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What's New in AAA?

Version 5.1

August 2023

This document contains a selection of the new features in AAA 5.1, organized according to the different modules in AAA. The following table includes an overview of the growth of AAA 5.1 compared to 5.0 in numbers.

	AAA 5.0	AAA 5.1
Lines of Code	354,944	358,764
Unique Parameters	6,191	6,358
Variables on All Windows	12,987	12,216
Output Parameters	4,210	4,245
Series of Calculations	773	779
Input/Output Windows	667	670
Plots	191	192
Unique Data Curves on Plots	601	665
Tables	232	231

Because of the improved methods in AAA 5.1, the user is recommended to go through each module and update the results when opening a file made in AAA 5.0 or prior versions. AAA will inform the users of changes and extra information needed.

The Installation Manuals describe the installation procedure. The manuals are available in pdf format on the installation CD and can be downloaded from www.darcorp.com.

The AAA Manual describes all general program features and all modules.

Highlights

- All data may now be imported or exported using a single CSV file. Users can programmatically or manually generate this CSV file and populate an entire AAA file from scratch by importing.
- AAA can now export a meshed model for FlightStream® based on inputted geometry. Users can use FlightStream® for external, high-fidelity aerodynamic simulation of their aircraft design.
- A new, 6 degree-of-freedom (6DOF) module has been added to AAA, containing all variables needed for a 6DOF flight simulator.
- Users may generate simplified geometry for bodies, such as fuselage and nacelles using the new simplified geometry modules. These require much fewer inputs than the detailed geometry modules, saving time early in the design process.
- AAA now performs calculations of human center of gravity and moments of inertia based on a given height, weight and position. Body part center of gravity and moments of inertia are also calculated, useful for small General Aviation and experimental aircraft.
- The AAA help system has been updated to an HTML-based format and is compatible with all versions of Windows.
- AAA now ships with over 1,300 airfoils with aerodynamic data, ready for users to use in their aircraft designs.
- Aircraft Trim now utilizes non-linear lift curves.
- Users may now specify Mach number, equivalent airspeed or dynamic pressure in the Flight Condition dialog box instead of true airspeed.

Weight

1. Class II Empty Weight C.G. table is now flight condition dependent.
2. Mission profile data can now be imported for easier changes.
3. Added the ability to calculate the moments of inertia of humans based on height and weight, as well as the moments of inertia of their baggage.

Aerodynamics

1. Rearranged order of aerodynamics calculations and modules to improve flow of calculations between airfoils and surfaces.

2. Implemented calculation of downwash on vertical tail.
3. Lift curve plots now show effects of control surface deflections in a separate line.
4. Effects of high lift devices on pitching moment are now contained in other pitching moment modules as opposed to their own.
5. Fuselage lift is now a separate module.
6. Added ability to verify if the aircraft maximum lift coefficient is sufficient.
7. Made downwash terms from canard on wing more obvious by grouping them with wing downwash terms.
8. Added ability to define zero-angle-of-attack pitching moment coefficient to airfoil data.
9. Added elevon gap in zero-angle-of-attack pitching moment calculation.
10. Added plotting functionality to "Aircraft No Empennage".
11. Immersed areas of control surfaces are now calculated.
12. Added thrust available to output in Lift > Propeller > Gradient.
13. The pitching moment coefficient for all lifting surfaces is corrected for Mach number.
14. The aircraft angle of attack and maximum lift without propeller effects is now calculated from the non-linear aircraft lift curve.

Performance

1. Moved high lift device sizing module to performance sizing.

Geometry

1. Geometry can now be exported as a mesh to FlightStream® for higher-fidelity aerodynamic analysis.
2. Added over 1,300 airfoils with aerodynamic data that users can select for use in their aircraft designs.
3. Allow the user to specify bodies using simplified geometry, requiring only a few input parameters.
4. Canard incidence angles can now be greater than 20 degrees.
5. Added "Recalculate Geometry" to the "Recalculate" module.

Stability and Control

1. Plotting pitching-moment-due-to-ruddervator-deflection derivative can now be done for different ruddervator-to-chord ratios.
2. Plotting lift-coefficient-due-to-ruddervator-deflection derivative can now be done for different ruddervator-to-chord ratios.
3. Added 6DOF module that can calculate 6DOF coefficients based on control surface deflections.
4. Fixed rolling-moment-coefficient-due-to-roll-rate derivative to use non-linear aerodynamic coefficients instead of linear.

Cost

1. Updated Cost Escalation Factor calculation to include 2022.

General

1. Date and time can now be toggled on or off.
2. Modules requiring information contained in the flight condition dialog will now link to that dialog.
3. The user can now specify Mach number or dynamic pressure instead of airspeed. AAA will automatically calculate the remaining variables using what is available.
4. Some dialog windows can now be resized to better show information.
5. Added 'RC' and 'None' to the Certification options in the Certification dialog box.

Other Improvements

1. GoTo buttons added.