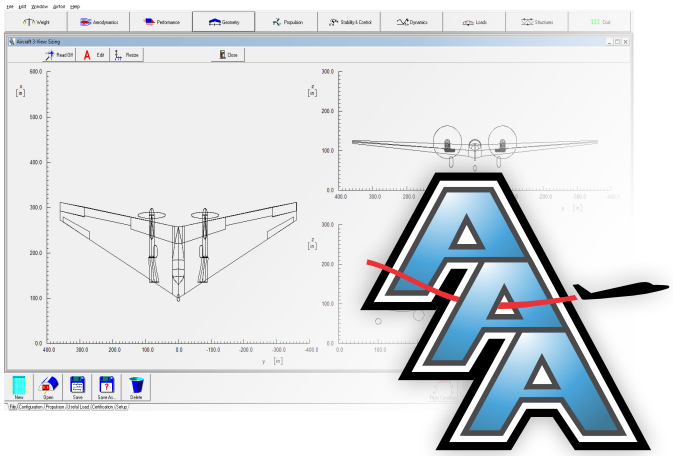
Advanced Aircraft Analysis AIRCRAFT DESIGN & ANALYSIS



Advanced Aircraft Analysis (AAA) is a comprehensive aircraft design program that gives users full authority over the entire preliminary design process. From weight and performance sizing to aerodynamics and stability and control analysis, you can monitor all aspects of the design every step of the way.

Physics-Based Methods

The high fidelity, physics-based methods of AAA, combined with its time-tested semi-empirical methods, have improved the ability for aerospace engineers to analyze more unconventional aircraft designs and to stay at the forefront of our ever-evolving industry.

Design & Applications

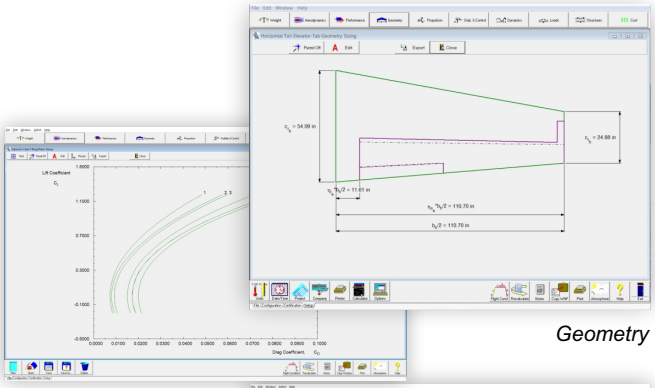
AAA provides a powerful framework to support the iterative and non-unique process of aircraft preliminary design. The AAA program allows preliminary design engineers to take an aircraft configuration from early weight sizing through open loop and closed loop dynamic stability and sensitivity analysis, while working within regulatory and cost constraints.

AAA can be used to design fighter style airplanes and high speed airplanes. The detailed drag module allows designers to go all the way to supersonic flow. The stability and control derivatives modules only deal with subsonic flow (up to about Mach=0.7) for most derivatives. Most other modules do not have a speed dependency and can be used in any speed regime.

AAA is used for preliminary and Class II design and stability and control analysis of new and existing aircraft. Class II design incorporates detailed weight & balance, aerodynamics (including power effects), stability & control calculations including trim analysis and flying qualities used in conjunction with the preliminary design sequence. Class II design accounts for power plant installation, landing gear disposition and component locations on the aircraft.

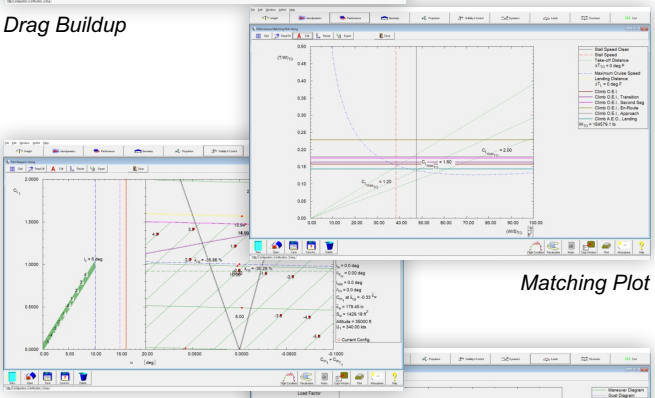
Configurations

AAA applies to most fixed wing configurations (civil, military and transport aircraft) as well as unconventional configurations such as VTOL, flying wing and allows design engineers to rapidly evolve an aircraft configuration from weight sizing through detailed performance calculations and cost estimations. All applicable performance and flying quality regulations are available in the AAA program. This provides the designer with an instant appraisal of the status of the design relative to these regulations.



Geometry

Drag Buildup



Matching Plot

Trim Diagram

V-n Diagram

AAA Internal Help

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Units

AAA uses both British and S.I. units and allows switching between both units within the same project. The calculator allows temporary change of units (for instance enter engine power in HP, while the project is in SI units and needs kW). Alternative units are also available.

Program Methodology

The design methodology for AAA is based on Airplane Design, Parts I-VIII, Airplane Flight Dynamics and Automatic Flight Controls, Parts I and II, by Dr. Jan Roskam, Airplane Aerodynamics and Performance, by Dr. C.T. Lan and Dr. Jan Roskam. AAA incorporates the methods, statistical databases, formulas and relevant illustrations and drawings from these references. Visit our Book Store to purchase these and other high-quality aeronautics resources.

Since development began, many new methods based on Federal Aviation Regulations, Datcom, methods from NACA and NASA and methods developed by DARcorporation engineers have been incorporated in AAA. DARcorporation engineers have over 30 years of aircraft design experience and data collected from wind tunnel testing has been used to validate and improve these design methods. All methods are documented in the AAA Help system. Many of these methods deal with modern aircraft (use of composites) and unconventional configurations, including VTOL (tilt-rotor, tilt-wing designs).

Design Modules

Weight
- Weight Sizing
- Class I Weight
- Class II Weight
- Center of Gravity
- Moments of Inertia

Dynamics
- Dynamics
- Control
- Flying Qualities

Aerodynamics
- Lift
- Class I Drag Polars
- Class II Drag Polars
- Wind Tunnel Corrections
- Pitching Moment
- Aerodynamic Center
- Flap Sizing
- Power Effect
- Ground Effect
- Deep Stall Angles
- Dynamic Pressure Ratio

Loads
- V-n Diagram
- Structural Loads

Structures
- Class I Sizing
- Materials

Performance
- Performance Sizing
- Performance Analysis
- APP

Cost Analysis
- Acquisition Cost
- Operating Cost
- Prototype Cost
- Price Data

Geometry
- Wing, Fuselage, Tail, etc.
- Airplane Wetted Area
- Airplane 3-View
- AeroPack

Atmosphere
- Reynold's Number
- Mach Number
- Altitude Variation

Propulsion
- Power Extraction
- Jet Engine Data
- Propeller Maps
- Thrust Calculation
- Installed Thrust and Power

Flight Condition
- Multiple Flight Conditions
- Speed, Altitude, C.G., Flap Setting, etc.

Stability and Control
- Stability and Control Derivatives
- Hingemoment Derivatives
- Class I Stability and Control
- Class I Empennage Sizing Analysis
- Class II Stability and Control
- Class II Empennage Sizing Analysis
- Stick and Pedal Forces

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