turbofan.** You can specify standard parameters, including the bypass ratio, to understand how advances in technology affect thrust and fuel burn across the flight envelope.

- **Sub/Super/Hypersonic Powerplant.** Combines the operating concepts of turbines, ramjets and scramjet modes.

### Search patterns

Define search patterns using the Flight Line and Parallel Flight Line procedures or the Area Target Search procedure.

### Automate tasks with the STK Aviator API

STK Aviator has a rich API via the STK Object Model. You can use the API to automatically configure a mission and generate routes, as well as access the Aviator Catalog to automatically configure aircraft and other catalog items.

### STK Aviator Pro

STK Aviator Pro extends the modeling capabilities of STK Aviator by providing a selection of real guidance strategies for the Basic Maneuver procedure. These strategies are executed without future knowledge of the target object's route, so that the aircraft reacts in simulated real-time to the target object's maneuvering.

- **Intercept.** The aircraft attempts a forward quarter intercept on a moving object, guided to a constant target aspect or lateral separation.
- **Relative Bearing.** The aircraft flies to a constant relative bearing to a stationary or moving object.
- **Stationkeeping.** The aircraft orbits a point relative to a stationary or moving object.
- **Rendezvous/Formation.** While operating in the wind frame, the aircraft uses multi-mode guidance to maintain formation with a cooperative aircraft.

### STK Aviator Prop Nav

STK Aviator Prop Nav adds ITAR hypersonic and weapons models to Aviator Pro.