The Menu System

Stallion 3D is driven using the main menu bar at the top of the program's main window. This section lists and describes the functions of the menu system.

Item Under the File Menu
The file menus control the opening and saving of project files, graphs and tables. It is also used to end the execution of the Stallion 3D program.

New Project
This option starts a new project. It clears the current data in the program and reset the parameters to the default values. The program starts with a 1 X1 meter surface with NACA 0012 airfoils.

Open Project
This option clears the current data and allows the user to import a project for the disk that was previously saved with the *Save Project* menu option.

Import MSA Design
This option imports a design from the MultiSurface Aerodynamics software. Only the design can be imported with this menu. The flow parameters and other options are not imported into Stallion 3D.

Insert MSA Design (Mirror Image)
This option is similar to the above item but imports the mirror image of the MultiSurface Aerodynamics design. It is useful to automatically create the left side of a wing when only the right side is available (or vice versa).

Save Project
This option saves the current design (surfaces, imported .stl file) and the flow parameters as a single file. It also saves the streamlines settings. It does not save the flow field data (velocity, density, pressure, etc.).

Export MSA Surfaces
Export surfaces designed in Stallion 3D so they can be read in MultiSurface Aerodynamics. This option does not export STL imports and flow parameters.

Export STL File
Export both STL imports (facets) and surfaces designed in Stallion 3D as an ASCII STL files.

Export Graph (.BMP)
First select the active window to export the picture as a MS Windows BMP file.

Export Table
Export the table in the active windows as an ASCII (text file). This command will not work if the active window is not a table.

Export Table as .CSV File
Export the table in the active window as a comma separated value (csv) file. This is useful to export a table to a spread sheet program since these programs can import and format csv files.

Print Graph
Print the graph in the selected window.

Print Table
Print the table in the selected window.

Exit
Exit the Stallion 3D program.

Items Under the Edit Menu
The items in the edit menu allows the user to copy graphs and data from Stallion 3D and then paste this information into other programs using the MS Windows clipboard.

Copy Graph
Copy the graph in the selected window. The graph can then be pasted into a program such as Microsoft Word.

Copy Table
Copy the table in the selected window.

Items Under the View Menu
The View menu commands allow the user to view the designs in 3D, select and zoom portions of the screen.

3D Surfaces
Invoke the viewer for 3-dimensional surfaces.

Zoom
Click this menu and then drag out a rectangle around a region in the active window to isolate that portion of the drawing. The zoom menu allows the user to enhance regions of the 3D Viewer, the Design Window and other graphics screens.

Unzoom (Auto)
Return the screen to the original view.

Items Under the Design Menu
The design menu allows the user to introduce 3-dimensional objects into Stallion for analysis. The menu allows addition of wing and bodies developed in the built-in geometry editor. It also can be used to import .stl files that were developed in external CAD software packages using the *Import/Edit STL File* sub menu.

Top Elevation
View the design from the top elevation.

Side Elevation
View the design in the side elevation.

Front Elevation
View the design in the front (back) elevation.

Import/Edit STL File
Import, rotate, scale and translate an ascii stl file into Stallion 3D.

Design/Edit Body of Revolution
Enter the coordinates of a body of revolution into Stallion 3D. This menu item allows the user to choose from NACA airfoils shapes and custom coordinates to enter the surface of revolution. The user can also choose the resolution of the model in the circumferential and axial directions.

3D View
Invoke the window to view the 3-dimensional model in three-dimensions. This window has functions to rotate the model about the x, y and z axes.

Group Surfaces
The lifting surfaces (wings) can be grouped so they can move as a single surface. They can also be locked to prevent accidental movement.

Edit Last Surface
A quick way to edit the last surface.

Add Surface
Add an extra lifting surface to the 3-dimensional model.

Items Under the Flow Field Menu
The flow field menu allows the user to define the flow parameters such as speed, direction, density and fluid type (air or water).

Flow Parameters
The dialog box invoked by this menu item allows the user to define the flow velocity, density and fluid type. The dialog box also defines measurements, units and parameters used to define the lift, drag and moment coefficients.

Change Angle of Attack
This is a shortcut to the angle of attack dialog box.

Flow Field Options
A shortcut to the flow field parameters dialog box.

Items Under the CFD Solver Menu
The *CFD Solver* menu allows the user to define the size and extent of the computational grid, setup boundary conditions (radiation or reflecting), integration accuracy and boundary spacing. The user can also select between the Euler or Navier-Stokes equations to model the flow field.

Setup CFD Solver
This option invokes the dialog box to set the grid size and boundaries. The dialog box also sets the boundary conditions, flow solver, solution accuracy and number of iterations.

Generate Grid (Only)
Automatically generates the computational grid based on the CFD solver parameters and geometry. This menu will generate only the grid. It will not initiate the flow solver.

Generate Grid/Solve Flow
This menu will generate the grid and then initiate the flow solver.   The solution will use the flow field parameters at infinity as the initial conditions.

Solve Flow (From Initial Conditions)
If a grid exists (either by generation from the above menu or from an existing solution), this menu will start the flow solver using the flow condition at infinity as the initial condition.

Resume Solution
Restart the solution if it was ended by the Stop Solution menu or if the solution was imported using the Open CFD Results menu.

Stop Solution
Stop the solution process at the current iteration. The solution can restart using the *Resume Solution* menu.

Save CFD Results
This option saves the flow variables, the entire computation grid, the geometry and other parameters. This is a very large ascii file.

Open CFD Results
Loads the information saved by the *Save CFD Results* menu. This operation can take a few minutes to complete based on the size of the computational grid.

Items Under the Aerodynamics Data Menu
The *Aerodynamics Data* menu allows the user to generate the lift, drag and moments coefficients generated by the geometry under the specified flow field. In addition, the user can compute and export forces and moments based on the size of the geometry and the flow velocity magnitudes.

Aerodynamics Coefficients
Compute the lift, drag and moment coefficients. In addition, the user can compute the forces and moments in the x, y, and z coordinate directions.

Aerodynamics Force
Compute the lift, drag and moments based on the flow parameters and geometry size. The forces and moments are computed and presented in dimensional form.

Force Integration Options
Stallion 3D computes the forces acting on a geometry using two methods. The first method is based on the integration of the pressure on the geometry surface. The second method is based on integration on the Cartesian grid near the surface boundary. The former method is more accurate for a good definition of the geometry.

Save Aerodynamics Data
This menu item saves the aerodynamic data in an ascii file.

Items Under the Visualization Menu
The *Visualization* menu is used to view the 3D geometry and the flow field. The surface of the geometry can display the pressure, velocity, density or Mach number.   In addition, the user can set the parameters to display streamlines that start at arbitrary locations in the flow domain.

View Geometry (Only)
Use this menu to display only the geometry in the 3D viewer. This is useful to verify that the imported geometry is correct.

View 3D Solution
View the 3D solution superimposed on the geometry and the flow field. Click on the menu to display pressures, velocity, density and Mach number on the surface of the geometry. This menu also displays the streamlines and flow planes.

Surface Color Options
Use this menu to set the flow parameter that is displayed on the surface of the geometry. The options are pressure, velocity, Mach number and density. The dialog box can also set the range of values of the displayed variable.

View Edit Streamlines
This menu invokes the streamlines dialog box. The parameters set the starting locations and number of streamlines.

View Flow Plane (Slices)
The flow planes can either display the computational grid or the flow variables at planes in the flow that are set by the user.

Reset Surface Values
Reset to the default values.

Items Under the Graphs Menu
The graph menu items allow the user to plot surface line graphs at locations along the y-axis. This is useful to graph flow variables at stations along the wing (for example).

Pressure Coefficient (Cp)
Plot the pressure as a function of x at a pre-defined y location.

Velocity Ratio
Plot the velocity ratio as a function of x at a pre-defined y-location.

Mach Numbers
Plot the Mach number at a specified y-location.

Density
Plot the density as a function of x at pre-defined y-location.

Temperature
Plot the temperature as a function of x at a predefined y-location

Surface Graph Options
This option set the y-location of the surface graph and set a range of values for x and z.

Clear Graphs
This menu removes all of the line graphs.

Items Under the Airfoil Tool Menu
Stallion 3D has an independent airfoil analysis tool based on a linear strength vortex panel method. The tool has a built-in library of airfoils and can be used to import and analyze custom shapes.

Select/Modify Airfoil
Use this menu to select or modify an airfoil. The airfoil library contains NACA 4, 5 and 6-digit shapes in addition to airfoils from the UIUC airfoil database. Custom airfoils can be entered as ascii files or .dxf files (line and arc entities).

Angle of Attack
Set the angle of attack for the airfoil analysis.

Reynolds No./Boundary Layer Options
Set the Reynolds number for the airfoil analysis and other options (for example, stall prediction).

Surface Pressure Coefficient (Cp)
Graph the pressure coefficient on the surface of the airfoil as a function of chord length.

Surface Cp with Cavitation No.
Graph the cavitation number cut-off on the surface pressure coefficient plot.

Surface Velocity Ratio
Graph the velocity ratio on the upper and lower surfaces of the airfoil as a function of chord length.

Cl. vs. AOA
Graph the airfoil lift coefficient as a function of angle of attack. The lift curve is based on the Reynolds number that was set in the above menu.

Cm vs. AOA
Graph the moment coefficient about the quarter chord location as a function of angle of attack.

Cd vs. AOA
Graph the profile drag coefficient as a function of angle of attack.

Cl/Cd vs. AOA
Graph the lift to drag ratio as a function of angle of attack.

Export Data to Airfoil Organizer
Export the airfoil data to the Airfoil Organizer software package.

Display Graph Data
Click this menu to display numerical values of the graph data. The data can be copied and pasted into another program.

Angle of Attack Range
Set the angle of attack range for the above graphs.

Clear Graphs
Remove all the graphs and start over with a single graph.

Items Under the Graph Options Menu
The Graph Options menu applies only to the selected graph window. Click on the pertinent graph window and then use the following graph options to customize the graph.

Manual Scaling/Axis Positions
Usually, the scales are set to the minimum and maximum values of the independent and dependent variables. Use this menu to set custom values for the horizontal and vertical axes variables.

Set Automatic Scaling
Return the graph to automatic scaling which simply uses the minimum and maximum values of the independent and dependent variables.

User Defined Scales
Define the range and domain for the graph.

Proportional Scales
This option selects the graph scales so that a circle will be displayed as a circle (not an oval).

Labels
Enter the graph title in the "Graph Title" box; the X-Axis label in the "X-Axis Label" box and the Y-Axis label in the "Y-Axis Label" box.

Edit Legend
create a legend for line graphs based on the information in the "Line Graph Options" dialog box.

You can display the legend box by selecting the "View" menu followed by the "Show Legend" choice. The legend can be placed at any location on the graph by dragging it with the mouse to the desired position. If it is placed beyond the boundaries of the graph, it can be centered onto the graph by selecting the "View" followed by the "Center Legend" choice.

The legend can be temporarily removed from the graph by selecting the "View" menu followed by the "Hide Legend" choice.

Show Legend
The legend can be placed at any location on the graph by dragging it with the mouse to the desired position. If it is placed beyond the boundaries of the graph, it can be centered onto the graph by selecting the "View" followed by the "Center Legend" choice.

Hide Legend
Remove the legend from the graph.

Legend Background Color
The legend background color can be changed by clicking on this option. This will invoke the color dialog box from which you can choose your desired legend color.

Background Color
You will be presented with the color dialog box from which you can select the background color of your choice.

Border Color
You will be presented with the color dialog box from which you can select the border color of your choice.

Axis and Label Color
Use the color dialog box to choose a suitable color for your graph labels and title text.

Set Graph Size
If you wish to change the size of your graph, you can select the "Graph" menu followed by the "Set Graph Size" choice. You will be presented with the following dialog box with which you can manipulate the size of your graph. Use the "Width" box to enter the new width of your graph. Use the "Height" box to enter the new height of your graph. Use the "Units" box to choose between pixels, inches or centimeters for the units of your graph.

Items Under the Window Menu
These items arranges multiple windows in Stallion 3D.

Tile Horizontally
Tile the windows in a horizontal arrangement.

Tile Vertically
Tile the windows in a vertical arrangement.

Items Under the Help Menu
The items under the help menu displays the built-in html help files.